



Faculty
of Business
and Economics

Svatopluk Kapounek (ed.)

18 ANNUAL
INTERNATIONAL CONFERENCE

ENTERPRISE
AND COMPETITIVE
ENVIRONMENT



MARCH 5–6, 2015
MENDEL UNIVERSITY IN BRNO

CONFERENCE PROCEEDINGS

Mendel
University
in Brno



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Faculty of Business and Economics**

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Conference Proceedings

**March 5–6, 2015
Mendel University in Brno
Czech Republic**

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Foreword

These Conference Proceedings provide a clear and objective account on competitive business environment in the post-crisis period. The papers were presented at the 18th International Conference “Enterprise and the Competitive Environment”, that was held at the Faculty of Business and Economics of the Mendel University in Brno on March 5–6, 2015.

This conference is significant in several ways. First, it crosses traditional discipline boundaries and involves a wide variety of interactions ranging from traditional academic disciplines or schools of thought to the reality of business. Many of the issues provide innovative ideas and combine the best academic thinking with the industry expertise development in financial services, public sector/government, information and communications technologies. It reacts on the current interdisciplinary problems arising in the area of socio-economic planning and development, especially decision-making processes improving. The Conference Proceedings provide effective legal and regulatory frameworks, economic instruments and other incentives at the policy and management levels.

Second, this document may serve as a resource for policymakers in educational and occupational sectors with increasing prevalence and impacts in the global economy. Theoretical insights are supported by empirical evidence and discussed in a world-wide context. There have been presented 184 papers from different countries as Austria, Bosnia and Herzegovina, Bulgaria, Czech Republic, Croatia, Germany, Hungary, Italy, Poland, Russia, Romania, Slovakia, and Ukraine. In addition to the contributed papers, Dr. Werner Hölzl from the Austrian Institute of Economic Research had a keynote speech on high growth SMEs.

For our conference we assigned one person as a discussant to each presentation. They discussed the papers presented and stimulated a lively discussion among the sessions' presenters and between the presenters and the audience. All papers, which are included in this volume passed successfully through the blind peer-review process.

I would like to thank to all participant of the conference for their inspiring contributions. I thank to members of the organizing team for their support and hard work which contributed to the successful organization of the conference. Moreover, I also thank to all the reviewers and the members of scientific committee, which contributed to the organization of high-level scientific conference.

Assoc. Prof. Svatopluk Kapounek, Ph.D.
Faculty of Business and Economics
Mendel University in Brno

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Academic mobility as a growth opportunity for HEIs

Eva Abramuszkinová Pavlíková¹, Kim Janssens² and Patrick De Mazière³

¹*Department of Law and Humanities, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic: eva.pavlikova@mendelu.cz*

²*Department of Business Studies, UC Leuven-Limburg, Campus Hertogstraat, Hertogstraat 178, 3001 Heverlee, Belgium: kim.janssens@ucll.be*

³*Department of Health Care and Technology, UC Leuven-Limburg, Campus Gasthuisberg, Herestraat 49, 3000 Leuven, Belgium: patrick.demaziere@ucll.be*

Abstract

Current contribution shows the importance and the potential of academic mobility within the European Union based on data from the Erasmus exchange programme. The mobility of students in the form of study or work placements can be quite effective for all parties concerned. Gained experience can stimulate growth or social innovations in societies involved and thus contribute very positively to a changing and competitive environment. The aim of this paper is twofold: First, the main goal of this project is to highlight the importance of the Erasmus programme for the personal development of students. The second aim is to compare and map Belgian and Czech Erasmus exchange student experiences. The current paper consists of a literature review on the Erasmus programme, both from a Czech as well as a Belgian perspective. The Businet platform was used for selection of Czech and Belgium HEIs. A pilot study will be conducted in one HEI in the Czech Republic and one in Belgium in Spring 2015.

This paper recognizes the additional value of the Erasmus programme as HEIs need to be able to offer an international experience to Business Studies students and identifies the gained knowledge and skills of such an exchange.

Keywords: academic mobility, mobility of students, study abroad, Erasmus+, comparison Czech Republic and Belgium

1. European education and Erasmus

The European dimension of education was introduced to the Member States of the European Union with the aim to recognize Europe as an additional value and become aware of its benefits. Additionally, the Council of Europe called for support for fundamental values, especially regarding European cultural diversity, democracy,

environmental balance, human rights, fairness and security in 1991. The Erasmus Programme is part of the Lifelong Learning Programme, which was planned for the years 2007–2013 and is one of the most popular programmes of European Union in terms of education with practical preparation for further employment. The Erasmus programme gives students in higher education institutions the opportunity to spend between 3 and 12 months in another European country, for studies or for an internship. In terms of tertiary education, Erasmus is the biggest programme supporting European cooperation in the area of mobility. There are 90% of European universities from more than 30 countries included in the project (Krnanska et al., 2010). In January 2014 a new programme called Erasmus+ came into force, which follows the programme of Lifelong Learning Programme. Erasmus+ was approved on November 19th 2013 by the European Parliament, and with a budget of 14.7 billion EUR it became the flagship programme of the European Commission for the years 2014–2020 with the aim of supporting international mobility and cooperation in terms of education (Pittnerova, 2013). In a recent report, called The Erasmus Impact study, it was proven by more than 78.000 respondents that the Erasmus programme has a positive impact on its participants in terms of mobility, internationalization and employability as the students learn the important capabilities (such as openness and curiosity about new challenges, problem solving and decision making skills, confidence, tolerance towards other personal values and behaviours) demanded by the employers in the labour market (EU, 2014). The last statistics of student mobility were published in June 2014 by the European Commission and are related to the academic year 2012/2013. In this academic year, a total of 212.522 students studied abroad and 55.621 students worked abroad, which makes a total of 268.143 students sent on Erasmus mobility. That represents a yearly increase of 6%. Also a key milestone was reached: the 3 millionth student was sent abroad.

Mobility is seen in the Erasmus study exchange programme as students physically moving from one country to another. They live in a new country for a couple of months and experience the daily life of locals; they learn about the local or national standards, customs and traditions; and usually they learn the local language together with English (which is spoken by the majority of exchange students). It is not an exception that these students keep in contact after returning to their home country. Sometimes they decide to continue studying full-time at a university abroad, or they find a job abroad and move there for a few years and maybe they stay there for the rest of their lives. Often, these students find their life partner on Erasmus exchange and move to the home country of the partner.

The Erasmus programme serves not only for the purpose of exchanging academic knowledge, but the main purpose (and not always fully mentioned) is mobility. Students involved will start to perceive not only Europe but the world differently and will feel less afraid of travelling and moving abroad. It can be seen as a kind of precursor for labour mobility, because for such “Erasmus-experienced” graduates it is easier to find a job in an international company or in a company abroad. One of the objectives of the programme is to prepare the students to actively participate in the labour market with European dimension. Regarding a recent study of the European Commission – the Erasmus Impact Study (2014), the unemployment rate of Erasmus students five years after graduation is 23% lower comparing to graduates without such an Erasmus experience. Moreover, a growing number of companies include having such an experience in the requirements for the offered position. The benefits of labour mobility were included in the context of the Lisbon strategy to make the EU “the most dynamic

and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion” (draft from Lisbon European Council, 2000). The labour mobility is seen as beneficial in terms of reducing unemployment and matching labour supply to labour demand (Boswell, et al., 2011). Its greatest benefit is seen as the development of human resources and strengthening of global competitiveness of the European Union (Pittnerova, 2013).

2. The Importance of Tertiary Education

In general, the significance of a university degree is now greater than it used to be a couple of years ago. This is confirmed in various studies; one of them is the OECD report from 2012. One of the EU objectives is to continuously increase the amount of tertiary educated people. The tertiary education in the Czech Republic and Belgium developed a lot in the past years. The percentage of young people who entered tertiary education increased in the Czech Republic from 28% to 61% and in Belgium from 32% to 34% between the years 2000 and 2010 (OECD, 2012).

There was a significant increase in the quantity of tertiary institutions in the Czech Republic over the past decade: in 2013 more than double comparing to 2000. There was a rapid increase in the amount of private schools up to the year 2013 (increase by more than 500% comparing to the year 2000), whereas the number of public institutions is relatively stable over time.

There was a significant increase of students and graduates between the years 2001 and 2010 in the Czech Republic. Starting from the year 2010 the amount of students is decreasing, however, the amount of graduates still keeps increasing as there is usual lag of three to five years between the beginning of studies and graduating. The standard length of Bachelor studies is three years and for Master studies it is two years. Nevertheless, some tertiary institutions keep the old model of Master studies (Bachelor and Master together), which takes five years. Based on reports of the Ministry of Education in the Czech Republic, there were 368.304 students and 91.539 graduates in 2013 (MSMT, 2014). There are unfortunately no data for the year 2014, but it is expected that the trend will be slowly decreasing.

In 2014, there were 33 universities and more than 30 other higher education institutions and colleges in Belgium, which is comparable to the quantity of higher education institutions in the Czech Republic in the same year (4ICU, 2014). Further, an increasing percentage of young people participate in tertiary education. Even though an increase of the trend is not as rapid as in the case of the Czech Republic in the past decade, the amount of tertiary educated Belgian people slightly increases in time. Also comparing to Czech students, who represent in average 25% of the young population, the Belgian students represent in average 60% of a comparable age group.

In case of the graduates of tertiary institutions in Belgium, an average of 42% of young people (aged between 25 and 34 years) obtained a university (or other higher education) degree. The most current programme followed in Belgium is the Bachelor programme. The standard length of Bachelor studies is three years and for Master studies it is one to two years. It must be mentioned that the higher public education in the Czech Republic is free, whereas in Belgium, tuition fees are collected. All Flemish universities and HEIs in Belgium are financed by the Flemish government, which results in relatively low fees for students from the European Economic Area (EEA). Tuition fees however vary from programme to programme and are higher for non-EEA students than

for EEA students. Upon enrolment students will be expected to pay a provisional tuition fee. This provisional fee is determined on the basis of an estimation of the number of credits or study points that might be taken up (€ 230 fixed fee + € 11 per study point). As from 2015 the tuition fee for a full-time study registration is € 890 or for a part-time study registration € 560.

In 2010, more than 44% of young Belgians had a diploma of higher education, which places Belgium on the seventh position within EU-27. In the same year, around 21% of the Czechs had a higher education diploma. This means, there are twice as many tertiary educated young people in Belgium than in the Czech Republic, despite the tuition fees collected in Belgium.

For graduates it is important to be able to offer as much knowledge, skills, and experience to have some kind of competitive advantage over others in the labour market (Göttlichova, 2014). One of such a competitive advantage can be international experience (study or work), as it contains openness and perspective in terms of international issues of the student and is usually connected with very good knowledge of a foreign language.

3. Competences demanded in the labour market

In 2004 and 2012, the Czech National Institute of Education conducted a survey about employers' requirements on candidates in the Czech and European labour market. A majority of them can be influenced on the tertiary level of education or more rapidly, during an international exchange mobility such as Erasmus. Among the four most important competences demanded over time (significant in both years) are problem-solving ability, bearing responsibility, decision-making ability and reading and understanding work instructions. All of them represent on average 80% importance for the employers when selecting a suitable candidate for a position offered. In addition to this, three new significant competences important for employers were identified in the survey realized in 2012: verbal and written communication skills (88.2%), presentation skills and expressing own opinions (78.6%), and stressful situations management (75.2%) (Lepic, et al., 2012). All these competences are also influenced by the culture, in which the person is growing up.

Previous research regarding the impact of an experience abroad has been carried out in Belgium from 2011–2013 (Simons et al., 2013). This longitudinal study is performed as a joint project from University Colleges Mechelen (Thomas More) and University Colleges Leuven Limburg. This research project gauged the gained international competences and learning outcomes of higher education students. The goal of the study was twofold. First, in order to answer the question on how international competences can be embedded in educational programs a well-defined description of such competences is essential: international competences within higher education programmes were unraveled, conceptualized and defined. Second, learning effects of an international experience (i.e. a study or an internship abroad) were analyzed.

Based on literature review and policy objectives regarding internationalization Simons et al. (2013) defined four clusters of learning outcomes in higher education: intercultural competence, language proficiency (i.e. level of English linguistic skills), global engagement and personal growth. Questionnaires were administered at the above mentioned University Colleges in Belgium with 1072 higher education students from different study programs (e.g., applied informatics, food and dietary sciences,

commercial sciences, teacher training). Both participants as non-participants in international activities were queried at the beginning of the academic year.

Results showed that prospective international students score higher on the international competences 'global engagement' and 'personal growth' compared to students that indicated staying at home. Simons et al. (2013) note that this may be due to a so-called self-selection process. Those students that are more predisposed to possess international skills appear to also be more willing to engage in an international experience. In addition, the survey revealed that future international students were likely to have had an international experience before. Since, in Belgium, prospective international students are screened and selected by staff members accountable for internationalization most likely those students that score well in the selection process are the ones that a priori score higher on international competences. This means that although an international experience is offered to all students, only those that already have certain international skills additionally benefit and are able to deepen their international skills.

4. Erasmus in the Czech Republic

In the Czech Republic a total of 7.299 students went abroad to study or train in the academic year 2012/2013. Out of that, 6.185 students went to a partner higher education institution to study and 1.114 students left for a work placement (an internship) abroad. As part of the mobility, 314 students chose Belgium, and the most popular countries were Germany (1.145 students), France (720 students), and Spain (702 students).

On the other side, a total of 6.437 students came to the Czech Republic to train of study in the academic year 2012/2013. Among the students, there were 125 Belgian students and the biggest group represented were 915 Spanish students, followed by 795 French students and 615 Turkish students. When comparing the years 2000 and 2013, there was an enormous increase in the number of the outgoing Czech students on Erasmus mobility by more than 250%.

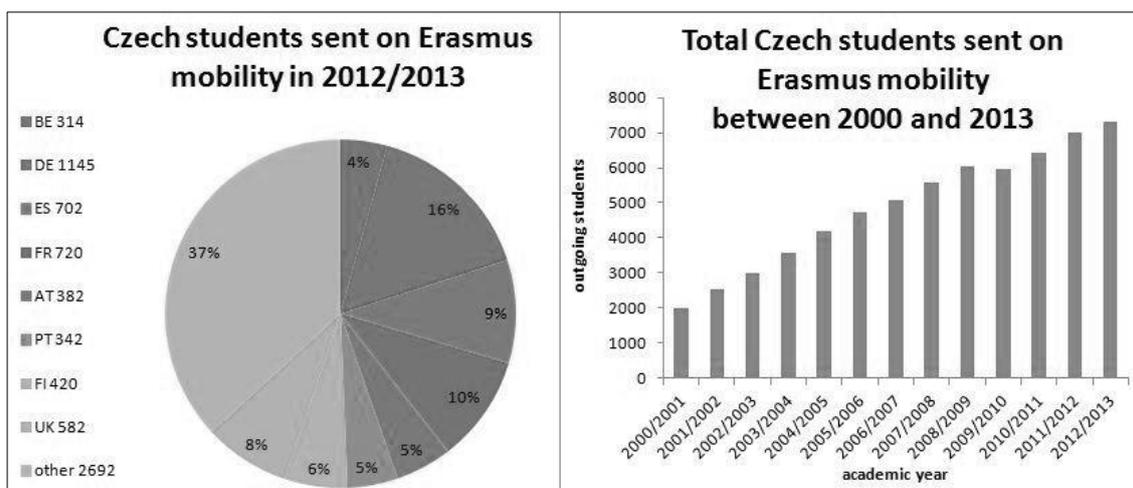


Figure 1: Development of outgoing Czech students on Erasmus mobility (EC(a), 2014)

In the selected Czech higher education institution, Mendel University in Brno, the following number of outgoing students sent on Erasmus mobility:

Table 1: Students of Mendel University in Brno participating in Erasmus mobility between 2009 and 2013 (Mendelu, 2011–2014)

Academic year	Students (study + internship)
2009/2010	282
2010/2011	366
2011/2012	301
2012/2013	331

From the table above it is noticeable that the amount of outgoing students is increasing yearly and with the launch of the new mobility programme, Erasmus+, an increasing number of outgoing students is expected as the available budget is more than double comparing to the Erasmus programme.

5. Erasmus in Belgium

In Belgium a total of 7.741 students studies or trained abroad in the academic year 2012/2013. Out of that, 6.412 students went to partner higher education institutions to study and 1.329 students opted for a work placement (an internship) abroad. As part of the mobility, 125 students chose the Czech Republic, and the most popular countries were Spain (1.527 students), France (1.155 students), and the United Kingdom (656 students).

On the other side, 6.437 students worked or studied in Belgium in the academic year 2012/2013. Among the students, there were 314 Czech students and the biggest group contained 1.892 Spanish students, followed by 1.289 French students, and 1.187 Italian students.

When comparing the years 2000 and 2013, there was an increase in the number of students by more than 80%.

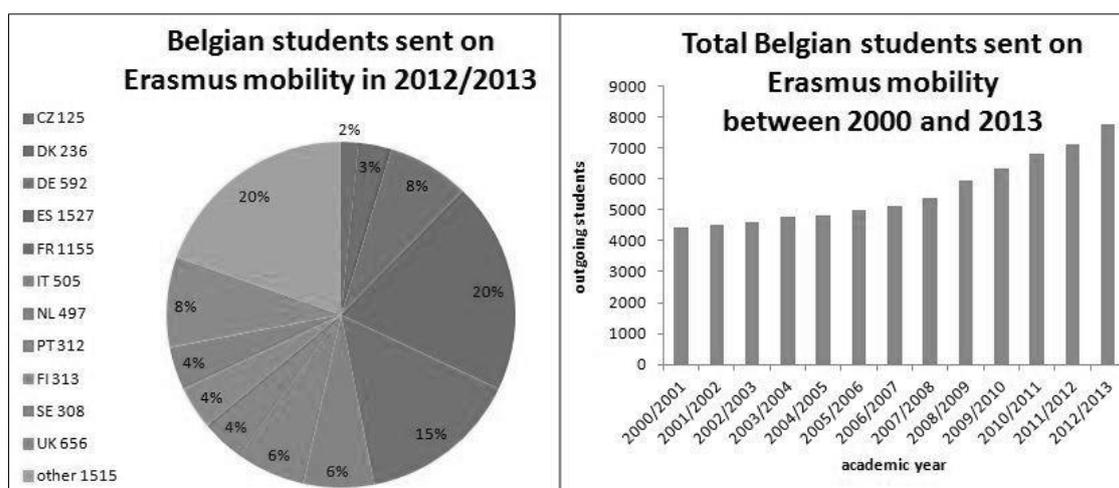


Figure 2: Development of outgoing Belgian students on Erasmus mobility (EC(a), 2014)

In the selected Belgian higher education institution, KHLeuven (now University Colleges Leuven-Limburg)¹, following number of students engaged in an Erasmus mobility:

Table 2: Students of KHLeuven (now University Colleges Leuven-Limburg) participating in the Erasmus programme between 2009 and 2013

Academic year	Students (study + internship)
2009/2010	113
2010/2011	128
2011/2012	188
2012/2013	156

With the launch of the new mobility programme, Erasmus+, a growing number of students is expected to participate.

6. Discussion

What are the reasons why students choose a certain country for Erasmus exchange? Is it their rational choice or are they influenced by their national culture and images of other cultures? What are the cultural consequences of an Erasmus exchange?

It is known that culture is a set of thoughts, emotions and behaviours in relation to its environment. Through the process of socialisation, individuals learn dominant values and self-identities of their particular culture. Hofstede (2001) described culture as “the collective programming of the mind that distinguishes the members of one group or category of people from another”. Although there are different levels of culture, the national culture gives individuals their basic assumptions and values, and therefore contributes heavily to their way of viewing the world. As this is learnt at early age and relatively unquestioned, national culture values are more difficult to change than other levels of culture (Brunet-Thorton, 2010).

Discussing the impact of cultural differences on students in Erasmus programme, the disparity among the national cultures in Europe must be stated. One of the major sources of the so-called cultural clash is the language. Since almost every country in Europe has its unique language, not only communication forms a problem but being able to correctly exchange and interpret thoughts between one another arises as an even greater problem. Using common language for communication between persons of two nations is not such a great obstacle – at least in the case of university students, however understanding the real meaning of what one is saying is absolutely different dimension to discuss.

During an Erasmus stay abroad in one of the European countries (for study or internship purposes), the person goes through a process of meeting, learning and accepting (or rejecting) the elements of the new culture. It is not only the national culture of the host country, but all the cultures other foreigners bring with them to the new community (at the secondary school, university, or company). This programme in combination with other initiatives (student/university/company organisations, special lectures focused on cultural assimilation, meetings with locals, etc.) definitely helps the

¹For the described period of time (2009–2013), KHLeuven and KHLim were separate entities. As from 2014 they have merged into University Colleges Leuven-Limburg.

newcomers to integrate faster and take the advantage of meeting with people with a different cultural background.

Another challenge is the so-called reverse culture shock. A person who has lived for a certain period of time in a foreign cultural environment and has experienced the process of acculturation might struggle with reverse culture shock when returning home. This person will usually unconsciously compare the home culture with what he experienced abroad and may feel the need to reintegrate again. During his stay abroad he could have changed his attitude, behaviour and way of living according to the foreign cultural environment and now, when he returns home he might perceive his original culture as foreign. One could argue that the “software of the might” cannot be changed whatsoever, however as a person experiences new situations and faces new problems, it will certainly affect him and his perception of the world.

7. Conclusion

This paper describes how the Erasmus+ programme impacts higher education in Europe. Studies have shown that adding an international experience (e.g. a study or an internship abroad) to the educational programme is of great importance from a myriad of perspectives. That is, the Erasmus programme has a positive impact on students regarding internationalization, mobility and employability. Students participating in this programme develop exactly those skills that are sought for by employers in the labour market such as decision-making skills and openness to new challenges. In addition, students engaging in an international experience grow accustomed to other cultural values, adapt to foreign cultural environments and learn the local language. Consequently, the unemployment rate of Erasmus students after graduation is 23% lower than that of graduates without this experience.

With regard to Czech and Belgian students enrolling in an Erasmus programme, an increase in interest and number of outgoing students over the past decade is perceived. When comparing the years 2000 and 2013, a growth of more than 250% is established for the number of outgoing Czech students. In 2013, 7299 students participated in the programme and studied or did an internship abroad. Although not as vast as in the Czech Republic, in Belgium too an increase of outgoing students is ascertained when comparing 2000 to 2013. In Belgium a rise of 80% was established, with a total number of 7741 students enrolled in the programme in 2013.

Given that the Erasmus programme enjoys a well-deserved reputation combined with the opportunity the programme offers considering the personal and cultural development of students, it is expected to grow and attract even more students in the future.

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Reference Budgets for More Inclusive Societies

Eva Abramuszkinová Pavlíková¹ and Marcela Basovnicková²

¹Department of Law and Social Sciences, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: eva.pavlikova@mendelu.cz

²Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: marcela.basovnickova@mendelu.cz

Abstract

The aim of this paper is to introduce the concept of Reference Budgets which is under development in several EU countries with the Czech Republic under a special focus. This contribution will introduce the pilot project for the development of a common methodology on reference budgets in Europe and current national study which is done at The Faculty of Business and Economics at Mendel University in Brno. This paper will focus on the CR food-based dietary guidelines and the development of new methodology. The first dietary recommendations for the CR were suggested by the Society for Nutrition in 1986, updated in 1989 and 1994. In 2004–2005, the Society for Nutrition published Nutrition recommendations for the CR. In 2012, this Society presented an innovative nutrition recommendations for the population of the CR which were intended for professionals who deal with the nutrition prevention of mass non-infectious diseases and promote good eating habits. For the first time, these recommendations were done in relation to the children’s age, nutrition of pregnant and lactating women and the elderly nutrition. The nutrition recommendations were based on the EU document: The Strategy for Europe related to health problems connected to nutrition, overweight and obesity from 2007 and inspired by WHO. Later, the Society for Nutrition decided to promote new reference intakes of energy and nutrients with a reference framework of the Societies for Nutrition in countries, known as “DACH” (Germany, Austria, Switzerland).

Keywords: reference budgets, inclusion policy, food basket

1. Introduction

Over the past 30 years, the European Council, the European Commission and the European Parliament have underlined the importance of active inclusion policies and

adequate minimum income support. In February 2013, the Commission has proposed Reference Budgets (RBs) as an instrument that can help Member States to design efficient and adequate income support but also facilitate the Commission's task to monitor the adequacy of income support in Europe. RBs are illustrative priced baskets of goods and services that represent a given living standard. They are widely used in Europe, serve many purposes but at the moment are largely created in isolation from each other, using different methods and the results are not cross-nationally comparable.

2. The Definition of Reference Budgets

RBs are illustrative priced baskets of goods and services that represent a given living standard. They are widely used in Europe, and serve many purposes. However, at the moment, RBs are largely created in isolation from each other, using different methods, so the results are not cross-nationally comparable, with very limited potential for cross-national learning. Within the Social Investment Package that was adopted in February 2013, the Commission has proposed reference budgets (RBs) as an instrument that can help Member States to design efficient and adequate income support but also facilitate the Commission's task to monitor the adequacy of income support in Europe.

The 'pilot project for the development of a common methodology on reference budgets', funded by the European Commission, has two main objectives. The first is to establish a 'Reference Budgets Network' that consists of key experts and representative stakeholders, on the national as well as the EU level, to share experience and expertise on reference budgets. The second important goal of this project is to try building a consensus on a common theoretical framework and a common methodology for cross-nationally comparable reference budgets in EU Member States. The third goal of the project is to develop comparable food baskets for all 28 Member States and complete RBs for 10 EU Member States.

2.1. Construction of Reference Budgets

Constituting elements of RBs are: the purpose, the targeted living standard, target population and theoretical basis, and the methodology (including the choice of model families, information base, selection criteria, the evaluator and an updating procedure). In addition, RBs for the purposes set forth by the European Commission, should comply with minimum quality requirements. RBs should be valid, and should be perceived to be so, i.e. be acceptable. The methods that are applied to construct them should be robust and reliable over time. The resulting RBs should be comparable in order to be useful for Commission purposes. They should be responsive to policy interventions but not be subject to manipulation and timeliness is crucial.

Currently, various approaches for constructing RBs in a national context are in use. Approaches relying primarily on household budget survey data appear to be confronted with several limitations which make them unfit for the development of comparable RBs in Europe. Moreover, they are not feasible due to the unavailability of up to date harmonised Household Budget Survey microdata files.

2.2. Cross-country comparability

This implies that we have to turn to fully-specified RBs. The main benefits of fully-specified budgets are (1) their very explicit nature, facilitating discussion about the minimum required resources for adequate social participation; (2) their comprehensive character and need for a rich documentation of the availability, accessibility and cost of publicly-provided goods and services, helpful for policy evaluation and cross-national learning; (3) their empirical assessment of economies of scale and the cost of additional household members. The main weakness of fully-specified reference budgets is their limited robustness, necessitating substantial cross-national coordination for maximising comparability and the requirement to develop RBs for specific model families, which vary strongly in their representativeness for the population.

The meaning of cross-country comparability is under-theorised in the literature on indicators of poverty and social exclusion. We introduce a distinction between procedural comparability and substantive comparability. Procedural comparability is defined as a situation in which the same procedures are implemented for measuring a phenomenon or characteristic at different occasions – different times or different places. For the purposes of this project, substantive comparability is defined as a situation in which at the level of the reference budgets, needs for social participation are satisfied at a similar level. RBs in different countries can only be supposed to correspond to a similar targeted living standard if they fully reflect, and differ exclusively for reasons of, cross-country differences in institutions, culture, climate and geographical conditions and the availability, quality and price of goods and services. We recognise that substantive comparability requires the collection of a large amount of data and that, in spite of a clear definition of the targeted living standard, cross-country comparability remains an ambiguous concept in the context of wide cross-national differences in institutions and vast differences in living standards, as is the case for other social indicators too. Unavoidably, one has to accept that targeted living standards tend to be elusive to some extent, no matter how precise one attempts to define them. Therefore we suggest to develop cross-nationally comparable RBs for a range of assumptions on the basis of clear arguments. In this way, the heterogeneous situations with which people are confronted are better recognised (e.g. regarding tenure status and use of public vs. private transport), and the potential for policy learning is increased through showing the variation in the cost of essential goods and services for households with a different ability to rely on publicly-provided goods and services. In addition, in our view this implies that RBs should be considered to be an instrument for building consensus, rather than to measure some form of consensus in society.

Therefore, the method proposed in this paper aims at setting decisive steps forward in the process of developing comparable fully-specified RBs which strike the right balance between cross-country robustness and sensitivity to the local context, explicitly recognising the limitations of fully-specified RBs. Given important differences in the nature of goods and services associated with different needs (e.g. housing, clothing, food, health care), data needs and data availability differ from one basket of goods and services to another.

2.3. Targeted Living Standard

We propose to define the targeted living standard as the *minimum resources required to adequately participate in society*. Adequate social participation is further defined as the

ability of people to adequately take the various social roles one should be able to take as a member of a particular society. In this pilot project, the target population consists of children and persons in working age, in good health, without disabilities, and living in an urban environment (the capital city). Fully-specified RBs can only be developed for 'hypothetical household situations' or 'model families'. In this pilot project, RBs are developed for three relatively simple model families, which form the building blocks of more complex household types for which RBs could be developed in the future: a single-person household (male / female); a single parent household with two children; a couple with two children. All three family types are assumed to live in the capital city of the country. The adults are in working age (about 40 years old). The children are assumed to be a boy in primary education (about 10 years old) and a girl in secondary education (about 14 years old). Furthermore, we assume that all household members are in good health, they are well-informed persons, having the necessary competences to be self-reliant, make the right decisions with regard to their health and safety, and are able to act economically. By making these assumptions, it is possible to look for a lower bound on the minimum necessary resources for adequate participation, increasing robustness and internal validity of the approach. At the same time, it is crucial to document how real-life situations deviate from those assumed for the model families, and which impact this may have on the minimum resources required for adequate social participation

2.4. The Purpose of Reference Budgets

Reference budgets currently developed or in use in Member States of the European Union differ in many important respects (Storms et al., 2014). The defining characteristics of RBs can be categorised in several ways. Dubnoff (1985: 285) summarised the critical factors of an instrument determining 'how much income is enough' in three questions: (1) enough to do what?; (2) enough for whom?; (3) enough according to whom? (cf. Deeming, 2011: 18). Veit-Wilson (1998: 21) added a fourth question: (4) enough for how long?

We found it useful to further formalise and order the various choices that are made explicitly or implicitly when developing RBs in the way presented in Figure 1. We make a distinction between the purposes for which RBs are constructed, key choices to be made, their theoretical basis, the method that is used for developing the RBs, and their use in practice. In the text that follows, we briefly discuss these dimensions.

In many cases, several different choices can be valid, depending on the purposes of the RB and the context. We would like to stress that the elements presented below do not in themselves include a judgement about whether one method would be preferable to another. At the same time, we are strongly convinced it is important to be explicit about what choices have (not) been made regarding these methodological aspects of RBs.

- to help Member States to design effective and adequate income support measures;
- to facilitate mutual learning and identification of best practices in the fight against poverty;
- to facilitate the Commission's task of monitoring and assessing the adequacy of income support in Europe;
- to be a helpful tool for the implementation and monitoring of the 2008 active inclusion recommendation and the 2013 Social Investment Package.

3. Methodology and Data

We propose for this project, to define the targeted living standard as the minimum financial resources required to participate adequately in society. Adequate social participation is further defined as the ability of people to adequately take the various social roles one should be able to take as a member of a particular society. With regard to the minimum required financial resources, it is important to note that the reference budgets focus on the out-of-pocket payments by private households, in addition to what may already be paid through taxes and social contributions. In other words, we look for the minimum required disposable household income, taking account of subsidised goods and services that are provided free or at reduced prices.

At the same time, RBs clearly differ in *target population*, that is, the group(s) of people for which the RBs are supposed to identify the targeted living standard (Dubnoff: ‘for whom?’). The population may include all inhabitants of a geographical entity, but may also be limited to a specific subgroup (e.g. families with young children or elderly persons with specific needs). The definition of the target population might frame the research process and influence the evidence that is considered relevant as well as the composition of and discussion within focus groups. The geographical scope (city, region or country) of the RB could be politically charged in countries where sub-national governments have significant powers. Both perceptions about the targeted living standard, and the social circumstances (especially the accessibility of public goods and services) may vary in important ways, resulting in different RBs for different regions. In those cases it is important to explain why the RBs differ across regions, and in what way they are comparable.

Within this project, the target population can be defined as children and persons in working age in good health, without disabilities, and living in an urban environment (the capital city). The number of model families developed within this pilot project is restricted to three family types: A single-person household (male / female), A single parent household with two children and a couple with two children. The adults are in working age (about 40 years old). The children are assumed to be a boy in primary education (about 10 years old) and a girl in secondary education (about 14 years old). Furthermore, we make the following assumptions: Health: all household members are in good health. The reason for this assumption is not so much that this is the most common health condition (that is debatable), but rather that costs for health care vary enormously depending on the kind and severity of health problems, each having different implications for the needs of the person affected.

Competences: family members are well-informed persons, having the necessary competences to be self-reliant, make the right decisions with regard to their health and safety, and are able to act economically (know their social rights and how to access public goods and services, are able to compare prices and buy the products with best value for money, can cook economically and healthily with sufficient variation, etc.).

Government-provided goods and services: we start from actual provision against actual prices, insofar these are accessible for low-income households.

The latter condition implies that sometimes judgment needs to be applied, when accessibility is limited by low supply or other factors. An example are regular dental check-ups in a country with a national health service (NHS). Waiting lists for NHS-linked dentists can be very long, but are not necessarily problematic for annual check-ups, as these can be planned well in time. However, for visits in case of dental pain waiting lists

can be too long. In this case national experts could include a visit to a private dentist. Similar arguments may apply to public transport, health care and education.

For each family type, and insofar this is relevant for the national context, we will develop RBs for a range of tenure statuses, including tenants paying at prevailing market prices, tenants paying reduced rent, as well as outright homeowners.

Finally, we develop long-term reference budgets which should give people access to the targeted living standard for an undetermined period of time. In other words, the reference budgets include some room for saving in order to gradually replace durables and to be able to cover one-off or yearly costs. This implies that we assume the model households are an 'on-going concern': that they have access to all goods and services that are included in the reference budgets from the moment they should start living on a budget at the level of the reference budgets. In other words, if a young person without any assets would move out to start a new family, the reference budgets would not suffice for covering the initial cost of buying all necessary durables at once.

From these assumptions, it will be clear that the reference budgets are targeted at the minimum financial resources required to participate adequately in society. We believe these assumptions increase the feasibility and internal validity for identifying the minimum resources required for adequate social participation.

4. Results – Food Basket for the Czech Republic

The first dietary recommendations for the Czech Republic were suggested by the Society for Nutrition in 1986, later in its updated form in 1989, under the title "The nutrition directions for the population of Czechoslovakia". In 1994, the Council for Nutrition of the Ministry of Health of the Czech Republic made recommendations on nutrition of healthy population called "Eat healthy, live healthy." In 2004, the Society for Nutrition published a report "Nutrition recommendations for the Czech Republic" followed in 2005 by a report done by the Ministry of Health of the Czech Republic entitled "Nutrition recommendations for the population of the Czech Republic."

In 2012, the Society for Nutrition presented an innovative nutrition recommendations for the population of the Czech Republic. This document was intended for professionals who deal with the nutrition prevention of mass non-infectious diseases and promote good eating habits. For the first time, these recommendations were done in relation to the children's age, nutrition of pregnant and lactating women and the elderly nutrition.

The nutrition recommendations are based on the EU document: The Strategy for Europe related to health problems connected to nutrition, overweight and obesity (a white book) from 2007 and inspired by WHO. After many consultations with professionals in nutrition, the Society for Nutrition decided to promote new reference intakes of energy and nutrients so that these recommendations reflect the current scientific knowledge about nutrition, nature and living conditions of Czech population. It was decided to take as a reference framework the information provided by the Societies for Nutrition in countries, also known as "DACH" (Germany, Austria, Switzerland) which are based on professional and scientific studies and regarded as conclusive.

The Czech food pyramid was suggested in 2013 by the Forum for Healthy Nutrition. It is a graphic simple explanation of recommended nutrition guidelines specifically set for the Czech population. It gives basic recommendations for the content of a food basket. The main focus was on the simplicity and complexity of information provided. It shows not only the selection of food, but also the intensity; it can be used by various groups of

people. The goal of these recommendations is the prevention of health risks which are rooted in the nutrition traditions of Czech population.

In the period 2000–2011, the total food consumption in Czech society increased by 6.7%, especially the consumption of plant products by 12%. Significant decrease in consumption occurred only in beef (–26%, mainly due to a large price), bread (–24.3%) and spirits (–16.9%). In contrast, the highest increase in consumption occurred in soft drinks (+39.3%), bread wheat (+33.6%), other dairy products (+30%), cheese (+23.8%), butter (+22%), wine (+20.5%), tropical fruit (+19.3%) and cereal products in total (+13.4%). Although the development of consumption depends on the economy, in times of economic recession there is not a significant reduction in material consumption due to biological nature of nutrition. The development of consumption is neither clearly negative, nor fully based on nutritional requirements. There is a demand to buy cheaper commodities (such as plant products, meat or dairy products) which results in a positive trend of increasing fruits and vegetables consumption as well as dairy products, and thus increase of Vitamin C intake and Calcium. On the other hand, the increasing consumption of butter, sugar and sugar products is a negative trend in Czech society.

The food pyramid, the menu proposed for the Czech Republic as well as other issues related to the pilot study on reference budgets are now in the centre of attention of Focus groups which take place in Prague in February–March 2015.

5. Discussion and Conclusions

When working with ‘model families’ to develop an indicator, representativeness of the model family is not the main goal, and cannot be achieved cross-nationally. In fact, household structures vary widely across the European Union (e.g. Iacovou and Skew, 2010). As a result, the model families included in this pilot project are chosen as a ‘test case’ primarily for their simplicity and not because they would represent the most typical situation.

The reference budgets developed in this pilot project should be considered as a step forward in a longer-term process to develop valid and sufficiently robust, comparable and legitimate reference budgets in Europe.

Reference budgets will bring a new perspective to the current list of social indicators, namely the perspective of the cost of essential expenditures that people face. This perspective is currently only marginally covered by the commonly agreed EU indicators. Therefore, it could point to new policy lessons, and be a useful tool for contextualising existing indicators. At the same time, it should be clear that because of their complexity, detailed character and limits to robustness, they do not offer a ‘one-size-fits-all fixed threshold’ that could replace existing indicators or could be used as a complementary poverty threshold or indicator to estimate poverty in a straightforward way.

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Emotional Literacy in Organizations. On the intersection of sociological and psychological phenomena

Eva Abramuszkinová Pavlíková¹, Blahoslav Rozbořil² and Pavel Žiaran³

¹*Department of Law and Social Sciences, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: eva.pavlikova@mendelu.cz*

²*Department of Art, Faculty of Education, Masaryk University in Brno, Poříčí 7, 603 00 Brno, Czech Republic, e-mail: 5221@mail.muni.cz*

³*Department of Law and Social Sciences, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: pavel.ziaran@mendelu.cz*

Abstract

The theoretical framework is focused on sociological dimension of emotions. Managerial world is traditionally supposed to be entirely rational, whereas emotions were considered as psychological or physiological phenomena. Research shows that emotion in the sociological perspective of the organizations can become a key success concept of the organization. Moreover, the intercultural background may be an influential issue related to emotional behaviour of managers, employees or businessmen. The theoretical framework is based on the theory of emotions as a social phenomena, as mentioned by R. Collins or T. D. Kemper. The paper also presents concepts of organizational sociology as mentioned by A. Hochschild. Emotions from the sociological perspective seem to be an important aspect which has influence on a key success of people in organizations. The second part of the paper presents an empirical research, based on the in-class behavioural experiments (n = 157), showing which emotion-related behavioural aspects correlate with the tendency to be a manager/leader (we call them “fixed” behavioural aspects or “ingredients”). On the other hand we have identified other set of emotion-related behavioural aspects that do not correlate with the preference to be a leader (and we call them “optional” aspects or “organizational flavours”). Consequently, based on the findings, we call for the need to establish an “emotional literacy” as a part of the HR management, so that the leaders can to create emotionally healthy and well functioning organizations.

Keywords: emotions, economics, sociology of emotions, expectation, rationality, emotional literacy,

1. Introduction

Our point of departure is holistic conception of situation and social space. In this paper we would like to rehabilitate emotions as the crucial factor producing results of intentional social behaviour. They could be we argue as important as rationality or will. To put emotionality against rationality as dichotomous mental entities is a part of common distortion in human perceiving of world. In fact there is something similar to continuum more than to discrepancy. We can point to metaphor of *solid substance* of ratio and *fluid substance* of emotion as used by Sedláček. An important reason why we have tendency to neglecting role of emotions is too narrow notion of them; for better understanding of its nature we should accept that they are not limited to affects with short and intense experience of it. Randall Collins, Thomas Kemper and many others (including the German philosopher Heidegger with his term *Grundstimmung*) pay close attention to long-lasting experience of mood going through actors and situations (connecting them together).

As Barbalet (2002) argues, all actions (and indeed reason itself) require appropriate facilitating emotions if successful action or reason at all are to be achieved. Without the emotion of confidence in our actions we could not deal with any practical problem; without emotion of trust we would not be take part on collective action. Even reason requires its back-ground emotions; these include feelings of calmness, security, confidence and so on.

2. Emotions as Social Indicator

Kemper (1978) understands the emotions as a reaction to disequilibrium in relation of actor to social surrounding. There are some basic forms of this reaction depending on relation between status and social position (insufficient or excessive status to excessive or insufficient social position). From this relation we could (according to Kemper) make typology of all basic emotions. Emotions are of ambivalent nature; they arise from substrate of individual psyche, but they refer to perceived social situation or current incentives from outside. The emotions have in this sense relevant cognitive dimension. Therefore it has we believe considerable significance to pursue emotions in economic settings as well.

Emotional literacy means certain degree of openness to introspection and ability to perceive emotional condition in relation to experienced social situation. Crucial and typical moment in a situation of decision making is lack of information for rational based decision. Capability to perceive own emotional tendency can draw attention to unconscious source of orientation or motivation. Emotional literacy does not mean kind of capacity like intuition rather kind of ability to observe one's own feeling including intuitive tendency and ability to perceive it in connection with outer conditions. In this context is necessary to distinguish emotional literacy from *emotional management* (described by Hochschild) as deliberated controlling of external impression because of interest to influence buyers or clients.

3. Emotions in Economic Life

Economic settings primarily influenced by rationalist's theories and mathematical models tend to conceive itself as highly rational setting. Yet, we should suppose, there is as much emotionality as it is in other spheres of human activity. However, this dominant notion felt as commitment to rationality can distort behaviour of economic actors as necessary or ideally rational (it means emotionally neutral or emotional-free). Yet people cannot act without emotions even if they decided to do it. The defence against emotionality could be as good as wrong. To be aware of experienced emotions should increase quality of intentional action and decision making.

Economics is in a sense the study of expectations in which *uncertainty* play important role; while the future cannot be predicted, economic thinking operates with concept of *risk* and tries to specify probable distribution of risk (Shilling in Barbalet 2002, pp.10–32). Expectation is also key concept in research of emotions because they are intrinsic part of *expectation*. Sociology of emotion is critique of rational actor models of expectation. As Shilling argues it also offer an alternative in particular emotions.

4. Operationalization of emotional aspects for psychological type of research – Emotionality and Agreeableness

In order to measure the role of emotions and other related cognitive and conative aspects we use the personality dimensions based on the personality test Hexaco. Hexaco personality test consists of six personality dimensions (Honesty-humility, Extraversion, Emotionality, Agreeableness, Conscientiousness and Openness to Experience). Each out of six personality dimensions is constituted out of four specific facets, see the Tab 1. (Ashton and Lee 2007; Ashton and Lee, 2008).

It is important to note, that the research show the validity and consistency of the Hexaco test also when applied in other European cultures, being translated into the local European languages (Ashton et al., 2006) what predetermines this test for a wider cross-cultural use.

Out of the complexity of personality traits we will focus on two that are the most relevant for our research: (1) Emotionality and (2) Agreeableness that reflect the majority of aspects related to the emotional part of the behaviour.

Emotionality, within the Hexaco personality test, can be described as follows: Persons with very high scores on the Emotionality scale experience fear of physical dangers, experience anxiety in response to life's stresses, feel a need for emotional support from others, and feel empathy and sentimental attachments with others. Conversely, persons with very low scores on this scale are not deterred by the prospect of physical harm, feel little worry even in stressful situations, have little need to share their concerns with others, and feel emotionally detached from others (Ashton and Lee, 2015). Consequently, the four narrow traits are defined in the Table 1.

Table 1: Four narrow traits constituting personality dimension of Emotionality (Hexaco-PI-R test)

Facet	Description
Fearfulness	The scale assesses a tendency to experience fear. Low scorers feel little fear of injury and are relatively tough, brave, and insensitive to physical pain, whereas high scorers are strongly inclined to avoid physical harm.
Anxiety	Assesses a tendency to worry in a variety of contexts. Low scorers feel little stress in response to difficulties, whereas high scorers tend to become preoccupied even by relatively minor problems.
Dependence	Assesses one's need for emotional support from others. Low scorers feel self-assured and able to deal with problems without any help or advice, whereas high scorers want to share their difficulties with those who will provide encouragement and comfort.
Sentimentality	A tendency to feel strong emotional bonds with others. Low scorers feel little emotion when saying good-bye or in reaction to the concerns of others, whereas high scorers feel strong emotional attachments and an empathic sensitivity to the feelings of others.

Source: Ashton and Lee (2015)

Similarly, for Agreeableness Hexaco test provides following definition: Persons with very high scores on the Agreeableness scale forgive the wrongs that they suffered, are lenient in judging others, are willing to compromise and cooperate with others, and can easily control their temper. Conversely, persons with very low scores on this scale hold grudges against those who have harmed them, are rather critical of others' shortcomings, are stubborn in defending their point of view, and feel anger readily in response to mistreatment. (Ashton and Lee, 2015). The four constituting narrow traits (facets) are defined in the following Tab. 2.

Table 2: Four narrow traits constituting personality dimension of Agreeableness (Hexaco-PI-R test)

Facet	Description
Forgivingness	Assesses one's willingness to feel trust and liking toward those who may have caused one harm. Low scorers tend "hold a grudge" against those who have offended them, whereas high scorers are usually ready to trust others again and to re-establish friendly relations after having been treated badly.
Gentleness	Assesses a tendency to be mild and lenient in dealings with other people. Low scorers tend to be critical in their evaluations of others, whereas high scorers are reluctant to judge others harshly.
Flexibility	Assesses one's willingness to compromise and cooperate with others. Low scorers are seen as stubborn and are willing to argue, whereas high scorers avoid arguments and accommodate others' suggestions, even when these may be unreasonable.
Patience	Assesses a tendency to remain calm rather than to become angry. Low scorers tend to lose their tempers quickly, whereas high scorers have a high threshold for feeling or expressing anger.

Source: Ashton and Lee (2015)

5. Methodology and Data

The research part deals with psychological dimensions of emotional and other related cognitive and conative aspects of human behaviour in the organisation. These behavioural components will be subjected to the correlations analysis vis-à-vis the preference of the managerial position.

The research was carried out on the basis of a behavioural experiment in the form of in-class simulation. In-class simulation under well structured condition and controlled environment can produce a quality scientific data for testing managerial and economic theories (Allery, 2004; Cooper, 2007).

In the experiment participated 157 undergraduate student of business. The experiment had the form of the leaderless group discussion (Waldman, 2004; Costigan and Donahue, 2009), where the participants had to determine their preferences to become a manager and than make a real negotiation in the frame of the pair (for the research we took the initial preferences).

Consequently, participants filled the Hexaco PI-R test, version with 60 items (Ashton and Lee, 2009), out of which we used two personality dimensions Emotionality and Agreeableness. These two variables were then subjected to the correlation analysis with the preferences of a managerial position.

6. Results

Tab. 3 shows the correlations between the preferences of a managerial position and personality traits relied with the emotion-oriented behaviour. Table has two parts: (1) Personality traits that correlate with the preference to become a manager. (2) Personality traits that do not create the correlation with the preference to become a manger.

For the needs of this paper we can name the first part of behavioural traits as “ingredients” that create a fixed part of the personality of a potential leader. These traits include: resistance against the physical fear (as opposite to fearfulness), resistance against stress (as opposite to anxiety), and capacity to deal with the problem independently (as opposite to dependence). Let’s note, that the all the three facets create negative significant correlation with the preference of a managerial position.

On the other hand, there are emotion-related behavioral aspects that do not create correlation with the preference to be a manager in the organization. For the need of this research, we name these aspects as organizational “flavors” as these are not necessary connected with the personality of the manager or leader. ”

In other words, based on the results the manager or leader will always have the “fixed” qualities, or as we call them here “ingredients”. However the other set of emotion-related behavioral aspects is “optional”, and we call them “flavors”. Because these qualities of the leader will create the final atmosphere, or “emotional flavor” of the organization.

Table 3: Correlation matrix, correlation between the preference to be a manager and personality traits related to emotional behavioral aspects, 5% critical value (two-tailed) = 0.1567 for n = 157

	Main managerial “ingredients” (behavioral aspects correlating with the preferences of a managerial position)		Organizational “flavors” (behavioral aspects, non-correlating with the preference of a managerial position)	
Emotionality (wider personality dimension)	Fearfulness (experience of physical fear)	-0.2432	Sentimentality (capacity to give and receive emotions)	Statistically insignificant correlations
	Anxiety (incapacity to deal with stress)	-0.2023		
	Dependence (emotional attachment to others)	-0.2875		
Agreeableness (wider personality dimension)			Forgivingness (capacity to forgive)	
			Gentleness (capacity to be mild and lenient)	
			Flexibility (willingness to cooperate)	
			Patience (capacity to remain calm and indulgent)	

7. Discussion and Conclusions

Emotional capacity, can be perceived as “flavour” that gives the management a human and constructive dimension. However the capacity to create positive and friendly emotional atmosphere does not create significant correlation with the preferences of a managerial position. This empirical finding suggests that in order to create a functional “emotional” organization, higher attention should be paid to the emotional qualities of leaders as well as in the construction of the “emotional” corporate culture.

Hence, as a result we call for the need the development the learning and assessing tools to assess and develop the emotional capacities of leaders and managers as a part of Human Resource Management, a set of emotional competencies a leader should have or in other words, we call for the need of emotional literacy in the organizations.

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The effects of Fiscal Policy on Business Cycle: Evidence from SVAR Model with Debt Constraints

Peter Baďo¹, Vlastimil Reichel² and Miroslav Hloušek³

¹*Department of Economics, Faculty of Economics and Administration, Masaryk University in Brno, Žerotínovo nám. 617/9, 601 77 Brno, Czech Republic, e-mail: pbado@mail.muni.cz*

²*Department of Economics, Faculty of Economics and Administration, Masaryk University in Brno, Žerotínovo nám. 617/9, 601 77 Brno, Czech Republic, email: reichel.v@mail.muni.cz*

³*Department of Economics, Faculty of Economics and Administration, Masaryk University in Brno, Žerotínovo nám. 617/9, 601 77 Brno, Czech Republic, e-mail: hlousek@mail.muni.cz*

Abstract

This paper is focused on macroeconomic effects of fiscal and monetary policy in the Czech economy. We are using a Structural Vector Autoregression model (SVAR) for small open economy. The model includes six variables, specifically: government spending, government revenues, inflation, GDP, exchange and interest rates. Furthermore, the model is enriched with debt constraints over time. We investigate the dynamic responses of output, inflation and the interest rate to changes in government spending and revenues and analyze the contribution of shocks to business cycle in the Czech economy for the period 1999:Q1 – 2014:Q1. The results for the Czech economy are similar to the results for other small open economies described in current literature. Fiscal policy during the estimated period is analyzed through historical shock decomposition. Our findings are that GDP decreases in reaction to fiscal shock and monetary variables show negligible reaction to the same shock. We identified the periods of business cycle, where the effects of fiscal policy were procyclical and countercyclical.

Keywords: structural vector autoregression, fiscal and monetary policy, debt

1. Introduction

This paper is aimed at the macroeconomic effects of fiscal policy in Czech Republic for the period of 1999:Q1 – 2014:Q1. We were inspired by the work of Parkyn and Vehbi

(2013), but we mostly followed Haug, Jędrzejowic and Sznajderska (2013). We also believe that major part of macroeconomic literature has looked separately at monetary structural vector autoregressions models (SVARs) like those applied by Christiano et al. (2007) or at fiscal SVARs propagated by Blanchard and Perotti (2002). Just like Haug, Jędrzejowic and Sznajderska (2013), we have used SVAR model that uses combination of a monetary SVAR with a fiscal SVAR, because we deem the importance of considering the effects of both the monetary policy and the fiscal policy shocks together. A major challenge of this type of models is to correctly identify the changes in current policy variable that are attributable to actual policies, rather than to endogenous variables. Examples are possible delays in legislation, the lags of implementation of responsible policies and others. If these problems are ignored or used incorrectly it can lead to misspecification of the model and associated impulse-response functions may end up inconsistent. Furthermore, Leeper (1989) traced out how the econometricians might incorrectly attribute some of the effects of fiscal policy to monetary policy when fiscal policy is anticipated by public and the econometricians ignore fiscal foresight.

In the last ten years there has been increased number of studies that used structural VAR approach to investigate effects of economic policies shocks on macroeconomic variables. Structural interpretations of these shocks require additional identifying assumptions. There have been several ideas how to improve the usefulness of these models for comparative analysis.

A notable suggestions in this respect is given by Favero and Giavazzi (2007) who argue that a large number of fiscal studies, which used a VAR model rely on potentially misspecified models because they fail to include any feedback from the level of debt to variables that enters the governments intertemporal budget constraint. They pointed out that the bias will be more significant in periods where there is strong correlation between government budget and debt to GDP ratio.

Following these rules and also the work of Haug, Jędrzejowic and Sznajderska (2013) we created a SVAR model containing six variables, government spending, government revenues, inflation, GDP, exchange and interest rates. We allow for the possibility that taxes, government spending and interest rates might respond to the level of debt over time. This is implemented by enriching the original model dynamics to include other variables, long term interest rate, which is only used to calculate debt constraint and inflation as well as including intertemporal budget constraint as an identity.

We investigate responses of variables in reaction of expenditure shock using the impulse responses. Secondly we used variance decomposition, which determine how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. Fiscal and monetary policy is analyzed through a historical decomposition of the shocks in the model. This suggests that discretionary fiscal policy has had a generally pro-cyclical impact on GDP over the observed period and impact on long term interest rates.

2. Methodology and Data

We use quarterly data from 1999:Q1 to 2014:Q1. The choice of our sample period is based on the availability of high quality quarterly data. In particular, we used quarterly fiscal data that has not been interpolated from annual data.

These data are obtained from Eurostat, Czech Statistical Office and Czech National Bank. Specifically, we use time series of government spending (EXP), government

revenues (REV), inflation (Pi), gross domestic product (GDP), real exchange rate (reer) and the 3-month Czech money market interest rate (PRIBOR). All these variables have been seasonally adjusted from the source. We took the logarithm of the data (except for the PRIBOR) and then we detrended them using Hodrick-Prescott filter (see more in Lütkepohl and Krätzig (2004)).

2.1. SVAR model with debt constraint

In this section we provide a brief introduction of used SVAR model and its structure (more about SVARs in Lütkepohl and Krätzig (2004) or Enders (2010)). We adapted the model from Haug, Jędrzejowic and Sznajderska (2013), which contains six variables: government spending, government revenues, inflation, GDP, exchange and interest rates.

Consider a structural vector autoregression model of the following base form:

$$Ay_t = B_1y_{t-1} + \dots + B_p y_{t-p} + Bu_t$$

A and B are matrixes of type: $n \times n$, y_t is a vector of type $n \times 1$ of macroeconomic variables with arrangement of $y_t = [GDP_t, Pi_t, PRIBOR_t, reer_t, EXP_t, REV_t]'$ and u_t is a vector $n \times 1$ of residuals. We have considered a maximum number of lags set to four.

According to the Parkyn and Vehbi (2013) this type of VAR model is likely to be misspecified, because the debt to GDP ratio, the d_t is included in μ_t and need to be taken out. Following the work of Parkyn and Vehbi (2013), we need to add to the model the d_t as an identity in the form of:

$$d_t = \frac{1 + i_t}{(1 + \Delta p_t)(1 + \Delta y_t)} d_{t-1} + \frac{\exp(EXP_t) - \exp(REV_t)}{\exp(y_t)}$$

Where i_t is long term interest rate, Δp_t is inflation, Δy_t is real GDP growth and EXP_t and REV_t are the logs of government expenditure and revenue. Structural VAR model after the previous adjustments would have to following form:

$$Ay_t = B_1y_{t-1} + \dots + B_p y_{t-p} + \gamma_1 d_{t-1} + Be_t$$

After some modification we obtained the following form of the model:

$$y_t = A^{-1}B_1y_{t-1} + \dots + A^{-1}B_p y_{t-p} + A^{-1}\gamma_1 d_{t-1} + A^{-1}Be_t$$

Now we can denote $A^{-1}Be_t$ as u_t and call it a vector of structural shocks. Values of individual structural parameters have been identified by the following AB model (see more in Lütkepohl and Krätzig (2004)).

$$Au_t = Be_t$$

In order to achieve identification of the structural parameters, we impose the following contemporaneous zero-value restrictions as in Haug, Jędrzejowic and Sznajderska (2013).

$$\begin{bmatrix}
 a_{11} & 0 & 0 & 0 & a_{15} & a_{16} \\
 a_{21} & a_{22} & 0 & 0 & a_{25} & a_{26} \\
 a_{31} & a_{32} & a_{33} & 0 & a_{35} & a_{36} \\
 a_{41} & a_{42} & a_{43} & a_{44} & a_{45} & a_{46} \\
 a_{EXP,GDP} & a_{EXP,\pi} & a_{EXP,i} & a_{EXP,reeer} & a_{55} & 0 \\
 a_{REV,GDP} & a_{REV,\pi} & a_{rev,i} & a_{REV,reeer} & 0 & a_{66}
 \end{bmatrix}
 \begin{bmatrix}
 e_t^{GDP} \\
 e_t^{\pi} \\
 e_t^i \\
 e_t^{reeer} \\
 e_t^{EXP} \\
 e_t^{REV}
 \end{bmatrix}
 =
 \begin{bmatrix}
 b_{11} & 0 & 0 & 0 & 0 & 0 \\
 0 & b_{22} & 0 & 0 & 0 & 0 \\
 0 & 0 & b_{33} & 0 & 0 & 0 \\
 0 & 0 & 0 & b_{44} & 0 & 0 \\
 0 & 0 & 0 & 0 & b_{55} & b_{56} \\
 0 & 0 & 0 & 0 & b_{65} & b_{66}
 \end{bmatrix}
 \begin{bmatrix}
 u_t^{GDP} \\
 u_t^{\pi} \\
 u_t^i \\
 u_t^{reeer} \\
 u_t^{EXP} \\
 u_t^{REV}
 \end{bmatrix}$$

In order to replicate the model of Haug, Jędrzejowic and Sznajderska (2013) we used the same restrictions of zeroes in first four columns and rows of matrixes. They are standard ones in current literature on SVAR models. The diagonal parameters of the first matrix are usually set to 1, which we did as well. Next, they followed the procedure pioneered by Blanchard and Perotti (2002), to acquire elasticity for other variables: $a_{EXP,GDP}=0$, $a_{EXP,\pi}=-0,5$, $a_{EXP,i}=0$, $a_{EXP,reeer}=0$, $a_{REV,GDP}=0,95$, $a_{REV,\pi}=0,9$, $a_{REV,i}=0$, $a_{REV,reeer}=0$ and $b_{56}=0$.

3. Results

This section describes results of our estimation. The maximum lags was tested by Akaike, Hannan – Quinn and Schwarz Criterion (see more in Enders (2010)). Based on these criteria the number of lags was set to 1 lag. Then we proceed to the actual estimation. First we describe the impulse responses of the government expenditure shock. Next we focus on the variance decomposition, and finally we look at the historical shock decomposition in which we discuss the pro-cyclical and counter-cyclical behavior of fiscal policy.

3.1. Impulse Responses

Figure (1) shows the impulse responses of model variables in reactions to expenditure shock. Solid line represents the actual impulse responds, the dashed lines are the confidence intervals. On the x-axis we measure the quarters after the shock, the y-axis shows percentage deviation from the trend.

To determine the effect of fiscal policy, positive expenditure shock was simulated at the size of one standard deviation. Reaction of GDP to expenditure shock is surprisingly slightly negative and decreasing until second quarter where it hits his bottom at $-0,57$ percent, after that it returns to its steady state. Next we can see reaction of government revenues, which is very similar to the reaction of GDP. This result is explainable due to the decline in GDP. Response of inflation to the expenditure shock is again negative and decreasing until 4 quarters and persistent. Another persistent variable is the PRIBOR, which has similar motion as previously mention variables. The last impulse response is described by reaction of real exchange rate. This response is positive, decreasing until

second quarter then it returns to steady state. Estimation of impulse responses can be declared as statistical significance, because there are several periods in which confidence bands of impulse responses do not include zero.

In comparison with the work of Haug, Jędrzejowic and Sznajderska (2013), there are several differences. In their paper the effect of GDP to expenditure shock was positive and very persistent same as government revenues.

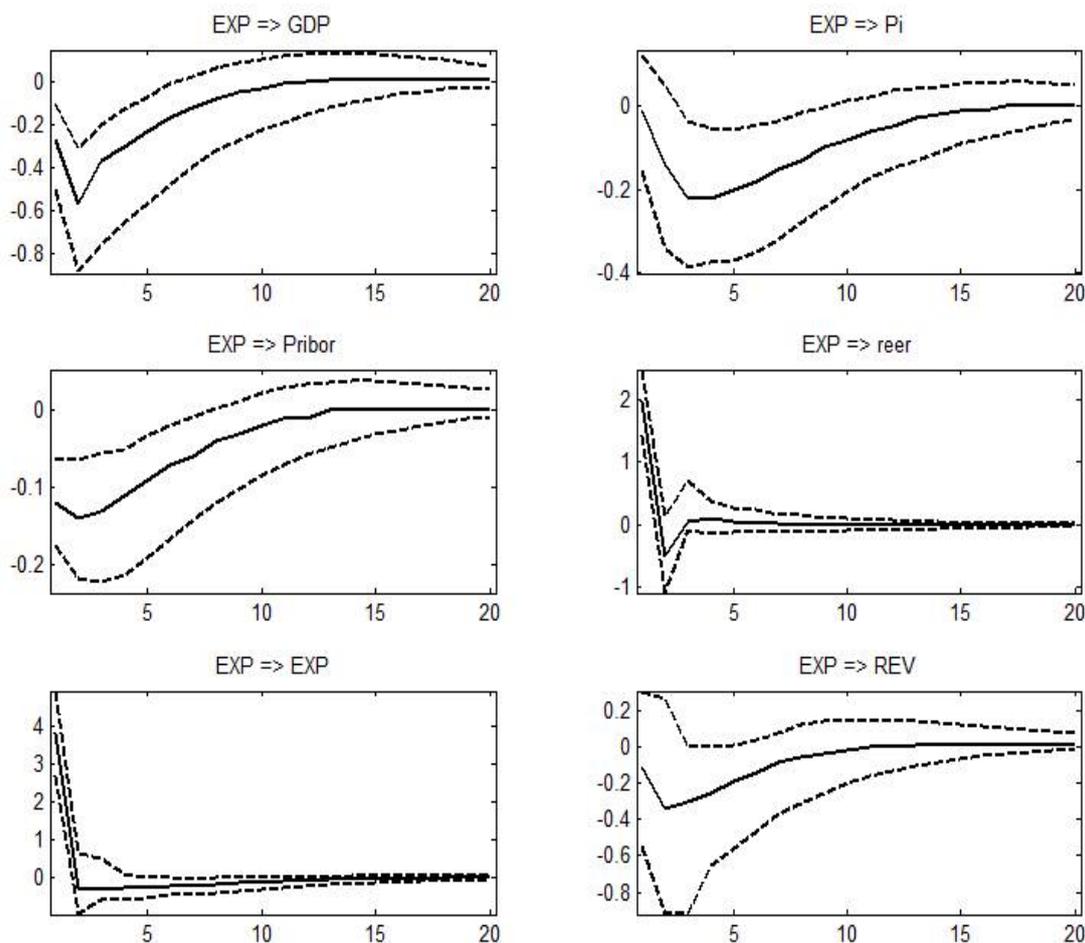


Figure 1: Impulse responses

3.2. Variance decomposition

Variance decomposition is a tool that indicates the amount of information each variable contributes to the other variables. Information for the concrete variable is shown in the following table (1) and figure (2).

Table 1: Share of structural shocks

Horizon	Structural shocks				
	Fiscal shock	Demand shock	Cost push shock	Monetary shock	Other
1	0,02	0,86	0,01	0,1	0,01
5	0,05	0,76	0,04	0,15	0,01
Inf.	0,06	0,71	0,07	0,15	0,01

Results from the table (1) are that share of fiscal and monetary shock to the variability of the gap of GDP is largely limited. In the first period is the almost whole variability explained by the demand shock and monetary shock. In the later periods we can see the increase in the share of other shocks, but in a small scale. For the monetary shock (PRIBOR) it is 15 percent, for the fiscal shock (EXP+REV) it is 6 percent, share of cost push shock (INF) is 7 percent and other shocks is 1 percent. For the better visualization we can see the evolution of the variability in structural shocks also in the next figure (2).

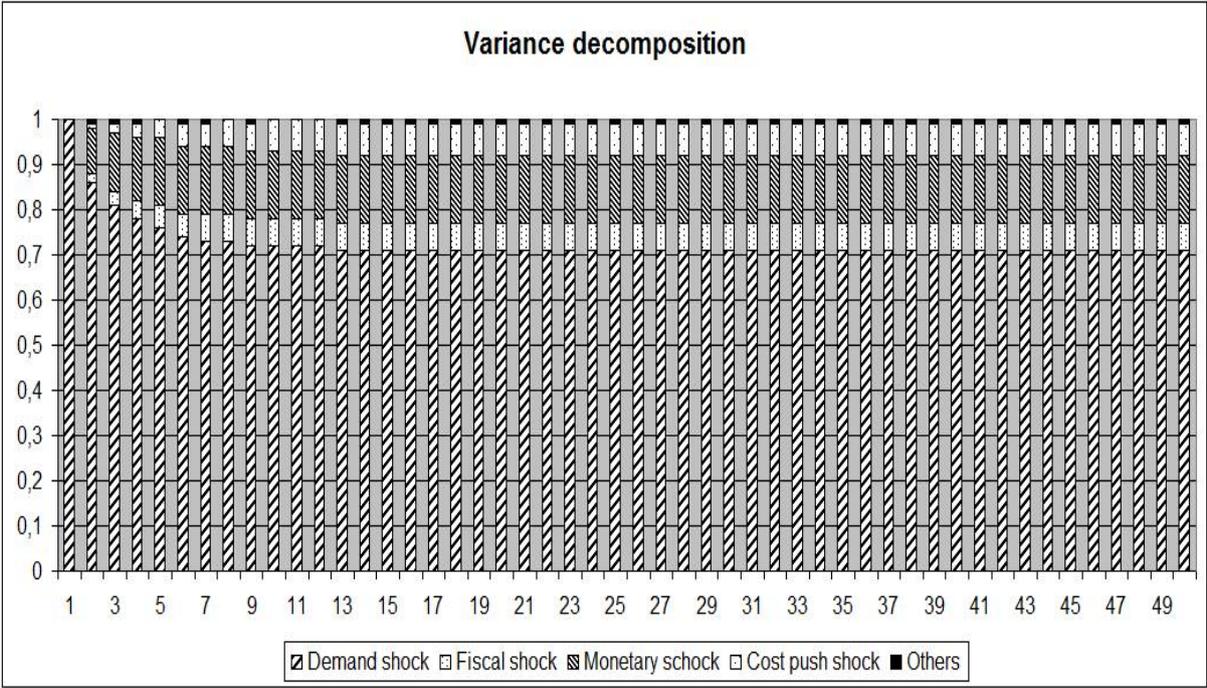


Figure 2: Variance decomposition

3.3. Historical shock decomposition

In this section we discuss the pro-cyclical and counter-cyclical effects of fiscal shock to the gap of GDP. Analysis is made by historical shock decomposition. In figure (3) we can see the estimated shock decomposition of our model. The x-axis represents time period and y-axis shows the percent deviation from the trend. An individual column means the contribution of structural shocks to the variability of GDP gap.

At the first look the most evident is the contribution of demand shock through the whole period. Other shocks have only local impact. In some periods we can see larger influence of certain shocks. For example in first two years we can observe negative fiscal shock. Between years 2001 and 2006 there is no dominance of either of the shocks. From the year 2006 to the early 2009 we can see positive impact of fiscal, monetary shock and cost push shock, this period is also known as boom before crises. On the other hand during crises all shocks expect real exchange rates are negative.

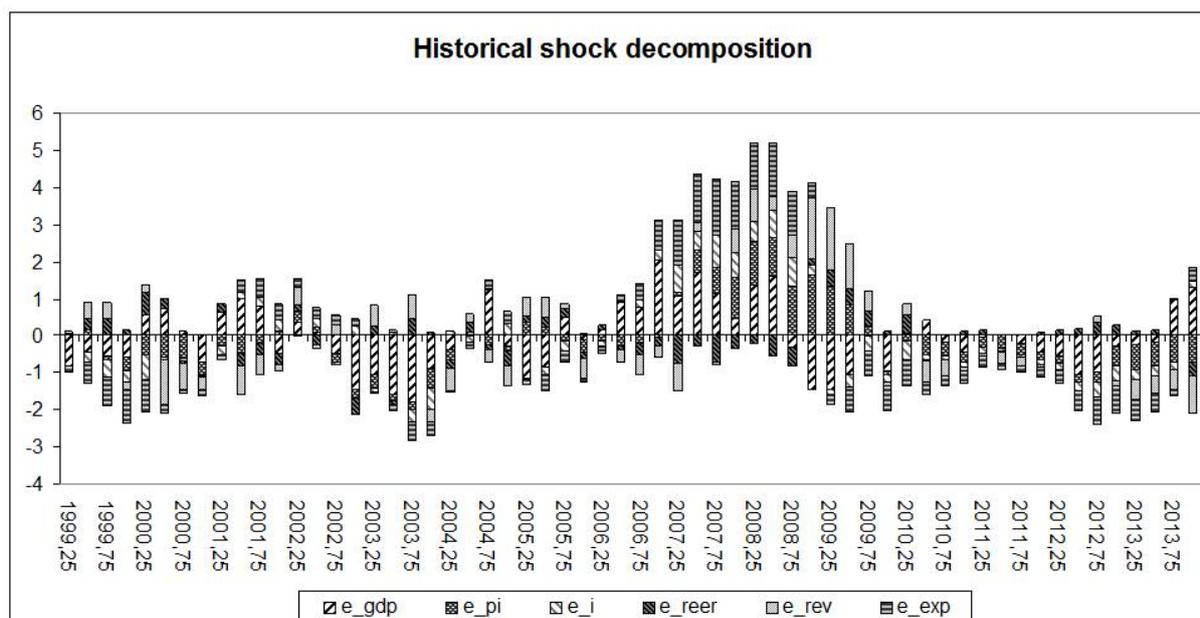


Figure 3: Historical shock decomposition

Average contributions of shocks in percent are shown in the following table (2). From the table we can observe that the fiscal shock has the largest share at 35 percent and GDP shock has 27 percent.

Table 2: Average contributions of shocks

%	Fiscal shock		Other shocks			
	Expenditure	Revenue	GDP	Inflation	Monetary	Reer
Share	16,8	18,2	27,5	16,4	10,2	10,9

3.4. Fiscal policy and business cycle

Now when we have shown the individual influences of these shocks on gap of GDP, we have focused on identification and discussion of pro-cyclical and counter-cyclical effects of fiscal policy.

At first we compute the correlation coefficient between gap of GDP and the fiscal shock. Value of this coefficient is 0,66. It could be said that between gap of GDP and the fiscal shock is high positive correlation on the whole sample. For the location of pro-cyclical and counter-cyclical periods we drew the gap of GDP. Then, in the same figure (4), we have adjusted the data from the effect of fiscal shock obtained from historical shock decomposition.

In the period from 1999 to 2002 we can observe that the Czech economy is above the steady state and fiscal policy is acting counter-cyclical. In the next period from 2002–2005 the effect of fiscal policy is negligible. On the other hand in the 2005–2008, during economy boom, we can see the pro-cyclical effect of fiscal policy. In the last period 2009–2013 the fiscal policy is again acting counter-cyclical. On the whole sample we cannot simple decide, if the fiscal policy is acting pro-cyclical or counter-cyclical, but on the concrete time periods we can see pro-cyclical and counter-cyclical effects.

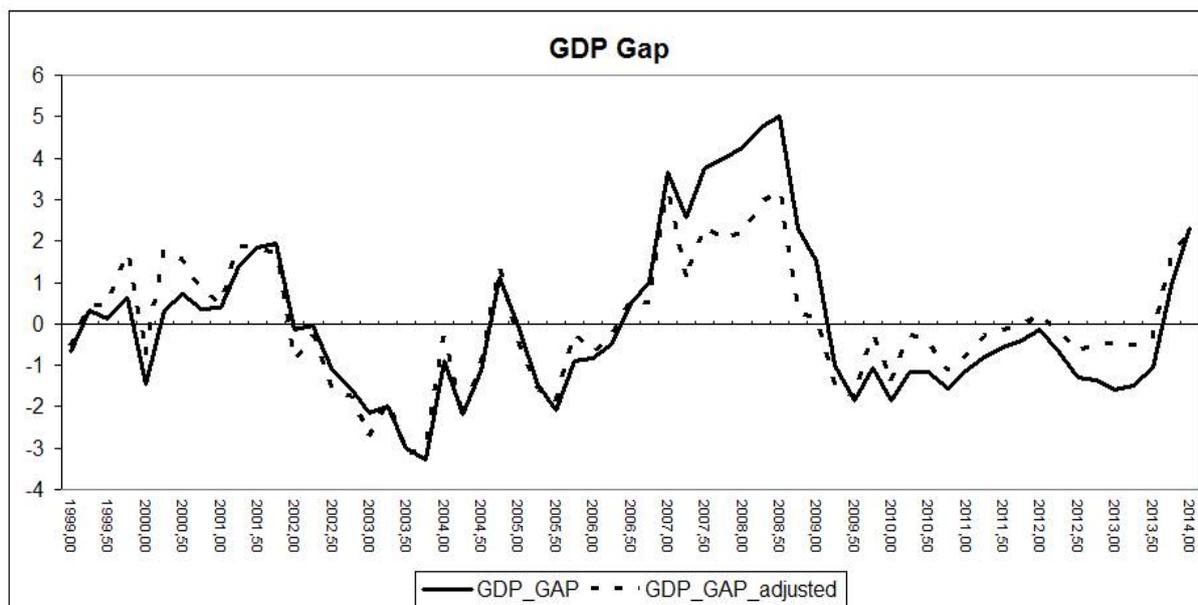


Figure 4: Gap of GDP

4. Discussion and Conclusions

In this paper we have estimated a combination of fiscal and monetary SVAR model with debt constraint on the data of Czech economy. In a direct comparison with the Haug, Jędrzejowic and Sznajderska (2013) we found several differences firstly in impulse responses. Mainly in reaction of government revenue and GDP to expenditure shock. On the other hand the results are very similar to the work of Reichel and Hloušek (2015), which uses a SVAR model for close economy.

Next we investigated the effects of fiscal policy using the variance decomposition and monetary shocks at the variability of gap of the GDP. We found out that the effect of fiscal shock is very limited with the value of 6 percent, on the other hand the effect of monetary shocks was not so negligible with the value of 23 percent.

Lastly we try to find the pro-cyclical or counter-cyclical effects of fiscal policy. For this task we used historical shock decomposition. We were unable to decide if the fiscal policy acts purely pro-cyclical or counter-cyclical. We only found out the time periods where fiscal policy act pro-cyclical and in others time periods counter-cyclical. These results are similar to those published by Parkyn and Vehbi (2013) on New Zealand economy.

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Competitiveness of the European Union: Converging or diverging tendency?

Pavĺína Balcarov¹

¹Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemedelska 1, 613 00 Brno, Czech Republic, e-mail: pavlina.balcarova@mendelu.cz

Abstract

National competitiveness is a very frequently used term in the last decades. The time period, when it was possible to call the concept of macroeconomic competitiveness into question, is gone. Nowadays all countries and economic integrations need to accept this concept and work towards improving their competitiveness. The European Union also realised this challenge and has started taking up interest in competitiveness. The EU accepted the Lisbon strategy in the year 2000 and the strategy Europe 2020 ten years later. Both this strategies indicate macroeconomic competitiveness as one of the priorities of the European Union. As it is obvious from these strategies not only the competitiveness growth is important. Major role plays the competitiveness convergence among the individual countries. The homogeneity of the EU member states is crucial for further common development and competitiveness is one of the most important indicators of the homogeneity. In the contribution we reflect this EU challenge and aim to verify, whether the differences in competitiveness among individual EU economies decrease or not. We apply two widely used competitiveness indices to evaluate competitiveness and test their convergence applying the concept of beta and sigma convergence. According to our results, convergence is confirmed only when we use the Global Competitiveness Index to evaluate competitiveness. For the World Competitiveness Index no significant results were found.

Keywords: competitiveness, European Union, beta convergence, sigma convergence, divergence, competitiveness index, regression, standard deviation

1. Introduction

Competitiveness has been in the center of expert’s attention for decades. Governments all over the world are aware of the importance of increasing national competitiveness to retain a competitive ability among other economies. It is especially important to ensure the long-term and stable competitiveness enhancement. It is not only essential for single economies to be competitive, but also for grouping of countries such as European Union. European Union has paid attention to competitiveness for several years as is attested

with two important documents accepted by the European Union. The first one is Lisbon strategy accepted in 2000 and the more recent strategy Europe 2020, which was accepted ten years later. According to these documents competitiveness is one of the priorities of the European Union. These two strategies emphasize not only the importance of the competitiveness growth in individual EU economies but also in the European Union as a whole. According to the European Commission “a competitive economy is an economy with consistently high rate of productivity growth” (European Commission, Glossary). The key role is played by the competitiveness convergence among the individual EU countries. As mention for example Malý (2014) or Dostálová (2014), the increase of the homogeneity of the EU member states is important for further common development and common economic policy creation (particularly this is true for Eurozone). And competitiveness is one of the crucial indicators of the homogeneity.

When talking about competitiveness of a country, it is necessary to define the term. The concept of macroeconomic competitiveness is quite controversial with no unambiguous definition. In this contribution we apply concept of competitiveness used by the World Economic Forum and by the International Institute for Management Development. Both institutions accepted aggregate meaning of macroeconomic competitiveness and their competitiveness indicators present a consensus in competitiveness measuring. The World Economic Forum defines competitiveness as “the set of institutions, policies, and factors that determine the level of productivity of a country” (WEF, 2014, p. 4). According to the International Institute for Management Development competitiveness is “a field of economic theory, which analyzes the facts and policies that shape the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people” (IMD, 2014, p. 493).

This contribution aims to verify, whether the differences in competitiveness among individual EU economies decrease or not, i.e. whether the competitiveness in European Union tends to converge or not. For convergence or divergence verification we use two different methods, beta convergence and sigma convergence. For competitiveness evaluation we use indicators constructed by the World Economic Forum and the International Institute for Management Development.

In the first part of the contribution we introduce the methods of competitiveness evaluation used. Also the methods of beta and sigma convergence are specified. The next part displays the results of our research. In particular, beta and sigma convergence of competitiveness indicators are assessed and described. In conclusion results of both methods are compared and policy recommendations discussed.

2. Methodology and Data

For competitiveness evaluation we use two well-known competitiveness indices measuring competitiveness at national level. We use two indices to make the results more robust. The first index is constructed by the World Economic Forum (hereafter WEF) and the second one is constructed by the International Institute for Management Development (hereafter IMD). These two competitiveness rankings were chosen for several reasons. Firstly, both of them are constructed yearly for decades and can be considered as a consensus among economists when evaluating competitiveness. Both institutions define competitiveness in aggregate conception and cover a lot of various

indicators when constructing competitiveness index. These indices correspond with the competitiveness definitions mentioned above. And finally both rankings cover a wide range of countries from the whole world including European Union economies. The WEF assess competitiveness of the country by the Global Competitiveness Index (hereafter GCI), the IMD use the index, which we will call the World Competitiveness Index (hereafter WCI). The methodology and construction of these two indices as well as their advantages and disadvantages were published formerly in conference paper “Multi-speed European Union – An assessment from the competitiveness point of view” (for further details see Balcarová (2014)).

To verify convergence of competitiveness in the European Union we use the concept of beta and sigma convergence. The methodology of both these methods is based on the neoclassical theory. The beta convergence concept is the older one, we can find fundamental ideas in the work of Maddison (1982) or Baumol (1986). The beta convergence theory proposes that initially poorer countries grow faster. It means poorer countries converge to initially richer countries because of more dynamic growth. This concept was labelled by Barro and Sala-i-Martin (1992) to be distinguished from sigma convergence. Baumol (1986) constructed the original equation to illustrate the beta convergence. Many authors used this equation in modified versions (for example Sala-i-Martin, 1996). In this contribution we estimate the equation (1):

$$\frac{1}{t-1} \cdot \log\left(\frac{y_{i,T}}{y_{i,t_0}}\right) = \alpha + \beta \cdot \log(y_{i,t_0}) + \varepsilon_i, \quad (1)$$

where t is the length of the time period ($t=11$), y is the chosen variable (i.e. GCI, WCI respectively), i is index for individual countries ($i=1, \dots, 22$), T is the last year of the time period ($T=2014$), t_0 is the base year (i.e. the first year of the time period, $t_0 = 2004$), α is the intercept, β is the slope parameter and ε_i is an error term. If $\beta < 0$, then we can speak about beta convergence in competitiveness among the selected economies. If $\beta > 0$, the differences in competitiveness among selected economies increase (i.e. we speak about divergence).

As emphasizes Dvoroková (2014), convergence analysis with the use of the beta convergence concept has one weakness as it only focuses on average values for the whole time period. It does not tell us anything about convergence process in particular years. In this case the concept of sigma convergence is much more appropriate. Among others, for example, Quah (1993) or Friedman (1992) emphasize the significance of the sigma convergence concept. Sigma convergence is defined as the decrease of dispersion of the selected indicator (in this contribution GCI, WCI respectively) among economies in the selected time period. The verification of the sigma convergence is based on the standard deviation (σ):

$$\sigma_t = \sqrt{\frac{1}{z-1} \sum_{i=1}^z (\log y_{it} - \overline{\log y_t})^2}, \quad (2)$$

where y is the chosen variable (i.e. GCI, WCI respectively), i is index for individual countries ($i=1, \dots, 22$), z is the number of economies included ($z=22$), t means year. We can speak about sigma convergence among selected economies, if $\sigma_t > \sigma_{t+1}$, i.e. the standard deviation decreases in time.

We can find a lot of contributions on the comparison of beta and sigma convergence concepts and their results. For example, we can mention Sala-i-Martin (1996), Young,

Higgins and Levy (2008) or Slavík (2007). These studies confirm the relationship between beta and sigma convergence: beta convergence is a necessary but not sufficient condition for sigma convergence.

In the contribution we analyze competitiveness of the European Union economies in the years 2004–2014. We have time series 11 years long for 22 economies (EU-22). The reason for the omission of 6 countries from our analysis is the limited data availability. Malta and Cyprus are not covered in IMD's competitiveness ranking, but this doesn't present any problem, as Malta and Cyprus are just small island territories and can be easily omitted. Moreover, some EU countries are included in IMD ranking only in last few years. This is the case of Bulgaria and Croatia, who are included in the ranking since 2006, Lithuania since 2007 and Latvia since 2013, which increases variance in these years and biases the overall results. For this reason we use only the countries, for which we have time series 11 years long in case of both indices, i.e. hereafter we analyze competitiveness convergence in EU-22.

In some cases, where it is more suitable, we work with logarithms of competitiveness indices to approximate to the normal distribution. The method of the ordinary least squares (OLS method) is applied to estimate the parameters of the linear regression equation (1).

3. Results

In this part the results of beta and sigma convergence models are presented. Furthermore, the statistical significance of both models was tested. In both cases we firstly used GCI as a measure of competitiveness of the EU economies. Then the results were verified by the use of the second index, WCI.

3.1. Beta convergence

The results of the beta convergence model when we used the Global Competitiveness Index to evaluate competitiveness are in Table 1. We use the average growth of competitiveness (expressed as GCI) as the dependent variable and the independent variable is GCI in the base year (i.e. 2004). We calculate logarithms of both variables to approximate to the normal distribution.

Table 1: Results of the beta convergence model for GCI

	coefficient	stand. error	t-ratio	p-value
const	0,039	0,021	1,870	0,076 *
l_GCI_2004	-0,026	0,013	-1,952	0,065 *
determination coefficient			0,160	
p-value (F-test)			0,065	
p-value (White test)			0,113	
p-value (Jarque-Bera test)			0,134	

We use t-test to test individual model parameters and F-test to test the statistical significance of the model as a whole. The coefficient β is statistically significant on the 10% significance level as well as the model as a whole (according to F-test). The value of the coefficient of determination indicates that the average competitiveness growth is explained in 16% by the initial level of competitiveness measured by GCI.

The econometric verification of the tested model is also of great importance. Heteroscedasticity was tested using the White test. According to the test, the p-value is bigger than 0,05. Thus the model can be considered as homoscedastic on the 5% significance level. Residuals normality was tested using Jarque-Bera test. Again, the p-value is bigger than 0,05, i.e. we can confirm normal distribution of residuals on the 5% significance level.

We found negative dependency of the average GCI growth on the GCI value in the base year. Because of the negative value of the parameter β , we can make a conclusion about competitiveness convergence in the European Union in the selected time period. The higher is the value of GCI in the base year (2004), the lower is the average competitiveness growth. The differences in competitiveness among individual EU countries decrease slightly. As can be seen in Figure 1, the indirect proportion between GCI growth and GCI level in the base year is confirmed just for some countries.

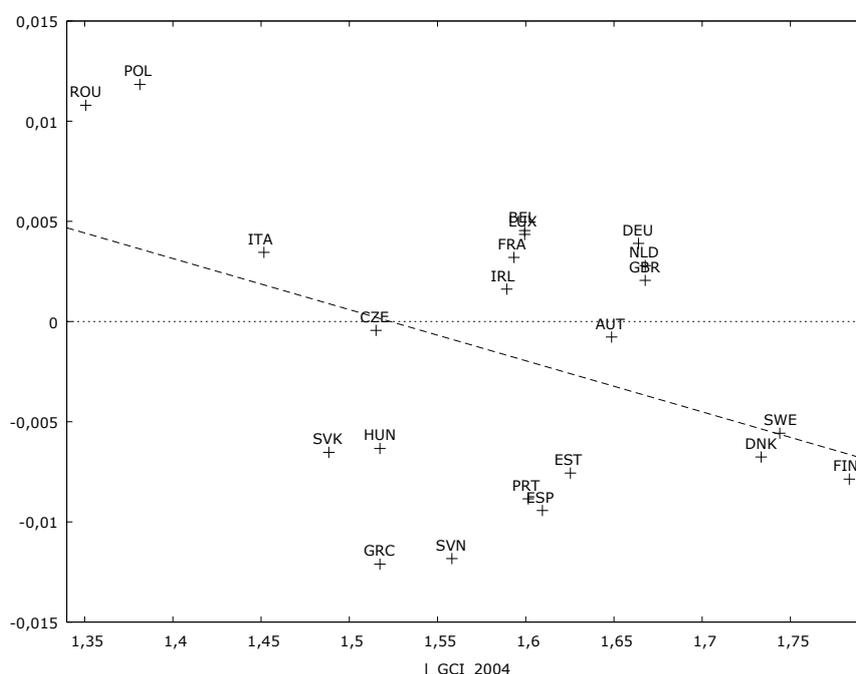


Figure 1: The relationship between GCI growth (2004–2014) and initial level (2004)

If we look at the figure, we can see a negatively sloped regression line, which indicates again convergence among the EU economies in the time period 2004–2014. In the left-up part we can identify a group of the EU countries which competitiveness converges up (Italy, Poland and Romania). These countries were the least competitive economies in the EU-22 in the year 2004 and their competitiveness growth during the time period was the highest (this is especially true for Poland and Romania). We can state, that these economies were catching up. On the contrary in the right-down part of the figure lie countries with high initial level of competitiveness, but whose competitiveness deteriorated, thus we can designate them countries which converge down (Finland, Sweden, Denmark, Spain, Portugal or Estonia). Countries in the left-down and right-up part of the figure rather diverge, as in case of Western European economies (competitiveness of these economies was high in the year 2004 and further grew) and Slovenia, Slovak Republic, Greece or Hungary (where competitiveness level was rather low in the base year and further decreased).

The same regression equation was estimated for the second index, the World Competitiveness Index. We used logarithms of both variables again to approximate to the normal distribution. The results are in Table 2. Parameter β is again negative, but according to the p-value is statistically insignificant. The same results we gain for the model as whole according to the F-test. Result of the White test is unsatisfactory, the p-value is smaller than 0,05, i.e. we must reject the hypothesis about homoscedasticity.

Table 2: Results of the beta convergence model for WCI

	coefficient	stand. error	t-ratio	p-value
const	0,060	0,062	0,970	0,344
\ln_WCI_2004	-0,015	0,015	-0,980	0,339
determination coefficient			0,046	
p-value (F-test)			0,339	
p-value (White test)			0,021	
p-value (Jarque-Bera test)			0,070	

These results are confirmed by Figure 2. Yet it seems that the only economy converging markedly up is Poland, Romania did not achieve so good results as according to the GCI (see Figure 1). Furthermore, we can identify a few countries with high initial WCI level, whose competitiveness decreased (Austria, Finland, Belgium, Spain or Estonia). These countries were according to our methodology converging down. As rather diverging economies we can mark Greece, Slovenia, Germany or Great Britain. But mostly the countries are neither converging nor diverging according to our results, when WCI was used to evaluate competitiveness.

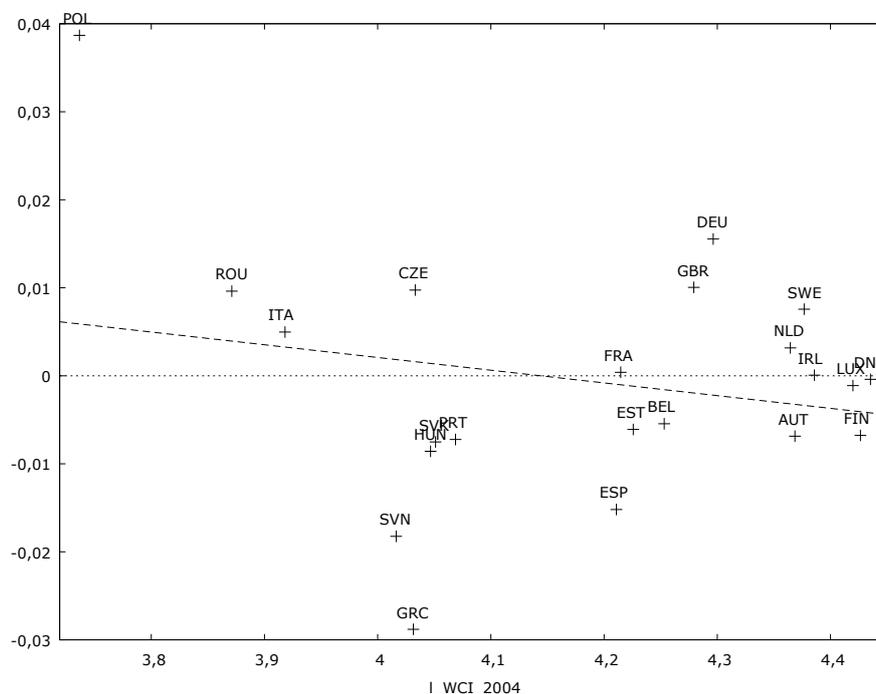


Figure 2: The relationship between WCI growth (2004–2014) and initial level (2004)

3.2. Sigma convergence

Finally, we analyze the convergence of competitiveness in the European Union using the methodology of sigma convergence. For the sigma convergence analysis we need to compute the standard deviations of competitiveness of all 22 EU economies for each year from the time period 2004–2014. The trend of standard deviations for all 11 years is shown in Figure 3 (for GCI) and Figure 4 (for WCI).

As we can see in Figure 3, the straight line has a negative slope, thus it seems, that competitiveness in the European Union converges in the time period 2004–2014. But as we can see in Table 3, the sigma convergence model as well as the results is not statistically significant.

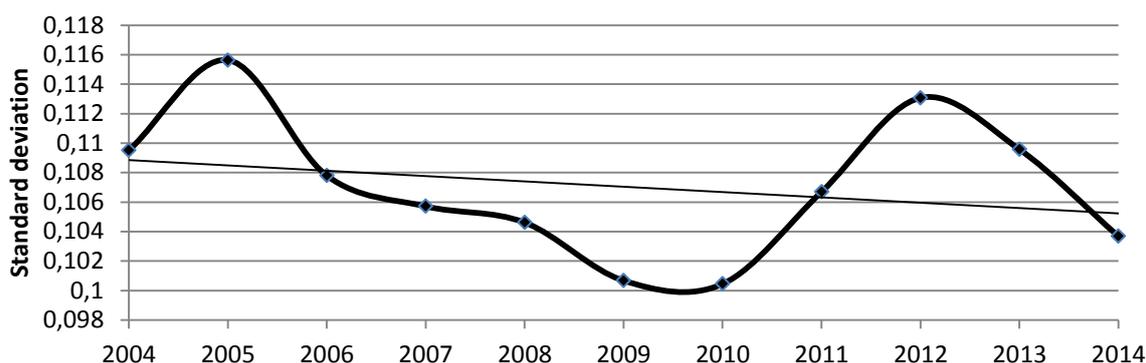


Figure 3: Sigma convergence in the years from 2004 to 2014 – GCI

Table 3: Results of the sigma convergence model for GCI

	coefficient	stand. error	t-ratio	p-value
const	0,109	0,003	34,810	<0,001***
time trend	-0,0004	0,0005	-0,781	0,455
determination coefficient			0,065	
p-value (F-test)			0,455	
p-value (White test)			0,732	
p-value (Jarque-Bera test)			0,879	

The standard deviation computed for the Global Competitiveness index of individual EU economies has downward sloped tendency especially in the time period 2005–2009. But we can see several turning points in the development, markedly in the years 2005, 2010 and 2012. The first turn was caused on the one hand by the competitiveness growth in the least competitive countries in 2006 (first of all in Romania) and on the other hand by GCI decline in the most competitive Finland in the same year. From 2006 to 2010 the competitiveness differences among individual EU economies decreased. The opposite was the development in the years 2011 and 2012. The competitiveness of the most competitive countries further increased (especially in Finland, Netherlands and United Kingdom), contrariwise competitiveness of the least competitive countries decreased (especially in Greece, Slovak Republic and Romania). This may be caused by the economic crisis, when more competitive economies recover more quickly than the poorer ones. The trend turned over in 2013 and competitiveness differences of EU economies began to decline again.

In the Figure 4 it is shown the development of standard deviation in the time period 2004–2014, when we used WCI to evaluate competitiveness of the EU-22 economies. We can again see a straight line with negative slope. But similar to the previous results, not in this case the model was statistically significant. The statistical and econometric verification results are in Table 4. When looking at Figure 4 again, we can see that the results in individual years are so volatile that we hardly ever can speak about converging or diverging tendency.

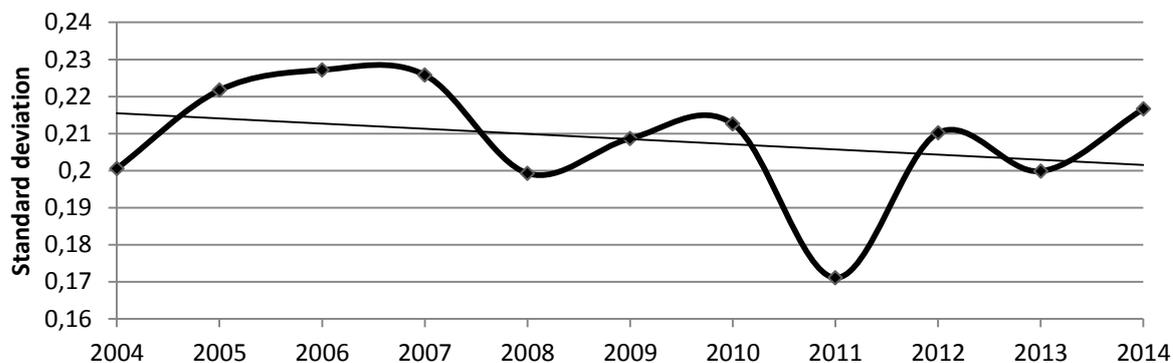


Figure 4: Sigma convergence in the years from 2004 to 2014 – WCI

Table 4: Results of the sigma convergence model for WCI

	coefficient	stand. error	t-ratio	p-value
const	0,217	0,010	20,920	<0,001***
time trend	-0,004	0,002	-0,917	0,383
determination coefficient			0,086	
p-value (F-test)			0,383	
p-value (White test)			0,890	
p-value (Jarque-Bera test)			0,176	

If we focus on the most noticeable turning points, we can discuss their main reasons. The increase of standard deviation in 2005 as well as in 2012 was caused by the decline of competitiveness in the least competitive economies (Spain, Portugal, Greece, Slovenia, Italy and Romania). The convergence (i.e. decrease of standard deviation) in 2008 was influenced partly by the decline of competitiveness in the most competitive economies (first of all Denmark, Luxembourg, Austria, Netherlands and Germany) and partly by the competitiveness growth in the countries like Poland, Greece or Slovenia (i.e. growth in not much competitive countries). Such different was the development in 2011. In this year competitiveness grew in most economies, but the rate of growth of WCI was higher in the less competitive economies, i.e. the less competitive economies were catching up.

4. Discussion and Conclusions

The aim of this contribution was to verify, whether the differences in competitiveness among individual EU countries decrease or not. For the competitiveness evaluation we used two well-known indices, GCI and WCI, which present a consensus in a country competitiveness measurement. Because of the limited data availability in case of the WCI, we tested convergence among 22 EU economies (EU without Bulgaria, Croatia,

Cyprus, Latvia, Lithuania and Malta). The convergence of competitiveness indicators was verified by two different methods known as beta and sigma convergence.

First, we used the Global Competitiveness Index. According to our results, beta convergence among EU member states can be confirmed at the 10% significance level in the time period 2004–2014. It was proved, that the initially less competitive countries achieved higher competitiveness growth than the initially more competitive economies. This is caused first of all by Italy, Poland and Romania, which converge up and on the other side Finland, Sweden, Denmark, Spain, Portugal and Estonia, which converge down. The converging tendency was not confirmed with the use of sigma convergence concept as the results are statistically insignificant. Better results could probably be achieved if data for all countries were available because countries with initially very low competitiveness have higher growth potential to catch up the more competitive economies. And this is especially true for the economies omitted from our analysis (Bulgaria, Croatia).

So much the less credible were the results, when we used the World Competitiveness Index instead of the GCI. Beta convergence testing did not prove any statistically significant results. We can identify just a few countries in the EU, which conclusively converge in the time period 2004–2014. When testing sigma convergence, we must state, that in the time period 2004–2014 the disparities among individual EU countries did not neither decrease, nor increase. The standard deviation was in the whole period very volatile and the model is statistically insignificant. It is not possible to make any conclusion about sigma convergence or divergence.

To conclude, the convergence among the individual EU economies was not confirmed. But according to the author's meaning it should be perceived positively, that we did not confirm the opposite result, i.e. divergent tendency in competitiveness in the European Union was also not confirmed. The small differences caused by the use of different competitiveness indicators are to be the object of further research. There are several possible reasons of this difference. Among others we can mention the different construction of the competitiveness indices or shorter time series in case of the World competitiveness index. We can suppose that the results would be more persuasive, if we would have data for all EU economies and the whole time period.

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Minimum Variance Investing on the Prague Stock Exchange

Jan Bastin¹

¹Department of Banking and Insurance, Faculty of Finance and Accounting, University of Economics in Prague, nám. W. Churchilla 4, 130 67 Praha 3, Czech Republic, e-mail: xbasj08@vse.cz

Abstract

The paper focuses on out-of-sample risk-return characteristics of a minimum variance portfolio on the Prague Stock exchange in the period 2006–2013. Due to the lost decade on equity markets (2000–2010), which included two huge drawdowns, investors and academic authors have revived the minimum variance concept. This article shows the construction of a minimum variance portfolio and the impact of different constraints on the portfolio performance. As expected a minimum variance portfolio has lower risk in comparison with the PX index or an Equal-weighted alternative, but it also has higher returns. Finally, warnings and recommendations are discussed.

Keywords: minimum variance portfolio, Prague stock exchange, risk, return

1. Introduction

Many investment practitioners and scholars are interested in the portfolio construction process. It was first formally published by Markowitz (1952) who demonstrated the efficient frontier. A rational investor has to maximize expected returns with a given level of risk, minimize the variance of returns with a given level of expected returns or both maximize returns and minimize risk. Portfolios which do not have those parameters are dominated and are not efficient. The efficient portfolio with the lowest risk is the minimum variance (volatility) portfolio. The basic portfolio theory was modified by Tobin (1958) and Sharpe (1964), who included a risk-free asset that resulted in a linear efficient frontier called the Capital Market Line (CML). With the development of the Efficient Market Theory, many believed that a market-cap weighted portfolio was an efficient portfolio and thus the best investment opportunity in the risk-return context. Because of this, Index funds and ETFs became an important part of equity portfolios.

Unfortunately, the performance of market-cap weighted indices was disappointing in the lost decade (2000–2010). Two huge drawdowns (the technology sector “bubble” and the financial crisis) pushed stock prices to their local minimum. As a result of this high

volatility period, investors and academics are demanding an alternative to the classical market-cap investing, potentially a renewal of the minimum variance concept.

Haugen and Baker (1991) were probably the first who tried to measure the minimum variance portfolio's performance. They argue that a market-cap weighted portfolio is efficient only if a set of assumptions is satisfied (All investors agree about the risk and the expected return for all securities; All investors can short-sell all securities; There are no taxes on security returns; An investment opportunity set for all investors holding any security in the index is restricted to the securities in the market-cap portfolio). Naturally, those conditions are very strong and probably not satisfied in reality. Authors created minimum variance portfolios from a population of 1000 of the largest stocks in the U.S. market for every quarter in the period 1972–1989. They concluded that the minimum variance portfolio had lower risk and same/higher return than the market-cap weighted portfolio (Wilshire 5000) and described the strategy of investing in a market-cap weighted index as an inefficient approach. A similar idea is applied by Clarke, de Silva and Thorley (2006). They analyzed the U.S. stock market for a longer period (1968–2005) and reported results similar to Haugen and Baker. Other papers documented characteristics of minimum variance investing; for example Scherer (2010), Baker, Bradley and Wurgler (2011) or Clarke, de Silva and Thorley (2011).

This article focuses on the Czech stock market, more specifically on constituents of the PX index, a market-cap weighted index of the Prague Stock Exchange. The objective of the paper is to construct minimum variance portfolios (containing PX members) with different constraints and report their characteristics.

The text is organized as follows: the data and methodologies are explained in the first part; next, results are reported; and finally, a discussion and warnings conclude the paper.

2. Data and Methodology

As pointed out above, we focus on stocks from the PX index – the index of the Prague Stock Exchange. The index contains a small number of stocks (9 to 15 stocks at its base in the period studied). The sources of data are the Prague Stock Exchange, the Patria database and the Czech National Bank (CNB). The period studied is from June 2006 to June 2013. Daily total returns of stocks are used in the analysis.

The text presents minimum variance portfolios in the Markowitz approach and adds additional constraints. We minimize the portfolio risk (the variance of returns):

$$\sigma_p^2 = \sum_{i=1}^N \sum_{j=1}^N \sigma_{i,j} w_i w_j \rightarrow \text{minimize} \quad (1)$$

Where σ_p^2 is the variance of returns of portfolio p;
 $\sigma_{i,j}$ is the covariance between returns of asset i and asset j;
 w_i is the weight of asset i in the portfolio;
 N is the number of assets in the portfolio.

The variance is optimized with a given level of portfolio yield:

$$R_p = \sum_{i=1}^N w_i r_i \quad (2)$$

Where R_p is the return of portfolio p;
 r_i is the return of asset i.

We assume some constraints:

$$\sum_{i=1}^N w_i = 1 \quad (3)$$

$$w_i \geq 0 \quad (4)$$

$$w_i \leq 2 \cdot \frac{1}{N} \quad (5)$$

$$w_i \geq \frac{1}{2} \cdot \frac{1}{N} \quad (6)$$

We create 3 minimum variance portfolios. The first one (MVP1) has constraints (3) and (4). The second one (MVP2) has constraints (3), (4) and (5). The last one (MVP3) has constraints (3), (5) and (6). Through these constraints, every minimum variance portfolio is fully invested in stocks and short sales of assets are restricted. Because of a low number of stocks in the universe, the MVP2 has a constraint of a maximum weight (2 times the equivalent of an equal-weighted portfolio) of individual asset to ensure that one security does not have a significant weight in the portfolio. For the same reason we add constraint (6) in the MVP3 case to diversify funds and add all available stocks to the portfolio.

At the end of each quarter from June 2006 through March 2013, minimum variance portfolios with different constraints are created. Those portfolios can contain equities that satisfy two conditions: 1) They are members of the PX index as of the formation date; 2) They are quoted on the exchange for at least one year as of the formation date. Sixteen stocks satisfied these constraints: CETV, CEZ, ERSTE GROUP BANK, KOMERCNI BANKA, ORCO, PHILIP MORRIS CR, TELEFONICA O2, UNIPETROL, ZENTIVA, ECM, PEGAS NONWOVENS, AAA, VIG, NWR, KITD and FORTUNA. The first condition is specified for a reasonable comparison to the PX index and the second is defined to estimate a covariance matrix. Thus, we estimate covariance matrices (28 quarters) with 252 days of historical return data. Due to a different number of stocks at the end of each quarter, the number of elements in the matrices also changes. Then, we use stock characteristics and covariance matrices to minimize the portfolio risk. Finally, we measure portfolio returns. If a stock disappears from the portfolio during a quarter (for example because of end of quotation on the exchange), the market value of this stock is divided into parts calculated with optimized weights of other stocks. Those parts are added to relevant stocks in the portfolio.

For a reasonable comparison we recalculate PX index returns, because the index itself does not include dividends. We also form an equal-weighted portfolio containing stocks satisfying requirements described above for an alternative comparison. This can be considered as a naive diversification approach.

The calculation of portfolio returns is provided with arithmetic and geometric averages. Standard deviations and Betas act as proxies for risk. Risk-adjusted performance measures are represented by Jensen alphas and Sharpe ratios. A classical linear regression model is used to estimate alpha and beta:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_p(R_{m,t} - R_{f,t}) + u_{p,t} \quad (7)$$

Where

$R_{p,t}$	is the portfolio return in time t;
$R_{f,t}$	is the risk-free rate proxy (PRIBOR 3M Deposit) in time t;
$R_{m,t}$	is the return of market portfolio proxy (PX index) in time t;
α, β	are estimated parameters;
$u_{p,t}$	are residuals.

Jobson and Korkie (1981) and Memmel (2003) demonstrated a statistic (z-score) that tests if the difference between two Sharpe ratios is statistically significantly different from 0. We also apply this measure:

$$z = \frac{SR_p - SR_m}{\sqrt{\frac{1}{T} \left[2 - 2\rho_{p,m} + \frac{1}{2}(SR_p^2 + SR_m^2 - 2SR_p SR_m \rho_{p,m}^2) \right]}} \quad (8)$$

Where $SR_{p,m}$ is the Sharpe ratio of portfolio p (or the market proxy);
 $\rho_{p,m}$ is the correlation between returns of portfolio p and the market proxy;
 T is the number of observations.

3. Results

Historical characteristics of portfolios are demonstrated in table 1. In general, minimum variance portfolios are less risky in comparison with the PX index or the equal-weighted alternative. This is true in terms of standard deviations and also Betas. MVP1 has an annualized standard deviation of 17.2% and a Beta of 0.49. This means a decrease of 30% in volatility in comparison with the PX index and a huge reduction of systematic risk. Risk measures of MVP2 and MVP3 are also lower than the PX index characteristics. MVP1 and MVP2 also outperform the PX index in returns. This shows that the PX index is an inefficient investment alternative in the risk-return world. The highest cumulative returns were produced by the MVP1 (50.9%) and the lowest by the equal-weighted portfolio (-42.2%). Only MVP1 and MVP2 have positive Sharpe ratios. Alphas of minimum variance portfolios are not statistically significant. This is the same case for the z-score statistic. This means that differences in Sharpe ratios of minimum variance portfolios and the PX index are not statistically significantly different from zero. We reject the null hypothesis on the 10% level only in the case of the equal-weighted portfolio (naive diversification alternative).

Table 1: Historical characteristics of portfolios in the period 2006–2013

	MVP1	MVP2	MVP3	E-W Portfolio	PX index (+Dividends)
Annualized Average Returns	7.32%	6.05%	1.07%	-4.81%	1.73%
Annualized Geometric Average Returns	5.85%	4.17%	-0.97%	-7.80%	-1.88%
Annualized Standard Deviation	17.16%	19.36%	20.17%	24.39%	26.81%
Sharpe ratio	0.0194	0.0131	-0.0031	-0.0178	-0.0008
Systematic Risk (β)	0.4879	0.6129	0.6690	0.8299	1.0000
Alpha (α)	0.02%	0.02%	0.00%	-0.03%	
Alpha (t-statistic)	1.2949	1.0861	-0.2200	-1.7511	
z-score	1.2271	1.0536	-0.2064	-1.7059*	
Cumulative Returns	50.85%	34.06%	-6.59%	-42.22%	-12.38%

Note: ***, **, * denote rejection of the null at the 1%, 5% and 10% level of significance

In table 2, year-by-year returns are presented (measured from the end of June of year Y-1 to the end of June of year Y). All portfolios had negative returns in the bear market year 2008. MVP1 and MVP2 outperformed the index in four out of seven years and MVP3 outperformed the PX in three out of seven years. Minimum variance portfolios had lower losses vis-à-vis the index in bear market periods (from June 2008 to June 2009 and from June 2011 to June 2012).

Table 2: Year by year Returns

	MVP1	MVP2	MVP3	E-W Portfolio	PX index (+Dividends)
2007	35.15%	33.68%	35.65%	36.17%	37.50%
2008	-32.72%	-33.77%	-34.92%	-33.07%	-16.46%
2009	7.33%	-2.65%	-11.48%	-30.67%	-36.82%
2010	28.83%	34.86%	31.33%	32.96%	29.19%
2011	17.50%	14.65%	11.54%	7.19%	17.47%
2012	-3.51%	-3.74%	-14.69%	-27.68%	-22.75%
2013	5.84%	4.51%	-4.34%	-11.28%	2.98%

The next figure is divided into four parts showing the comparison of realized rolling one-year standard deviation of returns between portfolios and the PX index. All minimum variance portfolios had lower volatility risk throughout the period studied. The picture supports results in table 1 – minimum variance portfolios are less risky than the PX index.

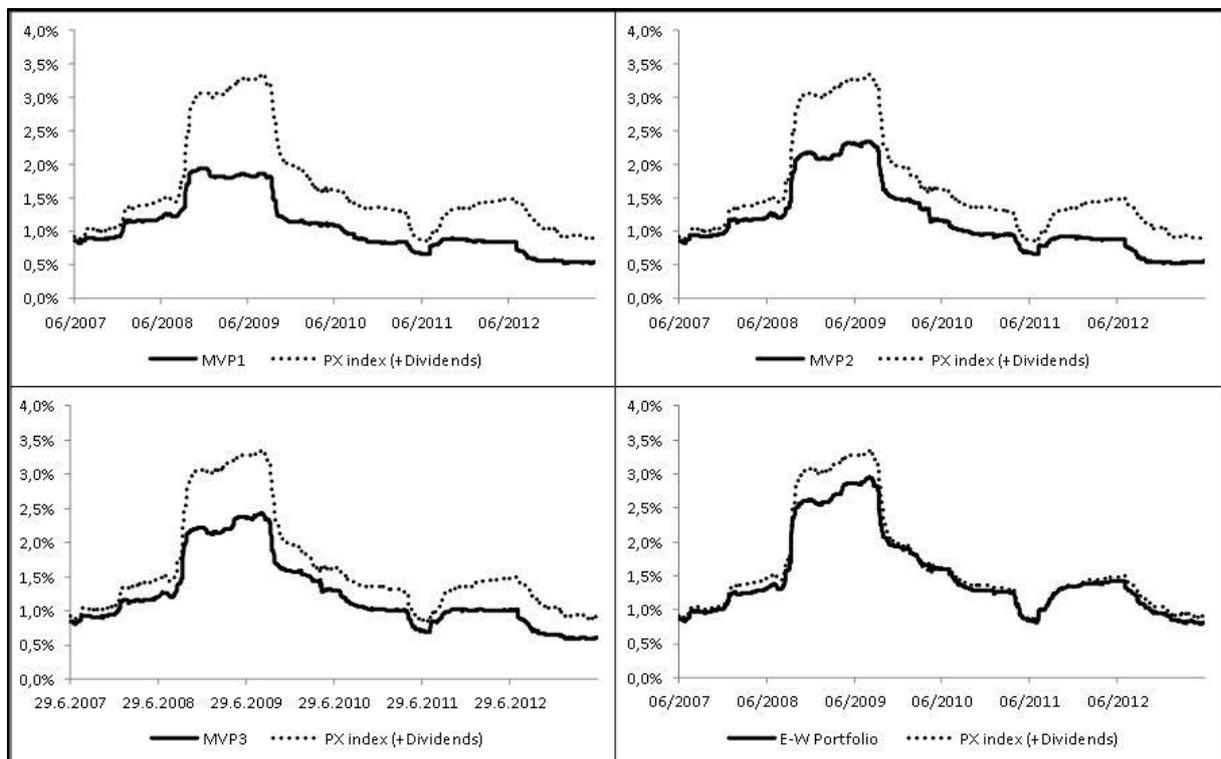


Figure 1: 250 days trailing standard deviations of portfolios

Figure 2 is similarly formatted – there are 4 graphs with rolling one-year returns of portfolios. There are some periods when minimum variance portfolios had higher returns, but there are also periods that show lower returns than the PX index. On average, MVP1 and MVP2 outperformed the market – this is also supported by results in table 1.

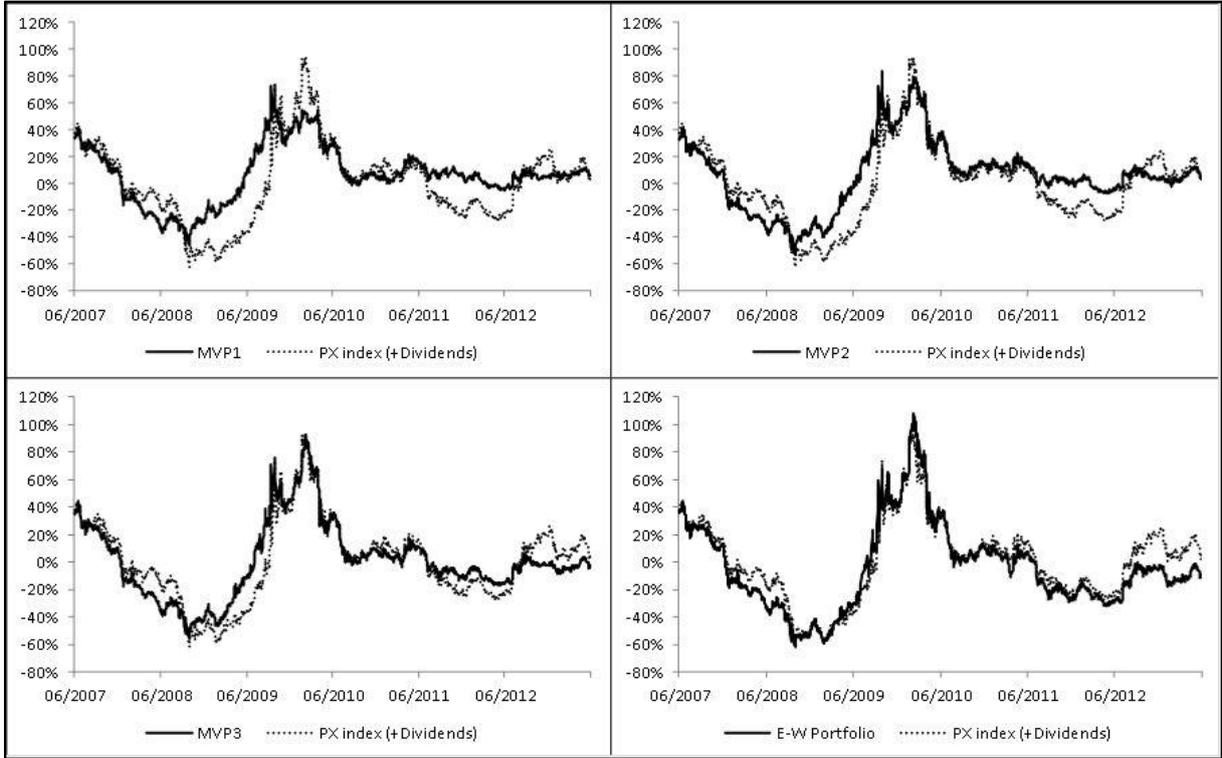


Figure 2: 1 Year trailing returns of portfolios

Finally, cumulative returns of our investment opportunities are demonstrated in figure 3. We clearly see the effect of the optimization technique. Minimum variance portfolios did not have as wide fluctuations in returns as the index. The drawdowns in the financial crisis period were less painful for minimum variance portfolios. MVP1 fell by 47%, MVP2 fell by 55%, MVP3 fell by 59%, the equal-weighted portfolio fell by 69% and a drawdown of 66% was measured for the PX index. Values of portfolios declined in a similar way in the August 2011 drawdown. MVP1 and MVP2 were able to cover losses from bad times and they had higher cumulative returns at the beginning of 2013 in comparison with the financial crisis period or the August 2011 crash. This is not the case for our other alternatives.

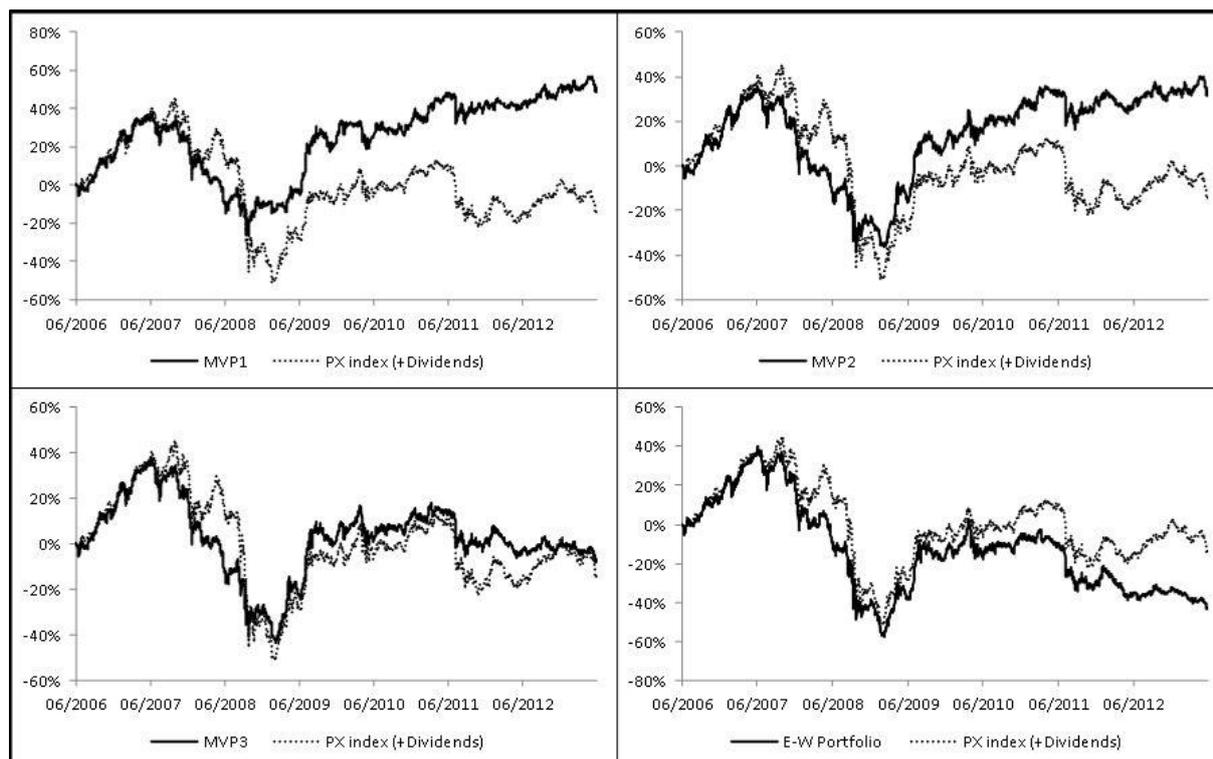


Figure 3: Cumulative returns of portfolios in the period 2006–2013

4. Discussion and warning

Academic papers have documented better risk-return measures of minimum variance portfolios in comparison with a market-cap weighted index. What is the reason for this “pattern”? Scherer (2010) reported that 83% of the variation of the minimum variance portfolio excess returns can be attributed to the Fama and French factors (see Fama and French (1996)): value and size. He also showed that minimum variance portfolios tend to have low beta and low volatility stocks. This fact can be related to the “low risk anomaly” described in Ang, Hodrick, Xing and Zhang (2006), Blitz and van Vliet (2007), or Baker, Bradley and Wurgler (2011). These authors demonstrated that low volatility and low beta stocks outperform high-risk stocks as well as the market proxy in the long-run with statistically significant results. In general, performances of minimum variance portfolios seem to be related to pricing anomalies. We are not able to provide a similar analysis in the Czech stock market. It is too small and it has a low number of stocks quoted on the exchange. There is also a much shorter data history, which is not the case of developed equity markets. In this context, it is useful to provide a warning about results presented in the text above.

As pointed out, the Czech stock market is very small in comparison with other markets. It also has a very low number of high-liquid stocks. The same is true for the PX index. The result is an undiversified index and thus undiversified minimum variance portfolios. Figure 4 shows the number of stocks held by minimum variance portfolios and the PX index. We can see that the number of stocks in minimum variance portfolios increased with the number of additional constraints. There are some periods when the MVP1 held only four stocks. This is not a good diversification. We do not incorporate fees for stock trading or bid-ask spreads, which is another problem with this analysis. To

be correct, we have to warn and note that the outperformance of minimum variance portfolios can be a result of chance. Risk adjusted performance results were not statistically significant and the period studied is only 7 years, which is a very short period in comparison with cited articles (cited texts reported similar results on developed markets in a time-horizon of 40 years).

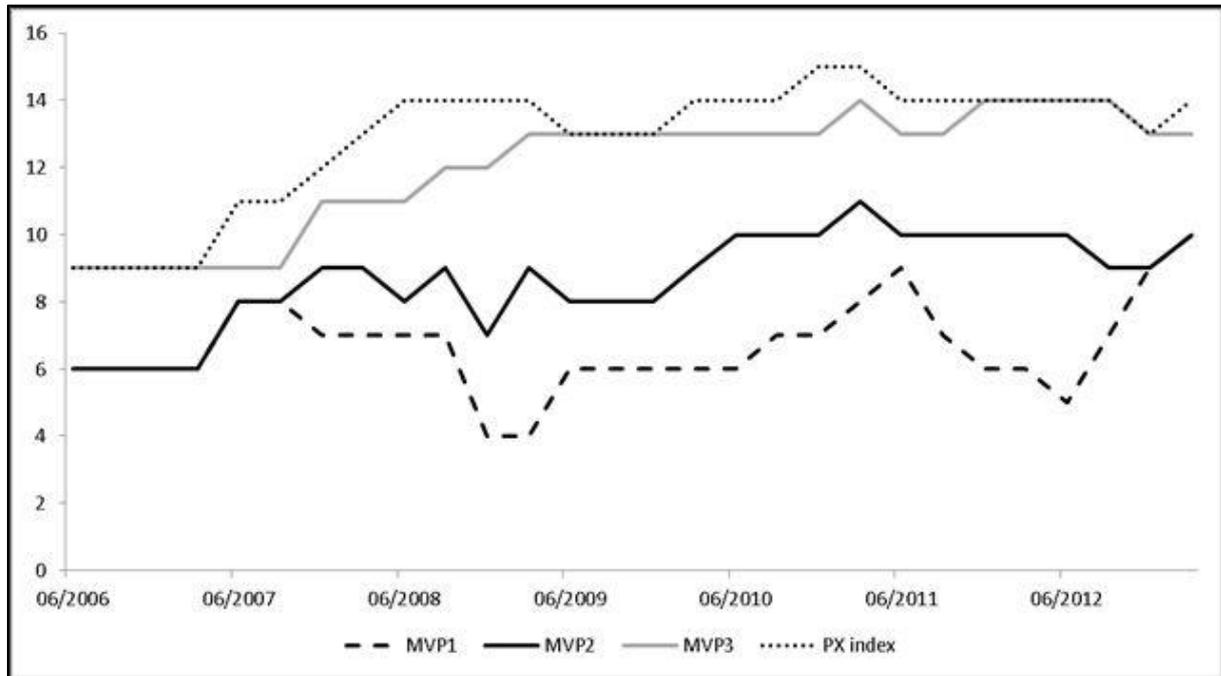


Figure 4: The number of stocks in portfolios in the period 2006–2013

Due to the problem of diversification in the Czech stock market, it is better to consider it as a part of the Central and Eastern Europe region, and thus only as a part of investors' equity portfolio. It seems that the PX index is an inefficient investment opportunity in the risk-return world. Market-cap weighted indices on developed markets are also inefficient (see cited texts). So, pose the question: Why are market-cap weighted portfolios considered as market portfolio proxies? According to the basic portfolio theory, a market portfolio lies on the efficient frontier. Empirical works show us that is not the case for market-cap weighted portfolios (indices). They are dominated by other investment opportunities. Financial institutions investing in stocks also use market-cap indices as benchmarks (see Baker, Bradley and Wurgler (2011)) and try to track them. Thus, the result is the fact that their portfolios are inefficient and dominated. The objective of those institutional investors is to minimize tracking error instead of optimize the risk-return profile using the available stock universe. It is correct to point out that a minimum variance portfolio is not a market portfolio proxy, but it can offer better risk-return characteristics than market-cap weighted alternatives in the long-run period. Perhaps it is time to think about reducing weights of market-cap weighted indices in benchmarks in favour of minimum variance portfolios, or at least invest a small part of equity funds in the minimum variance strategy.

5. Conclusion

We studied minimum variance portfolios and their characteristics on the Czech stock market in the period 2006–2013. Those investment opportunities had both lower risk and the same or higher returns than the market-cap weighted PX index. Properties reported above are similar to developed equity markets. We also provide a warning; investing on the Czech stock market alone is not a clever way to diversify risk. It should be seen only as a part of the equity investor's portfolio.

The minimum variance portfolio concept seems to be alive and applicable. Financial literature has presented better results of this strategy in comparison with the traditional market-cap weighted approach. Some practitioners have already launched new ETFs based on the minimum variance theory. Thus, the strategy also starts to be available to retail investors.

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Are direct tax revenues in Poland, Slovak and Czech Republic influenced by each other?

Ondřej Bayer¹

¹Department of Public Finance, Faculty of Finance and Accounting, University of Economics in Prague, nám. W. Churchilla 4, 130 67 Prague 3, Czech Republic, e-mail: xbayo00@vse.cz

Abstract

As possibility of the potential cross-border tax competition this article aims to analyze the relationship between the collection of direct taxes in Czech Republic, Poland and Slovakia. To prove if there are correlations between tax revenues in the selected countries, was used Granger causality method. In the case of proving causality was used multiple regression analysis method, where the dependent variables were tax revenues and explaining variables were common macro-indicators. The first part of the article graphically analyzes the development of tax revenue. The second part deals with the explanation of the methodology used and the third section describes the conclusions. The result is that cross-border tax competition has some influence of tax income.

Keywords: Granger’s causality, regression analysis, tax revenues

1. Introduction

Given the ever increasing rate of globalization in the tax systems, this article discusses finding the dependencies between direct tax revenues in selected countries. Specifically, the aim is to analyze the dependence of tax revenue of direct taxes between the Czech Republic, Slovakia and Poland.

To achieve selected objective were used econometric and statistical methods. The best indicator of dependence appears to be using multiple regression analysis in the form of “log-log” for capturing identical development of elasticities in main macroeconomic indicators affecting tax revenues. For testing the direct dependence of tax revenues was used method of Granger’s causality.

The sole issue of modeling taxes using econometric and statistical methods deals many publications. Arlt and Arltová (2009) describes in his monograph access to and analysis of time series, together with an explanation of Granger causality. Klazar (2003) in his final thesis describes a possible approach to econometric modeling of tax

revenues. Jenkins et al. (2000) deals with the possibility of regression estimates using a logarithmic transformation. Lee and Gordon (2005) deal with the relationship between economic growth and tax revenues.

The author used his previous publications (Bayer, 2013; Bayer, 2014a and Bayer 2014b), when it was confirmed that the methodology used for comparison Czech Republic and Germany tax revenues provides a relatively good results. In the case of this article applies the lessons learned for testing new explanatory variables and adding other countries.

The first part of the paper deals with the analysis of the evolution of direct taxes and selected macroeconomic indicators in the countries surveyed. The second part is dedicated to the methodical description of the data and econometric analyzes. The third part includes the construction of specific models for these variables and the possible inadequacy of selected models. The last part evaluates the results.

2. Development of the intercepted variables

For the analysis of dependence has been chosen group of direct taxes, although recently is the international trend in decreasing direct taxes compared to excise taxes. The reason for choosing direct taxes is that in the field of direct taxation, there is no direct coordination and harmonization. Therefore there is the opportunity to document whether there is an “autonomous” harmonization proceeds of these taxes based of the existence of tax competition. Followed countries (Czech Republic, Poland and Slovakia) have been chosen because they are neighboring country with themselves, but also they are countries with a similar historical development since 1993 (the transformation of their economies after 1989, entry into the EU). In terms of similarity of economies is worth mentioning that the Slovak Republic is a member of the eurozone (EMU).

2.1. Personal income tax

The actual development of the tax on personal income (PIT) is documented in Figure 1. The results show that Poland since joining the EU has shown a remarkable increase in the collection PIT. It is true that Poland is often portrayed as a shining example of the benefits of joining the EU – these data confirm this information. On the other hand, Slovakia and the Czech Republic recorded a certain increase in the collection of these taxes, but there cannot determine whether it is due to join the EU or the period of economic growth. A consequence of the economic crisis is evident in 2009 (direct taxes generally have annual delay). Consequently stabilization is obvious in all countries after 2009. The construction of this tax is similar in all observed countries, differing only in the number of sub-bases.

2.2. Corporate income tax

In the case of taxes on corporate income is similar development, see Figure 2. Also interesting is the relative amount of the tax collection in Poland and the Czech Republic. This phenomenon may indicate a greater representation of legal entities in the Czech Republic or their greater efficiency. Again there is a very noticeable decline in 2009 due to the economic crisis.

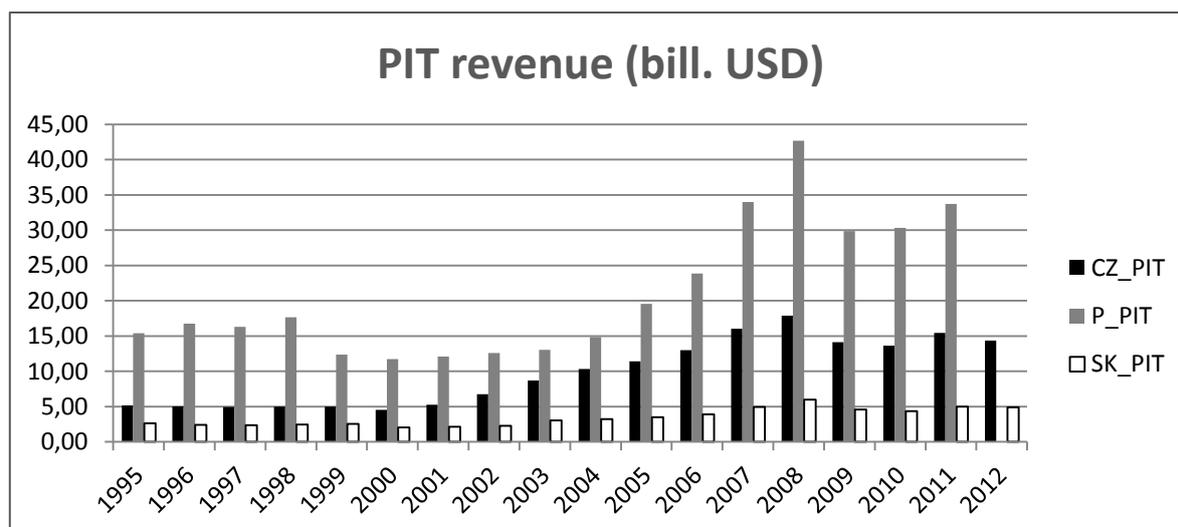


Figure 1: Personal income tax revenue, Data source OECD (2015) + author's adjustments

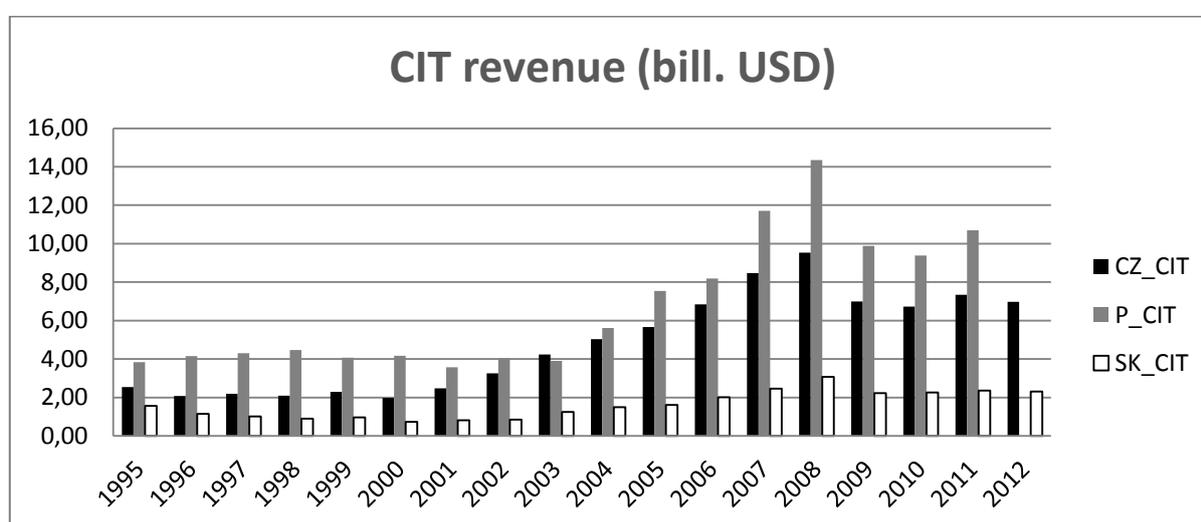


Figure 2: Corporate income tax revenue, Data source OECD (2015) + author's adjustments

2.3. Intercepted variables from view of dependency

For the objective of this paper is good that fluctuations observed at all countries and taxes, are similar, therefore, it could be possible to predict some degree of causality. Of course some of the observed changes in the collection of these taxes may be due to legislative measures entering into the total amount of tax revenue, but it is not possible within the scope of this paper to cover all changes in the monitored period.

2.4. Independent variables

For the construction of regression models were selected following Macro Indicators.

Gross domestic product (GDP) is clearly the best general explanatory variable for the construction of models of tax forecasting. This variable is used, for example in Jenkins et al. (2000) and Bayer (2014a and 2014b). It is obvious, that tax revenues behave relatively pro-cyclically and therefore they will copy economy trend with some delay. The actual GDP in surveyed countries describes Figure 3:

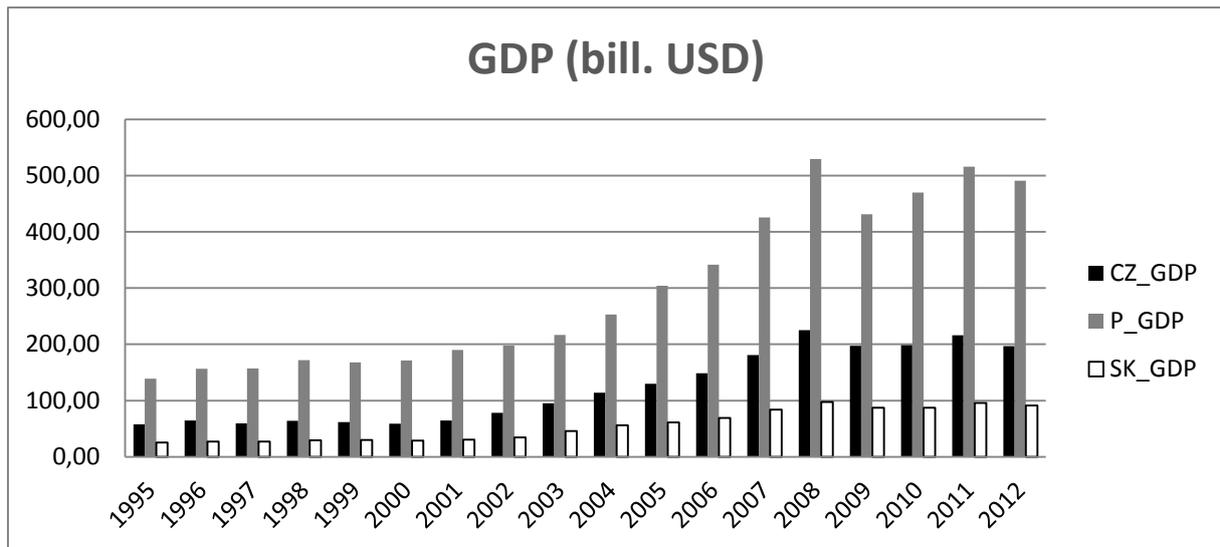


Figure 3: Gross domestic product, Data source: OECD (2015) + author's adjustments

Again, there is a significant growth in economies between 2003 and 2008. There is also noticeable drop caused by the economic crisis in 2009, which is also very significant. When comparing GDP development and evolution of tax revenues (Figure 1 and 2) it could be seen a fairly high correlation. Therefore, GDP was selected as one of the best explanatory variables.

Another usable independent variable is an indicator of unemployment – more specifically indicator of unemployment in non-increasing rate of inflation (NAIRU). Due to the design of tax on income of individuals, it is clear that the unemployment rate will certainly have an impact on the amount of tax collected. The actual unemployment trend is documented in Figure 4:

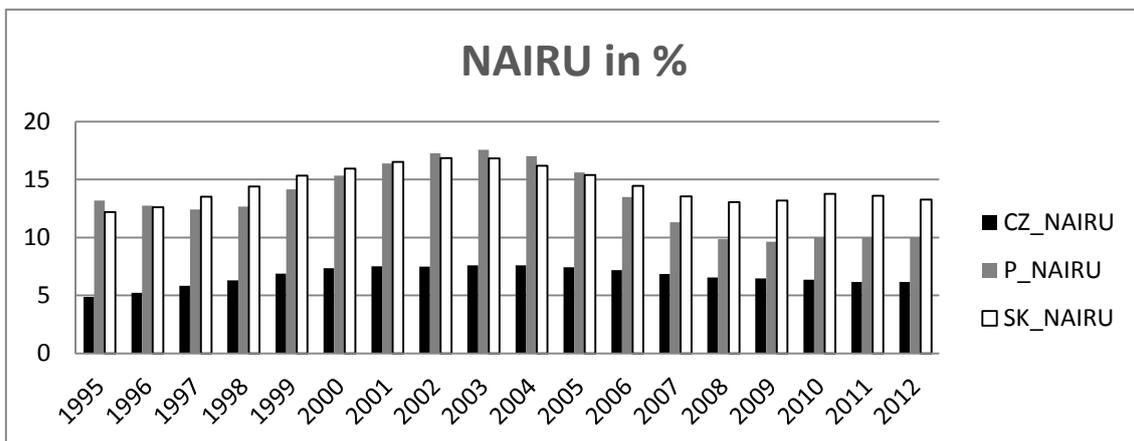


Figure 4: Unemployment rate with non-accelerating inflation rate, Data source OECD (2015)

The development of unemployment is relatively constant for the Czech Republic from 2001 to 2005. In general, it can be argued that the Czech Republic has the best rating for this indicator. Quite an interesting circumstance is relatively high unemployment in the Slovak Republic.

The last selected indicator is the volume of exports (VEXP), which in terms of tax revenues is not so crucial for the derivation of direct taxes revenues. On the other hand, the amount of export may indicate possible frontier trading, or the volume of cross-

border services in the countries surveyed. The actual development of this indicator is documented in Figure 5:

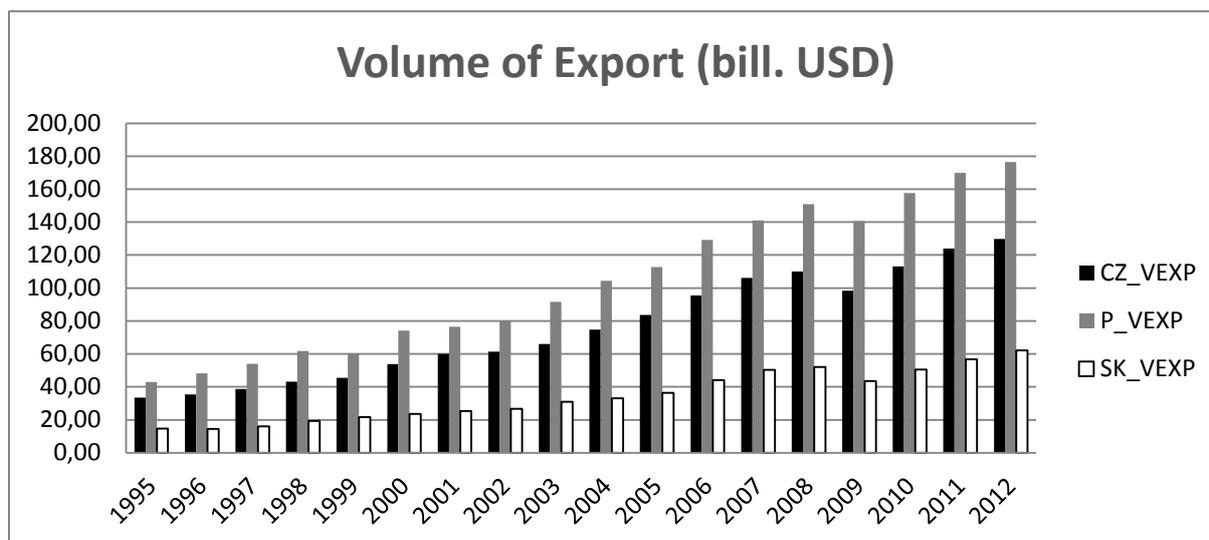


Figure 5: Volume of export, data source OECD (2015) + author's adjustments

Even this indicator shows a continuous increase until 2008, when the impact of the economic regression cause export to decline. It is also seen that the Czech Republic achieves very good results, compared for example with Slovakia and even Poland (Poland has a much larger population and a larger GDP).

3. Methodology and Data

Given that the quality of the models and the derived results are affected by input data and the selected method, this section of paper gives a description of the data and selected econometric and statistical methods.

3.1. Data

Input data are the most important part of econometric modeling. Generally, the greatest effort in developing models is dedicated to data. Data chosen for this article was obtained from the OECD Revenue Statistics (OECD, 2015). The aim was to obtain the longest time series, since the longer time series are statistically more accurate and derivative models should be more accurate too.

Used time series are from 1995 to 2010. The reason for this limitation is the lack of time series data for tax revenues from Poland in 2012. Start of series from 1995 is caused by the development of Slovak tax revenues. Of course it would be possible to try obtain these missing data from other sources, but here is the problem of variance methodologies used to calculate the indicators monitored in other statistical databases.

The issue of exchange rates differences in national currency has been solved by allocating to USD according to an annual rate by the OECD (2015).

For modeling itself were time series stacionaritated with logarithmic difference.

3.2. Regression analysis

Multiple linear regression analysis is an econometric and statistical method which describes the relationship of one (main) variable by several explanatory variables. Generally written is a relationship:

$$T_j = c + \alpha_1 \cdot Y_1 + \alpha_j \cdot Y_j \quad (1)$$

where T_j – tax revenue, c – regression constant, α – regression parameter.

For the estimated regression coefficients should be noted that the logarithmic transformation of the whole simple regression function (log-log regression) can be written as an elasticity of the individual explanatory variables in relation to explained variable, as for example evidenced by Jenkins, et al. (2000):

$$\ln T_j = \gamma + \delta \cdot \ln Y_j \quad (2)$$

where T_j – tax revenue, γ – regression constant, δ – regression parameter.

δ is actually tax elasticity:

$$\delta = (\Delta T_j / T_j) / (\Delta Y_j / Y_j) = (\% T_j / \% Y_j) \quad (3)$$

where T_j – tax revenue, Y – product.

A result of regression analysis has to be verified by statistical tests. F-test tests the model as a whole based on the selected statistical significance level. T-test tests the statistical significance of individual variables.

The actual interpretation of model quality is determined by the coefficient of determination R^2 , which indicates how much of the variance from monitored variable covers model.

Unfortunately, in regression may occur several unpleasant distorting phenomena. The issue of apparent regression arises when tracking many nonstationary time series – in this case selected models were stationaritated by using the difference of logarithms. To determine degree of stationary could be used extended Dickey Fuller test (ADF), which determines the number of differences for the stationarity.

Another negatives effects are caused by violations of Gauss-Mark's assumptions, which are essential for an undistorted and unbiased estimation.

Occurrence of autocorrelation distorts values F-test and the overall coefficient of determination. Autocorrelation itself is based on the dependence of the individual observation of explanatory variables on its own course in time. For the indication can be used Durbin-Watson test (DW), which refutes the presence of autocorrelation in the case, that his value is about 2. However, this test is sometimes distorted by the length of the time series. In case of correctly done stationaritation autocorrelation would not occur.

Multicollinearity is similar to autocorrelation, but the difference is that multicollinearity occurs only in multiple regression models, because it is based on the dependence of the individual explanatory variables between themselves. The actual incidence of multicollinearity distorts partial t-tests. For identification of multicollinearity you can use a simple correlation matrix. In case of a relatively strong correlation between the explanatory variables you should choose only one of them.

This method has been chosen for testing a similar dependence of tax revenues in Bayer (2013; 2014a and 2014b).

3.3. Granger's Causality

Granger causality methodology is based on predictive capabilities of the time series. This is not causality in the philosophical sense, but in econometrical sense. For this paper, it is possible to try to bring an econometric causality its literal meaning. In this case, it can be expected that if the tax revenues of one country affect other country tax revenues, we can assume a certain degree of harmonization.

Granger causality itself is based on time series VAR (vector autoregression process) in the form:

$$Y_t = \theta_t Y_{t-1} + a_t \quad (4)$$

where Y_t – variable, θ_t – parameter, a_t – random component.

The result of Granger causality can be one of three possible states according to Arlt and Arltová (2009).

Firstly, there is no causality between the observed time series. Secondly, there is only one way causality, where one series affects the other series, but the reverse implication is rejected, the third condition is bidirectional Granger causality when both two series are affected.

Granger causality, according to Arlt and Arltová (2009) is high-unstable phenomenon. Other results can be achieved for quarterly and annual time series. Similar dependence of tax revenue has been used in Bayer (2014a and 2014b).

4. Results

The first was tested dependence of tax revenues through Granger causality. Achieved results are summarized in Table 1:

Table 1: Granger's causality results-Chi² tests

	CZ_PIT	CZ_CIT	P_PIT	P_CIT	SK_PIT	SK_CIT
CZ_PIT_1	–	–	0.81	–	0.01***	–
CZ_CIT_1	–	–	–	0.49	–	0.25
P_PIT_1	0.94	–	–	–	0.09*	–
P_CIT_1	–	0.69	–	–	–	0.39
SK_PIT_1	0.93	–	0.51	–	–	–
SK_CIT_1	–	0.37	–	0.44	–	–

The results show that the Czech between Polish tax revenue is no dependence, because the results are really very much outside the acceptable scope of statistical significance. On the other hand, it is apparent one way dependence of Slovak tax revenue from PIT with other two countries surveyed. In the case of the Czech Republic it is 1% significance level. Dependence of yield Slovak PIT and Polish PIT is on the border of statistical significance. What could cause these results? Clearly there is a positive correlation of economic development of the Czech Republic and Slovakia. Furthermore, it is generally known that between the Czech Republic and Slovakia there are very many cross-border labor relations. Reason for the dependence of Slovakia on Poland also may be similar circumstances.

A surprising finding is the lack of dependence between tax collections in Poland and the Czech Republic, where it was possible to expect a certain level of dependence. The result for this phenomenon may be different composition of the economies in these countries, where the Czech Republic is rather engineering oriented economy, while Poland is famous for its food exports.

Independence in corporate tax can be explained, that this tax could be used to strengthen domestic business, and therefore there are various specific design features that are specific to each country.

The second approach to dependency of tax revenue was regression analysis, where as explanatory variables were used Macro Indicators from other countries. Results of regression analyzes are briefly summarized in Table 2:¹

Table 2: Regression analysis results

model	Equation	R ²	DW
CZ_PIT	$DLCZ_PIT = -0.03446 + 1.196 \cdot DLSK_GDP$	0.81	1.59
CZ_CIT	$DLCZ_CIT = -0.01639 + 1.14 \cdot DLSK_GDP - 1.092 \cdot DLP_VEXP + 0.9971 \cdot DLSK_VEXP$	0.74	1.86
P_PIT	$DLP_PIT = -0.06083 + 1.332 \cdot DLCZ_GDP$	0.59	1.77
P_CIT	$DLP_CIT = -0.03397 + 1.189 \cdot DLCZ_GDP$	0.47	2.16
SK_PIT	$DLSK_PIT = + 0.02555 + 0.134 \cdot DLCZ_GDP$	0.30	1.90
SK_CIT	$DLSK_CIT = -0.03159 + 1.22 \cdot DLP_GDP + 0.9769 \cdot DLCZ_VEXP - 1.427 \cdot DLP_VEXP$	0.89	1.53

For the estimated equation has been chosen variables in form first degree of logarithmic differential for stationarity. Derivate models can be described as fairly successful by statistical testing. DW test values are approximately within reject the hypothesis of the presence of autocorrelation (values around 1.6 are called "Gray zone", because in this interval it is not possible to clearly reject presence of autocorrelation). The coefficients of determination are quite high except model of Slovak personal income tax, where it is evident, that selection of better explanatory variables could possibly lead to a better result.

In the case of the Czech tax income from personal income tax came out as the only statistically significant explanatory variable the Slovak GDP. Here you can point to the relative consistency between Czech and Slovak economy, which also causes the relative dependence of tax revenues. Again, we can speak here of the relatively large number of cross-border labor relations, which also illustrates the development of Slovak collection of this tax.

Another interesting phenomenon is that in the case of corporate tax revenue in the Czech and Slovak Republics are explanatory variables based on the volume of exports of other countries. The question is, whether this indicator is merely a reflection of the economic situation, and therefore correlated with GDP, or the volume of exports is also correlated with the possibility of foreign investment. In case of increased investment opportunities for companies is obvious, that this explanatory variable is an important factor for estimating the tax collection.

¹ DL_country_variable is 1st difference of logarithm for given country and variable.

In the case of Poland we can talk only about the dependence of revenue on Czech economic situation, because the only good explanatory variable is the Czech gross domestic product.

5. Discussion and Conclusions

The results of Granger causality surprisingly show only relationship of Slovak tax revenues to the Czech and Polish revenues. In the case of the Slovak Republic is a possible cause of the correlation of tax revenues relative lower competitiveness of the economy in comparison with other surveyed countries. Slovakia could be more in tow of Czech and Polish economy. Independency between tax collection in Poland and the Czech Republic is quite surprising. A possible reason is the short time series, which can distort the results of the Granger causality or difference of economies.

Results of the regression analysis are also not entirely convincing, since most equations has explained by only one explanatory variable. Alternatively, would be probably better to try to use the method of multiple regressions with the other explanatory variables. The author hoped that the multiple regressions will contain more statistically significant variables.

Similar results showed similar work for the German and Czech tax system (Bayer, 2013 respectively Bayer, 2014a). But other result in similar paper (Bayer, 2014b) shows high volatility of Granger causality.

For a better measurement of similarity of tax revenues can be used, in my opinion, statistically method of panel regression that would remove restrictions on the length of the time series. Secondary option is cointegration method.

Although the results did not meet the author's expectation of higher interconnection between monitored tax revenues, at least in the case of Slovakia we can obviously assume a certain convergence of tax revenue of direct taxes in relation to other countries. Especially between Czech Republic and Slovak republic are "special" relations in labor market.

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Age management and its implementation in banking institutions with regard to the concept of Corporate Social Responsibility

Jiří Bejtkovský¹

¹Department of Management and Marketing, Faculty of Management and Economics, Tomas Bata University in Zlín, Mostní 5139, 760 01 Zlín, Czech Republic, e-mail: bejtkovsky@fame.utb.cz

Abstract

Given the predicted global demographic trends and population ageing process the management of bank institutions and of all corporations generally, will have to respond to this invertible process. The bank institutions which will, among other things, implement as a part of their human resources management process the Age Management philosophy, i.e. the management reflecting the age and changing skills of employees in view of the concept of social accountability of corporations, may become profitable and achieve a competitive advantage. In this manner they will also endeavour to improve quality of working life of all their employees regardless of their actual biological age.

The article presents an opinion to certain partial results of quantitative and qualitative research focused on the Age Management philosophy in direct connection with CSR concept. The goal of the article is, among other things, to initiate a discussion and contemplations about how the specific variables and elements of the Age Management concept should be set in a bank institution in order to ensure that the human resources management was efficient in terms of a competitive ability of a bank institution and targeted with respect to employees. This thesis should then be actively manifested in the fields of motivation, satisfaction and work performance which factor should increase or be improved and, on contrary, the fluctuation, loss and idle times or absences of personnel of a bank institutions should decrease.

Keywords: age management, commercial banks, competitiveness, corporate social responsibility, diversity management, employee 50+, human resource management, population ageing process

1. Introduction

The population in the Czech Republic is ageing dynamically because of two trends: a significant decrease in birth rate (while summary birth rate was 1.89 children per a woman in 1990, it was 1.13 children per a woman in 2000 and 1.49 children per a woman in 2009) and at the same time strong, almost linear increase in life expectancy: while men had average life expectancy of 67.5 years and women 75.4 years in 1991, it was 74.2 years (men) and 80.1 years (women) in 2009. Therefore, Czech women live on average five years longer and Czech men even seven years longer than twenty years ago. (Bílá, 2012; Cimbálníková et al., 2011; Vondra, 2012)

The prognosis of the Czech Republic population development by 2066 states that the proportion of 50+ inhabitants will have a growing tendency in the next decades. Whereas nowadays people in the 50+ age category form slightly more than one third of the Czech population, the proportion will be one half in 2040. (Kreuzigerová, 2009)

In association with the population ageing and the growing proportion of the 50+ inhabitants (the 50+ employees), factors that significantly facilitate their adaptation in the labour market need to be identified, such as (Langmeier & Krejčířová, 2006):

- To provide optimum job performance, the 50+ employee needs to be able to work at his/her own pace and not under time pressure.
- If the 50+ employee is motivated to be able to fully and purposefully make use of all his/her capabilities, knowledge and skills, he/she provides good job performance but cannot be pushed to his/her limits by the working conditions.
- The 50+ employee provides efficient and high-quality job performance when he/she can use his/her previous experience rather than where he/she has to learn new facts.
- External factors, such as work organisation and other conditions in a workplace, are important for the 50+ employees (interpersonal relationships).

The above features are based on basic characteristics of the Age Management philosophy. In association with the social area of the CSR concept, the philosophy can be defined as human resource management that takes account of age and changing skills of employees not only of a banking institution, supports age diversity and individuality of every employee not only of a banking institution.

In this context, three pillars of personnel work with the 50+ employees can be considered: the area of work organization, stimuli of work motivation, and the area of education and development of qualification of the employees. (Bejtkovský, 2013)

If the Age Management philosophy is directly associated with the CSR concept, not only a banking institution may experience increase in performance, profit, turnover, economy, quality of provided (bank) products or services, image, credibility of corporation, loyalty of clients, competitiveness, and overall efficiency, purposefulness and usefulness of human resource management. (Krymláková et al., 2009)

The CSR concept is classified into three basic areas (Řezáč, 2009; Zdražilová et al., 2010):

- Economic area (profit) – code of ethics; Corporate governance; relations with shareholders; transparency; rejection of corruption; intellectual property protection; behaviour to customers, suppliers, investors.
- Social area (people) – safety and health of employees; work-life balance; diversity in the workplace; outplacement and retraining; volunteering and corporate philanthropy; development of human capital and education of

employees; equal work opportunities; listening to and dialogue with various target groups – e.g. stakeholders.

- Environmental area (planet) – environmental corporate policy; environmental management; protection of natural resources.

The article will further refer to social area of the CSR concept that is in direct relation to human resource management not only in a specific banking institution.

A banking institution can be understood as a type of a financial mediator whose main activity is the mediation of the movement of funds between individual economical entities. This mediation is based especially on the fact that banking institutions accept deposits and use them to provide credits on their account. (Belás et al., 2010)

In order to fulfil its obligations, a banking institution needs and will continue to need experienced, skilled, motivated, reliable, and loyal employees. Therefore, it is necessary to devote the same attention to all employees regardless of their biological age. To see everybody as an indispensable link necessary for functioning of the entire corporation.

Although nowadays Internet banking is one of important factors of satisfaction especially of younger clients of a banking institution (Belás, Cipovová & Demjan, 2014), individual activities and processes associated with such type of banking cannot do without responsible, patient and reliable employees.

Although illegal, age discrimination commonly occurs in practice, which is something that should not happen. (Broderick, 2009)

Further, there may be situations where the management of corporations gets influenced by myths, prejudices and stereotype thinking towards the group of the 50+ employees, which worsens their situation not only in a banking institution but also in the entire labour market. (Bosničová, 2012; Rothwell, Sterns, Spokus & Reaser, 2008; Shea & Haasen, 2006; Schauerová, 2012)

Thanks to their live-long experience and personal know-how, the 50+ employees can offer a lot not only to a banking institution. Under certain assumptions they could even be perceived as talents within the philosophy of talent management.

The aim of the talent management is to identify and create space for the development and subsequent education of employees who have high or above-average potential and can be the holders of competitive advantage of a corporation. (Kroupa, 2006)

2. Methodology and Data

The aim of the article is, besides other things, to identify awareness of the Age Management philosophy in respect of the CSR concept in Czech banking institutions and further think about how to implement the philosophy in the process of human resource management so as to be targeted and efficient for all entities involved. This philosophy should then be actively manifested in the fields of motivation, satisfaction and work performance which factor should increase or be improved and, on contrary, the fluctuation, loss and idle times or absences of personnel of a bank institutions should decrease.

Partial objectives of the article include:

- Verification of hypotheses (H1, H2) and answering research questions (RQ1, RQ2, RQ3) associated with the area of strategic management of human resources in banking institutions.

The article presents a view of some of the results of quantitative and qualitative research conducted in banking institutions in the Czech Republic. The aim of the researches includes without limitation:

- Verify the position of the 50+ employees in the addressed banking institutions.
- Identify opinion on age diversity of employees in general and in the addressed banking institutions.
- Identify the extent in which HR strategies are implemented in association with the philosophy of Age Management in context of Corporate Social Responsibility.
- Identify how the addressed banking institutions seek to develop working conditions and environment for employees.

On grounds of an analysis of domestic and foreign expert resources, two hypotheses and three research questions have been formulated:

- H1: Most of the addressed respondents agree that elderly employees (the 50+ employees), if they still work, prevent the 50– employees from getting a job.
- H2: Most of the addressed respondents agree that their banking institution does not implement age diversity of employees in a certain form.
- RQ1: Have personnel strategies been implemented in your banking institution in association with the philosophy of Age Management?
- RQ2: How does your banking institution seek to develop working conditions and environment?
- RQ3: Is the process of targeted sharing of knowledge and experience of individual employees supported in your banking institution?

Employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) and employees of banking institutions from the 50+ age category were confronted with these hypotheses and research questions.

From research methods, questionnaire survey and observation were used. These methods were further supplemented with a semi-structured interview with the employees of banking institutions.

Within the performed quantitative and qualitative research, five banking institutions were addressed: Česká spořitelna, a.s.; Československá obchodní banka, a.s. (including Era – Poštovní spořitelna); Komerční banka, a.s.; GE Money Bank, a.s. and Raiffeisenbank a.s.

The respondents were employees of headquarters in the Czech Republic, branches and client centres. The research group of the questionnaire survey included in total 180 employees of banking institutions working in and responsible for the area of human resource management and 282 employees of the 50+ age category. Validity of the hypotheses was verified by using a one-sample test of proportions corrected for continuity.

The research group of the semi-structured interview included 20 employees of banking institutions working in and responsible for the area of human resources management. By means of the interview, more general categories were defined that covered statements of the addressed employees and consequently it was identified what claims were repeated in their responses. At the end, summary and interpretation of the identified facts was performed.

3. Results

Using analysis of expert sources, it can be stated that one of the prejudices towards elderly employees is that if they still work they prevent the 50- employees from getting a job. The myth has been scientifically examined and verified in addressed banking institutions by means of the defined hypothesis. The hypothesis has been verified from perspective of HR managers and the 50+ employees within complex assessment. Finally, a standpoint was formulated to verify validity of the hypothesis.

H1-A: Most of the addressed respondents (HR managers, specialists or leaders) agree that elderly employees (the 50+ employees), if they still work, prevent the 50-employees from getting a job.

Validity of the hypothesis (H1-A) was verified by using a one-sample test of proportions corrected for continuity.

H0: $\pi = 0.5$

HA: $\pi < 0.5$

Value of the test criterion: X-squared = 4.2820

Degree of freedom: df = 1

p-value = 0.008082

95% reliability interval: (0.0000000 – 0.4221262)

On the 5% significance level, the H0 hypothesis is rejected in favour of the HA hypothesis. A reliability interval of proportion estimate can be determined: $\pi \in (0.000; 0.422)$.

Maximum 42.2% HR managers agree that elderly employees (the 50+ employees), if they still work, prevent the 50- employees from getting a job. This is the evidence to reject the hypothesis (H1-A).

It can be generally stated that most HR managers believe that elderly employees (the 50+ employees), if they still work, do not prevent the 50- employees from getting a job.

H1-B: Most of the addressed respondents (the 50+ employees) agree that elderly employees (the 50+ employees), if they still work, prevent the 50- employees from getting a job.

Validity of the hypothesis (H1-B) was verified by using a one-sample test of proportions corrected for continuity.

H0: $\pi = 0.5$

HA: $\pi < 0.5$

Value of the test criterion: X-squared = 58.8062

Degree of freedom: df = 1

p-value = 4.02e-16

95% reliability interval: (0.0000000 – 0.2199804)

On the 5% significance level, the H0 hypothesis is rejected in favour of the HA hypothesis. A reliability interval of proportion estimate can be determined: $\pi \in (0.000; 0.220)$.

Maximum 22.0% the 50+ employees agree that elderly employees (the 50+ employees), if they still work, prevent the 50- employees from getting a job. This is the evidence to reject the hypothesis (H1-B).

It can be generally stated that most the 50+ employees believe that elderly employees (the 50+ employees), if they still work, do not prevent the 50- employees from getting a job.

On grounds of the one-sample test of proportions with corrected continuity performed in the hypotheses (H1-A and H1-B) it can be stated that the addressed

respondents (HR managers and the 50+ employees) agree with the statement that elderly employees (the 50+ employees), if they still work, do not prevent the 50-employees from getting a job.

Age diversity of employees (Diversity management) entails numerous benefits since heterogeneous personnel structure may increase success not only of a banking institution in achieving strategic goals or improve image in association with the CSR concept. It may support working morale, make new market segments accessible, increase the corporation's performance and competitiveness. This is why the hypothesis that is focused on team heterogeneity in addressed banking institutions has been examined in this respect.

The hypothesis has been verified from perspective of HR managers and the 50+ employees within complex assessment. Finally, a standpoint was formulated to verify validity of the hypothesis.

H2-A: Most of the addressed respondents (HR managers, specialists or leaders) agree that their banking institution does not implement age diversity of employees in a certain form.

Validity of the hypothesis (H2-A) was verified by using a one-sample test of proportions corrected for continuity.

$$H_0: \pi = 0.5$$

$$H_A: \pi < 0.5$$

$$\text{Value of the test criterion: } X\text{-squared} = 92.0128$$

$$\text{Degree of freedom: } df = 1$$

$$p\text{-value} = 2.8e-16$$

$$95\% \text{ reliability interval: } (0.0000000 - 0.0882064)$$

On the 5% significance level, the H_0 hypothesis is rejected in favour of the H_A hypothesis. A reliability interval of proportion estimate can be determined: $\pi \in (0.000; 0.088)$.

Maximum 8.8% HR managers agree that their banking institution does not implement age diversity of employees in a certain form. This is the evidence to reject the hypothesis (H2-A).

It can be generally stated that most HR managers believe that their banking institution does implement age diversity of employees in a certain form.

H2-B: Most of the addressed respondents (the 50+ employees) agree that their banking institution does not implement age diversity of employees in a certain form.

Validity of the hypothesis (H2-B) was verified by using a one-sample test of proportions corrected for continuity.

$$H_0: \pi = 0.5$$

$$H_A: \pi < 0.5$$

$$\text{Value of the test criterion: } X\text{-squared} = 280.6221$$

$$\text{Degree of freedom: } df = 1$$

$$p\text{-value} = 2.02e-16$$

$$95\% \text{ reliability interval: } (0.0000000 - 0.199802)$$

On the 5% significance level, the H_0 hypothesis is rejected in favour of the H_A hypothesis. A reliability interval of proportion estimate can be determined: $\pi \in (0.000; 0.200)$.

Maximum 20.0% the 50+ employees agree that their banking institution does not implement age diversity of employees in a certain form. This is the evidence to reject the hypothesis (H2-B).

It can be generally stated that most the 50+ employees believe that their banking institution does implement age diversity of employees in a certain form.

On grounds of the one-sample test of proportions with corrected continuity performed in the hypotheses (H2-A and H2-B) it can be stated that the addressed respondents (HR managers and the 50+ employees) agree with the statement that their banking institution does implement age diversity of employees in a certain form.

If a HR strategy of a banking institution is understood as a summation of all activities, processes, programs, and measures that relate to employing people – their recruiting, selection, motivation, stabilization, education, remuneration, or career growth – it should simultaneously respond to the approaching and inevitable tendencies of population ageing.

According to the addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) it can be said that HR strategies are prepared to ensure fast adaptation, stabilization and stimulation of employees. Banking institutions want to have the right employees in the right time in the right places to be able to purposefully meet the client's needs and respond to competitors. Within the reduction of costs, mutual substitutability is preferred. The Age Management philosophy is implemented, besides other things, by means of age diversity. For the time being, HR strategies do not show deeper perception of the philosophy.

Banking institutions – according to the addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) – try not only to succeed in the area of finance but also employment. This is evidenced by various recognitions that some banking institutions take pride in. The area of the development of working conditions and environment is varied. It basically comprises relationships between employees, the issue of ergonomics of work or the area of employment benefits. If the employees do not have these factors on a high quality level, they cannot fulfil their duties completely. According to the addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders), banking institutions support open communication, shared acceptance and achievement of objectives of a team, branch or department, regular meetings or briefings. Ergonomic measures are implemented according to specific needs of employees. Matter of course is facilitation of processes and activities, modernization of management, and the like. The elements of the Age Management philosophy with regard to the CSR concept are reflected in the area of health care (vouchers for health or sports services) and increase in satisfaction of employees (teambuilding, education, flexible working time, sick days or other financial and non-financial benefits).

Sharing of knowledge, information and experience is carried out especially through cooperation in various corporate projects or within the process of recruiting new employee – according to the addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders). The aim is, via experienced managers that lead the project, to enrich information and knowledge base of an employee so that he/she could lead the project in the future. According to the addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) the system of work is supported and used despite minimum variations or complaints.

4. Discussion and Conclusions

Today's organisation management endeavours especially to keep the largest possible market share and create profit large enough. Not every organisation management has realised yet that also the quality sophisticated strategies of work with various target groups of employees may help them to achieve it and, ultimately, they will reduce personnel costs, improve the climate within the organisation, increase employees' loyalty, and also provide the perception or evaluation of good employer in the labour market. (Rydvalová, 2011)

On grounds of an analysis of domestic and foreign expert resources, two hypotheses and three research questions have been formulated.

With reference to the researches implemented it can be generally stated that the addressed respondents (HR managers and the 50+ employees) agree with the statement that elderly employees (the 50+ employees), if they still work, do not prevent the 50+ employees from getting a job. Therefore, one of the myths that prevail in society towards the 50+ employees has been disproved through this discovery.

From perspective of a banking institution, age diversity of employees (Diversity management) is important to balance the unfavourable demographic development and prevent economic problems caused by decreasing birth rate. (©diverzita.cz, 2015)

In association with the conducted researches it can be generally stated that the addressed respondents (HR managers and the 50+ employees) agree with the statement that their banking institution does implement age diversity of employees in a certain form.

Pink (2009) states to these problems that employees of organisation should form heterogeneous work teams or groups and these should be structured so that their members may stimulate each other to effective performance of work tasks and duties and also to learn from each other or pass each other in this way specific information, knowledge or experience.

Management of ageing workforce is the subject of interest on many levels whereas motivation (stimulation) to the interest and its specific manifestations differ. Three basic levels can be distinguished (Cimbálníková et al., 2012):

- Individual level (individual).
- Corporate level (organization level).
- National or regional level.

Entities are interested in mastering and ensuring functioning of the Age Management philosophy on all three levels. Responsibility for Age Management philosophy cannot be transferred to one level only. (Cimbálníková et al., 2012)

The Age Management philosophy and its implementation in banking institutions with regard to the concept of Corporate Social Responsibility is translated in personnel strategies through the idea of heterogeneous structure of employees, development of working conditions and environment for performance of required working conditions or cooperation on corporate projects. Banking institutions want to have the right employees in the right time in the right places to be able to purposefully meet the client's needs and respond to competitors. Within the reduction of costs, mutual substitutability is preferred.

Individual variables and elements of the Age Management philosophy need to be set so as to respect the above criteria whereby competitiveness of a banking institution, satisfaction and loyalty of employees should be ensured.

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Hospital’s financial health assessment. Gradient method’s application

Agnieszka Bem¹, Rafał Siedlecki², Paweł Prędkiewicz³,
Paulina Ucieklak-Jeż⁴ and Taňa Hajdikova⁵

¹*Department of Public and International Finance, Faculty of Management, Informatics and Finance, Wrocław University of Economics, Komandorska 118/120, 53-345 Wrocław, e-mail: agnieszka.bem@ue.wroc.pl*

²*Department of Corporate Finance and Value-Based Management, Faculty of Management, Informatics and Finance, Wrocław University of Economics, Komandorska 118/120, 53-345 Wrocław, e-mail: rafal.siedlecki@ue.wroc.pl*

³*Department of Finance, Faculty of Economic Sciences, Wrocław University of Economics, Komandorska 118/120, 53-345 Wrocław, e-mail: pawel.predkiewicz@ue.wroc.pl*

⁴*Institute of Management and Marketing, Faculty of Social Science, Jan Długosz University in Częstochowa, Waszyngtona 2/4, 42-200 Częstochowa, p.ucieklak-jez@ajd.czest.pl*

⁵*Department of Management, University of Economics in Prague, Jarošovská 1117/II, 377-01 Jindřichův Hradec, hajdikova@fm.vse.cz*

Abstract

Hospital’s financial condition is crucial, from the point of view of health care’s system, due to important part of funds, consumed by hospital industry. In countries of Central and Eastern Europe, economic transition has changed significantly the conditions of hospitals’ activity, leading to, generally, poor financial situation.

The aim of this study is to build the synthetic indicator of hospital’s financial health, using the gradient method. Based on data, coming from financial statement of 333 hospitals, we have built 3 measures of financial condition, consisting of, respectively 7, 5 and 3 financial indicators. We have found, that, by adopting M1 measure, we can conclude, that, in Czech Republic, the situation of 9% hospitals can be described as very good and 9% – as difficult. In Poland – 13.5% and 16.7% respectively. In Slovakia – 28% of hospitals are below the critical value (“low band”) and no hospital has exceeded the “high band”.

Keywords: hospital, financial ratios, gradient method, financial health index, bankruptcy forecasting

1. Introduction

The economic transition of Central and Eastern European countries drastically changed hospitals' business environment (Soltes, Gavurova, 2014) (Gavurova, Soltes, Balloni, 2014). A financing system, based on Siemaszko's model, provided financial stability, although, financial resources very rather tight. Treatment possibilities, but also people expectations, were, to say the least, limited.

Hospitals play, in every country, an important role as a part of a health care system. Inpatient care (excluding long-term care) consume a significant part of funds (approximately 50% in analysed countries). That's way, quality and availability of benefits, or, broadly speaking, system's effectiveness, is often viewed through the prism of hospital care.

Economic movement resulted in attitudinal change. Currently, there is no longer any permissions to accumulate debts. The economic situation are, nowadays, one of basic elements of hospital manager's assessment.

Since the 1960s, researchers looks for a synthetic measure of company' financial condition. Studies were initiated by W.H. Beaver (1966), E. Altman (1968), who investigated industrial enterprises, especially from the point of view of bankruptcy's forecasting. Further studies proved, that part of indicators may be applied straightly in health care sector, and there are several indicators (financial and nonfinancial) which play more important role in hospital financial condition's assessment (Szczygiel, Rutkowska-Podolowska, Michalski, 2014).

According to that, this study correspond with current international research, leading to creation of a synthetic measure of financial condition's assessment in health care's industry (Soltes, Gavurova, 2014) (Gavurova, Soltes, Balloni, 2014). The need for further, deepen, studies is related to evolution of this sector, of external nature (demography, sources of funding, medical progress) and internal one – as effect of changes in the organization and management of medical entities.

This research is of exploratory character. *The aim is to build a synthetic measure which allow assessing of hospital's financial condition, basing on data coming from financial statement.* Taxonomic analysis should allow the selection of key indicators, which most strongly affect current, and also future, financial situation (Michalski, 2014a) (Michalski, 2014b). Research sample cover financial data coming from 333 hospitals, both public and private, located in Czech Republic, Poland and Slovakia.

Authors formulated following research hypotheses, which result from the exploratory nature of the study:

- 1) *it is possible to select relatively limited group of indicators, which explain comprehensively hospital's financial condition;*
- 2) *it is possible to build a synthetic measure of hospital's financial health, basing on an analysis of selected financial ratios.*

This study provide significant contribution to the science, by indicating financial ratios which are the most important, from the point of view of hospital's industry, and designing new synthetic measure of hospital's financial situation, which might be afterwards, employed in bankruptcy's forecasting. The study is of preliminary nature. Further research will lead to creation of a synthetic measure as an element of financial distress prediction, that would take into account also non-financial factors.

1.1. Health care system in Czech Republic, Poland and Slovakia

Health financing systems in Czech Republic, Poland and Slovakia show far-reaching similarity. In all these countries, in the 1990s, a transition from the socialist Siemaszko's system to the system based on universal health insurance took place.

Table 1: Selected health care indicators

	Czech Republic	Poland	Slovak Republic
Expenditures as % GDP	7.50	6.80	8.10
Expenditures per capita PPP USD	2077.40	1539.60	2104.90
General government expenditures as % of total expenditure	84.00	69.20	69.70
Out-of-pocket expenditures as % of total expenditure	15.00	22.70	22.40
Expenditures on inpatient care per capita (PPP\$)	640.20	464.60	402.90
Public inpatient expenditure as % of total inpatient expenditure	96.90%	94.70%	95.10%
Hospital beds per 100.000 population	683.55	654.84	597.54
Inpatient care admissions/ discharges per 100 population	20.48%	16.15%	18.46%
Average length of stay for hospitals (bed-days)	9.80	7.40	8.00

Source: own study based on OECD Health Data and HOPE Data

Despite minor organizational differences, health financing, and, therefore, also inpatient care's financing, is based, primarily, on public funds. Hospitals usually sign annual contracts for specified package of benefits (what sets a limit of public payer's obligations), which are systematically accounted for actually provided services. Teaching hospitals receive additional resources related to didactics and scientific activity. Hospitals are generally paid on a basis of DRG.

In Poland and Slovakia patients participate more significantly in health services' financing, however this mainly applies to outpatient care, and that's way don't affect hospitals' funding (in all countries public inpatient expenditures are about 95%). Awareness should be brought to higher expenses on inpatient care *per capita* in Czech Republic – on the other hand, it is accompanied by greater rate of populations receiving inpatient care (treatments requiring overnight stays) and longer average length of stay (Table 1).

Basing on similarities of health care systems in analysed countries, we can presume, that hospitals, generally, function in the same (or very similar) conditions, therefore can be assessed using analogous tools.

1.2. Hospital financial analysis

Generally, financial ratios employed in industrial enterprises can form a basis for hospital's financial assessment. The specificity of hospital's activity, however, force the application of indicators adapted to the industry, or a modified interpretation of existing ones.

Cleverly (1986) suggested, that hospital's assessment should include an analysis of three additional (comparing to industrial enterprises) financial dimensions: liquidity, capital structure, and asset efficiency. Other studies, conducted with Rohleder, led up to selection of 29 ratios, which might be grouped into 10 key characteristics: profitability, short term cash position, capital structure, liquidity, age of plant, debt coverage, payment mix, leverage, current asset efficiency, fixed asset efficiency (Cleverley, 1985).

Chu (et al, 1991) found, that, in contradistinction to industrial firms, special attention should be paid to hospital equity in relationship to total assets, net income, working capital flow and cash flow, and, especially, working capital flow. He also found, that 'Return On Equity' and 'Working Capital Flow' should be considered as two distinctly independent financial ratios, which plays important role in hospital's financial health assessment (Michalski, 2014c).

Zeller, Stanko and Cleverly (1996) conducted comparative study, and indicated a group of factor, which should be included in hospital's financial analysis. These are: profitability, fixed assets efficiency, capital structure, fixed assets age, working capital efficiency and liquidity. Among them, only three first was included in previous research. Further studies confirmed those findings. Using data from not-for-profit hospitals, Cleverly indicated six financial characteristic, which should be considered as crucial, from the point of view of hospital's performance. These are: profitability factor, fixed-asset efficiency, capital structure, fixed-asset age, working capital efficiency, and liquidity indicators (Zeller, Stanko and Cleverley, 1997).

Newer studies also highlighted a role of financial ratios in hospital's financial assessment. Mc Cue, analyzed five group of financial ratios: capital structure, profitability, activity, liquidity, and an operational factor (McCue, 2009). Das (2009) highlighted the importance of capital structure what influence the organization of the non-profit and for-profit hospitals' finances (Das, 2009).

Literature review, presented above, suggests, that the assessment of hospital's condition may, and should be, carried out on the basis of financial ratios. On the other hand, in terms of the selection of indicators, and their interpretation, results are mixed.

Synthetic indicators might be potentially created on the basis of selected financial and non-financial indicators. Literature study provides only two synthetic indicators which was adapted for hospital industry (in financial distress' prediction): Z-score, based on Altman's model and Financial Strength Index (FSI). Altman's Z-score is widely known, due to applications in industrial firm. FSI, developed by Cleverley was designed especially for hospitals, and bases on four dimensions: profitability, liquidity, leverage, and the age of physical facilities (Cleverley, 2002, p. 46).

2. Methodology and Data

The gradient method is a taxonomic tool, based on determination of taxonomic distances of examined objects from defined reference points. This procedure allow construction of synthetic indicator of different nature, by combining values of variables denominated in different units, including dummy ones. Variables might be of financial and non-financial character, but must be stimulant – nominant and destimulant variables should be transform into stimulant ones.

The method assumes, that the matrix X comprises of financial ratios values (observations of the studied phenomenon) denoted as: x_{ij} , which convert to stimulants¹ x_{ij} where:

$i = 1, 2, \dots, m$, (a number of analysed indicator);

$j = 1, 2, \dots, n$, (a number of analysed observation);

and $x_{ij} \in \mathbb{R}$.

In order to measure a taxonomic distance, two points must be determined:

Top: $P = [p_{1,0}, \dots, p_{m,0}]$

Bottom: $Q = [q_{1,0}, \dots, q_{m,0}]$

where: $p_{o,1} = \max x_{i,j}$ and $q_{o,1} = \min x_{i,j}$

According that QP segment describes the axes of synthetic indicator, PQ vector gradient takes a form of linear programming function:

$$GR(X) = [P - Q]X^T$$

and values of this function represent the value of synthetic indicator, according to formula:

$$\varphi = (p_{i,0} - q_{i,0}) * x_{i,j}$$

Obtained values of specific indicators, due to its construction, might take potentially very dissimilar values. In this situation, some indicators would affect a synthetic measure more strongly than other. To avoid this effect, obtained values are reduced to the range of [0-1] using the scaling method. Conversions should be made from matrix X to Z according to the following formula:

$$z_{it} = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})}$$

As a result, points P and Q take the following form: $P = |1, \dots, 1|$, $Q = |0, \dots, 0|$:

$\varphi = \sum_{i=1}^m z_{it}$, and the measure of development (μ_t) is defined as:

$$\mu_t = \frac{\varphi}{m}$$

This procedure makes result relatively easy to interpret, what increases practical applications of constructed indicators (Siedlecki, 2014).

Research data comes from databases: Amadeus and Emerging Markets, and hospital's financial statement, collected by authors. We've investigated 976 medical entities from Czech Republic, Poland and Slovakia. Certain part of observations (hospitals) have been removed due to lack of all required data. Entities, for which hospital services were not a primary activity, have been also excluded from research sample. We've decided to investigate only hospitals fulfilling an adopted criterion of having, at least, admission room, and 2 (or more) hospital wards, in order to exclude hospitals providing mainly "one day" procedures, due to its special financial characteristic (limited scope of services, high income, low costs). Finally, research sample covered financial data from 333 hospitals, coming from financial statement (balance sheet, profit and loss report, and cash flow statement) for the year 2012.

Finally, research sample included: 89 Czech hospitals (34.9% of hospitals in Czech Republic), 215 Polish hospitals (22.2% of hospitals in Poland) and 29 Slovakian hospitals (20.7% of hospitals in Slovakia). Selected hospital were both private and public, and operate in different legal form. The sample included also teaching hospitals.

¹ Destimulants and nominants have to be converted into stimulants.

3. Results

Based on literature review and previous research (Bem, Ucieklak-Jeż & Prędkiewicz, 2014), (Bem, Prędkiewicz, Prędkiewicz and Ucieklak-Jeż, 2014a), (Bem, Prędkiewicz, Prędkiewicz & Ucieklak-Jeż, 2014b), (Hajdikova, Komarkova & Pirozek, 2014), (Bem and Michalski, 2014) initially 14 financial indicator was created. Those indicators were qualified into 4 groups: profitability, liquidity, debt and efficiency.

Table 2: Selected financial indicators

Ratio	Formula	Character	Group
OPM	EBIT/Sales	stimulant	profitability
CR	Current Assets/Current liabilities	nominant	liquidity
D%	Total debt/Total Assets	destimulant	debt
CF/Debt	(Net Profit + Depreciation)/Total debt	stimulant	debt
TAT	Sales/Total Assets	stimulant	efficiency
CES	Employee benefit expense/Sales	destimulant	efficiency
ROCF	(Net Profit + Depreciation)/Total Assets	stimulant	profitability

Where, nominants and destimulants have been converted into stimulants respectively: nominants:

$$x_{ij} = -|x_{ij} - \text{avarage}(x_i)|, \text{destimulants: } x_{ij} = -x_{i,j}.$$

Basing on analysis of descriptive statistics for each indicator, especially volatility ratio (Table 3), we have selected 7 (from 14) financial ratios (Table 2). We've also investigated correlation's coefficients (Table 4), in order to avoid the autocorrelation.

Table 3: Descriptive statistics for selected indicators

	OPM	CR	D%	CF/Debt	TAT	CES	ROCF
N	333	333	333	333	333	333	333
Mean	-0.0020	1.2395	0.6969	0.1605	1.8881	0.4519	0.0569
Median	0.0031	0.9507	0.6542	0.0922	1.5216	0.4647	0.0521
Min	-0.8820	0.0486	0.0374	-1.1070	0.0982	0.0126	-0.9420
Max	0.3967	10.5530	2.7215	7.6667	6.4437	0.8566	2.2000
St. deviation	0.0842	1.2292	0.4600	0.4894	1.2510	0.1311	0.1698
Volatility ratio	-5121.0000	99.1700	66.0100	304.9700	66.2600	49.0100	298.6500

During the next stage, basing on selected indicators we have constructed 3 synthetic measures of hospital's financial health. The selection criteria for each measures have been defined as follow:

- measure 1 (M1) – $R < 0.7$, ($R^2 < 0.5$)
- measure 2 (M2) – $R < 0.5$, ($R^2 < 0.25$)
- measure 3 (M3) – R insignificantly different from zero.

Finally, M1 has been constructed by employing 7 financial indicators, M2 – 5 indicators, and M3 only 3 (only 3 indicators have fulfilled adopted criterion) (Table 4).

Constructed measures have been applied to the research sample. All hospitals have been sorted by increasing value of measurements (M1, M2, M3). Accordingly, hospital's ranking has been created.

Table 4: Correlation coefficients (R) for selected indicators.

	OPM ¹	CR ^{1,2,3***}	D% ^{1,2}	CF/Debt ¹	TAT ^{1,2,3***}	CES ^{1,2,3***}	ROCF ¹
OPM	1.000	0.221	-0.168	0.522	0.083	-0.348	0.676
CR	-0.221	1.000	-0.459	0.367	-0.080	-0.028	0.221
D%	-0.168	-0.459	1.000	-0.245	0.355	0.094	-0.260
CF/debt	-0.522	-0.367	-0.245	1.000	-0.110	-0.203	0.652
TAT***	0.083	-0.080	0.355	0.110	1.000	0.111	0.101
CES	-0.348	-0.028	0.094	-0.203	-0.111	1.000	-0.228
ROCF	0.676	0.221	-0.260	0.652	0.101	-0.228	1.000

¹ measure M2; ² measure M2, ³measure M3, *** indicators insignificantly different from 0 ($\alpha = 0.05$)

Then correlations coefficients between values obtained by individual hospitals has been examined. Studies have shown, that the mean of M1 and M3 are almost similar, though M3 measures are characterized by greater volatility than M1 and M2. The analysis has indicated, that values obtained by hospitals using M1 and M2 measures are strongly correlated – correlation coefficients between M1 and M3 measures and M2 and M3 measures are definitely lower (71–79%) (Table 5).

Table 5: Descriptive statistics and Spearman's correlation coefficients for M1, M2 and M3 measures

	Mean	St. variation	M1	M2	M3
M1	0.512108	0.052496	1.000000	0.963728	0.711433
M2	0.624472	0.062480	0.963728	1.000000	0.788374
M3	0.559858	0.091134	0.711433	0.788374	1.000000

The further analysis has been carried out using M1 and M2 measures. M3 measure has been excluded from further analysis because:

- has been constructed basing on only 3 financial indicators;
- positions in ranking indicated by M3 have been significantly different from positions designated by M1 and M2.

The value of M1 and M2, in accordance with the methodology, could take values from the range 0–1. In this empirical study hospitals have obtained the following values:

- M1: 0.2740 for the worst hospital and 0.9090 for the hospital characterized by the best condition;
- M2: 0.3151 for the weakest hospital and 0.8726 for the best.

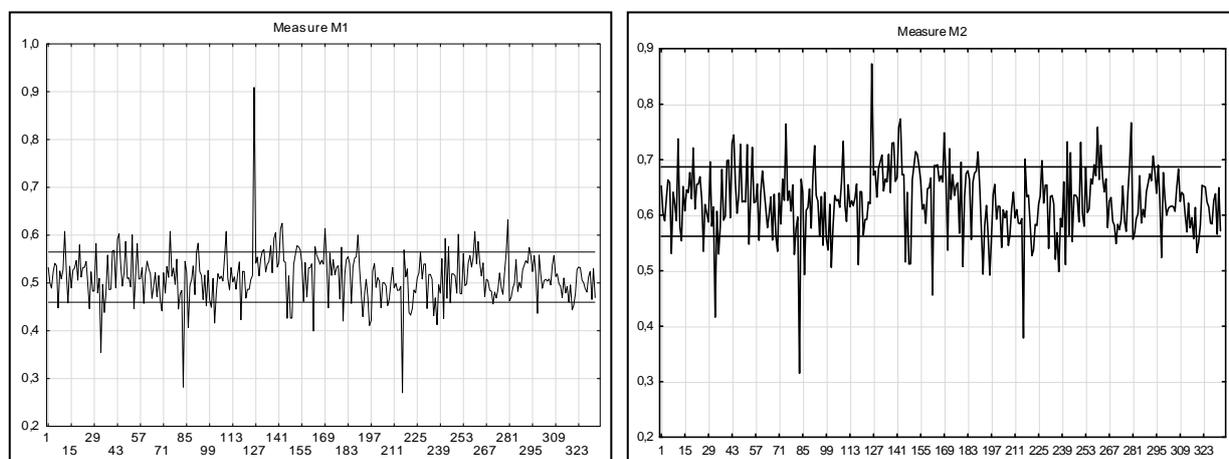


Figure 1: Values of M1 and M2 measures

In the case of the best entity both measures indicated the same hospital, in the case of the weakest – 2 different units (which have been ranked using M1 and M2 in a last and penultimate position).

Let us suppose, that the interpretation of built measures (M1 and M2) can be as follow:

- values less than the level “mean – standard deviation” – difficult financial situation (“low band”);
- values in the range “mean +/- standard deviation” – good/average financial situation;
- values above the level “mean + standard deviation” – very good financial situation (“high band”).
- By adopting this interpretation:
- M1 – the situation of the 40 hospitals can be described as difficult (below the “low band”) and, in the case of a 36 entities – over “high band” – as a very good;
- M2 – 43 hospitals received less than critical value (“low band”) and 39 hospitals values above „high band”.
- Adopting M1 measure, in Czech Republic, a situation of 9% hospitals can be described as very good and 9% – as difficult. In Poland – 13.5% and 16.7% respectively. In Slovakia – 28% of hospitals are below the critical value (“low band”) and no hospital has exceeded the “high band”.

4. Discussion and Conclusions

The assessment of hospital’s financial situation is essential for management of medical entities. More and more hospitals in analysed countries (especially in Poland) operate in a form of commercial law’s companies, and thus, there are at risk of bankruptcy. The assessment of financial health, in comparison to other hospitals, allow the evaluation of a threat of financial difficulties.

The study refers to previous studies. Proposed synthetic indicators, like Altman’ Z-score, is based solely on financial data. Two of five indicators have similar structure, however, have not been weighted. Comparing to FSI (Financial Strength Index) developed by Cleverley, data concerning infrastructure’s average age has not been included, while other areas (profit, liquidity and debt) have been defined by a different set of indicators – among others due to the fact, that FSI has been adapted to the specific of American market and include several indicators, that can’t be applied in analysed countries, like, for example, “Medicare LOS”, or, in some cases, unavailability of certain data. When it comes to the selection of financial indicators, this study has partially, confirmed results obtained by Cleverley’, Chu, Zeller and Stanko or McCue, first and foremost, has highlighted a substantial role of liquidity and efficiency indicators. Research have also pointed a crucial role of employment costs for hospital’s financial situation, which weren’t indicated by previous studies. Similar general rules were presented also by Raisova, M.; Buleca, J.; Michalski, G. (2014), Qineti, A., Matejkova, E., Pietrikova, M., Serences, R., Toth, M. and Dvorak, M. (2014).

Studies have indicated, that though hospital’s financial situation in analysed countries is varied, the important part of hospitals have been ranked within one standard deviation from the mean. It is also important, that the average value of constructed measures, particularly M1 is relatively low, which leads to the conclusion concerning the

overall not good hospital's financial condition. This has been also confirmed by detailed analysis of selected financial statements (the best and the worst hospitals). In practice, some hospitals improves financial condition by obtaining grants from owners (especially local public authorities), what should be also taken into account in further analysis. Further research should be focused on empirical verification of constructed tools, among all, in order to identify factors, that are critical to hospital's financial health. It is also important to incorporate into further analysis non-financial indicators, related both to hospital's activity and it's environment. We also plan to split the sample into groups, according to several characteristics – among all into private and public.

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Determinants of Czech inhabitants’ living standards

Nad’a Birčiaková¹, Jana Stávková² and Jakub Straka³

¹*Department of Marketing and Trade, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
nada.birciakova@mendelu.cz*

²*Department of Marketing and Trade, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
jana.stavkova@mendelu.cz*

³*Department of Marketing and Trade, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
xstraka3@mendelu.cz*

Abstract

Living standards are influenced by several variables. In the submitted paper, they are divided into eight main groups based on analysing alternative indicators of living standards – public life, place of residence, economic area, educational area, health care, environment, interpersonal relationships and personality. The main source of the data is represented by the results of a questionnaire survey performed in 2013 and 2014 in the Czech Republic, focused on elicitation of inhabitants’ opinions about how much individual variables influence their living standards. Using Principal Component Analysis, there were seven factors created out of the assessed variables. They should be reflected by a complex assessment of living standards.

Keywords: standard of living, Czech inhabitants, factors

1. Introduction

The issue of standard of living and its composition has, for many years, been engaged by many researchers (KDO), state authorities, institutions (OECD, UN, World Bank, etc.), etc. Knowledge of the factors that should make up standard of living is significant not only for its measurement and subsequent comparison of a state’s level of socio-economic development, but also for priorities of policy makers, understanding of population satisfaction and its behaviour. (Stávková et al., 2013, Gotowska, Jakubczak, 2013; Shumakova et al., 2014).

Although it is desirable for the above-mentioned entities to know how to measure standard of living, there is neither a consensus on how to measure it Cummins, 1997;

Wolff, 2009; Gotowska, Jakubczak, 2013) nor of which factors standard of living should consist. This problem follows especially from the different definitions of the term itself (see e.g. Hicks, 1979; Sen, 1987; Dasgupta, 1990; World Bank, 2004D; Matthews, 2007D; Wise and Geek, 2012D; etc.) and the fact that in science there are also a number of closely-related terms like living conditions or level of living (Gotowska, Jakubczak, 2013, p. 16). Standard of living is also seen from different perspectives – economic, socio-economic or socio-psychological. (Knausová, 2005).

On the basis of the many definitions of standard of living, there are a number of suggested approaches how to measure it. Currently, the most common approach is to measure the standard of living by real GDP per capita (Dorwick et al., 2003). Wolff (2009) lists three other measures, such as net national product (NNP), total personal income, and total personal disposable income. Although these approaches based on an objective measurement have been adopted by many states, a lot of authors have criticized them (see e.g. Mankiw, 2000; Woodard, 2008; Costanza et al., 2009). Based on this criticism, a number of alternative approaches were created, such as Net Economic Welfare (Nordhaus, Tobin, 1972), Genuine Progress Index (Anielski, 2001), Human Development Index (UNDP, 2013), Better Life Index (OECD, 2013), and Actual Individual Consumption based on the Stiglitz-Sen-Gitoussi report (Stávková et al., 2013).

Although these alternative approaches combining subjective and objective factors try to measure standard of living with respect to the criticism, no *“unified and universally accepted system of values that characterize people’s living standards”* exists which would be accepted by the above-cited subjects (Shumakova et al., 2014, p. 198). These subjects are (also for problems like difficulty in measurement, lack of information, delay of results, etc.) unable to agree especially on factors which the representative approach/indicator should contain. The main question therefore is which factors: have an influence on a population’s standard of living, are important, affect both functional and temporal aspects, and should be taken into account when measuring standard of living?

Because of complexity, standard of living cannot be expressed by a single factor. (Shumakova et al., 2014). Except of measurable objective factors, it should also contain subjective factors which are able to better express personal quality of life (Poláčková, Jindrová, 2011; Křupka et al., 2013; Campbell, 1972).

The above-cited approaches contain many economic (e.g. unemployment, investments, inflation, consumption, income), socio-economic (e.g. poverty, social exclusion, life expectations) and environmental factors (e.g. waste generation, gas emissions). According to Pope (1993), a standard of living indicator should consist of GNP per capita, wealth accumulation, the distribution of income and wealth, etc. Rapley (2003) selected frequently used objective and subjective factors (e.g. life expectancy, crime rate, school attendance, relationships with family, sense of community or material possessions). According to Shumakova et al. (2014, p. 198), *standard of living should be comprised of 3 main categories: “Population quality”, “Level of prosperity”, and “Quality of living conditions and social sphere”.*

The main goal of this paper is to identify factors which are important for measurement of standards of living based on subjective opinion of inhabitants. For the purpose of this paper, eight main groups of factors affecting standard of living were analysed: public life, place of residence, economic, education, health care, environment, interpersonal relationships, and personality.

2. Methodology and Data

The main source of data for the purposes of this paper were the results of the questionnaire survey performed in the Czech Republic. The data was collected using the quota selection based on economic activities. The numbers of respondents (heads of household) is 1 164.

The aim of the survey performed in 2013 and 2014 was to find out which factors are crucial for living standards, as subjectively perceived by the inhabitants. The respondents assessed individual factors using the 1–10 scale (1 – minimum, 10 – maximum) based on how important they considered them in terms of their living standards. In total, 99 factors were assessed, selected based on various indicators of living standards and welfare.

The results were assessed using Principal Component Analysis (PCA). This multidimensional statistical method enables the reduction of the number of variables (called principal components) that describe the variability of all the variables and their mutual relations. This method does not distinguish between dependent and independent variables, and the principal components are based on a linear combination of the original variables. The principle of the analysis is to create z_j variables – called principal components, uncorrelated, and arranged based on their dispersion – from p X_i variables in the following way:

$$\text{Var}(Z_1) > \text{Var}(Z_2) > \dots > \text{Var}(Z_p). \quad (1)$$

During further stages of the analysis the reduction of the variables with a negligible dispersion is performed, and then the analysis works with the variables with strong mutual correlations. First, a table with the data for p variables for n individuals is created. The first principle component is then a linear combination of the variables X_1, X_2, \dots, X_p :

$$Z_1 = a_{11}X_1 + a_{12}X_2 + \dots + a_{1p}X_p, \quad (2)$$

and it is distinguished by the biggest possible variability among the individuals provided that the a_{ij} constants correspond to this equation:

$$a_{211} + a_{212} + \dots + a_{21p} = 1 \quad (3)$$

On all the other principal components, the given relation and condition (Hendl, 2004) are applied. Using p independent principal components makes it possible to express the original variables out of which only several first variables have significantly big dispersions that are further used. The subsequent correlation between the variable and the principle component is called factor loading, and the sum of all the factor loadings for all the variables for the selected component corresponds to the total dispersion explained by the component. As highlighted by Meloun (2011), the dominant part of the analysis is identifying and explaining the relation of the original signs to the principal components. Pecáková (2008) adds that in order to further use the principal components in following statistical analyses it is necessary to set a unit of the component value, i.e. a component score. The score of the first principle component for unit j is specified by substituting it in an equation with the parameters of the first component of the found value of the original variable for this unit. This process is similar for the other principal components.

3. Results

To reach the aim of the paper Principal Component Analysis was used which provided for defining the main components of living standards and enabled significant reduction in number of indicators used for identifying and assessing the living standards of inhabitants. The achieved results can be one of the arguments for future alteration of the indicators of assessing inhabitants' living standards which have been used so far.

Respondents' opinion survey realised for such a purpose was unique for the fact that the analysis of various authors' opinions concerned with assessing living standards and factors influencing them had been accomplished before creating the questionnaire. Questions were formulated to comprise all the areas which are a part of living standards. The areas were introduced to respondents in a form of as many factors being part of the particular area as possible, and respondents were asked to express their opinion on importance of a factor for expressing the standard of living and level of satisfaction as they comprehend it subjectively. Representativeness of the group of respondents was assured in 6 criteria – age, gender, number of household members, level of education attained, economic activity, and income level. The 8 areas of living standards formulated by 99 determinants were firstly analysed and then assessed by authors.

3.1. Economic side of life

It is an area which due to its content corresponds the most with the so far most frequently used factor of living standards – form of GDP per capita. The area includes questions aimed at household income situation, job opportunities, price and quality of goods and services, balance between work and free time, property ownership, and others. According to respondents' opinion, gross income, quality of goods and services, and price of goods and services have the biggest impact on living standards. 52% of respondents are satisfied with the overall economic situation, the remaining 48% is represented mainly by the unemployed and pensioners.

3.2. Public services and infrastructure in the place of residence

The area is defined by questions concerning feeling of security in the place of residence, local municipality activity, accessibility and quality of shops, services, sport and free-time activities, and others. The importance of the area is strongly influenced by the level of infrastructure in the respondents' place of residence. Most of the factors in term of meaning fluctuate on the middle level, the most meaningful one for inhabitants is security, and price and quality of living. Within the whole area, respondents' satisfaction predominates (77.6% of respondents).

3.3. Educational area

In this area, the attention was turned to respondents in a form of questions like education level, accessibility of schools, financing education, importance of public and private universities, and others. The most important factors for respondents are quality of teachers, applicability of taught subjects, and accessibility and quality of public universities. Within the area of education, overall satisfaction predominates (74%). By a group of the unemployed and pensioners, dissatisfaction predominates.

3.4. Healthcare area

Healthcare area aims at accessibility and quality of healthcare institutions, or elderly housing and housing for disabled people, and financial demands of healthcare services, aids and medicine. Individual parts of the area have the strongest influence whatsoever according to respondents, the importance of many of the factors was marked by maximum points which is 10. The most important ones are quality of healthcare institutions, price of healthcare aids and medicine, and their accessibility. There are 57% of generally satisfied respondents in the healthcare area, by the 43% of the unsatisfied, the unemployed and pensioners predominate.

3.5. Environment

In the area of environment, respondents assessed how cleanliness of air and watercourses, noise in the place of residence, cleanliness of public buildings, amount of greenery, recycling possibilities, and others influence quality of life. By most of the factors, their importance for living conditions and standard of living was marked by number 8 on the point scale, an area marked as an important one, thus. According to respondents, noise in the place of residence is the most influencing factor, recycling possibilities are the least influencing one. In the area of environment, overall satisfaction predominates by the respondents (73.8%).

3.6. Public life

The area of public life and state affairs includes questions relating to government and individual ministries activities, trust in politics, number of foreigners and minorities in the state, accessibility and quality of transportation services, and others. The average influence of all the factors is on the level 6.12, according to respondents, the most influencing factors are amount of taxes paid, law enforcement, quality of the law; the least influencing ones are non-governmental organisations activities. The area of public life is an area where dissatisfaction predominates, 58% of respondents expressed themselves negatively. The only group of respondents satisfied with the area of public life is a group of the self-employed.

3.7. Interpersonal relationships

Within the area of interpersonal relationships, family relationships, family and close friends health, value arrangement, and others were assessed. The most significant influence is assigned by respondents to family relationships (55% percent expressed themselves), family and friends' health, relationships in the workplace, and value arrangement in society. While assessing satisfaction in the area of interpersonal relationships, satisfaction predominates among respondents (65%). Dissatisfaction predominates by a group of the unemployed.

3.8. Self-satisfaction

Among the assessed factors, there were talent, feeling of security, and possibility of self-actualisation, image, and others included. Factors connected to respondent's personality are significantly rated highly (7.7 points). None of the factors was rated less than 6.

The most important one is feeling of love, security, the least important one is image. Respondents assessed their self-satisfaction highly positively, there were only 17% of the unsatisfied, the most satisfied respondents were from a group of employees.

At the end of the questionnaire, respondents were to summarise the above mentioned areas using assessing scale according to their importance in every-day life, therefore essential for identifying and assessing the living standards. The result is stated in the following Figure 1 from which it is visible that the area of interpersonal relationships, health, and as lately as the third position, economic side of life have the strongest influence on identifying and assessing the living standards. Authors may claim that the same conclusion about the importance of particular factors was reached by a similar opinion survey carried out in 2013 and 2014 by 2,713 households in 5 European countries.

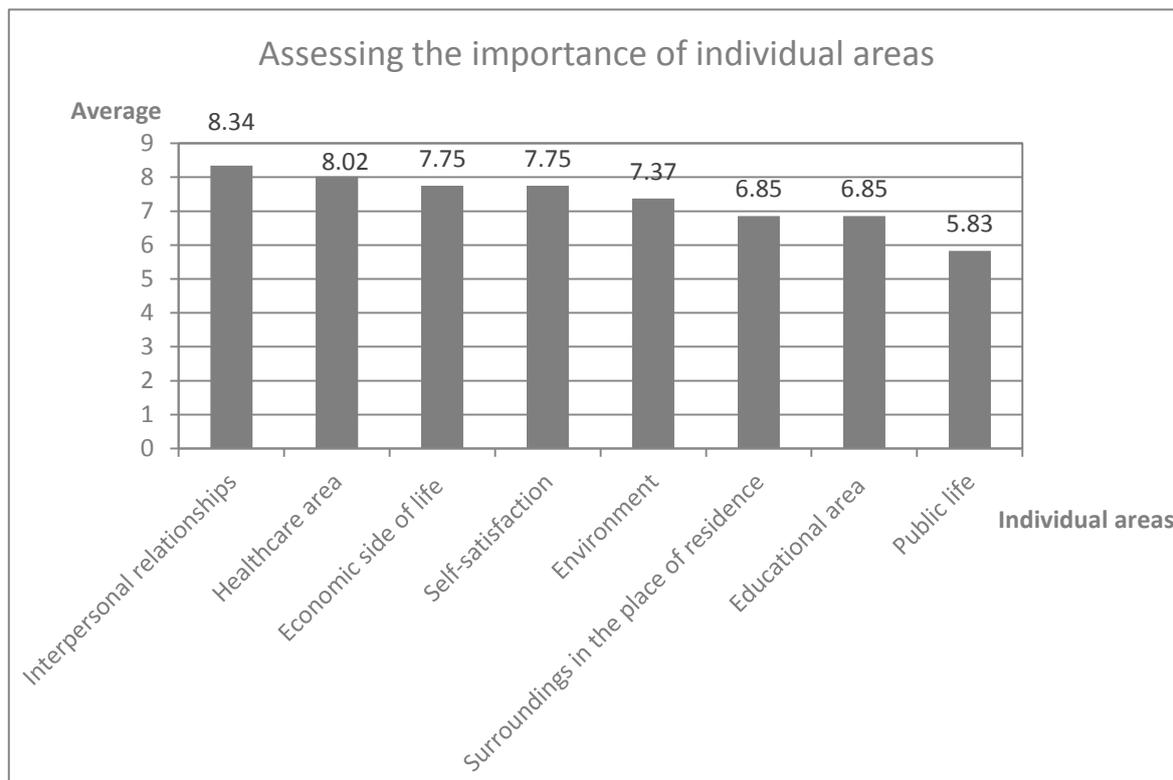


Figure 1: Assessing the importance of individual areas

Figure 2 depicts the most important factor from every section as it was marked by respondents using a point scale.

Applying a method of Principal Component Analysis, the original 99 variables were reduced to 18 factors, explaining 72% of the overall variability of variables. Such a fact is formulated graphically using a scree plot (Figure 3).

Due to apparent cutoff points in the scree plot progression, only 7 factors were identified and described consecutively, by which it was possible to state defining variables to every factor using factor loading. It was impossible to denote variables of the factor 8, therefore they were affiliated to the already defined factors according to the factual content of the variables. Created factors and their defining variables are stated in Table 1. It is necessary to draw attention to the share of the remaining 12 undescribed factors creating 20% of the overall variability.

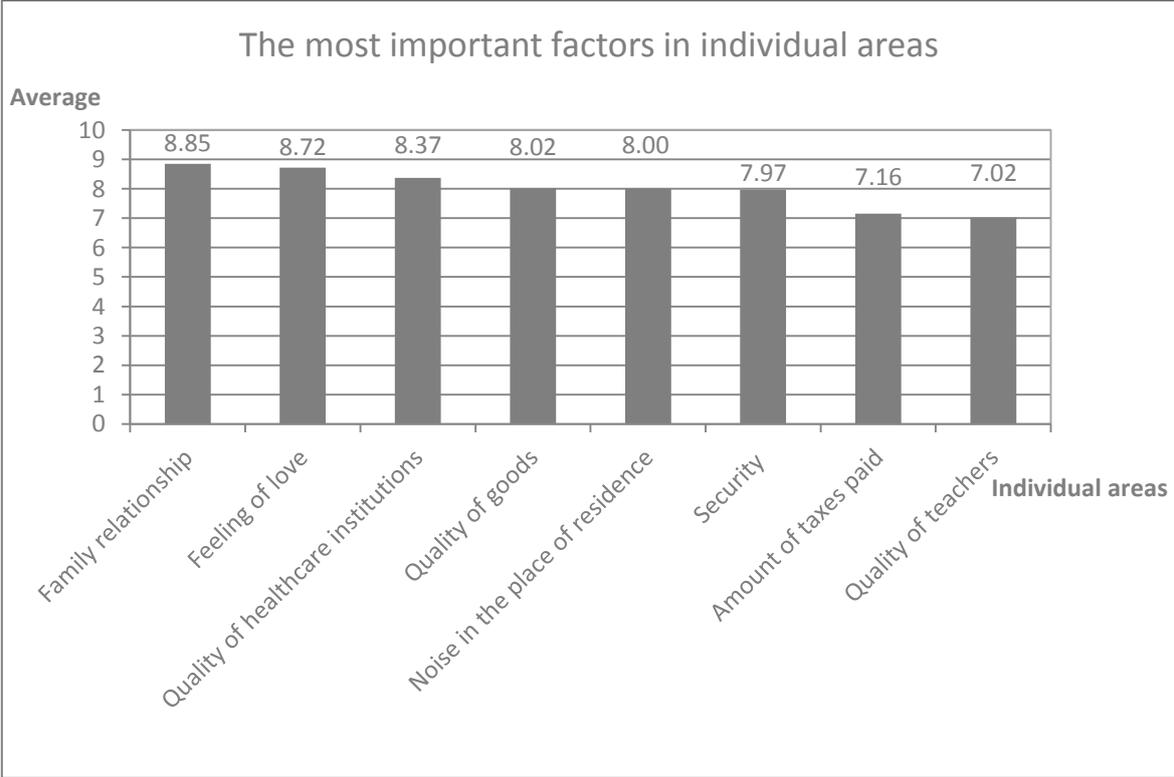


Figure 2: The most important factors in individual areas

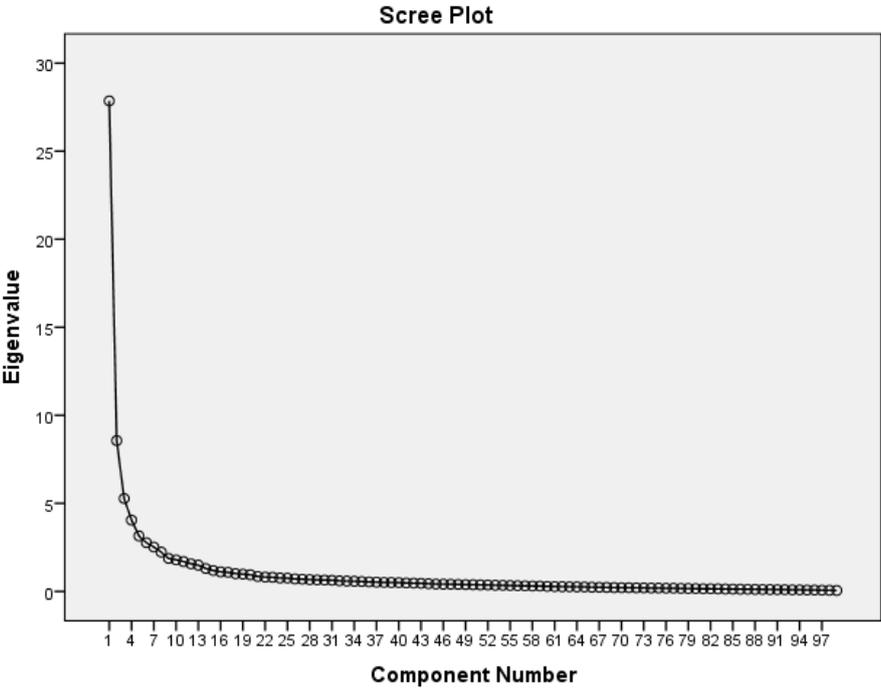


Figure 3: Scree Plot

Table 1: Final factors with variables

Education	accessibility to public education institutions, accessibility to private education institutions, quality of education institutions, applicability of the taught subjects, qualities of teachers, financial costs of education, opportunity for foreign studies, education system, highest level of education reached
Health	accessibility to healthcare institutions, quality of healthcare institutions, healthcare personnel communication, accessibility to elderly housing, quality of elderly housing, financial costs of healthcare services, accessibility to healthcare aids
Environment	air cleanliness, water cleanliness, nature cleanliness, public places cleanliness, accessibility to greenery and forests, opportunity to recycle
Public life	government and ministries activities, trust in politics, corruption, judicial activities, law enforcement, law quality, municipality office activities
Economic side	number of job opportunities, gross income, the amount of social benefits, quality and price of goods, quality and price of services, opportunity to live in state housing, property ownership, legacy
Interpersonal relationships	family relationships, neighborhood relationships, feeling of overall satisfaction, feeling of security, feeling of love, feeling of appraisal and esteem, possibility of self-actualisation
Infrastructure	accessibility to grocery shops, accessibility to other shops, accessibility to services, quality of services, availability of the internet connection, accessibility to transportation services, quality of transportation services, accessibility to free-time activities, sport and culture facilities

4. Discussion and Conclusions

Opinion survey was carried out in 2014 with a representative set of 1152 respondents. Using 99 factors, respondents expressed themselves to the factors importance for assessing inhabitants' living standards. Via method of Principal Component Analysis, the factors were reduced to 18 of them, explaining 72% of all the variables variability. 7 defined factors were used for the possible logical interpretation and describing factors assessing living standards – education, health, environment, public life, economic side of life, infrastructure, and interpersonal relationships.

The following might be concluded from the results of analysing opinion survey about inhabitants' living standards. First of all, subjectively defined areas and factors created by rotation of factors and variables match in 6 out of 7 areas (health, education, environment, public life, interpersonal relationships and economic side of life). Only the subjectively defined area concerned with self-satisfaction became a part of other factors, mostly the factor expressing mutual interpersonal relationships. Furthermore, factors

defined by the method of Principal Component Analysis, or subjectively stated areas of living standard (based on experience, results of foregoing surveys, and deep theoretical knowledge) may be marked as the most suitable ones and sufficient for assessing inhabitants' standard of living. Specifying the content and number of explaining variables (factors) is to be a subject matter for further research.

As the opinion expression to the importance of factors for assessing living standards implies, interpersonal relationships and health are the most important ones for respondents, followed by the factor of economic side of life, generally understood as a factor crucial for satisfaction and quality of life. Based on the findings it may be inclined to an opinion that material side of life is not a priority for its quality, thus we contribute to several arguments criticising GDP per capita as a factor of living standards.

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Returns to scale in the Slovak banking sector

Martin Bod'a¹

*¹Department of Quantitative Methods and Information Systems, Faculty of Economics,
Matej Bel University in Banská Bystrica, Tajovského 10, 975 90 Banská Bystrica, Slovakia,
e-mail: martin.boda@umb.sk*

Abstract

The paper aims to identify for individual commercial banks of the Slovak banking sector the scale of their operations as exhibited by their production activities during the period from 2000 and 2012. To this end, the DEA procedure of Tone and Sahoo utilizing the concept of the degree of scale elasticity is enhanced and combined with the framework of the SBM model. The analysis of scale is conducted for the major 11 Slovak commercial and it is found that the largest Slovak commercial banks were in the investigated period already “too large” so as to gain potentially some benefit from expanding their services by increasing their inputs.

Keywords: returns to scale, degree of scale elasticity, SBM model, production approach, Slovak banking sector

1. Introduction

An important property of banking production is the scalability of operations, i.e. the ability to produce dominantly at constant or variable returns to scale (hereinafter contracted to “RTS”). Abstracting from other conditions of banking enterprise, it is desirable from a societal standpoint that banking production is accomplished at constant RTS inasmuch as in such a case average production is maximum and under perfect competition (when the prices of outputs and inputs are exogenous) commercial banks attain zero profits in the long run. The knowledge about the scale of operations is important to commercial banks on several grounds.

- In the first place, if a commercial bank operates at increasing RTS, there is still room for increasing the size of its operations as a more dynamic increase of outputs is associated with the initial expansion of inputs. The reverse action is advisable for a commercial bank operating under decreasing RTS.
- The performance of commercial banks (as well as their branch offices) is nowadays frequently investigated as follows from a great amount of research interest that arose in connection to technical efficiency measurement in the banking sector. The

methods devised to this end (and data envelopment analysis in particular) require the analyst to specify the nature of operations in terms of scale. This specification is often set heuristically, a priori to a full and thorough consideration of the issue, or both constant RTS and variable RTS are considered as options and results are compared. Nonetheless, this choice and comparison are made short of a solid basis.

In line with these considerations, the centre of attention of this paper rests with the Slovak banking sector and its production characteristics. There were several studies with their attention devoted to technical efficiency measurement in the Slovak conditions that employed some approach of data envelopment analysis (DEA) either for the entire banking sector (e.g. Zimková, 2014) or on the level of branch offices (e.g. Ševčovič et al., 2001, Kočíšová, 2012), but they failed to recognize the importance of this issue and opted for variable RTS by default. To the best knowledge of the author, the investigation into the nature of RTS in the Slovak banking sector has not been conducted and this issue relevant to technical efficiency measurement escaped the attention of researchers.

In this respect, the aim of the paper is to identify for individual commercial banks of the Slovak banking sector the scale of their operations and locate their position on the technological frontier in view of scale. The assumption of three recognizable and separable phases in the development of the Slovak banking sector during the period from 2000 until 2012 is adopted and justified. The identification procedure of RTS is thus carried out for these three identified phases, under the belief that each phase is characteristic of a specific production technology constant throughout the phase, and with this the “unified DEA” approach of Tone and Sahoo (2004) is utilized. Whilst this two-step procedure builds, as proposed originally by the authors, on using the oriented BCC model in the first step, its radiality and orientation are somewhat binding properties. In order to relax them, the paper recommends the slacks-based measure (SBM) model of Tone (2001).

The contributions of the paper are then twofold. In the empirical dimension, an investigation of the position of Slovak commercial banks with respect to scale of their operations is conducted from the perspective of one of the most prominent approaches to interpreting banking production: the so-called production approach. From the methodological point of view, the procedure of Sahoo and Tone (2004) for identification of scale is enhanced by introducing a less restrictive projection into its first step.

The paper is structured into five sections. This introductory section expands into the second section containing the general presentation of the procedure. The third section is methodological and the ensuing fourth section shows the obtained results and comments on their implications. The final, fifth, section summarizes.

2. Scale and its Identification

It is assumed that production technology of commercial banks converts m inputs into s (desirable) outputs. All production variables are represented by non-negative numbers and any input vector denoted generally as \mathbf{x} is a point in \mathfrak{R}_+^m and, similarly, any output vector \mathbf{y} is a point in \mathfrak{R}_+^s . A production activity is then an ordered pair $[\mathbf{x}, \mathbf{y}]$ in the full input-output space $\mathfrak{R}_+^m \times \mathfrak{R}_+^s$. The production technology of commercial banks is represented by the set of all feasible production activities. The boundary of T defined à la Debreu and Farrell in terms of maximum attainable radial contractions of inputs and maximum attainable radial expansions of outputs is referred to as the technological

frontier. Production activities lying on the production frontier need not still be technically efficient because there may be room for non-radial improvement of (at least) one of their inputs or (at least) one of their outputs. Production activities that come to satisfy the definition of Koopmans (1951, p. 60) stipulating that no further improvement of production is attainable are called here technically efficient or technically efficient in the sense of Pareto and Koopmans.

For reasons analytical, it is needful to characterize production technology in respect of the scale of production. RTS describe the behaviour of production as the scale of production changes in situations when all input levels are variable and chosen by the production unit. The paper shows how to establish whether a particular production activity operates at constant RTS, increasing RTS or decreasing RTS. The last two cases are commonly cast into the case of variable RTS. Before providing the definition for these three basal situations, to change the scale of operations for a given production activity $[\mathbf{x}, \mathbf{y}] \in T$ is to multiply $[\mathbf{x}, \mathbf{y}]$ by a non-negative number k , and to increase (resp. decrease) the scale of operations is to restrict further k to be larger than 1 (resp. smaller than 1). It is concurred in the literature (e.g. Sahoo et al., 1999, p. 380, 383; Tone and Sahoo, 2004, p. 758) that it is only sensible to define the RTS status only for production activities that are positioned on the efficient subset of the technological frontier. Hence, assume that a production activity $[\mathbf{x}, \mathbf{y}] \in T$ is technically efficient in the sense of Pareto and Koopmans. This production activity is then said to operate at

- *increasing RTS* if one can arbitrarily increase the scale of operations, viz. for any $k > 1$ also $[k\mathbf{x}, k\mathbf{y}] \in T$;
- *decreasing RTS* if one can arbitrarily decrease the scale of operations, viz. for any $0 < k < 1$ also $[k\mathbf{x}, k\mathbf{y}] \in T$; and, finally,
- *constant RTS* if for one can arbitrarily change the scale of operations, viz. for any $k > 0$ also $[k\mathbf{x}, k\mathbf{y}] \in T$.

The trio of definitions is borrowed and adapted from Debreu (1959, p. 40) and is complemented below by an analytical procedure to identify for a particular technically efficient activity its status with respect to RTS.

This approach uses the measure known as the degree of scale elasticity (hereinafter addressed as “DSE”) or passus coefficient (see e.g. Frisch, 1965), which is also the instrument used throughout the paper to recognize the nature of scale for individual production activities. This coefficient is originally defined for a single-output production (with possibly multiple inputs) and is generalized by Tone and Sahoo (2004) to multiple-output (and possibly multiple-input) technologies, which is the reference basis here in the paper. All production variables must be required positive. Assume for a while that the production technology transforms $m \geq 1$ inputs into $s = 1$ outputs. The DSE ε is then the elasticity of the output quantity with respect to one of the inputs when all inputs vary proportionally and is defined for one input ($m = 1$) and one output ($s = 1$) as

$$\varepsilon = \frac{dy/dx}{y/x} = \frac{\text{marginal product}}{\text{average product}}. \quad (1)$$

DSE measures elasticity with respect to scale: a production activity with $\varepsilon > 1$ (resp. $\varepsilon < 1$) thus operates in a local increasing (resp. decreasing) RTS environment, and constant RTS answers to the case when $\varepsilon = 1$.

In generalizing (1) to a multiple-output and multiple-input case, the focal challenge is how to approximate the marginal product dy/dx and the average product y/x . Tone and Sahoo (2004) employ the concept of a supporting hyperplane to render this approximation workable. The supporting hyperplane and DSE as well are estimated on the basis of the observed set of production activities $S_n = \{[\mathbf{x}_i, \mathbf{y}_i]\}_{i=1}^n$ on n production

units. This estimation is done in the framework of the standard BCC model that is linked and built upon the concept of supporting hyperplane. In this, introduce the matrices of inputs and outputs respectively as $\mathbf{X} = (\mathbf{x}_1 | \mathbf{x}_2 | \dots | \mathbf{x}_n)$ and $\mathbf{Y} = (\mathbf{y}_1 | \mathbf{y}_2 | \dots | \mathbf{y}_n)$. Subsequently, estimate the production technology as a convex linear combination of all observed production activities contained in S_n by

$$est.T = \{ [\mathbf{x}, \mathbf{y}] \in \mathfrak{R}_+^m \times \mathfrak{R}_+^s : \mathbf{x} \geq \mathbf{X}\boldsymbol{\lambda}, \mathbf{0} \leq \mathbf{y} \leq \mathbf{Y}\boldsymbol{\lambda}, \mathbf{1}'\boldsymbol{\lambda} = 1, \boldsymbol{\lambda} \geq \mathbf{0} \}, \quad (2)$$

where $\mathbf{1}$ stands for a vector of ones. If an observed production activity is not positioned on the Pareto-Koopmans efficient portion of $est.T$, it is projected on to it and made technically efficient; if, however, this activity is found technically efficient with respect to $est.T$, no projection is necessary. For individual technically efficient production activities directly or for technically efficient projections of production activities an output oriented BCC model is then run in order to estimate their supporting hyperplanes. In checking whether individual projection activities are technically efficient with respect to $est.T$ and in effecting projections – unlike Tone and Sahoo (2004) – this paper suggests employing the non-radial SBM model of Tone (2001) based on the slacks-based measure. This will be elucidated later on.

In the meantime, assume that $[\mathbf{x}_r, \mathbf{y}_r]$ is either technically efficient with respect to $est.T$ or made technically efficient by an appropriate projection. The output oriented BCC model is solved for it in a multiplier form as

$$\begin{aligned} \mathbf{v}'\mathbf{x}_r - u_0 &= ! \min_{\mathbf{v} \in \mathfrak{R}_+^m, \mathbf{u} \in \mathfrak{R}_+^s, u_0 \in \mathfrak{R}} \\ \text{subject to} & \\ -\mathbf{v}'\mathbf{X} + \mathbf{u}'\mathbf{Y} + \mathbf{1}'u_0 &\leq \mathbf{0}', \quad \mathbf{u}'\mathbf{y}_r = 1, \quad \mathbf{v} \geq \mathbf{0}, \mathbf{u} \geq \mathbf{0}, u_0 \text{ free in sign.} \end{aligned} \quad (3)$$

Here $\mathbf{0}$ stand for a zero vector (of appropriate length). It can be shown that DSE transforms in its estimation formula from (1) into

$$est.\mathcal{E} = 1 + u_0^*. \quad (4)$$

However, as Tone and Sahoo (2004) point out, in many occasions, there exist multiple optima of u_0^* and they suggest determining the lower bound \underline{u}_0^* and the upper bound \bar{u}_0^* by solving the linear program

$$\begin{aligned} u_0 &= ! (\max) \min_{\mathbf{v} \in \mathfrak{R}_+^m, \mathbf{u} \in \mathfrak{R}_+^s, u_0 \in \mathfrak{R}} \\ \text{subject to} & \\ -\mathbf{v}'\mathbf{X} + \mathbf{u}'\mathbf{Y} + \mathbf{1}'u_0 &\leq \mathbf{0}', \quad -\mathbf{v}'\mathbf{x}_r + \mathbf{u}'\mathbf{x}_r + u_0 = 0, \quad \mathbf{u}'\mathbf{y}_r = 1, \quad \mathbf{v} \geq \mathbf{0}, \mathbf{u} \geq \mathbf{0}, u_0 \text{ free in sign.} \end{aligned} \quad (5)$$

The upper (lower) scale elasticity is then estimated respectively as

$$est.\underline{\mathcal{E}} = 1 + \underline{u}_0^* \quad \text{and} \quad est.\bar{\mathcal{E}} = 1 + \bar{u}_0^*. \quad (6)$$

Although Tone and Sahoo (2004) employed the oriented BCC model to check technical efficiency of production activities and used their projections to make these production activities in case of need technically efficient, here a more sophisticated SBM model proposed by Tone (2001) is utilized to this end. For a production activity $[\mathbf{x}_r, \mathbf{y}_r] \in S_n$ this model solves the following task of fractional programming (though in actual applications Charnes-Cooper transformed to the task of linear programming)

$$\rho = \frac{1 - \frac{1}{m} \sum_{i=1}^{i=m} s_{ri}^x / x_{ri}}{1 + \frac{1}{s} \sum_{j=1}^{j=s} s_{rj}^y / y_{rj}} = ! \min_{s^x \in \mathfrak{R}_+^m, s^y \in \mathfrak{R}_+^s, \lambda \in \mathfrak{R}_+^n} \quad (7)$$

subject to

$$\mathbf{s}^x = \mathbf{x}_r - \mathbf{X}\boldsymbol{\lambda} \geq \mathbf{0}, \quad \mathbf{s}^y = \mathbf{Y}\boldsymbol{\lambda} - \mathbf{y}_r \geq \mathbf{0}, \quad \mathbf{1}'\boldsymbol{\lambda} = 1, \quad \boldsymbol{\lambda} \geq \mathbf{0},$$

in which s_{ri}^x , x_{ri} denote the i -th element of the vectors \mathbf{s}^x , \mathbf{x}_r , respectively, and in which s_{rj}^y , x_{rj} stand for the j -th element of the vectors \mathbf{s}^y , \mathbf{y}_r , respectively. The symbol ρ denotes the slack-based measure of DEA, which lent its name to the entire model. This coefficient takes values from interval $[0,1]$ and measures technical efficiency. If for a production activity the optimal solution $\rho^* = 1$ happens to be the case, this production unit is technically efficient in the sense of Pareto and Koopmans (with respect to S_n). If this production unit fails to satisfy $\rho^* = 1$, it can be brought into technical efficiency by effecting the following projection

$$\mathbf{x}_r \rightarrow \mathbf{x}_r - \mathbf{s}^{x*}, \quad \mathbf{y}_r \rightarrow \mathbf{y}_r + \mathbf{s}^{y*}. \quad (8)$$

The use of the output-oriented BCC model is not in collision with the use of the non-radial SBM model. Whereas the former is utilized here for constructing an *economically interpretable* supporting hyperplane that in a geometric way characterizes the scale property of production (see Cooper et al., 2007, pp. 134-136) and for subsequent investigations of scale, the latter is employed for checking whether individual commercial banks are technically efficient in respect of the estimated production technology $est.T$ and for projecting them on the efficient frontier of $est.T$.

3. Methodological notes

Two factors influenced gravely the methodological route taken in the paper: (1.) the size of the Slovak banking sector and (2.) a possibility to slice the period from 2000 to 2012 into three economically consistent phases in the development of the Slovak banking sector.

On the one hand, the small number of commercial banks and branch offices of foreign banks prohibited analysis from being carried out in a traditional way on a yearly basis. The core of the Slovak banking sector is formed by 11 banks which make up more than 90% of operations of the entire sector. The overview of these banks participating in the analysis (with abbreviations adopted henceforth) is displayed in Table 1.

Table 1: The “Core” commercial banks of the Slovak banking sector between 2000 and 2012

Commercial bank	Abbreviation
Citibank Europe plc, foreign bank subsidiary (before 2009 Citibank (Slovakia), a. s.)	CITI
Československá obchodná banka, a. s. (in 2009 merged with Istrobanka, a. s.)	CSOBISTRO
OTP Banka Slovensko, a. s.	OTP
Poštová banka, a.s.	POSTB
Prima banka Slovensko, a. s. (before 2011: Dexia banka Slovensko, a. s.)	PRIMA
Privatbanka, a.s. (before 2005 Banka Slovakia, a. s.)	PRIVAT
Sberbank Slovensko, a. s. (before 2013 VOLKSBANK Slovensko, a. s.)	SBERBANK
Slovenská sporiteľňa, a. s.	SLSP
Tatra banka, a.s.	TB
UniCredit Bank Slovakia, a. s. (a 2007 merger of UniBanka, a. s. & HVB Bank Slovakia, a. s.)	UNI
Všeobecná úverová banka, a. s.	VUB

On the second hand, the development of the Slovak banking sector during the period from 2000 to 2012, its economic changes and political reforms that it had to go through, points clearly to three separable phases with specific environmental conditions. It is

reasoned here in the paper that within each distinctive phase the production technology may be thought of as intact and invariant with respect to a time shift, this being so thanks to the inertia of the economic environment. Under this view, the period from 2000 to 2012 may be broken down into three such successive non-overlapping phases: 2000–2003, 2004–2008, 2009–2012.

- The first phase (2000 to 2003) reflects the fading-away of the restructuralization of major banks and of the privatization of selected banks in Slovakia that commenced in the 1990s. This phase was also accompanied by final stages of the transformation process of the Slovak economy.
- The second phase (2004–2008) begins by the accession of Slovakia into the European Union and terminates by the entry of Slovakia into the euro area. Slovak banks during this period implemented a new system of corporate governance, moved to the communication with targeted client segments and towards electronic banking services. Commercial banks were intensively engaged in the preparations for the entry of Slovakia into the euro area as of 1 January 2009.
- The third phase (2009–2012) is marked by the successful adaptation of the Slovak banking sector to the euro environment and by the manifestations of the economic crisis in the Slovak economy. Though the process of the euro-conversion was smooth and trouble-free, the global economic crisis caused small Slovak banks to face existence problems.

Combining these two decisive factors, the identification of scale undertaken in the paper was effected for the 11 commercial banks whose list is given in Table 1 and for the three phases identified. The hypothesis on the time-invariance of the production technology permitted the pooling of individual commercial banks in the identified phases into one sample and resulted in using “bank-years”. The dataset on these 11 commercial banks operating in the Slovak Republic came from TREND Holding, s.r.o., Bratislava. Only the data for 4 bank-years were not complete (CITI 2003–2006, 2009–2012). Accounting for the non-available data, the first sub-period was represented by $11 \times 4 - 1 = 43$ bank-years, the second phase counted in total $11 \times 5 - 3 = 52$ bank-years, and finally, the third phase was formed of $11 \times 4 - 4 = 40$ available bank-years.

The empirical analysis was effected under the production approach to transformation in banking. In the choice of input and output variables, only variables stated in physical quantities or balance-sheet items stated in monetary units were accommodated. The production approach views commercial banks as producers of banking services, in which they use and consume labour and physical capital. Table 2 shows the detailed information on the selection of production variables.

Table 2: The list of production variables recognized under the production approach

Inputs	Outputs
(the number of) employees ^{*)}	(the total amount of) deposits ^{†)}
(the total amount of) fixed assets ^{†)}	(the total amount of) loans ^{†)}

Notes: ^{*)} The variable is measured in full time equivalents and in an arithmetic average form for the given fiscal year.

^{†)} This variable is measured in thousand € deflated to 2000 prices (by means of the gross domestic product deflator) and as reported as of 31 December of the given fiscal year.

4. Results and findings

All data preparations and computations were performed in program R (R Core Team, 2013). The R scripts for computing technical efficiencies and projections in the set-up of the SBM model and for computing the degree of scale elasticity as well as its lower and upper bounds were compiled by the author on his own.

The detailed results may be obtained from the author on request. The preponderance of decreasing RTS is suggestive that the largest and medium-sized commercial banks operate at decreasing RTS and are unable to effectively utilize their size in respect of the chosen input mixes consisting of labour force and fixed capital and the chosen output mixes made up by total deposits and total loans. The scale of their operations does not afford them to gain additional returns by increase in inputs at any factor. By (equiproportionate) raising their inputs also their outputs are expected to (equiproportionate) rise – provided that the settings of their operational environment remain the same – still, the intensity of increase in outputs is lower than that in inputs. Namely, the list of commercial banks with the status of decreasing RTS comprise CSOBISTRO, OTP (in the second and the third phase), POSTB (in the third phase), PRIMA (mostly during the investigated period), VUB, UNI, TB, SLSP and SBERBANK. Mostly increasing RTS were exhibited in the production operations of OTP (the first phase), POSTB (the first and the second phase) and PRIVAT. The status of CITI was somewhat erratic during the investigated period in order to infer firmer conclusions. Although SBERBANK and PRIMA were declared to be operating at decreasing RTS, in the third phase they are very close to the benchmark status of constant RTS.

A total of three notable implications may be inferred from the results.

First, the positions of individual commercial banks with respect to the (estimated) Pareto-Koopmans efficient frontier were during the period from 2000 to 2012 different. Most commercial banks conserved their position in the area of decreasing returns, only some smaller commercial banks were positioned in the area of increasing RTS (in all the three phases or in some of them). Their transition from the sphere of increasing RTS into the sphere of decreasing RTS of the production technology, and vice versa, happened alongside their economic optimization and adjustments induced by structural changes across the three periods recognized in the development of the Slovak banking sector. Eventually, only one bank (the small CITI which later transformed its status into a branch office of a foreign bank) found itself (and jittered) in the investigated period in the vicinity of constant RTS and switched its status between decreasing RTS and increasing RTS.

Second, if one is to occupy oneself with measuring technical efficiency of Slovak commercial banks under the production approach with reference this selection of inputs and outputs and with respect to the investigated period from 2000 to 2012, then he should opt for variable RTS. More ideally, especially decreasing RTS should be pre-set in DEA models as these are descriptive for the vast majority of Slovak commercial banks. It is evident that decreasing RTS capture best the empirical technology that is used in production of banking depository and creditory services. Nonetheless, one may still use DEA models in conjunction with the assumption of constant RTS, but this goes only with the full understanding that technical efficiencies calculated (estimated) under such an assumption does not reflect what truly holds for the production of Slovak commercial banks, but just what might be found reasonable and desirable from an economic (theoretical) point of view.

On the other hand, individual coefficients measuring the degree of scale elasticity in are valuable from a managerial perspective as they give an insight about reactions of output variables to changes of input variables. The smaller is the degree of scale elasticity, the lesser is the advantage of scale of which Slovak commercial banks may avail themselves. In such a case, one is free to modify the slogan “too big to fail” into “too big to expand” as with small degree of scale elasticity outputs react slowly to changes in inputs. The average values of degrees of scale elasticity for the eleven Slovak commercial banks subjected to the analysis structured according the three phases are reported in Table 3.

Table 3: The average scale elasticities for the Slovak commercial banks under consideration in the three phases

Bank	Phase			Bank	Phase			Bank	Phase		
	# 1	# 2	# 3		# 1	# 2	# 3		# 1	# 2	# 3
CITI	4,359	1,082	NA	CSOBISTRO	0,570	0,767	0,838	OTP	6,773	0,606	0,925
POSTB	6,774	1,246	0,879	PRIMA	4,634	0,635	0,977	PRIVAT	20,905	6,423	2,449
SBERBANK	0,312	0,521	0,947	SLSP	0,346	0,685	0,427	TB	0,681	0,809	0,698
UNI	0,365	0,680	0,840	VUB	0,433	0,838	0,591	-	-	-	-

Putting CITI aside for its erratic behaviour, these averages imply that across the three phases of the investigated 13-year long period the scale elasticity of CSOBISTRO, SBERBANK and UNI gradually increased in the direction of constant RTS, whereas POSTB, PRIMA as well as PRIVAT displayed a tendency to decrease their scale elasticity, again towards constant RTS. PRIVAT is a specific small bank that exhibited increasing RTS throughout the investigated period, during which it underwent a consolidation process and was able to optimize its scale and take advantage of its high scale elasticity. The largest commercial banks – SLSP, TB, VUB – showed rather low degrees of scale elasticity in all the three phases, without any apparent trending behaviour. Their production is clearly affected by the “too big to expand” maxim formulated above.

5. Summary

The identification of scale in the Slovak banking sector was conducted under the production approach, under which the bank is approached as a service factory and is focused on taking deposits and making loans. Having adopted this scheme, the analysis of the paper covered the majority of the Slovak banking sector and was done for the 11 major Slovak commercial banks representing almost the entire sector. The crucial ingredient of the methodological procedure was the division of the whole period of 13 years from 2000 to 2012 into three consecutive and separate phases of development, during which the production technology of the banking sector may be righteously thought of as constant and void of change. The breaking up the investigated period into the three phases, 2000–2003, 2004–2008 and 2009–2012, was defended by means of economic arguments pointing to changes happening between the phases.

The results confirm that the largest Slovak commercial banks were in the investigated period already “too large” so as to gain potentially some benefit from expanding their depository and creditory services by increasing their inputs. Most commercial banks operated at decreasing RTS, yet some of them moved throughout the three phases towards constant RTS, which is evidential in favour of their ability to implement

necessary optimization measures and regulate their scale. Another implication, now in the sphere of technical efficiency measurement, is that in using DEA for the purpose measuring technical efficiency under the production approach a preference for variable RTS (or more appropriately, decreasing RTS) should be safely made as this is most characteristic of the Slovak banking sector during the investigated period from 2000 to 2012.

Some words of warning are appropriate in the conclusion. The identification of scale unfolded here in the paper takes no notice of circumstances of production that sometime happen to block the smoothness of the transformation process such as indivisibilities or congestion. Also the treatment of scale here is on the basis of equiproportionate changes and reactions, which is in line with the neoclassical convention. Contrary to these caution-urging remarks, the concept of RTS is still a matter of interpretation, not an issue of its validity as such.

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The prediction of IFRS for SMEs adoption

Hana Bohušová¹ and Veronika Blašková²

¹*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
hana.bohusova@mendelu.cz*

²*Department of Statistics and Operation Analysis, Faculty of Business and Economics,
Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
veronika.blaskova@mendelu.cz*

Abstract

Small and medium sized companies have an important position in the economy, mainly in the area of employment. Activities of SMEs on the international markets are limited by a great deal of obstacles in comparison with large enterprises. Different national financial reporting and taxation systems can be considered as the most important obstacles. Harmonization of financial reporting could partially remove one of these obstacles. The paper is concerned with the development of a model for adoption of the IFRS for SMEs in different countries. The model is based on the identification of indicators that characterize the relevant country in relation to decisions about adoption of the IFRS for SMEs.

Keywords: IFRS for SMEs, harmonization, adoption of IFRS for SMEs

1. Introduction

SMEs are considered as the main actors of the economic development in many countries. There are a lot of researches about the importance of SMEs in the country's economy. The importance of the SME sector is well recognized worldwide due to its significant contribution to various socio-economic objectives, such as growth of employment, output, promotion of exports and fostering entrepreneurship. According to ECORYS (2012), SMEs form the backbone of the European economy and are the key players in the creation of new jobs and economic growth as well. Activities of SMEs on the international markets are limited by a great deal of obstacles in comparison with large enterprises. Different national financial reporting and taxation systems can be considered as the most important obstacles. Harmonization of financial reporting could be considered as a tool for elimination of this obstacle. Nowadays, it is represent by the adoption of the International Financial Reporting Standard for Small and Medium-sized Entities (hereinafter as IFRS for SMEs). The International Accounting Standard Board (hereinafter as IASB) published an International Financial Reporting Standard designed

for the use by small and medium-sized entities on 9th July 2009. The aim of the IFRS for SME is to meet the financial reporting needs of entities that do not have public accountability and publish general purpose financial statements for external users.

2. Aim and methodology

The research is aimed at the development of a model for IFRS for SMEs adoption prediction in different countries. The model development is based on the identification of indicators that characterize the relevant country in relation to decisions about adoption the IFRS for SMEs.

In the frame of methodology the secondary research was used. The survey of the current stage of implementation process in approximately 70 countries across the world was made. The information of IASB and other information resources were used for the evaluation of the IFRS for SME implementation process in particular countries. The research builds on former studies concerning the adoption of IFRS for SME across the world carried out by authors (Bohušová, Blašková, 2012), (Blašková, Bohušová, 2013), (Bohušová, Blašková, Nerudová, 2013).

The research also builds on the evidence of a positive relation between disclosure requirements quality and GNP (Cooke and Wallace, 1990) and GNP growth (Belkaoui, 1995) in developing countries. The previous similar researches (Zeghal, Mhedhbi, 2006, Ramanna, Sletten, 2009) concern the issue of the adoption of full IFRS over the world. There are identified the major factors that could affect the adoption or non-adoption of IFRS by developing countries in these studies.

For the purposes of our research, the factors were selected to describe country's decision making concerning the adoption of the IFRS for SMEs. These are the economic growth; education level; the degree of external economic openness; cultural membership in a group of countries; and the existence of a financial market. There were approved significant differences in economic indicators identified for countries which have adopted the IFRS for SMEs and which have not yet included in the authors' previous studies.

The main aim of this study is a development of a statistical model using economic indicators which differs for countries which already have adopted the IFRS for SMEs and which have not yet.

The indicators were selected using findings of a limited number of studies concerning the adoption of IFRS for SMEs in some countries (Stainbank, 2008, Shutte, Buys, 2011, , Van Wyk, Rossouw, 2009, Deaconu, 2006). There is formulate the hypothesis about an existence of a relation among the level of economic development of the country, quality of national GAAP, volume of the foreign trade and the willingness of the country to adopt IFRS for SME as national GAAP in the paper.

The indicators GDP per capita and its growth, strength of auditing as the indicator for quality of financial reporting, foreign market size index and willingness to delegate authority were selected. The values of selected indicators are based on the Global Competitiveness Report 2013–2014 data, which represent the comparable data for majority of countries over the world.

Only indicators with the high statistical dependence were used for the model development. The normality of these indicators was tested by Shapiro-Wilkinson Test and then the conformity of variances was tested. The authors used the t-test for selection of relevant indicators for the further processing (Bohušová, Blašková, 2012).

The suitable indicators (based on t-test results) were applied for econometric modeling purposes (5% risk). The most suitable was considered non-linear model based on alternative data modeling, i.e. - Binary variable (value of it is only 0 or 1). The attitude to the adoption of IFRS for SME is the explained variable. The model – subject of the development could be described in the following way:

$$Y_i = \frac{e^{Z_i}}{e^{Z_i} + 1} = \frac{1}{1 + e^{-Z_i}}, \text{ where } i = 1, \dots, n \quad (1)$$

$$Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \varepsilon_i. \quad (2)$$

Subsequently, the developed model is the subject of verification.

3. Theoretical background

The cross-border investing and capital flows caused that the use of different national accounting systems makes difficult and costly for investors to compare opportunities and make financial decisions. The way out of this situation is a global harmonization of financial reporting. The introduction of International Financial Reporting Standards (IFRS) for listed companies in many countries around the world is one of the most significant regulatory changes in the accounting history. It is supposed that the use of IFRS enhances the comparability of financial statements, improves corporate transparency and increases the quality of financial reporting (Daske, Hail, Leuz, Verdi, 2008). The IFRS system is intended especially for large listed companies. There is a question about suitability of accounting practices pertaining to large entities for smaller entities. Many national standard-setters have introduced differential reporting systems for SMEs, resulting in diverse practices by standard-setters, preparers and users of SME financial statements (Cordery and Baskerville, 2006).

Specific accounting standards for SMEs reflecting diverse practices, different needs of SMEs' financial statements users and decreasing the costs of financial statements were demanded. There were three different ways for harmonized financial standards for SMEs development in the past.

Firstly, there was an effort of the Association of Authorized Accountants in Hong Kong. The draft of special financial reporting standards for SMEs was published by this organization in 2004¹. The draft used only historical cost for measurement. This solution seems to be suitable from the cost and contribution point of view, but there are certain difficulties connected with the transition from these standards on the full IFRS.

Secondly, there was an effort of Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting (ISAR) by United Nations Organization in Geneva (Kovanicová, 2005). It was the significant effort to unify financial reporting harmonization all over the world.

This concept is based on the three doors accounting framework, which defines three levels of enterprise size:

- Level I – Public interest enterprises, which are obliged to use full IAS/IFRS,
- Level II – Middle-sized enterprises, owners need reliable information on enterprise, financial statement should be prepared in accord with simplified IAS/IFRS,

¹ SME-Financial Reporting Framework (2004)

- Level III – Small enterprises, owners are managers enterprises, financial statements should be based on accrual principles.

Finally, the IASB was authorized to develop internationally acceptable accounting standards for companies which are not the subjects of public interest i.e. SMEs. The project was finished by the publication of the final version of IFRS for SMEs on July the 9th 2009.

As mentions PricewaterhouseCoopers (2006) the adoption of IFRSs for SME would provide a lot of benefits to SMEs. Firstly, it would improve the comparability of financial information of SMEs at either national or international levels, secondly, it would make easier to implement planned cross-border acquisitions and finally, it would help to initiate proposed partnerships or cooperation agreements with foreign entities. The adoption of the IFRS for SME can have a positive effect on the credit rating scores of enterprises, which may lead to the strengthening of SMEs' position in negotiations with credit institutions. According to (Meeks, Swann, 2009 and Hail, Leuz, Wysocki, 2010), adoption of common accounting standards may enhance business relations between countries by lowering information processing and monitoring costs and by increasing the linkages within communication networks. Aggarwal, Klapper, Wysocki, 2005 and Covrig, DeFond, Hung, 2007 consider that improvements in financial disclosure and comparability may lead to greater international capital mobility and cross-border investment. According to Shima, Yang (2012) countries without resources to develop high quality national GAAP may use IFRS for SMEs as a signaling mechanism to attract the foreign capital. Last, but not least, the adoption of IFRSs for SME would enhance the financial health of the SMEs.

It is possible to identify different approaches to the IFRS for SME adoption in different countries. The decision about the implementation is influenced by many factors. Cooke, Wallace (1990) identified these factors in the case of adoption of full IFRS. These are economic growth and the level of wealth, the level of inflation, the education level, the legal system, the country's history and geography, the financial system, the size and complexity of business enterprises, the notoriety of the accounting profession, the development of financial markets, sources of investment and financing, and the predominant culture and language.

There are some studies describing and analyzing the adoption of the full IFRS by a developing country or a group of developing countries. Larson (1993) tried to determine a difference between the economic growth rates of African countries that adopt IFRS, and those that don't adopt them. The results of his research confirmed that IFRS can contribute to higher economic growth.

According to Zeghal, Mhedhbi (2006) economic conditions represent a major determinant in the development of a country's accounting system. Research carried out by Adhikari and Tondkar, 1992) proved that a country's level of economic growth has a positive effect on the development of accounting systems and practices. This conclusion was further proved by Al-Akra, Jahangir and Marashdeh, 2009; Larson, 1993; Zeghal and Mhedhbi, 2006.

The European Commission decided to seek the opinion of the EU financial statements users on the IFRS for SME adoption. Based on the EFRAG (2010) Compatibility Analysis IFRS for SMEs conclusion and the Council Directives submitted to the European Commission, the IFRS for SMEs was assessed to be incompatible with the EU Accounting Directives. As a result, the IFRS for SME was not endorsed in the EU.

Despite that the European Commission decided to reject the idea of requiring the adoption of the IFRS for SMEs at the level of the EU as a whole, it is proposing that individual member states could adopt the IFRS for SMEs as their national reporting standard for some (or all) unlisted companies, provided that the standard was modified to remove any conflicts between it and the Accounting Directive.

4. Results

Based on the information on the attitude towards the IFRS for SME adoption gained during the secondary research, the countries have been categorized into three groups for further research. Group 1 includes countries that have already adopted the IFRS for SMEs, Group 2 includes countries that are ready for adoption², and Group 3 covers countries that still refuse the adoption of IFRS for SMEs. Group 4 includes countries that did not express the approach to the adoption. The categorization of the researched countries is shown in Table I. As can be seen from the bellow stated classification, there are many countries that have already adopted the IFRS for SMEs or intend to adopt in the near future. Most of them are developing countries while developed countries are restrained to the IFRS for SMEs adoption.

Table 1: Attitude of individual countries to IFRS for SME adoption

Group 1	Anguilla, Antigua and Barbuda, Argentina, Azerbaijan, Belize, Brazil, Bahamas, Bahrain, Bangladesh, Barbados, Bhutan, Bosnia i Herzegovina, Botswana, Cambodia ,Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Ecuador, Ethiopia, Fiji, Georgia, Grenada, Guatemala, Guyana, Ghana, Honduras, Hong Kong, Iraq, Ireland, Israel, Jamaica, Jordan, Kenya, Lesotho, Lebanon, Macedonia, Maldives, Malaysia, Mauritius, Montserrat, Myanmar, Namibia, Nigeria, Nicaragua, Panama, Rwanda, Peru, Philippines, Saint Lucia, Saudi Arabia, Sierra Leone, South Africa, South Korea, Singapore, Sri Lanka, St. Kitts and Nevis, St. Vincent and the Grenadines, Serbia, Swaziland, Switzerland, Sweden, Tanzania, Trinidad and Tobago, Turkey, Uganda, United Arab Emirates, United Kingdom, Venezuela, Yemen, Zambia, Zimbabwe
Group 2	Albania, Bolivia, Bulgaria, Guinea Bissau, Hungary, Iceland, Kosovo, Madagascar, Mongolia, Netherlands, Niger, Norway, Oman, Pakistan, Paraguay, Russia, Taiwan, Thailand, Ukraine, Uruguay, Egypt
Group 3	Belarus, Belgium, Canada, Finland, France, Germany, Greece, India, Indonesia, Italy, Latvia, Liechtenstein, Lithuania, Macao, Malta, Mexico, Moldova, Nepal, Poland, Portugal, Romania, Slovenia, Spain, United States of America, Uzbekistan
Group 4	Australia, Austria, Brunei, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Japan, Luxembourg, Slovakia

The binary variable describing the individual country's attitude to the IFRS for SMEs adoption (0 for adopters, 1 for non-adopters) is applied. The information on the IFRS for SMEs adoption is based on the IASB survey (2014). Quantitative information on

² Based on Analysis of country profiles prepared by IASB

individual countries was obtained of the Global Competitiveness Report (2013–14). The information concerns 62 adopters and 21 non-adopters.

A number of variables were classified as non-significant for model development purposes. Due to this fact the number of variables was reduced only on indicators with the high significance.

The model development is especially concerned to improvement of the model developed in the previous research (Blašková, Bohušová, 2013),

$$Y_i = \frac{e^{Z_i}}{e^{Z_{i+1}}}, \text{ kde } \hat{Z}_i = -8,067 + 0,178X_{1i} - 5,717X_{2i} + 0,877X_{3i} + 2,705X_{4i}, \quad (3)$$

where X_1 ... GDP per capita, X_2 ... venture capital availability, X_3 ... legal right index, X_4 ... foreign market size index.

Using the latest Global Competitiveness Report 2013–2014 data the previous model was modified. The latest updating of the attitude to the IFRS for SMEs adoption made by IASB in 2014 was the main reason for the model updating. Due to this latest information the original model was enlarged by the two indicators. These are the annual percentage change in GDP, where the high dependence was approved p-value = 0.001219 ($t = 3.234^{***}$) and indicator Strength of auditing.

The matrix of pairwise correlation coefficients was applied for suitability of selected indicators. The matrix is subject of Table 2.

Table 2: Pairwise correlation coefficients matrix

	legal rights index		gdp per capita		strength of auditing		venture capital availability		foreign market size index		Annual per. change in GDP
legal rights index	1										
gdp per capita	0.156	*	1								
strength of auditing	0.329	***	0.620	***	1						
venture capital availability	0.165	*	0.581	***	0.701	***	1				
foreign market size index	0.122		0.453	***	0.382	***	0.457	***	1		
Annual per. change in GDP	-0.190	*	-0.186	*	-0.199	*	0.019		-0.109		1

*, **, *** Significant at 0.05, 0.01, and 0.001, respectively

Source: authors' work based on Global Competitiveness Report

Using data for above surveyed countries the updated model was developed. The reliability of the model is 78.3%. The model is based only on the significant variables, see the tab. 3)

Table 3: Model

	coefficient	stand. error	Z	p-value	
const	-4.914590	1.482240	-3.3157	0.00091	***
foreign market size index	0.800456	0.287873	2.7806	0.00543	***
annual percentage change in GDP	-4.001750	2.102420	-1.9034	0.05699	*

Source: authors' work based on IASB information

The final model is described as:

$$Y_i = \frac{e^{\hat{Z}_i}}{e^{\hat{Z}_{i+1}}}, \text{ where } \hat{Z}_i = -4.91459 + 0.800456X_{1i} - 4.00175X_{2i}, \quad (4)$$

where X_1 is foreign market size index a X_2 is annual percentage change in GDP.

Table 4: Intervals for estimated value

	Value Y
Recommend	0–0.3
Not clearly defined	0.3–0.7
Adoption is not necessary	0.7–1

The verification of the model was done. Mongolia, Brunei, Guinea, Paraguay and Surinam made the final decision to adopt the IFRS for SME after the research competition. Due to this fact these countries were utilized for verification. The value of the variable Y describing the attitude to adoption is very low for above mentioned countries. The value of variables is Brunei (0.09), Guinea (0.06), Mongolia (0.05), Paraguay (0.07) a Surinam (0.03). It means that according to the final model these countries are appropriate candidates for IFRS for SMEs adoption.

5. Conclusion

Currently there is only a limited research concerning the implementation of IFRS for SMEs in the world. The research is concerning especially on adoption in developing countries. These countries, as it is evident from the analysis, are the main candidates for the adoption of IFRS for SMEs. The findings of studies carried out show that the implementation in individual countries is considered to be difficult, requiring high costs and the number of entities that are not willing to implement the IFRS for SMEs.

The analysis showed that the developed countries take a rather reserved position, while developing countries with lower quality financial reporting access to the adoption with much greater willingness and expect the higher benefit. The results of the analysis show, that a greater willingness to adoption of IFRS for SMEs could be expected from less developed countries with higher increase in GDP and open economy.

The reliability of the modified model is less than 80%. The reduction of the reliability is due to factors which could not be quantified in the model. These are historical development of the country, existing financial reporting system, geographical location. In the case of former colonies is significant the metropolitan state influence on the state accounting system.

The cases of Guinea, Mongolia, Paraguay, Pakistan and Surinam confirm that the values of indicators for these countries correspond with the conclusions of a statistical analysis. Based on the conclusions of the analysis, the adoption of IFRS for SMEs could be expected in Brunei, Guinea, Mongolia, Paraguay a Surinam.

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Level of functioning of selected processes in SMEs, targeting to South Bohemia Region and trade sector.

Monika Březinová¹, Jaroslav Vrchota²

¹*Department of Management – Faculty of Economic, South Bohemia University in České
Budějovice, Studentská 13, 370 00 České Budějovice, Czech Republic,
e-mail: brezina@ef.jcu.cz*

²*Department of Management – Faculty of Economics, South Bohemia University in České
Budějovice, Studentská 13, 370 00 České Budějovice, Czech Republic,
e-mail: vrchota@ef.jcu.cz*

Abstract

Process management plays an important role in making up the competitiveness of small and medium-sized enterprises. This issue is researched in the long term at the Economic University of South Bohemia. The paper presents a comparison of trends in the average level of functioning of core processes (selling, human resources, marketing and finance) in the South Bohemian Region MSP for 3 years in the sector of trade. The first data was obtained under the grant GAJU 068/2010 / S in 2010, and the second group of data was obtained from the grant GAJU 039 /2013 / S and GAJU 079 /2013 / S in 2013.

Keywords: SMEs, processes, South Bohemia region.

1. Introduction

SMEs are indispensable in all economies, can be described as a driving force of business, growth, innovation, competitiveness, and are also very important employers. In the Czech Republic, 1,066,787 legal and natural persons that are placed in the category of small and medium-sized enterprises performed some business activity to 31st December 2012. The total number of active small and medium-sized enterprises participated in 2012 is 99.84% (Novotná 2014). The share of employees in small and medium-sized enterprises amounted to 60.85% in relation to the employees of the Czech economy.

According to Ivancevich (1989) the small and medium-sized businesses will create and offer new and quality jobs. According to Porter (2008) management of small and medium-sized enterprise, has many specifics. In small companies due to the small number of employees and managers many functions are accumulated within the

competence of only a few workers predominates, informal leadership is more common, oral communication is preferred than written, etc.

The management of enterprises of different size and specialization is today under the press of advantages, challenges and problems connected with the function of worldwide markets. Strategic management is that set of managerial decisions and actions that determines the long-run performance of a corporation (Kotler, 2012). Strategy can be viewed as building defences against the competitive forces or as finding a position in an industry where the forces are weaker. Process management is a relatively new direction. It is an alternative to legacy systems, such as system of functional arrangement in which an enterprise is divided into operations, divisions, departments, departments and each department has its agenda and their responsibility (Charvát, 2006; Srpová 2010). The disadvantage of this model is the centrifugal tendencies of the individual departments that compete with each other, and there is among them a number of information barriers. This quality suffers activities that are important for its prosperity (Rehor, 2007; Dedouchová, 2001). On the other hand, process management is based on the principle that each product or service is created by a series of specific actions – the process. Importance and timeliness of management processes (process management) for the development of enterprises can be illustrated by the following statements. Business processes are according to Burton (2011) “The production lines of the New Economy.” They can be considered as assets of an enterprise, together with people, equipment or information.

The following quotation from Smith (2013) supports the above mentioned “Businesses have the ability to manage their business processes; they will be able to serve their customers better and faster. They will be able to offer higher quality at lower cost with greater economies of scale, thereby increasing their profitability. They will be able to respond to new market opportunities more readily due to binding or termination of business relationships on both supply and demand. Despite the complexity and the complexity of real-world business processes, process management will never be the choice: it is the critical need.” To support the importance of process management for enterprise development it is also important to quote Thomas H. Davenport (1995) a recognized expert on Business Process Management: “Any company that will ignore processes or fail to improve them is risking their future.”

2. Methodology and Data

This article is provided as one of the outputs of the research project “Process management and the possibility of its implementation in small and medium-sized enterprises” of Grant Agency of the University of South Bohemia GAJU 068/2010/S and GAJU 039/2013/S. In the research project were used secondary data (financial statements of SMEs, who took part in the research and primary data which were obtained primarily through quantitative methods questionnaire supplemented by qualitative method of in-depth interviews. The questionnaire data were collected from several regions. This article deals with functions of selected processes, data in this area were obtained from senior managers and from business owners who rated functioning of processes in their enterprise at percentages level.

For the classification of small and medium-sized enterprises, a new definition of the European Union in accordance with the Law No. 47/2002 Coll. as amended was used. In the South Bohemian region, 68,826 economic entities from the selected category were

registered in 2012. Enterprises with up to 9 employees (micro-enterprises) represent 18% of the total number. Small enterprises represent less than 4% of all the small and medium-sized enterprises in the region. There are 78% of medium-sized enterprises within the region. (Novotna, 2014)

The first group of data was gathered in 2010 where the examined sample presented 189 SMEs in the South Bohemian Region. Gathering data was carried out with the help of the questionnaire survey and in-depth interviews in chosen companies. By the same method, even the other group of data was gained. The effort was to address the same companies as in the first case. After having addressed all the companies which took part in the first round of gathering it was found out that some of the companies do not exist anymore, and some of them have changed the owner who is not willing to cooperate. For this reason, our final collection contains just 124 companies from both monitored periods. The data were tested with the help of two-selection Wilcoxon test and its asymptotic variance. The results of the test exemplify the differences and the movements of the curves within the individual monitored periods.

In calculating the null hypothesis H_0 was proposed: the level of functioning of the main processes has not changed during three years and the alternative hypothesis: the standard of functioning of the main processes increased during this period. Data acquisition was carried out in three years of the grants within the GAJU ((068/2010/S; 039/2013/S; 079/2013/S). Data were collected from the four most commonly occurring major processes in societies in the South Bohemia Region. These processes are, marketing, production, human resources, and finance. Data was tested using two-selection Wilcoxon test (Freund 2010, Friedrich, 2010) and its asymptotic variants. This is a nonparametric two-sample test, which is most commonly used when the assumption of data normality is not met. A slight violation of normality for samples greater than 30 has no significant impact on test results. Let X_1, \dots, X_n and Y_1, \dots, Y_m is two independent random samples from two continuous distributions. The distribution function can only differ by sliding. $x_{0.50}$ and $y_{0.50}$ are the first and the second median distribution. The hypothesis that the distribution functions of both distributions are identical is tested. In other words, that the medians are equal. Compared to the alternative of the second median $y_{0.50}$ of new data is greater than the first (Budíková 2010, Freund 2010, Friedrich 2010). In the first phase, all $(n + m)$ values of X_1, \dots, X_n and Y_1, \dots, Y_m are arranged in ascending order of size. Since the whole process test is done electronically using the Statistika statistics software ver. 10, this step is not recorded, since it is only a short operation. Furthermore, the totals of X_1, \dots, X_n values are detected and identified as T_1 . The sum of Y_1, \dots, Y_m values in order of old firms is identified as T_2 . The next step is to calculate the test statistics for U_1 and U_2 ; while it is still true that $U_1 + U_2 = mn$ (Friedrich 2010).

$U_1 = mn - n(n+1)/2 - T_1$, $U_2 = mn - m(m+1)/2 - T_2$ (Friedrich 2010).

If it is true that statistics $\min \{U_1, U_2\} \geq$ tableted critical value for a selected range of both selections and the chosen significance level, the null hypothesis about the identity of the compared groups is denied at the significance level of $\alpha = 0.05$. Since both samples in all tested cases, the n, m are greater than 30, it is proceeded to the asymptotic variant of the Wilcoxon test (Mann-Whitney test), which is used for n and m larger than thirty. $U' = \min \{U_1, U_2\}$ applies. (Budíková 2010 Wonnacot 1995)

$U_0 = (U' - mn/2) / \sqrt{(mn(m+n+1)/12)}$ (Friedrich 2010)

Critical field values for right alternative $W = <k_2, n>$ non-negative values k_1 and k_2 are exactly given in the literature. We reject H_0 at the significance level α if $U_0 \in W$. (Freund 2010 Friedrich 2010)

The test results demonstrate the differences in displacement curves within individual reporting period for the companies investigated.

3. Results

With the help of two-selection Wilcoxon test (Mann-Whitney U test) in the chosen level of importance $\alpha = 0.05$, where X= data of 2013 and Y= data of 2010, the following hypotheses were tested:

$$H_0 = x_{0.50} - y_{0.50} = 0 \quad H_A = x_{0.50} > y_{0.50}$$

Table 1: Mann-Whitney U test focused on the main processes.

Process	U	Z	p-value
Marketing	25395.5	-1.5685	0.1167
Production	14936.5	8.5676	0.0000
Finance	27571	-0.1128	0.9102
Human Resources	24342	-2.2736	0.0230

As seen in Table 1, it was not possible to deny zero hypothesis in processes of marketing and finance, because p-value has the following value: p-value $> \alpha$ (0.1167 $>$ 0.05 marketing), or (0.9102 $>$ 0.05 finance). These results are also supported by figure 1 where the both medians are identical, and the interval of data layout is very similar.

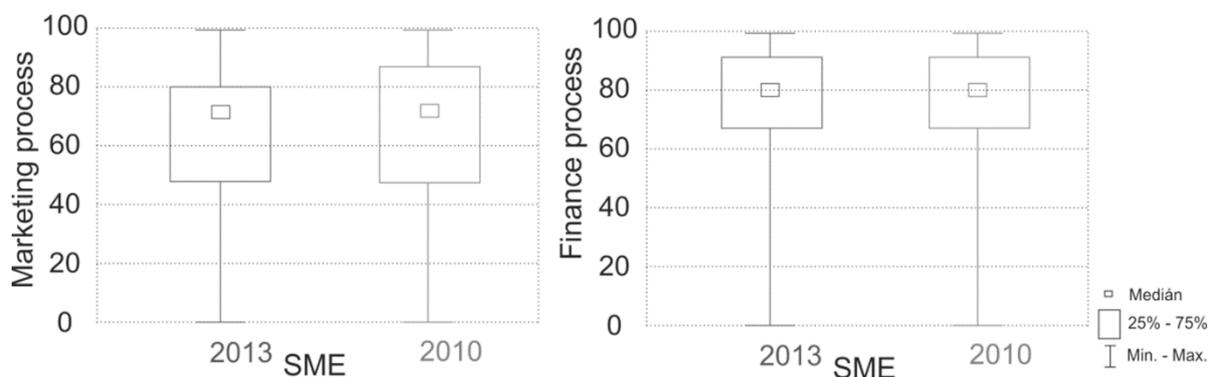


Figure 1: Median and interval of data layout in processes of marketing and finance

For above mentioned processes, it cannot be said whether the level of their functioning in the monitored period changed or did not change. Nevertheless, picture 1 shows that the process of finance works in the monitored sample on the same level at present (2013) and also 3 years ago, even the medians of both the monitored periods are identical 80%. In the process of marketing the median is also identical in both monitored periods, it means 70%. Data in this process are slightly different; nevertheless, there are no radical changes. In processes production and human resources management final p-value is close to zero and is lower than chosen α , that is why we deny zero hypothesis at the 0.05 level of importance.

Production process	0.0000 < 0.05	p-value < α
Human resources management process	0.0230 < 0.05	p-value < α

At the same time in the process of production, half of the p-value is still smaller than the chosen α and that is why we can deny H_0 in favour of H_A that says that at present this process is working better than three years ago, as shown in picture 2. The level of functioning of the process changed quite significantly, in 2010 the median was 73% and in 2013 it is already 90%. Even the data in both the chosen periods are different; in 2010 from 25 to 75% respondents evaluated functioning of the process within 47–87% and in 2013 from 25 to 75 respondents evaluate functioning of the process within 80–92%. The range of evaluation narrowed and additionally moved to higher values in 2013. In the process of human resources management it was possible to deny H_0 , but because of the existence of negative Z, H_A cannot be proved as Z and p-value show that this process in the chosen sample worked better three years ago (median 80%) than now (median 75%), as picture 2 shows. Minimal and maximal values are always identical because there are always the companies that evaluate functioning of the processes up to 100% (faultlessly functioning process) or 0% (non-functional).

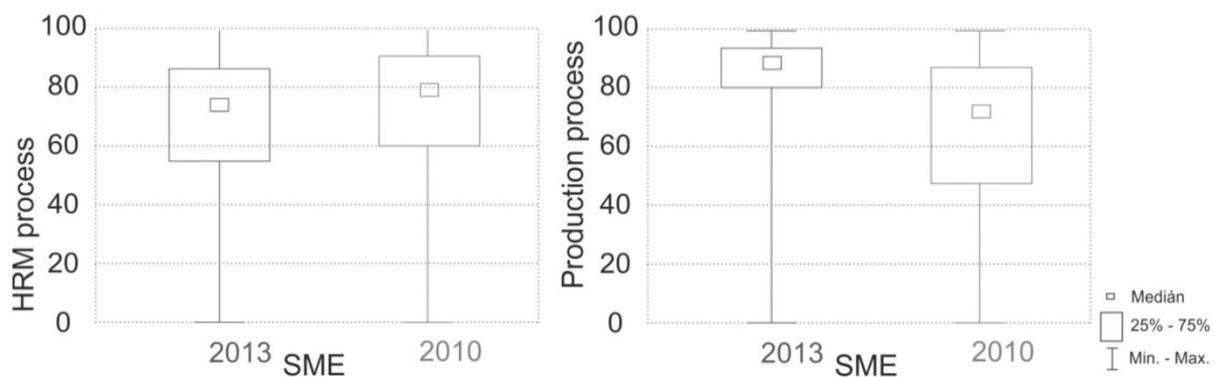


Figure 2: Median and interval of data layout in processes of production and human resources management.

Within enterprises in the trade sector, it was possible to reject H_0 in favour of H_A for the sales process as there is a p-value close to zero and is, therefore smaller than the chosen α p-value of $0.02 < \alpha$, as illustrated in Table 2. This means that the level of functioning of the sales process increased between the years of the research. The most common level of functioning of the production process in the trade sector is significantly higher in 2013 (87%) than in 2010 (55%), as illustrated in Figure 3. This means that enterprises engaged in trade increased the level of ability to sell the product in the reporting period. The results of this process and industry are also interesting that there has been a major bottleneck in the range of the data obtained between years. In 2010, the level of functioning of the process was evaluated from 0 to 90% (none of the enterprises considered the level of functioning as 100%). In 2013, this process was assessed in the range of 55–100%.

Table 2: Mann-Whitney's U test focused on monitoring processes for companies implementing its profits in trade industry.

Variable	2010	2013	U	Z	p-value
Marketing	1173,500	2147,500	436,5000	2,408982	0,015998
Trade	541,5000	2779,500	265,5000	4,20001	0,000027
Human Res.	1068,500	2252,500	541,5000	-1,309230	0,190458
Finance	1027,000	2294,000	583,0000	0,874565	0,381811

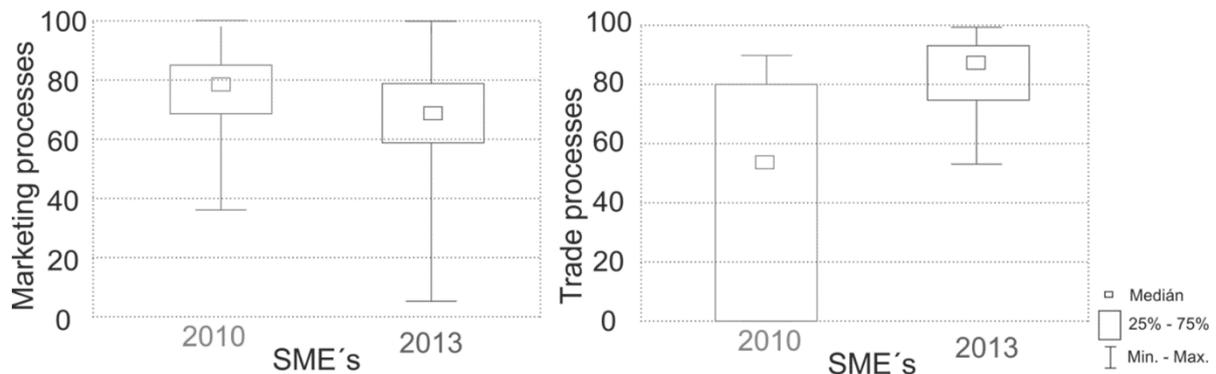


Figure 3: The level of functioning of the processes in the years 2010 and 2013 in trade industry.

The most common level of functioning process of marketing is for businesses in 2010 which is higher (79%) than in 2013 (70%). The minimum and the maximum can also be evaluated as better in 2010. In this case, the observed results can be reproduced as a result of the pressure of the external environment leading companies attenuation processes which are superficially connected with their primary activity (in this case it is hence trade sale). In terms of theory (complete citation), this approach is short-sighted and does not provide a stable income and existence on the market in the future.

For processes human resources and finance trade, failed to reject the hypothesis H_0 , where the p-value is greater than if the chosen α or confirm H_A .

As can be seen, an enterprise tries to optimize the most important process during the period of economic uncertainty. The sale process is the most important, so enterprise do not seek to optimize others processes such as marketing, HRM, due to lack of finance, financial, human and experiential resources, and these processes are already at their possible maximum if we take into account the possibilities for SMEs.

4. Discussion and Conclusions

From all the chosen processes within the research sample, significant changes can be shown only in the processes of human resources management and production where improvement of functioning of the processes was achieved. Slight deterioration can be seen in the process of human resources where the average functioning of the process in 2010 was 80% and in 2013 74%. Nevertheless, all the monitored processes in the companies represented in the research sample are on a rather high level. The average functioning of the processes in 2013 is: Finance 80%, Production 81%, Human Resources Management 77%, and Marketing 72%. The reason why in other two processes no change can be observed might be their stable and long term setting. At the

same time, it can be expected that the process of finance is stabilized after the first few years of business while the process of production always keeps developing. On the contrary the process of management is directly dependent on free financial resources of the company and its strategy, for that reason no change can be expected since in 2013 companies felt economic crisis, it can be assumed that the process will increase in the following 3 years. The changes in the production can be caused by suffering from economic crisis where all companies needed to reduce production expenses and that is why production processes were inspected and optimized. The result of the process of human resources management is unusual, its functioning worsened from 80% in 2010 to 75% in 2013. This development can again be caused by the impact of the crisis when companies reduced or abolished perquisites, did not hire new employees, laid off, lowered salaries, etc. These unpopular measures could result in lowering of evaluation of processes, yet it is necessary to remind that despite the fact that within the process unpopular measures are being implemented it does not influence functioning of the process itself. Nevertheless, the evaluation of the processes proceeded from the subjective perception of the company managers that is why it can be expected that the influence of the present situation in the company can be important, unlike objective long term functioning of the processes.

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The impact of social activity on bond-like stocks. The evidence from threshold model.

Jaroslav Bukovina¹

¹Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xbukovin@mendelu.cz

Abstract

Bond-like stocks are stock prices of well established companies, with long earning history and stable dividends. According to theory, these securities are less driven by sentiment because the estimation of fundamental value is easier due to lower information and transaction costs. This paper quantifies this relationship between bond-like stocks and social activity more closely. As a first, paper provides the theoretical background about the plausible impact of sentiment or social activity on bond-like stocks. Subsequently, it estimates this relationship by application of threshold regression technique on unique data of social activity collected from social media.

Keywords: bond-like stocks, social activity, social media, threshold effects

1. Introduction

The efficient market hypothesis defines the information about the fundamental value of a security as the only source of volatility. Stock prices are near the fundamental values due to activity of rational arbitrageurs or “smart-money” investors (Friedman, 1953; Fama, 1965). Since 80’s, observations of anomalies and especially excess volatility has been detected at capital markets, which occurs for no fundamental reason (Shiller, 2003). The efficient market hypothesis is not able to successfully deal with it. Behavioral finance argues that social mood of society or investors’ sentiment can be a source of excess volatility. In this context, behavioral finance has augmented the standard model of finance with assumptions of investors, who are subject to sentiment and existence of limits to arbitrage (De Long et al. 1990; Shleifer & Vishny, 1997; Barberis et al. 1998). Theories and models based on the above assumptions simply point that the level of stock prices in the aggregate can depend on sentiment. The empirical studies try to define the impact of sentiment more closely. Edmans et al. (2007) and Kaplanski & Levy, (2010a; 2010b) studied the specific “sentiment-bearing” situations like famous sport events or aviation disasters which affect the asset pricing. Baker & Wurgler (2007) defines the classes of stocks more prone to be affected by sentiment. Specifically, stocks

of low capitalization, young and non dividend paying companies can be more sensitive to investors' sentiment. It is due to higher information and transaction costs with result in a difficult valuation of such companies. Baker & Wurgler (2007) study the relationship between small companies and sentiment in detail. However, they provide only general conclusion about lower impact of sentiment on companies with long earning history, tangible assets and stable dividend or in other words "bond-like" stocks. This paper studies the impact of sentiment on a bond-like stocks or so called "blue-chips" stocks more deeply. The theoretical background behind this relationship can be addressed as follows. The well-know companies or brand companies are well established in the society and in the collective mind of the public. These companies shape our everyday reality e.g. because of the products we use every day. Let's imagine there is unexpected information about a specific company (author assumes the sentiment bearing information, not the regular information like earnings announcements). If this information is extremely extended in a society, for example, because it is amplified by activity of society through the press, web and social media then this sentiment information can drive the company stock. The sentiment issue here is the herding behavior of society based on overreaction on the information. Herding behavior has a psychological foundation in availability heuristic (Tversky & Kahneman; 1973; Schwarz, 1991). Brand-name companies are well-known in the society and information is easily connected with them, plus the activity of society and media makes the information more visible at least in a short run. The perception of information is more vivid and intense. The less rational investors or "noise-traders" can be easily influenced by the amplified activity of society. The second condition in behavioral models is the limit to arbitrage which should be low in bond-like stock. However, in the above scenario the sentiment information is amplified in society in such level that smart-money investors are limited because there is a risk to bet against the opinion of society which drives the stock prices. The overreaction on the news is unexpected, rational arbitrageurs do not know which information will be the one which cause the overreaction of society or how long it will last. Therefore arbitrageurs who bet against mispricing run the risk, at least in a very short run, that overreaction becomes more extreme and prices can move further away from fundamental value. However, this paper does not define the deviation in stock price or the range of mispricing. The paper addresses the simple idea, when social activity based on sentiment information overcomes some level, it can influence the stock price. It is in contrast with the efficient market hypothesis which argue only the information about fundamentals is a source of volatility. Author analyses the excessive social activity based on unique data of social media Google and Facebook. The employment of social media as a main source of sentiment is a relatively new approach but few studies have already applied such a data. Bollen et al. (2011) forecasted the Dow Jones Index based on mood of social network Twitter. Sprenger & Welpé (2011) propose the online stock forums of Twitter as an alternative to traditional media sources. Choi & Varian (2009) provide the early indicators of consumer spending based on Google search queries. In general, social media can be seen as a virtual mirror of our society. In the context of a paper, every well-known company has a social network profile, where millions of users share their opinions. The advantage of social media is the ability to track the behavior of users according to specific information. It is important to keep in mind that social media profiles of big companies content especially the social mood of users and sentiment information. The regular or expected information connected with fundamentals like company earnings are not an issue here. The rest of the paper is addressed as follows.

The next section describes the methodology and data. Section 3 provides the results and last section content discussion and conclusion.

2. Methodology and Data

This paper studies the impact of excessive social activity on large-cap companies which belongs among the 100 biggest companies according to market capitalization. An every company is traded at US capital market. Analyzed period has 94 weeks, from February 2013 till December 2014. The time period is given based on availability of social media data. This paper provides the unique analysis because it employs the data of social media as a gauge of social activity and sentiment in the society. However, bond-like stocks in general are less influenced by sentiment as is proposed by Baker & Wurgler (2007). Therefore, the definition of proper variables which captures the fundamentals in a model is important as well. Author sees the volume of trade (liquidity) and the stock indexes as only reasonable variables which can capture the fundamentals in a short run. The changes in volume of trade can represent the important signal about changes of fundamentals and the interest of investors. The liquidity is also important in the view of current monetary policy. US equity market has been significantly influenced by unconventional monetary tools like quantitative easing. In the context of the paper, volume of trade is measured at the level of firm. Regarding the influence of macro environment on individual firm, the author applies the stock index S&P 500 which is constructed as a representative indicator of US economy. The impact of stock indexes on individual stock prices has been shown by King (1966) or Roll (1992). Author applies the liquidity and stock price index as a proxy variable for fundamentals in the short run, but these variables can incorporate the investors' sentiment or current market mood as well. Positive or negative investors' sentiment is reflected in the trading volume or current mood of whole market captured by stock indexes as well. This situation makes the results about the impact of social activity measured by social media data more robust. Specifically, social media data captures occasional exogenous events which are not reflected in capital market variables. According to proposed theory, the impact of excessive activity is expected occasionally. This situation requires the appropriate empirical methods. The standard panel model $y_{it} = \alpha + X'_{it}\beta + u_{it}$ which averaging across all observations cannot capture the observations which fall into discrete classes. This problem can be addressed by a threshold regression technique for non-dynamic panels proposed by Hansen (1999). This regression technique estimates the model which supports the idea about the impact of excessive social activity on bond like stocks. The model with threshold effects can be addressed as:

$$stock_{it} = \alpha_i + \beta'_k vol_{it}^k + \beta'_l ind_{it}^l + \beta'_m (sent_{it}^m \leq \gamma) + \beta'_n (sent_{it}^n > \gamma) + \varepsilon_{it}, \quad (2)$$

or in compact representation for variable of sentiment or social activity:

$$sent_{it}(\gamma) = \begin{pmatrix} sent_{it}^m \leq \gamma \\ sent_{it}^n > \gamma \end{pmatrix}, \quad (3)$$

and if $\beta' = (\beta'_m \ \beta'_n)'$, then (2) equals:

$$stock_{it} = \alpha_i + \beta'_k vol_{it}^k + \beta'_l ind_{it}^l + \beta'(sent_{it}) + \varepsilon_{it}, \quad (4)$$

where *stock* denotes the stock price, α is a model constant, *vol* is the volume of trade or liquidity, *ind* represents the stock index S&P 500, *sent* captures the sentiment in the society expressed by the data of Google queries or Facebook activity (talking about) and ε is the error term. Specifically, Google queries are searches of individual firm (e.g. Apple Inc.) and searches of main product of the company (e.g. iPhone). Facebook activity or talking about is the amount of comments, likes and sharing of information among users. In the context of paper, when social activity in the society overcome threshold γ the social activity drive stock prices. The threshold model is estimated for each variable of social activity individually. This model is able to define a multiple thresholds but in this paper author assumes the existence of one threshold. Therefore, observations of social activity are divided into two “regimes” depending on whether the variable *sent* is higher or lower than threshold γ . The “regimes” are defined by different regression slopes of β'_m and β'_n . The computational issues and technical details of threshold effects in this paper follow the approach provided by Hansen (1999).

2.1. Data

Data of stock prices, volume of trade for individual firm and stock price index S&P 500 have been collected at the Yahoo Finance database. Data of Google search queries for individual firms and their main products have been tracked by database Google trends. Data of Facebook activity or so called “talking about” have been collected by algorithm. Facebook data are unique because it is not publicly available. Social media data have been collected as an average activity per week. Data of capital markets have been transformed to such structure as well. Data was transformed to logarithms with exception of Google data because Google trend database provides the data in the form of interval (0, 100) per given period. This interval quantifies the relative amount of searches for the specific firm/product in comparison with searches of other topics. Therefore, there is no need to apply the statistic standardization of data in a scale range proposed by Kapounek & Lacina (2011). Zero means no searches for the specific firm/product in comparison with other searches at Google. A hundred means the maximum amount of searches for specific firm/product per given period in comparison with other topics in general. Only companies which belong among 100 biggest companies according to market capitalization are analyzed. The final sample includes 21 companies, specifically 25 but four companies are not part of analysis because they are not traded in US capital markets. The final sample is given according to benchmark which represents the amount of “likes” on the Facebook profile of a firm. Only companies with the amount of likes higher than 75% quantile are a part of the sample. The amount of “likes” relatively represents the amount of followers (people who follow the activity of individual firms). This benchmark diminishes the bias that excessive social activity will be tracked by company profile which has only a few hundreds or few thousands of followers. Small groups of followers can excessively react to information which do not have the all-society impact.

3. Results

Table 1 summarizes the test for existence of a threshold. This test has been estimated for every variable of social activity individually. The approach proposed by Hansen (1999) is able to estimate multiple threshold, but the author assumes the existence of single threshold. According to Table 1, the threshold is statistically significant only for social

activity collected at social media Facebook. Specifically, the single threshold is 13,54 or $e^{13,54} = 759\,184$ because original data has been transformed to logarithms. In the context of the paper, when social activity in Facebook profile of specific company overcomes approximately 760 000 comments of users, the sentiment information is amplified in society in such level that it can influence the stock price of well know company.

Table 1: Test for threshold effects

threshold	firm searches	product searches	talking about
<i>single threshold</i>			
estimate	39	57	13.54
p-value	0.41	0.63	0.08*
<i>double threshold</i>			
estimate	64	51	11.16
p-value	0.27	0.26	0.22
<i>triple threshold</i>			
estimate	73	66	11.82
p-value	0.45	0.80	0.50

Table 2 presents the estimation based on the existence of a threshold. Only results with single threshold for variable *talking about* are shown. Index *S&P 500* is not statistically significant, *liquidity* is significant with a negative sign. The negative sign of *liquidity* is in the context of theory where smart-money investors drive the stock price back to fundamentals because the excessive social activity (*talking about*) has positive impact which can be explained as an overreaction on the positive sentiment information. Quite an unexpected result is the significant impact of talking about below the threshold (*talking about* ≤ 13.54) which can be explained by Figure 1. The impact even below the threshold 13.54 is possible because according to Figure 1 there is clearly visible threshold near the level of 11.16. However, it is not statistically significant. Figure 1 shows the general threshold, specifically the existence of every possible threshold during analyzed period. Figure 2 shows the single threshold only at level 13.54.

Table 2: Regression estimates: single threshold model

stock	Coefficient	OLS SE	White SE
S&P 500	-9.845	930.067	1063.530
liquidity	-0.349**	0.161	0.205
talking about	0.048**	0.021	0.028
talking about ≤ 13.54	0.027***	0.009	0.010
talking about >13.54	0.036***	0.009	0.011

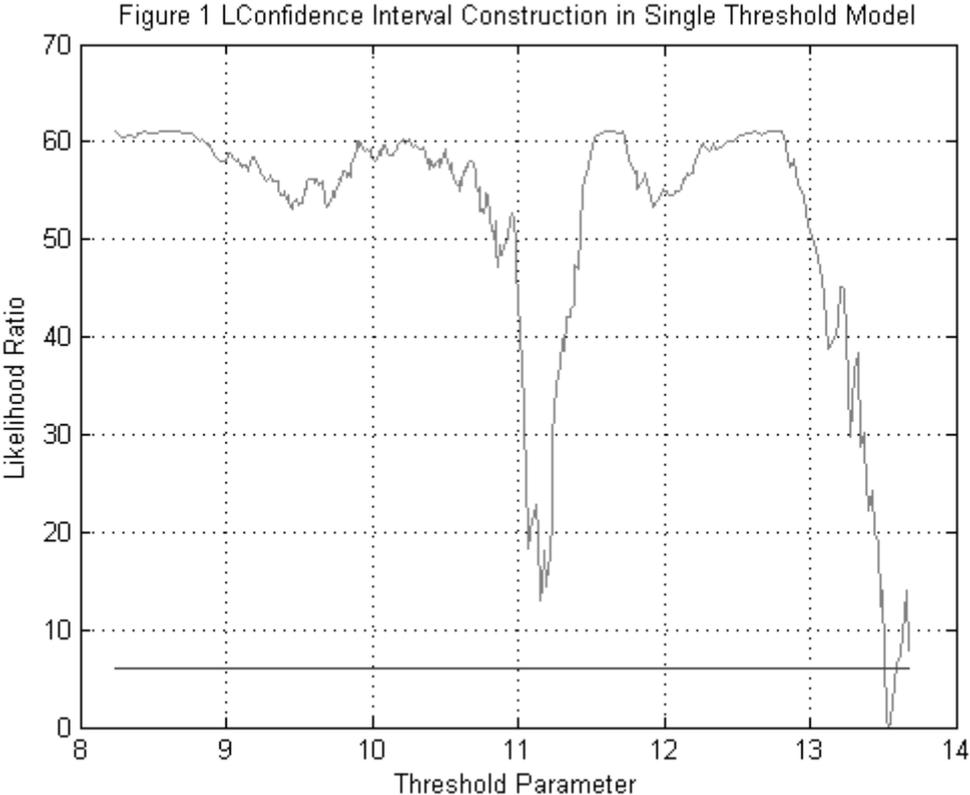


Figure 1: Threshold parameter

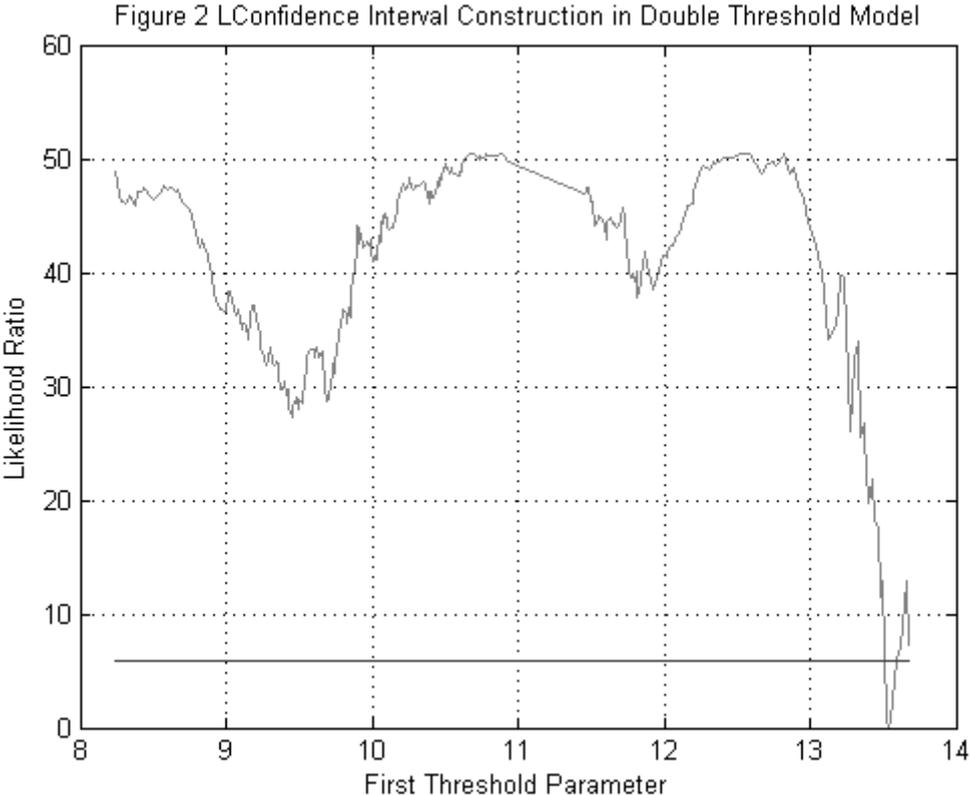


Figure 2: First threshold parameter

Table 3 provides the distribution of companies through the analyzed period according to level of threshold. These results are in the context of the proposed theory that the impact of excessive social activity is occasional.

Table 3: Percentage of firms in each regime by week

Week	Talking about ≤ 13.54	Talking about > 13.54	Week	Talking about ≤ 13.54	Talking about > 13.54
2	90	10	41–44	95	5
3	95	5	45–47	90	10
4	100	0	48	95	5
4–8	95	5	50–52	90	10
9–10	100	0	53–59	95	5
11–13	95	5	60	90	10
14	100	0	61–62	95	5
15–17	95	5	63–64	90	10
18–20	90	10	65–68	95	5
21–26	95	5	69–81	90	10
27	90	10	82–84	90	5
28–32	95	5	85–86	90	10
33–34	100	0	87–88	95	5
35–36	95	5	89	100	0
37	100	0	90	90	10
40	90	10	92–94	86	14

4. Discussion and Conclusions

This paper studies the impact of excessive social activity on bond-like stocks. The author has analyzed more deeply the statement of Baker & Wurgler (2007) that “blue-chips” stocks are less likely to be under the influence of sentiment. Author presented the theory that bond-like stocks can be under the influence of occasional excessive activity in the society. This theory is supported by empirical methods proposed by Hansen (1999). This regression technique defines the threshold or level of social activity. If this level is reached than social activity is a factor which drives the stock prices as well. This situation is in the contrast to the efficient market hypothesis where only information about fundamentals can influence the specific stock price. Paper is unique by employment of unique data tracked by social media. The paper proposes the social media as an appropriate source of sentiment in the society because the mood of society is connected with specific information. This paper accomplished the analysis on a sample of 21 companies. The further research should be extended to bigger sample and extend the model with control variables like media coverage. The extension of the threshold effect model can be challenging for further research as well. A current threshold model developed by Hansen (1999) allows only analysis of stock prices and social activity because it considers only the fixed effects. The application of random effects would lead to more appropriate analysis of social activity and stock returns.

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Assessing the Needs of Disclosing Information Concerning Forest Stand Value and Discipline of Forest Owners in Fulfilling Obligations Arising from Legal Regulations of the Czech Republic

Helena Čermánková¹, Miroslava Navrátilová² and Marta Stárová³

^{1,2,3}Department of Trade and Finances, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, Czech Republic,

¹e-mail: cermakovah@pef.czu.cz

²e-mail: navratilovam@pef.czu.cz

³e-mail: starovam@pef.czu.cz

Abstract

The aim of the paper is to map the range of forest owners' attitudes in the Czech Republic towards a disclosure obligation concerning the value of the growing forest stand; the paper is based on its own primary research. The aim is also to monitor the discipline of entities in meeting legal obligations. The dependence between existing obligations to measure the growing volume of forest stand and also to disclose its value in accordance with Czech legal regulations and the need to do so is statistically evaluated. At the same time, the need of more suitable methodology for forest stand valuation is determined bearing the existing legal obligations in mind. The extent of fulfilling obligations arising from legal regulations by forest owners is investigated by quantitative research. Data for statistical investigation were provided by 264 respondents, including legal and natural persons, municipal and state forests, etc. The results are compared with similar studies by Czech and foreign authors. Problematic parts of the current legal status of providing information about the value of growing forest are highlighted and possibilities and consequences of potential changes are discussed. The paper results from the need of higher awareness of professionals and general public of the financial and proprietorial situation of subjects – owners of forests – in the Czech Republic; their economic viability is derived from it. The fact that forest land in the Czech Republic was 2.66 million hectares in 2012 and its proportion of the total area of the country is 34% adds importance to the topic.

Keywords: accounting treatment, fair value, Forest Act, forest assets, forestry, IAS 41 – Agriculture, land, valuation.

1. Introduction

Specificity of forestry primarily results from the length of the production cycle, which is not comparable with any other sector of agricultural or industrial production. The legal rules of the Czech Republic (hereinafter referred to as the “CR”), namely the Forest Act¹ (hereinafter referred to as the “Forest Act”) defines forests as forest stands with their environment and land designated for the fulfilment of forest functions (CZ, Forest Act, 1995). The special nature of the forest production is the basis for complexity of determining the value of a growing forest stand and recording it in the accounts. The magnitude of the situation is emphasised by the fact that forests cover a significant part of the CR. More specifically, in 2013 the area of forest land in the Czech Republic was 2.66 million ha and its percentage of the overall area of the country accounted for nearly 34% (Cenia, 2014).

From the ownership’s point of view, forests can be divided into small and large private forests, forests owned by legal entities and state-owned forests (Depenheuer and Möhring, 2010). The ownership structure of forests in the Czech Republic is stabilized, however, changes may be expected depending on the effect of Act No. 428/2012 Coll., on Property Settlement with Churches and Religious Societies (CZ. Ministry of Agriculture, 2012, 2013). The most significant forest owner is the state, which owns approximately 60% of the total area of forest stands (2,599,142 hectares) in the territory of the Czech Republic. The proportion of forests owned by natural persons and legal entities accounts for approximately 22%, out of which 19% is owned by natural persons. 17% of forests are owned by municipalities and cities (CZ. Ministry of Agriculture, 2014). In recent years, economic aspects of forest use, primarily due to the global economic crisis, have come into focus for many forest owners (Von Teuffel, 2005). This is closely related to the fulfilment of economic functions of the forest, which always lie within the authority of the owner of the forest property or the farming entity so that the desired economic benefits can be achieved (Lenoch, 2010).

The objectives of forest enterprises are diverse, they complement one another and may change over time (Von Gadow, 2003 Depenheuer and Möhring, 2010). The growth of forest stands is the subject of the forest production cycle, whose output is a different range of timber in the final stage (Čermáková, 2012). The length of the growing cycle has a major impact on the complexity of the economic analysis of the forest (Von Gadow, 2003). Forest owners, forest managers and persons performing forestry activities are obliged to follow the legislation in force, thereby mandatorily providing the basic scope for ecological and social functions of forests within a national economy (Lenoch, 2010).

The need for a wide range of information on forest management, both at the domestic and international levels, more and more requires a reliable and sophisticated system of data collection, processing and storage of information on management of forest as a renewable natural resource, i.e. information that is used to assess the economic situation of farming entities, to monitor the contribution of forests to the regional development and the entire national economy (Matějčíček, 2013). Accounting data and results are used by entrepreneurs and policy makers in their decision making and they are also applied in research, agricultural management, business consultancy, finance and agricultural education (Matějčíček and Prčina, 2007). The natural production process of forestry is not fully recorded in value increases and decreases of forest stands in

¹ Act. No. 289/1995 Coll. on Forests and Amendments to some Acts.

accounting books kept in accordance with the current legal regulations of CR (Čermáková, 2012).

The paper is focused on the current situation concerning the professional public awareness of the valuation and accounting treatment of forest stands at the moment of their planting and in the course of their long-term growth under the legal regulations of CR. The attention is turned to business entities. For these reasons, an interpretation is put on the legal situation in the given area pursuant to Decree No. 500/2002 Coll., which implements certain provisions of Act No. 563/1991 Coll., on Accounting as amended (hereinafter referred to as the “Accounting Act”), for reporting entities that are entrepreneurs using double entry bookkeeping.

2. Objectives

The main aim of this paper is to evaluate the relation between a subjective need to determine the value of growing forest stands and disclose it in financial statements, namely of entities farming forest land and the statutory duty to do so. Another aim is to ascertain whether there is a need for a change in the valuation method for forest stands, which is specified by the Ministry of Finance of CR for reporting entities that are obliged to determine the value of a growing forest stand and disclose it in the financial statements.

A partial aim of this paper is to present information on the basic connections between accounting for and reporting of the growing volume of forest stands on forest land under the legal regulations of the CR and the disclosure obligations for forest owners in the CR resulting therefrom. To put the issues in the international context, the partial aim of the paper is also to briefly mention options of measuring and reporting forests under the International Financial Reporting Standards.

3. Methodology and Data

The critical analysis of secondary sources, i.e. scientific articles, professional literature and official internet sources, both Czech and foreign, will be used for elaboration of the theoretical part of the paper. After that, the subsequent synthesis of findings will be carried out. The attention will primarily be focused on the issues of valuation and accounting treatment of forest stands and land in accordance with the legal regulations of the CR and the current state will then be compared, to a limited extent, with possible principles of accounting for the forest land value in the world.

The rotation period, i.e. the period from planting the forest stand up to the point of its logging represents several decades². Logically, it could therefore be assumed that the forest stand (the growing forest) will be recognized in fixed assets of the owner separately and in the amount corresponding to its current value. However, the accounting treatment of forest land is more complicated. Pursuant to Section 2 (a) of the Forest Act of CR, a forest is understood as a forest stand with its environment and land designated for the fulfilment of forest functions. For the purposes of this paper, the term “forest asset” will be used as a summary designation of land with forest stands. The

² In 2013, the average rotation period was 115 years. This quantity, with few exceptions, increases constantly and also areas of overaged forest stands are increasing (Uhul, 2014).

balance sheet item called “Land” is included in fixed assets under forest assets. Pursuant to Section 14 (1) of Decree No. 500/2002 Coll., Land is included in fixed assets irrespective of its valuation amount, unless it is merchandise (CZ. Decree 500, 2002). Section 507 of Act No. 89/2012 Coll., the Civil Code, also contains a provision where it is stated that the land’s vegetation grown therein is its part (Under the tax and accounting rules, Perennial Crops are the only exception and they are recognized separately). It follows from the facts mentioned above that reporting entities are obliged to include the value of the land itself and the value of forest stands in the valuation of forest land.

Thus, if a reporting entity acquires forest land with a full-grown forest stand, such an amount will be recognized separately in fixed assets under the item of Land. In the event that the value of land and also the value of a forest stand growing on it are known separately to the reporting entity, the information may be allowed for by means of sub-accounts to the synthetic account of Land. However, the situation is different when planting and growing a forest on the forest land after logging. According to the valid legal regulations of CR, all costs related to the silvicultural activities on forest land do not increase the value of fixed assets, but they are included in full in the entity’s operating expenses incurred in the current period. (Valder, 2008). As a consequence of this approach, the equity value is reduced through profit or loss instead of increasing the value of fixed assets. It therefore results from the facts mentioned above that the financial statements prepared in accordance with the Czech legal regulations fail to give a fair and true view of the value of the entity’s assets.

Recently, a requirement to disclose the value of a growing forest stand has been entered in the implementing decrees³ to the Accounting Act. This provision applies to all types of reporting entities which own more than 10 ha of forest land. Reporting entities are obliged to determine the value by multiplying the area of forest land with forest stand in m² by the average value of raw wood in m², which is CZK 57.

The method of reporting forest assets may be similar in accounting systems that are followed by reporting entities in different countries of the world, but it may be different from the principles the Czech legal order. The International Financial Reporting Standards (hereinafter referred to as the IFRS) are the basic instrument of the global accounting harmonization. EU companies whose securities are registered on the regulated European market must keep accounts and prepare their financial statements in accordance with this accounting framework⁴. In accordance with the IFRS, the valuation and financial reporting of forest stands is governed by the wording of International Accounting Standard IAS 41 – Agriculture (IASB, 2014).

Pursuant to IAS 41, a forest stand is considered to be a biological asset that shall be measured on initial recognition and as at each balance sheet date at fair value (IASB, 2014, Hinke 2014). Land, including forest land, as required by the IFRS, is reported separately⁵. The international harmonization process continues and solutions copying the IFRS bases are gradually being implemented in the individual national bookkeeping regulations. The question arises whether these solutions are better suited to the principle of a true and fair view of reality (Stárová, 2014) and also to what extent they are applicable in companies. The implications of IAS 41 for the European Union (EU) entities reporting on material holdings of forest assets were investigated through the

³ Decree No. 500/2002 Coll., Decree No. 504/2002 Coll. and Decree No. 410/2009 Coll.

⁴ In the Czech Republic this obligation is enshrined in Act No. 563/1991 Coll., on Accounting, as amended (CZ. Accounting Act, 1991).

⁵ In the case of land with forest stands used by a reporting entity for its own activities, it would be IAS 16 Property, Plant and Equipment.

Australian experience⁶ by Herbohn and Herbohn (2006). From their research “it is clear that there is high subjectivity in the measurement of fair value, substantial unrealized gains are included in the annual net profit, and there is increased volatility in income due to these gains. However, an important question that has been buried in the debate on IAS 41 is whether reporting under this regime in fact reflects the nature of investment in the agricultural sector” (Herbohn and Herbohn, 2006). Other authors, for instance Lefter and Roman (2007) and Knechtle and Attenslander (2000) consider the determination of fair value of forest stand to be not always completely reliable. In particular, it is difficult to determine the fair value of an asset if there is no active market (Dvořáková, 2014). When determining the fair value by the method of present book value of future net cash flows⁷, it is always difficult to determine the corresponding amount of the interest rate in such a long production cycle (Bragg, 2013). Bohušová et al. (2011) claim that IAS 41 “does not solve the method of reporting of the costs incurred in connection with the transformation of biological assets”, and it “can lead to a different structure of the incurred loss and to influencing the financial analysis indicators.” In their research, they concluded that “It would be appropriate to separate the influence of biological transformation and price fluctuation on the total change in the fair value” (Bohušová et al., 2011).

Primary data will be obtained in the quantitative survey, which will be carried out through a questionnaire survey. An approach of business entities owning forest land to the fulfilment of the obligation to disclose the value of a growing forest stand, which is enshrined in the legal order of CR, will be examined. In addition, the reporting entities that are obliged to disclose the value of a growing forest stand (in the notes to the financial statements) will be inquired about their need to do so and also their need to report the value of forest stands in the financial statements will be looked into. The need for a change in the existing valuation method will be also surveyed in the reporting entities required to disclose the information on the value of a growing forest stand.

Instruments of descriptive statistics (absolute and relative frequencies, contingency tables) will be used to evaluate the results. All forms of forest land ownership were included in the data collection. The reporting entities were approached according to two criteria, namely according to the region of their business activities and the form of forest land ownership. The questionnaire was always completed by a person acting as an economist or a financial officer in the organization; in case of natural persons, the respondent was usually the forest owner himself. Data were obtained from 264 reporting entities. The structure of entities, by majority interest of forest owners, was composed of 41.3% (109) of natural persons and 14.4% (38) of legal entities. The proportion of municipal and urban forests in the total number of respondents accounted for 38.7% (102) and the proportion of state forests was 5.3% (14). Only one company stated that it was the church ownership (0.4%).

⁶ Australia has been a test for IAS 41 because of the close similarities between IAS 41 and the relevant Australian regulation on forestry that has been operational for the last four years (Herbohn and Herbohn, 2006).

⁷ Pursuant to IFRS 13 – Fair value may be determined in an alternative way if there is no active market (IASB, 2014, Dvořáková, 2014).

The following null hypotheses, which were tested by using the Chi-square test at the significance level of 0.05, were set.

- H01: There is no dependence between the existing obligation to disclose information on the value of a growing forest stand in the notes to financial statements and the conviction about the necessity to value and recognize the growing forest stand in the accounts.
- H02: There is no dependence between the existing obligation to disclose information on the value of a growing forest stand and the conviction about the necessity to recognize the growing forest stand in the balance sheet and the profit and loss account.
- H03: There is no dependence between the existing obligation to disclose information on the value of a growing forest stand and the conviction about the necessity to develop a more suitable valuation method by the Ministry of Finance of CR.

The results of the questionnaire survey will be presented using the method of deduction. The crucial findings of the survey will be summarized by the method of inductive reasoning at the end of the paper.

4. Results

To research the situation in the disclosure of forest owners' information on the value of the growing forest stand on forest land, which they own or to which they have a right to farm, the data set obtained from the questionnaire survey, which had been conducted in 264 reporting entities, was used. Approximately one quarter (67) of them discloses the information required pursuant to the implementing regulations to the Accounting Act. Of the total number of respondents, 114 entities are currently obliged to submit annual statistical reports that are specific for reporting entities carrying their business activities in forests.

The individual lines of following tables 1, 2 and 3 show the frequency of responses to the question: "Do you disclose the information on the value of a growing forest stand on forest land pursuant to the provisions of implementing decrees to the Accounting Act in the notes to the financial statements of your organization?" The individual table columns list the answers to the question, which is always specified below each table.

Table 1: The relation of factual disclosure of information on the increasing volume of wood and the need of the entity to disclose the information in the notes to financial statements.

	Certainly yes	Rather yes	Rather not	Certainly not	Total
Yes	8	14	36	9	67
No	9	37	88	63	197
Total	17	51	124	72	264

The columns in Table 1 show the answer to the question: "Do you think that it is necessary to value the growing forest stand and then disclose its value in the notes to the financial statements?" The test criterion of the Chi square test (11.51) is higher than the critical value of chi square distribution for 3 degrees of freedom (7.81). H01 null hypothesis can therefore be rejected. Hence, it results from the data mentioned above that if the respondents disclose the value of a growing forest stand in the notes to the

financial statements, then they themselves feel statistically more significant that measurement and disclosure of the value is needed. However, it may be stated that this need is felt very weakly. The need for measuring and disclosing the information on the value of a growing forest stand is felt by 33% of the entities that publish the information on the value of a growing forest stand and 23% of those that are not obliged to disclose it.

Table 2: The relation of factual disclosure of information on the increasing volume of wood and the need of the entity to disclose the information in its financial statements.

	Certainly yes	Rather yes	Rather not	Certainly not	Total
Yes	6	13	34	14	67
No	8	45	72	72	197
Total	14	58	106	86	264

The columns in Table 2 show the answer to the question: “Do you think that the value of a growing forest stand should be regularly (e.g. once a year) determined and recognized in the balance sheet and the profit and loss statement?” The test criterion of the Chi square test (8.7) is higher than the critical value of chi square distribution for 3 degrees of freedom (7.81). H02 null hypothesis can therefore be rejected. However, the dependence is very weak. Furthermore, the analysis of differences also show that a breach of independence is primarily due to differences between the strict and weak rejection of the necessity of such a measurement. This fact can be interpreted in the way that the reporting entities disclosing information on the value of forest stands in the notes to financial statements do not reject the possibility to recognize the value of a growing forest stand in their financial statements so strictly as opposed to those who do not disclose the information on the value of forest stands in the notes to the financial statements.

Table 3: The relation of factual disclosure of information on the growing forest stand and the requirement for a more suitable valuation method

	Certainly yes	Rather yes	Rather not	Certainly not	Total
Yes	15	17	26	9	67
No	21	43	94	39	197
Total	36	60	120	48	264

The columns in Table 3 show the answer to the question: “Do you think that your forestry organization would welcome if, in connection with the requirement to disclose the value of a growing forest stand in the financial statements, a more suitable method of valuation were developed by the Ministry of Finance than the product of the area of forest land and an average value of raw wood per m², which amounts to CZK 57/m²?” The test criterion of the Chi square test (7.3) is lower than the critical value of chi square distribution for 3 degrees of freedom (7.81). H03 null hypothesis cannot therefore be rejected. It can be interpreted in the way that the existing valuation methodology is not suitable for a majority of enterprises. The unsuitable methodology may also be the reason for a low popularity of this activity among workers in forestry.

5. Discussion and Conclusions

The disclosure of the value of a growing forest stand in the financial statements of reporting entities farming forest land seems to be a topic for a broad professional discussion. In comparison with foreign professional sources of information, the methodology of the Ministry of Finance to determine the value of growing forest stand (laid down for certain reporting entities) is disputable. In the international context, there are methods how to determine the fair value of a growing forest stand (IAS 41) as well as ways how to recognize it in the financial statements. However, determination of fair value carries considerable risks, primarily with commodities where there is no active market and the length of the production cycle is, on average, 80 years.

The essence of the paper is to interpret the results of primary research, which was conducted in 264 reporting entities farming forest land in the territory of CR. The aim of the survey was to determine the degree of conviction of the entities concerned about the necessity to disclose the value of a growing forest stand in the financial statements and also the degree of conviction about the suitability of the method used for determining its value during its growth. The survey showed that approximately one fifth of entities consider disclosure of the information on the value of growing forest stands necessary.

A weak, positive statistical correlation between the obligation to disclose the information on the value of a growing forest stand in the financial statements and an internal need to do so was proven with the reporting entities that disclose the information on the value of a growing forest stand in accordance with the implementing regulations to the Accounting Act. Other reporting entities rather lack this need. The survey has also found out that the valuation method currently used for calculating the increasing volume of forest stand, laid down by the Ministry of Finance of CR, is for those that use this method not entirely suitable. The question remains why almost a half of the entities that disclose the value of a growing forest stand in accordance with the legal requirements of CR do not require a change if the valuation method, in fact, provides distorted information on the value of forests. This area seems to be scope for further research. Šmída and Dudík (2014) conclude that compliance with the legal obligation to publish the financial statements is much higher with the reporting entities engaged in forestry than in other sectors, which suggests a high degree of discipline of organizations operating in this sector of the national economy (Šmída and Dudík, 2014). Thus, an overall positive attitude of owners and farming entities to the fulfilment of their obligations towards government institutions can be concluded. Matějčíček (2013) deals with the issues of economic monitoring in forestry and, based on the comparison of legal regulations and evaluation of the overall situation in these issues in individual countries which have similar characteristics to the Czech Republic in the area examined (Finland, Germany and Austria), observes a weak activity of the competent national authorities of CR.

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Relation of CSR and market measures of financial performance in reference to sector: International evidence^{*}

Karolina Daszyńska-Żygadło¹, Tomasz Słowski² and Bartosz Zawadzki³

¹*Wrocław University of Economics, Institute of Financial Management, 118/120 Komandorska St., 53-345 Wrocław, Poland, e-mail: karolina.zygadlo@ue.wroc.pl*

²*Wrocław University of Economics, Institute of Financial Management, 118/120 Komandorska St., 53-345 Wrocław, Poland, e-mail: tomasz.slonski@ue.wroc.pl*

³*Wrocław University of Economics, Institute of Financial Management, 118/120 Komandorska St., 53-345 Wrocław, Poland, e-mail: b.zawadzki.ue@gmail.com*

Abstract

In this paper we investigate the relationship between Corporate Social Responsibility performance (CSP) and firms' financial standing – corporate financial performance (CFP) in ten Global Industry Classification System (GICS) sectors. The analysis of each sector provides unique opportunity of finding these CSR actions which nowadays play the most important role. We use Thomson Reuters ASSET4 ratings in order to proxy the CSR behaviour of 7942 companies from all over the world. We prove that eco-efficiency investments are value destructors in majority of sectors. For corporate governance we find significant results only in five sectors with ambiguous characteristic. Despite of adding the third Social dimension we observe relatively small overall impact of CSR actions on firms' financial performance.

Keywords: Corporate Social Responsibility performance, financial performance, industry analysis.

1. Introduction

Substantial attention in the literature had been drawn to the relation between corporate social responsibility (CSR), also specified as corporate social performance (CSP) and corporate financial performance (CFP) over the past thirty years.

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More than 100 studies have examined whether corporate social responsibility (CSR) metrics predict financial performance, with a variety of results (for reviews, see Margolis and Walsh, 2003 and Margolis, Elfenbein, and Walsh, 2007).

But it doesn't seem that in these studies there has been reached a clear conclusion on the relationship between CSR and financial performance. Along several arguments have been developed to explain the contradictory results underlying the lack of consensus. McWilliams and Siegel (2000), Rowley and Berman (2000) as well as Elsayed and Paton (2005) point to numerous biases and problems in previous work that encompass: model misspecification, omitted variables in the determinants of profitability, limited data (small samples, old periods), cross-sectional analysis invalid in the presence of significant firm heterogeneity, problems of measurement of CSR, and the wide diversity of measures used to assess financial performance. The problem that is also mentioned is the direction and mechanisms of causation. Whether CSR leads to superior financial performance, or whether financial performance is rather necessary condition for CSR, is the issue covered by only few papers (Waddock and Graves, 1997; Margolis et al., 2007, Scholtens, 2008; Lioui and Sharma, 2012).

Our study attempts to show the contextuality of CSR performance and its influence on financial performance by conducting research on unique dataset with separate result of CSR performance in four dimensions: Corporate Governance, Environmental, Social and Economic. In the same time we use contingency approach in order to fill in the gap in the literature of analyzing and finding differences between business sectors in the impact of CSR performance on financial performance.

We structure our paper in six sections: The second section discusses contextuality of Corporate Social Responsibility (CSR). In the third section, we analyze sector impact on CSR performance and deliver the hypothesis of the paper. Section four commences our empirical analysis by describing our data sets and methods. The fifth section discusses our empirical results. Section six presents the discussion and concludes.

2. Contextuality of Corporate Social Responsibility definition

One of the major issues is a challenging process of reaching the agreement among the academics on a single precise and general definition of corporate social responsibility (CSR). It could be even evaluated as unsuccessful given that a wide range of views have been expressed on questions concerning the scope and priority aligned to CSR (Hoepner et al, 2010).

According to European Commission (2001) being socially responsible means that, beyond legal constraints, firms commit on a voluntary basis to bear the cost of more ethical behavior in a variety of practices, for example improving employment conditions and/or banning child labor in countries that do not respect human rights, protecting the environment and investing in abatement equipment to reduce the carbon footprint, developing partnerships with NGOs, or providing funds to charity, etc. (European Commission, 2001). Therefore, CSR is inherently multi-faceted and implies a multi-dimensional decision. Researchers often group those different dimensions into three main pillars: environmental, social and corporate governance (so-called ESG factors). These categories are also used in CSR ratings, scoring and models for firms' evaluation for inclusion in sustainability indexes, such as FTSE4GOOD, DJSI or STOXX Sustainability (Daszyńska-Żygadło, Ryszawska, 2014).

It could be stated that CSR involves taking actions which reduce the extent of externalized costs or avoid distributional conflicts. That approach is reflected in OECD materials, stating that the common aim of the governments adhering to the OECD guidelines to multinational enterprises on corporate responsibility is to encourage the positive contributions that multinational enterprises can make to economics, environmental and social progress and to minimize the difficulties to which their various operations may give rise. This could be understood as an interpretation of CSR activities as the ones that would increase the social value added by corporate activity, admitting the contextual approach towards it.

Contextuality of the concept is an often discussed matter and a field of disagreement, drawing attention to two utmost opinions being that a search for one common definition of CSR should be abandoned (van Marrewijk, 2003) and on the other extreme given that context specific definition of CSR would be less useful (Dahlsrud, 2008).

Explicit confirmation of importance of differentiating the types of CSR activities among different actors could be found in Global Reporting Initiative, recognized standard for CSR reporting worldwide. One can find there not only core guidelines for CSR reporting under any business conditions, but also complementing, additional guidance for particular sectors and nations. In many researches the moderate, intermediate approach is reflected in the explicit or implicit recognition of the CSR contextual nature (Matten and Moon, 2008; Siegel and Vitaliano, 2007).

Hoepner et. al (2010) define a corporation as displaying social responsibility, when it engages itself in processes that appear to advance a general contextual social or environmental agenda beyond legal arrangements. Examples of general agendas across sectors could be easily found, among which there could be corporate codes of ethics and employee relations practices, but there exist very distinctive context specific opportunities to signal social responsibility. Just giving an example of car producers only which can introduce to the market hybrid vehicles or financial institutions only which can offer microfinance instruments.

“Managers should treat decisions regarding CSR precisely as they treat all investment decisions” (McWilliams, Siegel, 2001). The difficulty, however, is that the payoffs have been unclear because researchers have struggled for several decades to demonstrate a universal rate of return in a situation that clearly calls for a contingent perspective (Rowley, Berman, 2000; Ullmann, 1985). A contingent perspective argues that although all CSR activities are not profit maximizing, some may be, and so the careful use of CSR can fulfill management’s fiduciary responsibilities. (Barnett, 2007)

Therefore it is necessary to take into account the way the CSR performance is being measured and differentiate its impact on financial performance across industries (sectors).

3. Research hypothesis and analysis of sector impact on CSR performance

Contingency perspective in previous studies was based on three conditional dimensions: CSR form, firm characteristics and time (Barnett 2007) and national and industrial characteristics (Matten and Moon, 2008; Rowley and Berman 2000; Hoepner et al., 2010) as two additional ones. Taking into account that CSR form refers to specific CSR activities and it represents a contextual concept, the relevance of individual activities depends on its application context. Therefore what will be highly important for fossil

fuel sector stakeholders will not be a top priority issue of financial sector stakeholders. This is why, as stated by Kempf and Osthoff (2007) the adoption of different CSR activities across firms in majority of cases is not significantly correlated. These activities will also differ in terms of impacting CFP.

Even though a substantial number of researchers have noticed the need for and called for research on the potential heterogeneity of CSR's impact on CFP across industries (Ullmann 1985; Hart 1995; Barnett, 2007; Godfrey and Hatch, 2007), up to the date there have been only a few studies conducted in that field. Mainly focusing on one separate industry type (e.g. Simpson and Kohers, 2002) and some studies investigating the moderating effects of a specific parameter of industries (e.g. Hull and Rothenberg, 2008) with only one paper analyzing the effect of CSP on CFP across industries (Hoepner et al., 2010). Hoepner et al. (2010) taking the perspective of corporation and of the investor conducted a research aiming at finding differences in the CSP – CFP relationship among industries by adopting an unconditional measure of CSR that weighted its sub-indicators identically in any industrial context. The authors claim to achieve it by using a unique data sample from Innovest database.

In vast majority of the studies on CSP – CFP relationship described in paper analyzing 95 studies (Margolis and Walsh, 2001) number 1 control variable is industry, but this is a controlling variable for CFP and it does not control for industry drivers of CSP's effect on CFP. These studies implicitly assume that the CSP – CFP relationship is homogeneous across industries. Therefore, if evidence would be found suggesting a heterogeneous effect of CSP on CFP across industries, the results of many previous empirical studies of multiple industry datasets should be interpreted with slight more caution than up till now.

Following Hoepner et al. (2010) conceptual framework we hypothesize that there exists contingency perspective on the effect of corporate social responsibility performance (CSP) on corporate financial performance (CFP) and it is contextual in respect to three different dimensions of CSR being – Environmental, Social and Governance.

Conducting our study on the basis of four dimensions of ASSET4 rating: Corporate Governance, Social, Environmental and Economic could give valuable insights and confirm the legitimacy of contingency perspective adoption and previous findings. We also add the regional perspective, controlling for regional location of the business, namely Asia, Europe and North America. In order to confirm heterogeneity across industries we have divided our sample into ten industries subsamples and checked the impact of each category of CSP (Corporate Governance, Environmental, Economic and Social) on the financial performance.

We do not control for industry drivers of CFP but we show how in particular sectors financial performance is impacted by CSR.

4. Data description and methodology

For a unique dataset, our empirical investigation allows us to analyze the relationship between CSP and CFP across ten industries across all the continents from two perspectives: the corporate (company financial efficiency) and the investor perspective who gets the information that is publicly accessible.

The CSR data about firms is taken from Thomson Reuters ASSET4 Database. To the three main proxy dimensions of corporate social responsibility (so-called pillars):

environment, social and corporate governance, ASSET4 universe adds additional economic score as additional pillar of the performance assessment. Financial data has been obtained from the Thomson Reuters Datastream and Bloomberg databases. Research is conducted for the period of 2009–2012.

ASSET4 gathers extensive, objective, quantitative and qualitative ESG data on almost 4000 global companies and scores them on four pillars. Research analysts collect more than 600 data points per company since fiscal year 2002. Typical sources include stock exchange filings, CSR reports, annual reports, non-governmental organization websites, and news sources. Scores and data are provided transparently at all levels in the ASSET4 framework¹. Table 1 presents the sample size with respect to sector defined as in Global Industry Classification System (GICS).

Table 1: Observations by sector

Sector	Number of obs.
Basic Materials	1285
Consumer Staples	609
Consumer Discretionary	612
Energy	450
Financial	1119
Healthcare	396
Industry	1155
Technology	397
Telecom	633
Utilities	1286

In order to reduce the effect called by Hoepner (2010) *accounting illusion* (because of concluding about CSR – CFP link on the basis of accounting measures) we incorporate in our research market value measure as Tobin q (used as a proxy for assets' market-to-book valuation) taken as a proxy of firms' financial performance.

Financial data for our research is divided into valuation proxy (dependent variable) and control (independent) variables taken from Thomson Reuters Datastream and Bloomberg databases. For Tobin's q we have used the values provided by Thomson Reuters Datastream database. Following Barth et al. (1998), firm's value is influenced by firm's profitability, firm's size and sales growth. To enhance model's robustness we used a complete set of those variables. Return on Equity (RoE) is used as a measurement of firm's profitability; firm's size is defined as a logarithm of the market capitalization; sales growth – as one-year revenue growth.

Based on OLS (ordinary least squares) regression, we estimate the specified model (model 1) with Tobin's q as the dependent variable. Following Guenster et al. (2010), we use trimmed (the procedure ensures a limited effect of outliers) dependent variables in logs. The trimming procedure eliminates potential outliers in the extreme left and right 0.5 percent of the distribution.

¹ www.thomsonreuters.com

Model 1:

$$\begin{aligned} Value_i = & \alpha_0 + \alpha_1 Economic\ Score_i + \alpha_2 Corp\ Governance\ Score_i \\ & + \alpha_3 Environmental\ Score_i + \alpha_4 Social\ Score_i + \alpha_5 RoE_i \\ & + \alpha_6 Sales\ growth_i + \alpha_7 Market\ Cap_i + \sum_{j=1}^3 \beta_j Region_{i,j} + \varepsilon_i, \end{aligned}$$

where: $Value_i$, valuation proxy for sector i ; $Economic_i$, $Corp\ Governance_i$, $Environmental_i$, $Social\ Scores_i$ – are the scores (ranging from 0 to 100) for particular pillars of the Reuters Assets 4 CSR ranking; RoE_i , Return on Equity; $Market\ Cap_i$, logarithm of market capitalization; $Sales\ growth_i$, one-year revenue growth; $Region_{i,j}$, 3 dummy variables, distinguishing the country of registration of the company between North America, Europe and Asia; ε_i , residual.

5. Results

In table 2 we present the estimation results for years 2009–2012. For each sector we run regression on trimmed Tobin's q . We receive wide range of adjusted R-squared ratios between 21.47% and 54.61%.

Regarding the Corporate Governance pillar in the CSR universe we find the positive significant impact in the case of Materials, Financial and Industrial companies. Financial companies benefit the most from the Corporate Governance activities. On the other hand the Consumers Staples and Consumer Discretionary companies lose when expanding Corporate Governance efforts.

As for the Environmental dimension we find significant results which prove that Environmental efforts deteriorate companies performance measured by Tobin's q . The biggest negative influence is in the case of Materials and Utilities. Companies from Energy, Financial and Industrial sectors are relatively less punished for Environmental actions.

We find interesting results for Social actions' influence on Tobin's q . Only in the case of four sectors, namely Consumers Staples, Financial, Industrial and Utilities, we find significant results. Only for Industrial sector the impact is negative. This pillar of CSR actions has relatively lesser impact on dependent variable.

We decided to control results using a range of variables. For two financial variables and Market Cap we find positive strong impact. The ROE's positive influence is significant for all sectors. The biggest impact of ROE is for Consumers Discretionary and Consumers Staples. We observe less significant influence of sales growth on companies financial standing. For six out of ten sectors the sales growth factor is significant and it reaches its maximum impact for Healthcare.

For many sectors the Market Cap maintains relatively highly important. The extent of Market Cap's impact is biggest for Materials and Consumer Staples, and only for Healthcare this factors is irrelevant.

We find versatile impact of companies geographical location on many sectors. European origins are important only for Healthcare companies. There is a large premium for being North American company in CSR universe for as much as seven sectors. For these sectors the location becomes the most important factor among control variables. On the other hand, for 5 sectors Asian location gives opposite results to North

American ones. For example, in Material sector slope coefficient for North America is 0.130 while for Asia is -0.161 .

Table 2: Regression parameters estimates for Tobins'q

	Materials	Consumers Staples	Consumer Discretionary	Energy	Financials
Governance	0.0010**	-0.0015	-0.0018**	0.0006	0.0021***
Economic	0.0001	-0.0003	0.0002	0.0015**	-0.0008**
Environmental	-0.0052***	-0.0011	-0.0036***	-0.0020**	-0.0023***
Social	0.0007	0.0007	0.0019**	-0.0006	0.0011**
Asia	-0.1615***	-0.0655	-0.3529***	-0.0266	0.0547
Europe	0.0163	-0.0416	0.0619	0.0096	0.0182
N. America	0.1296***	0.0538	0.1147**	0.0233	0.0146
Market Cap	0.0488***	0.0332***	0.0457***	0.0182***	-0.0063*
ROE	0.0081***	0.0171***	0.0142***	0.0078***	0.0116***
Sales growth	0.0006	0.0026***	0.0040***	0.0010*	-0.0003
R-squared	22.02%	55.29%	46.97%	23.54%	29.49%
Adjusted R-squared	21.47%	54.61%	46.17%	21.95%	28.91%
	Healthcare	Industrials	Information Technology	Telecom Services	Utilities
Governance	0.0014	0.0009**	0.0019	-0.0002	-0.0006
Economic	0.0012	0.0009*	0.0001	0.0012*	0.0006
Environmental	-0.0030**	-0.0020***	-0.0039***	0.0004	-0.0047***
Social	0.0018	-0.0009*	-0.0008	-0.0010	0.0032***
Asia	0.0922	-0.0875*	-0.5919***	0.0008	-0.1923***
Europe	0.1346*	0.0265	-0.0260	0.0498	0.0397
N. America	0.1646**	0.1300***	-0.0636	0.1930***	0.1604***
Market Cap	0.0118	0.0278***	0.0840***	0.0190***	0.0262***
ROE	0.0116***	0.0093***	0.0070***	0.0089***	0.0107***
Sales growth	0.0066***	0.0007	0.0069***	0.0011	0.0005
R-squared	27.76%	31.52%	34.66%	23.78%	31.91%
Adjusted R-squared	26.07%	30.98%	33.12%	22.67%	31.43%

Note: ***, **, * represent significance on 1%, 5% and 10% levels respectively

6. Discussion and Conclusions

Our research targets at serving as a valuable comparison to up to date studies as well as claims to present complimentary results obtained on the basis of different approach. In order to confirm heterogeneity across industries we have divided our sample into ten industries subsamples and checked the impact of each category of CSP (Corporate Governance, Environmental, Economic and Social) on the financial performance.

Taking three CSR dimension into account we find the Social performance relatively the least important. This CSR's dimension is significant in only four sectors. According to Siegel and Vitaliano's (2007) results the connection of CSR and CFP depends on the type of consumers goods sold. We confirm that firms that sell credence services (e.g. financials) improve their performance while enhancing Social and Corporate

Governance performance. The same commitment of a Utility sector towards consumers may explain the positive impact of Social performance. Following Porter and Kramer (2006) the Social performance in sectors depending on large low-cost workforces is costly and less rewarding. For this reason, we find the negative impact of the Social activities in Industry sector.

Our main findings, however, are related to Environmental performance. We find this factor significant in 8 sectors but in each case the impact is negative. Previous studies of Marsat and Williams (2011), followed by Słoński et al. (2014), analyzing general linkage, without differentiating for sectors confirm these findings. According to Derwall et al. (2005) and Semenova and Hassel (2008) the CSR's positive effects are difficult to achieve in environmentally sensitive sectors due to higher cost of environmental performance. The biggest reduction of assets' market-to-book value is in Materials and in Utilities sectors. Similarly to Padgett and Galan (2010) we find that manufacturer's environmental actions affect the CFP to a stronger degree.

It is worth mentioning that each sector benefits/looses from CSR actions to the different extent. Some of them are immune to the CSR actions (i.e. Telecom Services). Energy and Healthcare sectors are sensitive towards Environmental actions only. For the Consumer Staples only the Corporate Governance actions are significant.

Therefore on the basis of these findings we can confirm that there exists contingency perspective on the effect of corporate social responsibility performance (CSP) on corporate financial performance (CFP) which can be observed by statistically significant differentiated results across ten analyzed sectors.

Testing three dimensions of CSR actions using an entire sector of companies could be perceived as overall vague notion and might hide significant differences between sector's leaders and procrastinators. We think that further evidence is required based on portfolios of companies to confirm the reliability of the measures.

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The effects of increase VAT rates applied in the EU member states in 2014

Petr David¹

*¹Department of Accounting and Taxes, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: david@mendelu.cz*

Abstract

The European Union countries show a clear tendency of the preference of indirect taxes resulting in the increase in rates of the general excise tax, value added tax. Legal burden of the consumption tax is distorted in the economic reality and it leads to its distribution and shift to other entities participating in the market transactions. The primary value of relative distribution of the burden of the seller and buyer are further adjusted for values suggesting that the increase in the tax burden may result in reduction of the sales prices. Furthermore in this text there is realized the conservative approach for determining the minimum values of the shift of the tax burden on the consumers in the form of a strict determination of limits of the distribution of the burden only within the limits amount of the actual tax burden. Identification of the partial shift of the increased tax burden on consumers in the minimum amount of 1/3 is an important result of the carried investigation. I have identified a significant negative correlation between the size of change of the tax burden and the rate of shift of the tax burden.

Keywords: taxation, indirect tax, VAT, incidence, tax burden

1. Introduction

An essential part of the process of introducing or changing the taxes is the implementation of the relevant formulation to the legal framework of the country. In terms of the needs of the forcible nature of the tax it is necessary in such a law to identify the person or entity who is liable to declare and pay the tax. This legal impact is undeniable. However in the economic reality the legal impact is modified to the effective impact, which has not the parameters defined by law and therefore it is freely formed by the market. Brown (1939) argued that the entire burden of the general excise tax is in the perfectly competitive environment shifted into the entry price of the production factors. Musgrave (1953) then admits assumptions of the real impact of taxes in the model of partial equilibrium, when excise taxes should be carried by consumers, property taxes by owners of property and corporate tax by owners of the shares. Rapid development in the field of theory of tax shift furthermore demonstrates the conclusion

of Rothbard (1963) in the sense that there is no way how to ad valorem sales tax may be reflected in the price in the model of the company maximizing net profit.

We find out that the essence of effective impact of the tax burden is therefore the possibility of shifting this burden to the previous or subsequent market players by the extension of the Musgrave model of assumptions. Baumol and Blinder (1991) strongly point out the fact that the real burden of the entities may not strictly correspond to the legal impact or to assumption about full shift of the tax burden. Even earlier it was also suggested by Devarajan et al. (1980) who mentioned the fact that companies are shifting the tax burden, and it is therefore difficult to determine the actual impact of the imposition of the tax in general.

Indeed, Barnett and Block (2011) define bilateral causality when adding the fact to the Rothbards model of the company maximizing profit, that the cost of capital and intermediate goods are derived from the price of the final product, which allows the possibility of the validity of extension of Musgrave model and it is not contrary to the conclusions of Baumol or Devarajan.

Different approaches to achieve this goal have been formed from the moment of the need for establishing the values of the tax shift and the impact. Particularly they include overall balance models and partial equilibrium models, which are classified aptly by Stiglitz (1997). Those models are in many ways challenging and provide questionable or inconsistent results. Their undoubted advantage is that they work on the principle of ex-ante.

The opposite is the analysis ex-post, which has been in various forms handled by larger number of authors that will be mention in the next part of the text. Ex-post analysis are based on historical data, are not based on often uncertain assumptions, their shortcomings arising from non-standardized methodology and the very nature of ex-post approach. Poterba (1998) highlights the significance of these models in the form of natural experiments. Conciliatory it is possible the meaning of potentially competing models and approaches of the measuring the impact of changes in the tax burden evaluate by expression of Shoven and Whalley (1984) in the sense that regardless of its specific form it should contribute to the leadership of the political debate, and if used sensibly, it can generate substantial contributions in the field of tax policy.

Indirect taxation of consumption, at the expense of other types of taxes, is achieving an increasing significance in the contemporary world. Within the European Union it is specifically the general consumption tax – value added tax, which is applied in more than 160 countries around the world (Graetz, 2014). In the case of taxes on consumption it is possible to shift the tax burden specifically to suppliers (supply of production factors), but also to customers, ultimately buyers or consumers. The subject of the following ex-post investigation is the rate of shift of change of tax burden to the buyers in the case of changes in the rate of value added tax in the European Union countries in 2014. The specific aim of the research is to answer the question, what is the shift rate of increase the tax burden from the value added tax on consumer of goods or services burdened by this tax, and if there is some dependence of the size of the change in the tax burden and the shift of the tax burden on consumers.

2. Recent Empirical Evidence

A number of authors has devoted to the measuring the distribution of the tax burden in the practice. In addition to the observed values they contribute to the diffusion of related

phenomena and factors determining the tax incidence often due to a combination of quantitative and qualitative research. Hereafter, the current findings are classified according to the identified shift rate of the tax burden.

Viren (2009) concluded, in his study using data from EU countries in the period 1970 to 2004, that taxes are shifted to the buyers either completely, or at least from more than 50%, and this value increases with the openness of small economies and therefore almost completely elastic supply side of the market. At least partial shifts are confirmed by examining by Zápál (2014). Politi and Mattos (2011) found out, when examining food market in Brazil in the period of almost 15 years, that a full shift of the tax burden is infrequent, and more than a full shift is exceptional. Therefore they confirm that routinely the burden is shifted partially to the consumers.

Ring (1999) identifies the actual share of the tax burden of existing (not only the distribution of the burden of change of tax burden) general excise for the consumers in the range of 30-90%, on average it is 60% in the nearly thirty examined cases. Assuming a certain shift of the tax burden on the suppliers of production factors, then the producers themselves carry only a small portion of the tax burden. Unlike other exploration it is not the case of the actual change of the tax burden when it is possible to expect a higher rate of tax shift to consumers assuming the existence of the current equilibrium state.

I have carried out two surveys of values of the distribution of the tax burden in my present work. During the quantification of the distribution of the change in the tax burden in the Czech Republic and Slovakia in 2008, respective 2004, the results show that buyers of agricultural products carry a significant part of almost the entire increased burden of tax and consumers of food collectively carry a significant part of the increase in the tax burden to more than this burden (David, 2012).

On average 4/5 of the increased tax burden are then shifted to the consumer of the food. I found out (David, 2013) that the rate of shift of the increased burden of general excise tax to the buyers was identified in the range of 30% to 90% (the case of the eight countries of the European Union, in which change in the rate of value added tax occurred in 2012) by examining changes in consumer prices in the European Union between 2011 and 2012. The medium value of the impact of changes of the tax burden on buyers is 60% and so therefore 40% is on the seller.

Hypothesis of the full shift of the sales tax on consumers has been verified by Poterba (1996) in a very long period of about 50 years. Hypothesis of full shift was on average confirmed in the postwar period, in the case of clothing prices in selected cities. Mentioned author has identified a shift of the tax burden in amount of 2/3 in times of crisis. Identified differences are attributed to changes in supply and demand elasticity. Carbonier (2007) measures the distribution of sales tax between sellers and buyers in case of an increase and a decrease in the rate of general excise tax in France in 1987–1999. Consumers carried three quarters of the increased tax burden and producers only one quarter from this additional burden when increasing the rate of value added tax. However these results cannot be considered entirely generalizable because the examined changes in the rates of value added tax occurred within a relatively specific products or services.

Besley and Rosen (1999) also defined the distribution of the tax burden of selected taxed commodities in terms of the USA. The mentioned authors, in the case of certain goods, have confirmed the assumption of full shift of the increased tax burden on consumers and have identified even more than a full shift of the increased tax burden for other products.

3. Methodology and Data

Indicators of tax incidence are examined in terms of European Union countries, where there has been a change in any of the rates of value added tax in 2014. Specific identified changes listed in Table 1 were conducted in France, Croatia and Cyprus, while in the case of France and Cyprus this was a change in the two rates of value added tax.

Table 1: Changes in rates of VAT in EU countries in 2014 (%)

Country	Original rate of VAT	New rate of VAT	Change in rate of VAT
France	7,0	10,0	3,0
France	19,6	20,0	0,4
Croatia	10,0	13,0	3,0
Cyprus	8,0	9,0	1,0
Cyprus	18,0	19,0	1,0

Source: European Commission (2014), author.

It was the increase in the rate in all identified cases of changes in rates of value added tax. To a certain degree of difference, as it is evident from the examinations so far, I can leave the issue of the impact of decrease in rate in this investigation.

It is necessary to have available the base of prices, respectively the price indices related to the same baseline period in order to realize the defined objectives. These are the price indices of goods or services which are liable to the identified rates of value added tax. Indices are available from the National Institute of Statistics and Economic Studies (2014), Croatian Bureau of Statistics (2014) and Statistical Service Republic of Cyprus (2014).

In view of the need to standardize the distinctive level in each country, I have used Consumer Price Index CPI by Classification of Individual Consumption by Purpose COICOP. Examinations includes only those individual items that all their content corresponds to examined VAT rate. Otherwise, the item is removed from the dataset. A total of 211 items is then categorized through the average value into the same level of classification of COICOP in each of the surveyed countries.

The period taken into account in the examining includes six months, namely always three months prior to the effective change in rate and three months after the effective change in rate, thus approaching the recommendations of Politi and Mattos (2011).

$$CTB = \frac{CPI_i - CPI_j}{(CPI_i \cdot VATC_i) - (CPI_j \cdot VATC_j)} \quad (1)$$

CPI_i is CPI in the month after the change in VAT, CPI_j is CPI in the month before the change in VAT, $VATC_i$ is coefficient of the VAT after the change in VAT and $VATC_j$ is coefficient of VAT before the change in VAT.

$$VATC = \frac{TR}{100 + TR} \quad (2)$$

TR is the nominal rate of VAT. Coefficient $VATC$ is rounded to 4 decimal places according to mathematical rules.

In this way I determine the relative value of the burden shifted to the consumer in each month after the change in the VAT rate in relation to each month before the change

in this rate. So I get 9 values of the shift of the tax burden CTB for each item COICOP. Then I determine the final value $TCTB$ in the given country as the arithmetic average of surveyed items and the obtained values CTB .

The relative impact to the sellers is then defined as STB .

$$STB = \frac{((CPI_i \cdot VATC_i) - (CPI_j \cdot VATC_j)) - (CPI_i - CPI_j)}{(CPI_i \cdot VATC_i) - (CPI_j \cdot VATC_j)} \quad (3)$$

It is possible to define the STB values also by trivial procedure.

$$STB = 1 - CTB. \quad (4)$$

Another procedure when defining $TSTB$ is similar as in case of $TCTB$.

Values of the rate of shift of the tax burden on consumers CTB can reach values exceeding 1, or vice versa, may be negative. This is due to the fact, when the selling price increases more than the actual increase in the tax burden, or on the contrary the selling price decreases after the growth of nominal VAT rate. These results bring interpretive complications, regarding the fact that due to the increase in tax burden obviously there cannot be decrease in selling prices of goods and services, and also it is questionable the increase in selling prices by more than the increase in the tax burden. From these reasons, the results of values CTB and STB will be progressively adjusted.

$$\begin{aligned} \text{If } CTB < 0 \text{ and } STB > 1, \text{ then } CTB_l = 0 \text{ and } STB_l = 1, \\ \text{else } CTB_l = CTB \text{ and } STB_l = STB. \end{aligned} \quad (5)$$

$$\begin{aligned} \text{If } CTB_l > 1 \text{ and } STB_l < 0, \text{ then } CTB_a = 1 \text{ and } STB_a = 0, \\ \text{else } CTB_a = CTB_l = CTB \text{ and } STB_a = STB_l = STB. \end{aligned} \quad (6)$$

Thanks to identified values it is possible to examine the parameters of correlation of rate of tax shift and the magnitude of change in the nominal rate of VAT.

4. Results

First I should determine the average values of the distribution of the tax burden CTB and STB using the formulas (1) and (3) or (4) with knowledge of consumer price indices CPI in the surveyed period of 6 months, three months prior to the change in the VAT rate and three months after the change in this rate using the coefficient $VATC$ obtained by applying a formula (2). At the same time I should perform a partial adjustment of the obtained detailed values of the distribution of the tax burden by the logical process according to (5), and finally I should calculate the completely adjusted final value of the distribution of the tax burden through (6) in countries where there was a change in the rate of value added tax in 2014.

In the context of changes in the rates of VAT in the EU in 2014 I have quantified the gross values of the shift of the tax burden on buyers (consumers) CTB and impact on sellers STB in Table 2. It is obvious that the results in the individual countries are very volatile, which is a consequence of this characteristic of primarily used price indices of some items in the context of some relatively minor changes in nominal rates of VAT. The maximum and minimum value of impact on buyers was recorded in the item "Personal belongings not listed elsewhere" in the amount of 82.77 and -98.67 in Cyprus under the

change in the standard VAT rate by one percentage point. The maximum and minimum value of the impact on the sellers is then logically equivalent to the rule of the sum of impact on the buyer and seller in the amount of 1, i.e. 100%. The recorded maximum is therefore 99.67 and minimum is – 81.77 for the same item “Personal belongings not listed elsewhere” in Cyprus under the change in standard VAT rate. Another extreme but with less partial value of the impact on buyer and seller was recorded within the change in standard VAT rate in France by 0.4 percentage points.

Table 2: Distribution of the tax burden (%)

Country	Impact on buyers			Impact on sellers		
	$TCTB$	$TCTB_l$	$TCTB_a$	$TSTB$	$TSTB_l$	$TSTB_a$
France	–60	55	30	160	45	70
France	–200	169	48	300	–69	52
Croatia	–13	31	31	113	69	69
Cyprus	96	107	37	4	–7	63
Cyprus	–110	552	45	210	–452	55
Average	–57	183	38	157	–83	62

Extreme values of the individual items significantly determine the average values of the impact in the individual countries, which consequently significantly determine also the price average value of gross impact on buyers (consumers) and sellers. From the gross values it is therefore clear that the buyers profited on the increase in the tax burden because despite the increase in the tax burden there was a reduction in consumer prices. However the given situation is not logical, because when considering *ceteris paribus* condition it is unacceptable that the prices would decrease due to the increase in tax burden. To remove these apparently illogical values I will use the partial adjustment of impacts of individual items of impact on sellers STB_l and buyers (consumers) CTB_l which leads to the replacement of a negative impact on buyers by zero value and at the same time I will replace the value of the impact on sellers exceeding 1 just by this value. This step leads to a significant growth of partial, originally extreme items of impact. This is reflected in the average values of impact in countries and rates, where there are the highest extremes, i.e. in the mentioned Cyprus and France, both in cases within the standard rate. The overall average of impact of the buyer is then almost twice the growth of the tax burden and the sellers profit from this situation. This situation is already certainly more realistic than the gross results.

In this situation, I must accept the possibility that seller does not change prices, only by the tax change, but also due to other factors. Furthermore, it is a real fact that the seller does not change prices with each impulse because price changes also bring with them costs, the so-called menu cost. That is the reason why the price changes can therefore be determined also by other factors and the size of price change may not correspond to only reaction to the change in tax. These are the reasons why make an overall adjustments of the impacts on buyers CTB_a and impacts on sellers STB_a . As regards impacts on the buyer CTB_l I remove the values exceeding 1 and replace them just with this value. As regards impacts on the sellers STB_l I remove the negative values and replace them with zero. The resulting impact on the buyer and seller must necessarily be between 0 and 1. I get conservative values of the partial shift to the buyer in all examined cases, whose range is 18%. On average 38% is shifted to consumers, the sellers are carrying the greater part of the increased tax burden.

One of the factors determining the distribution of the tax burden, which can be identified from the obtained values, is the dependence of the change in the tax burden and the shift of the tax burden on consumers. Correlation coefficient of these variables reaches -0.92 , which corresponds to the strong negative relation. With the increasing size of the change in VAT rate it can likely be expected a moderate projection of these changes into consumer prices, at least with respect to the selected period of three months after the effective date of change in rate.

5. Discussion and Conclusions

The chosen method of quantification of distribution of the tax burden is based on established models examining the tax incidence. It offers a clear calculation of the values without introducing confounding, complicated, and often distorting assumptions of general equilibrium models. However the results need to be understood in the context of the given situation of the analyzed economies and to admit their determination by other factors.

In 2014 there was a change in five VAT rates in three EU countries. Adjusted values indicate that the sellers are shifting to consumers about $1/3$ of an increased tax burden, and themselves they are carrying the remaining $2/3$ of the burden. The achieved results belong to the investigations that have identified a relatively low rate of tax shift, such as Ring (1999) and David (2013). Considering that three out of the five surveyed rates were reduced rate, then there is a low share of the tax shift at the first glance quite surprising given the assumption of imposing lower rates on goods or services of basic needs, whose demand is highly inelastic. Looking at the intersection of items COICOP and their belonging to reduced rates, we find out, in the examined cases, that in addition to the food, services play the important role, e.g. accommodation, catering and transport, which can be expected on the contrary, high elasticity of demand. Within the reduced rates, the average value of shift of the tax burden is lower by 14% than for the standard rate.

The performed investigation has identified a strong negative relation between the size of change in the nominal tax rate and shift rate of the tax burden on consumers. If the low impact on consumers in the need to increase the level of taxation is socially desirable, so therefore it is preferable to perform less frequent but more significant changes in nominal rates of value added tax.

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Development and Education of Employees in SME’s in the Region of South Bohemia

Vlasta Doležalová¹, Darja Holátová² and Petr Řehoř³

¹*Vlasta Doležalová, Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: dolezalovav@ef.jcu.cz*

²*Darja Holátová, Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: holatova@ef.jcu.cz*

³*Petr Řehoř, Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: rehor@ef.jcu.cz*

Abstract

Education policy in the organization provides skilled, educated and skilled employees needed to meet current and future needs of the organization. Unfortunately, small and medium-sized enterprises are characterized by the fact that they do not pay enough attention to education and development of their employees. The aim of this paper is to analyse the key areas of Human resource management process with focus on the area of the Development and education according to the categorization of companies, concentrating on comparing all the key areas of the Human resources management process. Further on there is the importance and function of the area of Development and education, plans for this area and control of this area in the paper. The primary data were collected by means of a questionnaire survey and interviews with managers and owners of small and medium-sized enterprises in the Region of South Bohemia in 2013 and 2014 within the grant project GAJU 039/2013/S being called as follows: Human Resource Management of Small and Medium-sized Enterprises.

Keywords: development, education, small and medium-sized enterprises

1. Introduction

Tracey (2003) defines human resources in the following way: “The people that staff and operate an organization.” The consideration of human capital and its impact in an enterprise is based on an ideal of human resource management that can be defined as a strategic and coherent approach to the management of an organization’s most valued

assets: the people working here who individually and collectively contribute to the achievement of its objectives (Armstrong 2011).

The original concept of human capital as defined by Becker (1964) sees education as the key to human capital accumulation and as a type of investment. Empirical research was done to determine the return on this investment as private returns from human capital (Mincer, 1974). However, by Lucas (1988), the stock of human capital can affect the productivity of other inputs of production as a person who invests in its own human capital is usually not able to appropriate the full economic value and for this reason a positive externality occurs, which can be seen as the difference between private and social income from human capital.

Personal development plan focuses on actions that people suggest in favour of their training and development. They take responsibility for formulating and implementing the plan, but they must receive some support from an organization and its managers. The purpose is to provide an organized system of education (Tamkin et al., 1995).

All managers, team leaders and workers must learn to personal development planning. They should be involved in deciding how the planning process works and what would be their role. Everyone in the organization will need time and assistance to adapt to the culture in which they must take more responsibility for their own learning and education. All participants should be given guidance and help to identify their learning and educational needs and the means to meet these needs and how to use the equipment / facilities and opportunities that may be available (Armstrong, 2009).

By Keep (1989), human resource development is closely related to investing in people and human capital development of an organization. That is why one of the primary objectives of human resource management is to create the conditions in which they can realize the hidden potential of staff and ensure their loyalty with a focus on the organization where they work. This hidden potential should be understood not only as the ability to acquire and use new skills and knowledge, but also as unused wealth of ideas about better organizing and implementation of organization's activities. By Williams (1998) education is target-oriented, based on experience, influences behaviour, cognition. The changes it brings are relatively stable. Education takes place when people can show that they know something they did not know before (knowledge, understanding something and facts), and if they can do something they could not do before (skills) (Honey, Mumford, 1996). The difference between development and education is described in table 1:

Table 1: The difference between development and education

	Development	Education
Aimed at	Educational activities focused on future needs Activities affecting the personal and professional growth	Acquisition and development of knowledge, skills, abilities to improve performance in the current job
Timetable	Long-term	Short-term
Effectiveness measurement	Availability of qualified personnel if necessary The possibility of internal mobility	Evaluation of employees Cost-benefit analysis Certificates Testing

Source: Mathis and Jackson (2008)

An enterprise must get qualified and experienced tutors who have mastered the ability to attract and gain the attention and interest of participants in training programs to be able to provide its employees with satisfactory experience with educational and development programs. Training courses should be well prepared, accessible to those interested and trained participants should be provided with a positive mediated learning experience (Choo, Bowley, 2005). Completion of training does not mean the actual end of training. After training, the manager should assess specific data from the plan of overall corporate development and further analyze the advantages and disadvantages that resulted from the training. These findings should be used to the most appropriate complement for the next training (Hu, Yang, 2010).

2. Methodology and Data

The primary data were obtained by means of a questionnaire survey of 302 respondents (owners and managers) of small and medium-sized enterprises in the Region of South Bohemia in the Czech Republic. The survey which took place in 2013 and 2014 focused on the characteristic features of the surveyed enterprises and their human resource management strategies, evaluation of individual processes and areas of human resource management process according to their importance and the functionality of the use. The enterprises were categorized according to the number of employees in the following way:

- micro enterprises (1–9 employees),
- small enterprises (10–49 employees),
- medium enterprises (50–249 employees).
- Human resource management process was divided into the following areas:
 - planning of employees,
 - recruitment,
 - development and education,
 - remuneration for employees,
 - employee evaluation,
 - communication with employees,
 - satisfaction of employees,
 - corporate culture.

The survey was realized personally with managers and owners of enterprises. It was explained. Grant members explained to respondents completing individual areas in the questionnaire. Criteria for selection of respondents was company size and demographic location. The selected enterprises must be SMEs from the South Bohemian Region.

In the South Bohemian region was registered 66 514 economic subjects, the selected category includes 96% micro enterprises (61 560 companies), 3% of small enterprises (2 349 companies) and 1% of medium-sized enterprises (608 companies).

Characteristics of sample is as follows: micro enterprises represent 19% (57 companies), small business are represented 49% (149 companies) and medium-sized enterprises represent 32% (96 companies).

In the examined sample is represented in the sectors: trade 20%, transport 6%, services 26%, construction 10%, manufacturing 30% and agriculture 8%.

The average age of companies in the sample is 16 years. The longest survival of the enterprise within the research sample is 50 years old and least is 1 year old. Most

enterprises 58% are older than 15 years and only 25% of companies are younger than 10 years.

3. Results

Before the analysis of the area of Development and Education is it good to make a comparison with all key areas of the Human Resources Management process. The comparison was analysed when the managers and owners of a sample of enterprises answered the questions aimed at functionality and importance of the key areas of the Human Resources Management process. The importance of key areas, was recorded at a scale of 1 to 8, where 1 meant the most important area for an enterprise and vice versa 8 meant the least important process for an enterprise, i.e. the lower the value of the selected area, the greater its importance for an enterprise. The respondents compiled a chronological list of areas of importance and of functionality. In practice, this meant that each area had its own specific value (1 to 8), therefore no two areas are located at the same level. Figure 1 and figure 2 list and report the values of key areas of the Human Resources Management process.

Figure 1 revealed that the most important areas of the process in micro, small and medium-sized enterprises are Communication with Employees (3.19 to 3.64), followed by the area of Employee Satisfaction (3.24 to 3.66) and the Remuneration of Employees (3.55 to 4.24). On the other hand, the Headcount Planning (4.73 to 5.59), followed by the Recruitment Area (4.58 to 5.53) and Corporate Culture (4.19 to 5.05) are the least important. The area of Development and Education is located on the fourth position (4.31 to 4.89) with respect to the importance of the key areas of the Human Resources Management process. Small enterprises were the most interested in this area.

Prioritizing the areas of Human Resource Management was followed by evaluating the function of these key areas in a sample of small and medium-sized enterprises. Evaluation of functionality of areas was recorded at a level of 0–100%, where 100% meant a faultlessly functioning area and 0% corresponded to a malfunctioning area.

Figure 2 reported that the results of function of key areas and their importance correspond together. According to the respondents, the biggest function is the area of Remuneration (75.55 to 83.45%), which was located at the third position of importance, followed by field of Communication with Employees (75.69 to 81.77%), which is the most important area, followed by the area of Employee Satisfaction (72.2 to 80%), which was located on the third position of importance. On the other hand, the lowest function appeared within the area of Headcount Planning (59.53 to 74.24%) that was also the least important for the sample of enterprises, followed by the area of Recruitment (61.89 to 75.38%). Similarly, the function of this area corresponds with the importance followed by the area of Development and Education (70.18 to 73.24%).

In the area of Development and Education, the respondents responded to the question whether they make or do not make plans in this area. If they make plans in that area they also responded if these plans are also recorded. The results are shown in Figure 3, where the concern comes with the micro enterprises, in which half of the sample enterprises make no plans at all, similar results occur even for small businesses. The situation in medium-sized enterprises has improved. Within this area a fifth of respondents do not make any plans.

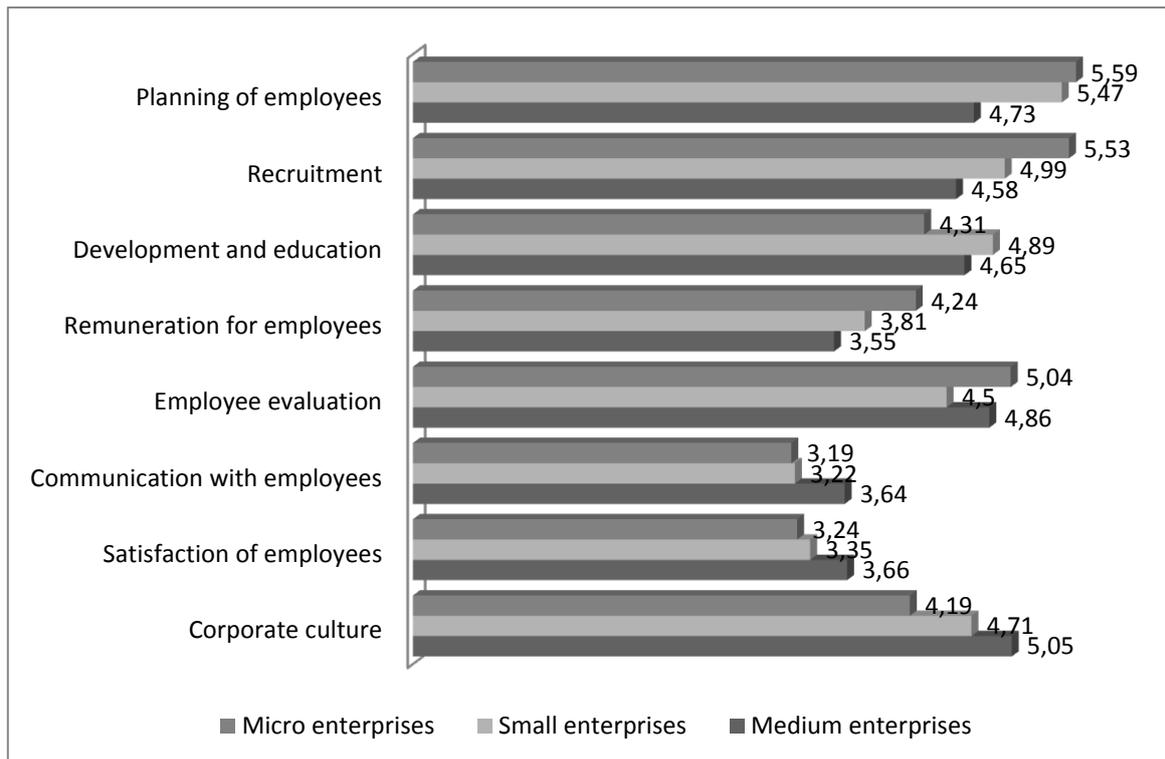


Figure 1: Importance of the key areas of the Human Resources management process according to the categorization of enterprises

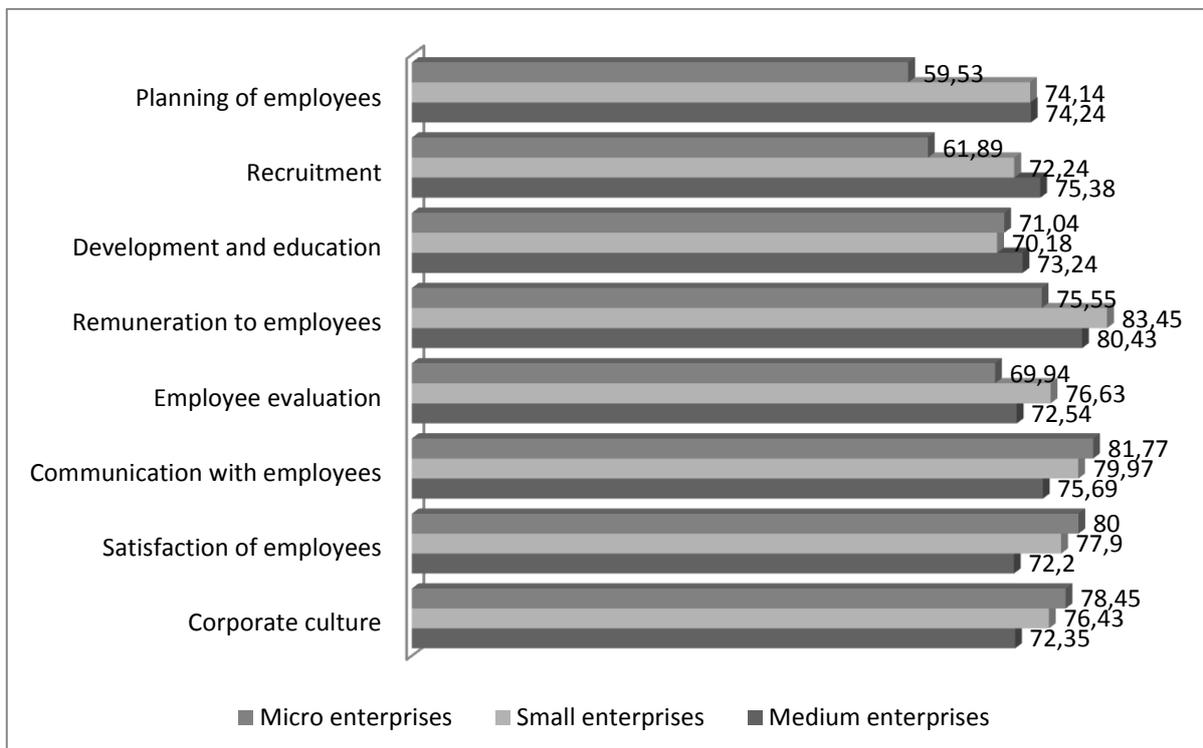


Figure 2: Function of key areas of the human resources management process according to the categorization of enterprises

Figure 3 points to the fact that with increasing size the area of development and education planning, including records increases, as 11.54% of the micro enterprises, 20.39% of small enterprises and 37.35% of medium-sized enterprises, make records.

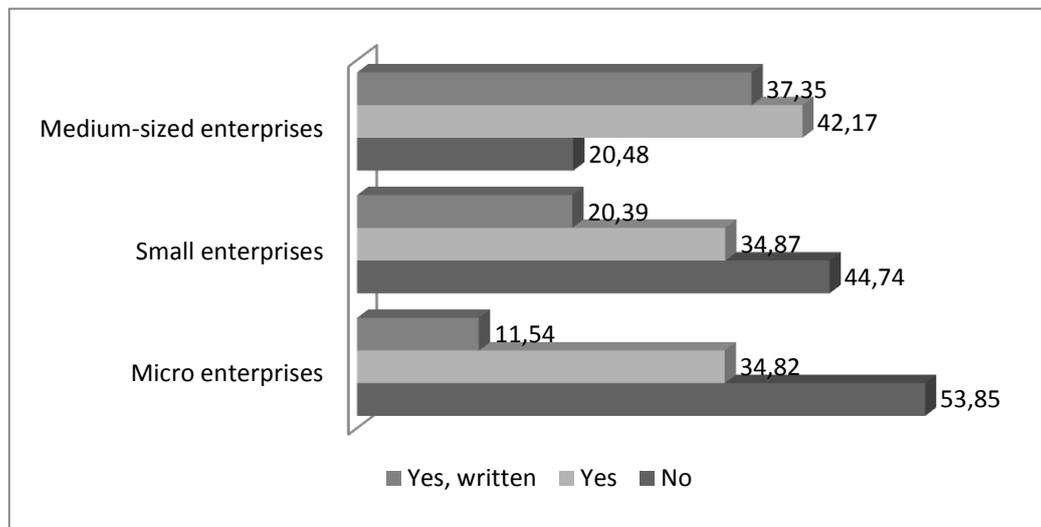


Figure 3: Plans for the Development and Education

After the Development and Education planning, the questionnaire survey focused on checking area. The respondents could choose one of the following options: monthly, quarterly, half-yearly or annual checks or no check in the area. Results of checks and planning are almost identical in unplanned and unchecked areas where half of the respondents of micro-enterprises followed by a third of small enterprises and a fifth of middle sized enterprises businesses do not monitor this area.

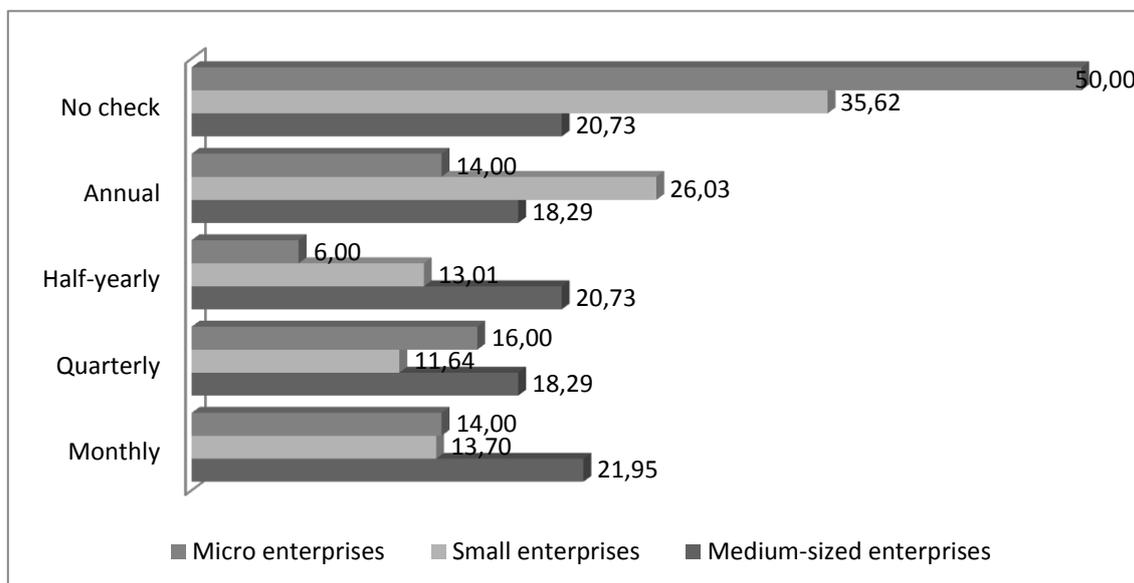


Figure 4: Check of the Development and Education area

Regarding other enterprises that monitor the area, the results are different in terms of time and the categorization of enterprises too. Micro enterprises check quarterly (16%), monthly and annually (14%) and half-yearly (6%). Small businesses check annually (26.03%), monthly (13.7%), half-yearly (13.01%) and quarterly (11.64%). Medium-

sized enterprises are almost equally divided into four time-oriented options; checking is done monthly (21.95%), then half-yearly (20.73%), followed by annual and quarterly checks with equally large proportion (18.29%).

4. Discussion and Conclusion

The results indicate that importance of the Development and Education area is situated at the level of 4.31 to 4.89 (which is the fourth positions compared to other areas). Regarding functionality (70.18 to 73.24%) in this process, managers and owners of businesses reported sample results at a low level (6th position in comparison with other key areas), it would be appropriate to pay more attention and provide higher level of functionality.

Although the planning of Development and education area is the fourth most important area 4 (Figure 1); in terms of planning, with a particular focus on the creation of documentation the results are clearly low. Probably this is one of the possible reasons for the low function of this area (Figure 2).

Function is probably affected by the area of planning and checks of the area. The results of planning are at a low level, while the fewer employees an enterprise employs, the less is this area planned. At the same time, the weaknesses of checks are quite high. Also, the checks of the area increase with a large number of employees.

The area of planning the Development and Education pointed to the fact that the size of an enterprise increases the area of planning. Small businesses mainly focused on micro enterprises are not engaged in this area because of time and cost. Still, a greater interest in this area was proposed to all enterprises, especially to small and microenterprises because it is easier for educated and qualified personnel to ensure compliance with corporate goals.

Similar results as in planning the area of Development and Education were revealed in checking the area. The size of an enterprise increases the representation of enterprises that check this area. Alarming results occurred for the micro-enterprises as a half of them do not check the Development and Education.

The SMEs are considered the backbone sector of the economy. Innovation, which is a process of continuous development, is often mentioned in the context of SMEs (except for employment factors and social cohesion). The purpose of innovation is to ensure the development, competitiveness and process and manufacturing efficiency. In practice, there is a connection between research and education (the educational system), all of which should lead to the development of the educated society. An educated society is able to innovate, and improve processes, which are essential for the future of an enterprise.

Development and education is an essential part all enterprises to maintain an advantageous position compared to competitors in the market, unfortunately, small and medium-sized enterprises are characterized by the fact that they do not pay enough attention to education and development of their employees. One of the reasons is the lack of specialists who would be engaged in this area in the long term. Various forms of educational activities are implemented at random, without plans and education and evaluation of educational activities. Too high costs and inadequate benefits are reported as a reason for not provided educational activities (National Training Fund – NVF, 2003). Sirková, Taha, Ferencová (2014) recommended that educate employees especially during their working life in the field of communication and language competence,

presentation skill, which may help them continue to acquire and improve their professional skills. Like all the activities of human resources management, the education and development of employees also have to be well-grounded and effective, i.e. interrelated to performance objectives, where performance objectives and objectives in education and development are interconnected (Cagáňová et al., 2014).

This year (2015) is followed by further research. Secondary data, concretely balance and profit and loss account will support in the statistical survey focused on the impact of human resource to enterprise economy.

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Analysis of possibilities of detecting the manipulation of financial statements in terms of the IFRS and Czech accounting standards

Zita Drábková¹

¹Ing. Zita Drábková, Ph.D., Department of Finance and Accounting, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: drabkova@ef.jcu.cz

Abstract

The main objective of financial statements is to give information. The diversity of interests and objectives of individual groups of users and creators of financial statements presents the risk of manipulation of financial statements in the context of true and fair view as defined in the national accounting legislation. The paper is concerned with the different possibilities of detecting the manipulation of financial statements in terms of the Czech Accounting Standards and IFRS. The paper analyzes the selected risk detection models of the manipulation of financial statements using creative accounting methods, off-balance sheet financing methods and accounting frauds in specific case studies of selected accounting unit in terms of Czech accounting standards. Based on the analysis and comparison of the results thereof, the paper presents and evaluates the alternatives of users of financial statements to evaluate the risk of manipulation of financial statements beyond the scope of a fair and true view. The evaluation further includes a comparison of uses of these models with respect to the International Financial Reporting Standards.

Keywords: financial statements, detection of the risk of manipulating financial statements

1. Introduction

The most important requirement of financial statements is to give a true and fair view of the reality. For the most interest groups, the financial statements are still one of the most important sources of information about an enterprise as they report the information about the financial health of an enterprise. Presentation of financial

statements is influenced by national legislation, the interests and objectives, and the quality of accounting information reported in the accounting system of the entity. To reduce the information asymmetry of a broad group of users of financial statements and their decisions on the basis of submitted financial statements, it is important to know to what extent the users can rely on the true and fair view of the financial statements and whether the financial statements present their financial information in accordance with accounting regulations to which it refers and that records transactions and activity of an enterprise as close to reality as possible. For the above mentioned reasons enterprises seek anti-fraud programs and they use them in their control systems. Such programs allow detecting the risk of manipulated financial statements. Also, the national accounting legislations include obligations for an entity to invite independent qualified persons, auditors, who should assess that the financial statements really give a true and fair view. External auditors have to comply with legislative regulations. In the Czech Republic, they are bound by the Act 93/2009 Coll., On Auditors, by the Code of Ethics and by international accounting standards and related regulations, including the internal regulations of the Czech Chamber of Auditors. The auditors are also obliged to evaluate the risk of accounting fraud in compliance with ISA 240 standard.

The paper deals with possibilities to identify and assess the risk of financial statement manipulation above the true and fair accounting and the risk of accounting fraud and methods of creative accounting used on purpose to manipulate important accounting information. The following paper analyzes and evaluates the options of sample models to assess the risk of manipulated financial statements within Czech accounting standards and IFRSs.

2. Methodology and Data

National research studies around the world (Brennan, McGrath, 2007), (Murphy 2011) or (Henselmann, Hofmann, 2010) show that there is a growing pressure in enforcing transparency and business ethics, which is true not only for publicly traded companies, but also for example the misuse of subsidies by prominent entities, substantiation in accounting. Demands are namely imposed on administrative bodies whose responsibility is to guarantee the development of corporate culture and to promote shared values inside the company.

These issues have been addressed by a number of prominent authors. However, this has been done much less often than, for example, as regards creative management related to the explanatory power of accounting statements.

You can also find more information in studies of Global Economic Crime Survey of the major auditing companies (Ernst&Young, 2012), (PriceWaterhouseCoopers, 2014), that draw attention to the growing problem of crime in the economy, which relates to fraud and corruption inside corporations. Chartered Institute of Management Accountants published a guidebook of risk management where the importance of issuing a plan of reactions after a fraud is detected and fraud prevention is highlighted. The guidebook also lists risk areas of fraud, its definition followed by case studies in reporting fraud. (CIMA, 2009)

Prevention and detection of accounting fraud is also engaged in Dave Tate's publication. Tate lists typical operation, through which accounting fraud can be committed in 15 major risk areas such as liabilities, expenses, assets of increase, cost of goods sold, equity. (Tate, 2011)

Pamela S. Manton in the book called *Using Analytics to Detect Possible Fraud* provides case studies of four companies. The financial statements of the selected companies subjected examination of via the individual tools and techniques appointed to examine the accounting fraud. These case studies include the following techniques: Liquidity ratios, profitability ratios, horizontal analysis, vertical analysis, cash realized from operations, analyzing cash realized from operations to net income from operations, the Beneish M-Score model, Dechow-Dichev Accrual Quality, Sloan's Accruals, Jones Non-discretionary Accruals, The Piotroski F-Score model, Lev-Thiagarajan's 12 Signals, Benford's Law, Z-score analysis, Correlation, Regressions analysis (Mantone, 2013).

Due to the endless range of intent of the creators' of accounting in relation to real life, a wide group of users of financial statements, increasing intensity is needed to identify increased risk of manipulation of financial statements (accounting fraud) at a significant level of financial information that could change the user's decision on the basis of the presented financial statements. Using technology to detect risk of manipulated financial statements i.e. detection of the risk of accounting fraud is not an easy decision and requires sophisticated professional qualification of people who analyze the financial statements. A wide range of ratios, bankruptcy and credibility models, which often provide users with conflicting results, often complicates decisions on the financial health of a company. Based on previous research of the possibility of detection of manipulated financial statements CFEBT model was designed and based on the hypothesis of a relation between a loss and an increase in cash flow in the period of five years i.e. whether the sum of their value in five years with minor variations lead to a similar result. After that the CFEBT model was tested to identify possible risks of manipulated financial statements in case studies of creative accounting for the conditions of Czech Accounting Standards. Furthermore, the results of case studies detecting risk of manipulated financial statements are compared with the results of the Beneish model that tests the risk within the US GAAP accounting system and IFRS (Drábková, 2013). At the same time the CFEBT model has been studied on case studies of sample areas of creative accounting techniques and the intensity detection of risk of manipulated financial statements beyond true and fair view of accounting (Drábková, 2013). The CFEBT model was designed as one of possible tests of detection of risk of accounting fraud as one of the auditors' test in relation to the ISA 240 international standard on auditing. The paper analyses the different possibilities of detecting the manipulation of financial statements in terms of the Czech Accounting Standards and IFRS. A sample accounting item (corporation) meets the condition of a loss of more than five million CZK in the first accounting period and its financial statements provided within the Czech accounting standards for six accounting periods between 2008 and 2013 are available and at the same time the corporation's liquidation took place in the year after the analyzed period, i.e. in 2014. The case study analysed the financial statements of the sample entity by the Beneish model, the Jones Non discretionary Accruals model and by the Altman model, which is the model of bankruptcy prediction. The paper analyses the results of the case study in relation the results of the financial statements in time and explains the specifics of risk assessment of manipulated financial statements of accounting data in a sample of financial statements in 2008–2013 based on the results of the models (Mantone, 2013), (Bell, 2009), (Singleton, Singleton, 2010), (Drábková, 2013), (Vochozka, 2011). The paper also summarises the possibilities of financial statements' users to detect increased risk of financial statements manipulation in time. It also discusses the most important ways of assessment in case of conflicting results of different models, which are often found in financial statements' analyses.

3. Results

In order to find answers to defined questions, a case study of an accounting entity, which is risky in terms of the financial health, was designed. The entity's liquidation took place immediately after the period of the research. Also, the entity was in the loss of more than five million CZK. The financial statements of the sample entity were subjected to analysis of different models in order to evaluate the possibility of users (auditors) to detect the risk of accounting fraud and the manipulation of financial statements beyond the true and fair view of accounting.

3.1 The Beneish M-Score Model

The Beneish M-Score Model is a mathematical model based on eight variables. It was designed by Professor Beneish to evaluate the motivation to manipulate earnings.

The M-Score is calculated as follows (Beneish, 2001):

$$M = -4.84 + 0.92 \cdot DSRI + 0.528 \cdot GMI + 0.404 \cdot AQI + 0.892 \cdot SGI + 0.115 \cdot DEPI - 0.172 \cdot SGAI + 4.679 \cdot TATA - 0.327 \cdot LVGI \quad (1)$$

Where:

DSRI – Days' sales in receivable index in the t and t–1 period.

GMI – Gross margin index as the ratio of gross margin and sales in the t and t–1.

AQI – Asset quality index.

SGI – Sales growth index.

DEPI – Depreciation index.

SGAI – Sales and general and administrative expenses index.

LVGI – Leverage index of total debts to total assets in the t and t–1.

TATA – Total accruals to total assets in the t-period.

If $M > -2.22$, a firm is likely to be a manipulator

Table 1: Assessing the risks of manipulation of financial statements by the M-Score

Derived variables	Fraud indicator	2013/2012	2012/2011	2011/2010	2010/2009	2009/2008
Other L/T Assets [TA-(CA+PPE)]		140	260	225	211	262
DSRI	≥ 1.465	0.458	0.683	0.926	1.359	0.864
GMI	≥ 1.193	-0.589	-0.993	4.544	4.010	1.360
AQI s	≥ 1.254	1.892	1.844	0.750	0.306	0.867
SGI	≥ 1.607	0.836	0.942	1.700	2.060	0.763
DEPI	≥ 1.077	1.072	0.918	0.660	0.841	0.426
SGAI	≤ 1.041	1.323	1.060	0.570	0.463	1.416
TATA	≥ 0.031	-1.016	-0.172	-0.185	-0.266	-0.479
LVGI	≥ 1.111	1.944	1.077	1.131	1.819	1.513
M-score (8)-		-8.72	-4.39	-1.02	-1.33	-5.23

Table 1 reveals the entity's results of the Beneish M-score between 2008–2013. In 2010 and 2011, the M-scores were reported at the level of more than -2.22 and the years were assessed as risky with a possibly earnings manipulation. The M-scores detected high risk of manipulation. The period of 2008 was not possible to be assessed as a result of the calculation method of the model in the first year of testing.

As seen in table 1; in terms of the risk of accounting fraud, the Beneish model identified two fraud indicators in 2009, but five indicators in 2010, four fraud indicators in 2011, one fraud indicator in 2012 and two fraud indicators in 2013 again. In 2010 and 2011, possible manipulation was identified in the AQI and the LVI, by the general and administrative expense index, by the sales growth index (SGI) and gross margin (GMI) index. Based on the above mentioned analysis of detection of increased risk of manipulation of financial statements in the Beneish model, 2010 and 2011 should be assessed as risky and it is likely that there was a manipulation of the result of the accounting entity. For the rest of the years it would be appropriate to focus on different fraud indicators and to make certain that the expenses in 2012 and 2011 were not capitalized incorrectly (the AQI indicator) and to perform detailed tests of administrative expenses and general expenses including the promotion expenses (the SGAI indicator). At the level of Czech accounting standards, fluctuations in the cost accruals may cause a discrepancy between reported income and expenses in relation in the same period.

3.2 Jones Non-discretionary Accruals

Jones Non discretionary Accruals are defined as follows (Mantone, 2013):

$$\left(\frac{1}{\text{Total Assets}}\right) + \left(\frac{\text{Revenue}_{\text{current year}} - \text{Revenue}_{\text{prior year}}}{\text{Total assets}_{\text{current year}}}\right) + \left(\frac{\text{Property, plant, equipment, gross}_{\text{current year}}}{\text{Total assets}_{\text{prior year}}}\right) \quad (2)$$

Table 2: Assessing the risks of manipulation of financial statements by Jones Non discretionary Accruals

Accounting entity	2008	2009	2010	2011	2012	2013
Total assets	21618	18256	48020	68264	42774	12172
Revenue	41194	31421	64734	110070	103635	86620
Property, plant, equipment	915	654	443	305	331	191
Jones 'analysis	x	-0.5352838	0.693787	0.664148	-0.15043	-1.3979
Result	x	x	high risk	low risk	high risk	high risk

Table 2 shows the results of Jones's Non-discretionary Accruals. The high risk of manipulation was detected in **2012** and **2013**. Years 2008 and 2009 were not possible to be assessed as a result of the calculation method of the model in the first years of testing. The risk of fluctuation of discretionary expenditure is identified in all periods. By analyzing financial statements prepared in accordance with Czech accounting standards, the fluctuation of discretionary expenditure is higher than when evaluating the financial statements prepared by IFRS. It is the difference in both accounting systems in the accruals principle, the matching principle and the rule that "the content is more

important than the form” causes that reporting financial items in accordance with Czech accounting standards does not always strictly require to report income and expenses, assets and liabilities in the period they are related to based on the economic substance and form of actually implemented content rather than its form.

3.3 The CFEBT model

The CFEBT model is defined as follows:

$$CFEBT = \frac{\sum_{t=1}^5 CF_t - \sum_{t=1}^5 EBT_t}{\sum_{t=1}^5 EBT_t} \times 100 \quad (3)$$

Where:

ΔCF Increase of cash flow in period t

EBT Earnings before taxes in period t

If $CFEBT \geq \text{materiality}$, there is a high risk of breaching a true and fair view of the accounts (Drábková, 2013).

Materiality significance ranges between 5 and 10%, taking into account the individual circumstances of the entity, as it did during the audit of financial statements by an external auditor.

Materiality of 5–10% is considered in this paper.

Table 3: Assessing the risks of manipulation of financial statements by the CFEBT model

	2008	2009	2010	2011	2012	2013	Sum
VH (EBT) in thous.CZK	7547	-8935	-5979	4752	-1776	-8502	-37491
CF Accrual in thous.CZK	136	-91	6738	1065	-2251	-1727	3734
CF in thous.CZK	136	45	6783	7848	5597	3870	24279

Table no. 3 contains the results of detecting manipulation risk in the financial statements through the CFEBT model in the accounting periods of 2008 to 2013. It was high above the materiality of the separate assessment of years 2008 to 2013, and the CFEBT revealed high levels above the materiality in CF and EBT accruals in the years of 2010 to 2012.

The analysis of the accruals development in different accounting periods between 2008 and 2013 revealed two possible tendencies of financial statement manipulation. During these six reporting periods, the entity reported negative accounting loss from its activities in a total amount of EBT amounting to -37.491 million CZK and in the same reporting period, the increase in the amount of 3.734 million CZK was revealed. After calculating the value of the CFEBT model, it represents 110% of the value thus well above consideration materiality 5–10%.

In case an entity's financial statements are manipulated two basic ways of manipulation are obvious. The first line reports manipulation with the profit/loss – undervaluation of the profit (overvaluation of the loss). In the second line, an entity

manipulated its cash flow, which is not reflected in the profit and it overvalued the reported cash flow.

To evaluate the risk of manipulation of financial statements beyond the true and fair presentation of financial accounting statements prepared in accordance with IFRS or CAS, it is necessary to analyze the development of risk items above mentioned guidelines of the discrepancy between development and cash flow items reported in the financial statements. Accounting expert or an auditor then evaluates whether the deviation of the reported values can be considered as the inherent risk of the accounting system or as some risk of manipulation of accounting statements beyond the legislative rules.

Based on an analysis of costs and revenue items and their links to increase the production of cash flow of an entity in the period from 2008 to 2013 on the condition of the true and fair view of accounting, risk items were identified in order to find potential manipulation leading to an undervaluation of profits and overvaluation of reported losses. Subsequently, they were adjusted for these material differences in accounting items, which caused a diversion of development of the EBT and growth of CF in the context of true and fair view of accounting; the CFEBT values were modified so that the modified CFEBT could be calculated. The resulting value of the modified CFEBT was reduced to 21%.

Table 4: Modified CFEBT – analysis of significant items

Adjusting the CFEBT for significant items of the financial period 2008 – 2013	thous. CZK
∑ EBT before adjustment	-37491
overvaluation of the accounting loss (undervaluation of the EBT):	
Change in reserves and allowances	3011
depreciation (extreme assumption of zero-option income in the period)	1249
modified EBT	-33231
increased CF before adjustment	3734
overvaluation of increased CF:	
Reserves	0
increase in short-term trade payables	-19803
increase in liabilities to controlled and managed persons	-24083
change of advance payments received	0
modified increase of CF	-40152
CFEBT after modification	21

This result has implications of legislation of the country. In legislative terms of the Czech Republic, especially for auditors it means to assess the risk of accounting fraud and its response to perceived risk, particularly of ISA 240, act no 253/2008 Coll. on money laundering and terrorist financing (the "Act against money laundering") and Act 40/2009 Coll. of the Criminal Code.

Table 4 presents various adjustments to the calculation of the CFEBT that emerged from the analysis of financial statements and the development of cash flow over the period.

By Table 4, the value of the modified CFEBT was significantly reduced from 110% to 21%, but it remains above the considered materiality of a deviation.

Increased risk of manipulation of financial statements for users of financial statements can therefore be considered beyond the true and fair view. Users of financial statements who need to decide about the credibility of financial statements in terms of CAS can be advised to perform a more detailed analysis of risk items within the accounting and taking into account the specifics defined by the true and fair view of the accounts of the national accounting systems.

These detailed tests can be performed by a professionally qualified user of accounts who wants to decide about the development of the company's financial health, as part of the introduction of anti-fraud program into their internal control systems based on the submitted financial statements. The group of professionally qualified users include internal or external auditors, owners, those charged with governance (Corporate Governance) or stakeholders of public administration and control offices. Information about the risk of manipulation of financial statements may not only improve the effectiveness of internal control systems of the subject, but also reduce the information asymmetry between owners and those charged with management of an enterprise.

3.4 The Altman model – Z-score

The Altman bankruptcy model is defined as follows for enterprises not traded on the stock exchange:

$$Z \text{ score} = 0.717 \cdot x_1 + 0.847 \cdot x_2 + 3.107 \cdot x_3 + 0.420 \cdot x_4 + 0.998 \cdot x_5 \quad (4)$$

Where:

x_1 = Net working capital / total assets

x_2 = retained earnings / total assets

x_3 = EBIT/ total assets

x_4 = registered capital / total debt

x_5 = sales / total assets

If the resulting Z is greater than 2.70 an enterprise is financially stable. If the Z0 is less than 1.2 an enterprise is at risk of bankruptcy. (Vochozka, 2011)

The Altman bankruptcy model shows following results in the period from 2008 to 2013:

By the Z-scores for 2008, 2009, 2010 and 2011, the assessment is not possible as the entity is revealed in the gray area of uncertainty. In 2013, the Altman Z-score revealed significantly good financial stability of the entity. This significant change was caused by varying the ratio of the partial x_5 ratio, the ratio of sales to total assets.

In terms of risk assessment of manipulation of financial statements, the Altman model has no real possibilities to identify this risk. A significant increase in reported revenues (sales) could potentially mean some manipulation of the revenue by for example circular trades or deliberate increase in the value of recognized income by mispricing; on the other hand also it could also mean manipulation by the reduction in the reported value of assets (in terms of CAS, a mass sale of assets already depreciated in significant values).

Discussion and Conclusions

Auditors or any professionally qualified user of the accounts should be see the financial statements of an entity with professional skepticism and assume that the financial data are partly manipulated as intentions, objectives and scope of an entity using creative methods of accounting adequately lead to complex and diverse nature of business transactions.

Then it depends of the specialists to be able to identify risk areas of accounting. A narrower group of financial statement users who have the access to more detailed accounting data at lower levels of accounts (account-level, off-balance sheet records, supporting documentation) should perform a targeted analysis of risk areas in context of the development of each accounting period. This analysis requires knowledge of the possibilities and limits of creative accounting, and the projection of accounting concepts (especially the true and fair view, the accrual principle, matching principle, the content is more important than the form) reporting to the national accounting system.

The paper evaluates the possibility of detection the risk of manipulated financial statements above frame of the true and fair view of accounting using sample models in comparison with the results of the bankruptcy model. Different models of financial analysis, bankruptcy or creditworthiness often show different results when compared. In addition, the user should take into account the possibility of manipulation with various accounting items when deciding on the basis of the previously mentioned models. In our opinion, it is necessary for any user of the accounts to take this risk into account when deciding. The group of users includes internal or external auditors, the owners, banks or other institutions, and the managers of Corporate Governance and every one whose decisions regarding the outcome of accounting is dependent on the quality of the accounting data in the financial statements.

Based on the results of the analysis of individual models, the author can conclude that it is appropriate to use the combination of several models for the detection of manipulation in the financial statements. Based on their results it is possible to identify risk points, reverse reaction in the financial statements or accounting (if you are a user who has access to the records) and to carry out detailed tests to obtain assurance that no manipulation occurred. The CFEBT model is considered to be a basic comprehensive view of the financial statements and the links between them. The model traces the development of the statements and links for more accounting periods (optimally in five years) and analyses the links between cash flow and profit. The paper also presents a modified version of this model, which is the result of identifying risk factors that emerged from the development of discrepancies in cash flow and profit. The modified version of the CFEBT model respects the individuality of the accounts of a sample entity and substantially eliminates the diversity of national accounting systems such as the Czech accounting standards, IFRS and US GAAP.

We believe that the suggested CFEBT model may be used by auditors to identify risks of accounting fraud of in accordance with ISA 240 or by any user accounts for testing financial statements. Its modified version may be used as a detailed test for auditors to identify risk; particularly in application of the audit judgment in assessing audit risk, in audit planning and in testing different items in the financial statements.

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Relationship between studied faculty and required employee benefits

Jiří Duda¹ and Veronika Blašková²

¹Department of Management, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: jiri.duda@mendelu.cz

²Department of Statistics and Operation Analysis, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: veronica.blaskova@mendelu.cz

Abstract

Employee benefits represent an integral part of employee compensation. The paper examines whether the studied faculty influences the set of desired employee benefits. Students themselves determined the top 5 benefits that they would demand from their future employer. Research is carried out continuously, and the paper uses data from the years 1998–2014 for Faculty of Agronomy (FA) and Faculty of Business and Economics (FBE) MENDELU in Brno. Statistically significant differences concerned specifically the preference of additional salary (prevailing preference at FA), and extra week holiday (prevailing preference at FBE). Also in benefits contribution to recreation and contribution to life insurance is the percentage of students FBE who want these benefits, greater than students with AF. Two benefits (contribution to recreation and contribution to life insurance) have confirmed the hypothesis H₀ only: the percentage of students, who want the benefit, is the same for the students of FBE as for students of AF.

Keywords: employee benefits, Faculty of Agronomy MENDELU in Brno, Faculty of Business and Economics MENDELU in Brno, research, student.

1. Introduction

Remuneration of employees, which includes the provision of employee benefits, is one of the most important personal activities in the enterprise.

Various authors such Bláha (2005), Horalíková (2006) Koubek (2007) and Milkovich (1993) states that employee benefits are a form of remuneration that employees organization provides only that its employees. Benefits usually are not tied to the performance of the worker, but shall be taken into operation, the status of a worker in society. Similarly, define the benefits and Armstrong (2009), Dencker (2007), Kleibl (2001)] and Provazník (1996), who consider the benefits of the traditional components of remuneration are provided in addition to the basic forms of wages. According

DeCenzo (1999), Dvořáková (2007) and Kleibl (2001) Employee benefits are part of the total remuneration and it mean effective investment to the staff. Many employees is expecting fair administration of benefits (Muse and Wadsworth, 2012).

Benefits are by many authors (DeCenzo, 1999 Dulebohn, 2009 Dvořáková, 2007) an essential part of a functioning program, employee motivation, because they have a significant impact on whether the employee will remain in the company. Except the benefits, for attracting of new employees there are the important characteristics of the company – eg. a good working atmosphere, career advancement (Backes-Gellner and Tuor 2010). Benefits also become possible reason to accept a job offer contender. Horská (2009) contends that the benefits considered as hygiene factors Herzberg et al. (2004). According to the author, if the benefit is withdrawn, there leads to demotivation of employee. This view is supported by research Vnoučková (2014). Benefits are also less demanding than the economic exploitation of wages, because many benefits are tax-supported (eg. Hammermann, 2014; Macháček, 2013; Duda, 2011; Otavová, 2009; Grubb and Oyer 2008).

2. Methodology and Data

The aim of this work is based on long-term research to determine whether the faculty has studied the influence of the song popular benefits students of Business and Economics (FBE) and the Faculty of Agriculture (AF) Mendel University in Brno. Research is carried out continuously in the paper are used data from the years 1998-2014. In the academic year 2000/2001 survey was the Faculty of Agronomy (AF) was performed, so this year is not included in the results presented in this paper.

Hypothesis was formulated:

H0: the percentage of students who want the benefit, the students FBE same as for students AF .

$$H_0 : \pi_1 - \pi_2 = 0$$

H1: the percentage of students who want the benefit is for students FBE larger (or smaller) than students AF

$$H_1 : \pi_1 - \pi_2 < 0 \quad \text{or} \quad H_1 : \pi_1 - \pi_2 > 0$$

When processing the results were used testing relative frequencies (Hindls, 2007)

$$U = \frac{p_1 - p_2}{\sqrt{\frac{(n_1 p_1 + n_2 p_2)(n - n_1 p_1 - n_2 p_2)}{(n_1 + n_2)n_1 n_2}}} \quad (1)$$

U – test criterion

n_1 – the number of respondents FBE

n_2 – number of respondents AF

p_1 – percentage of students FBE requesting the benefit

p_2 – percentage of students AF requesting the benefit

$n = n_1 + n_2$

If in the last column of the table value test criterion comes out in the interval $<-1.645, 1.645>$ so it can be said that it failed to show the disparity between the AF and FBE. If the value is less than -1.645 then test showed that the percentage of students AF who

want the benefit is significantly higher than students FBE. If it is greater than the value of 1.645, then the percentage of students FBE who want the benefit, increased against to students AF.

3. Results

Students were asked to spontaneously give up the 5 most important benefits that would at the employer requested. These benefits should also indicate the order of importance (1–5 place) provided benefits. During the monitored period they have identified a total of 51 employee benefits. Based on the analysis order of preference (Duda, 2014) was determined top ten most spontaneously desired benefits.

Ranking benefits reported in spontaneous answers of students is, if we look at the general popularity of benefits in turn depends on the frequency of the benefit, almost identical. In the course of research in the academic years 1998–2014 among 10 most popular occurred the same benefits, with one exception. 9 identical benefits were as follows – contribution to corporate catering, additional salary (extra wage), use of company car for private reasons, extra week holiday, employer cover language courses, contribution to pension insurance, contribution to recreation, contribution to life insurance, cellular phone for private use.

Benefit cellular phone for private use of the testing was eliminated from the relative frequencies due to the lack of students AF of this benefit in 2001–2003.

These benefits assay was performed relative frequencies. The results of this test can be seen in Table 1 and Table 2.

Table 1: Results of test criterion

Year	Contribution to corporate catering	Additional salary (extra wage)	Use of company car for private reasons	Extra week holiday
2013/2014	0.459156	-5.132510***	1.649368*	-2.734640**
2012/2013	1.266460	-1.178920	1.754199*	2.895621**
2011/2012	-6.103040***	-7.181850***	-2.266520*	-0.570530
2010/2011	0.496600	-4.310840***	1.043502	1.710581*
2009/2010	2.111128*	-0.573750	1.971098*	1.575746
2008/2009	2.934555**	4.342760***	3.080682**	5.449986***
2007/2008	-0.396930	0.415434	-1.511380	1.754472*
2006/2007	2.282236*	-1.082110	-2.215740*	1.133808
2005/2006	3.560800***	-0.999000	-1.196530	2.507221**
2004/2005	1.361143	-1.915790*	0.761624	3.042268**
2003/2004	-2.082720*	-0.921890	1.793276*	4.167223***
2002/2003	-0.733380	-3.274150***	3.714314***	1.321870
2001/2002	1.316188	-0.907460	-0.144230	2.868396**
1999/2000	3.630214***	3.000395**	3.265211***	3.927986***
1998/1999	0.610424	2.233269*	2.930637**	-2.734640**

*, **, *** Significant at 0.05, 0.01, and 0.001, respectively

Table 2: Results of test criterion

Year	Employer cover language courses	Contribution to pension insurance	Contribution to recreation	Contribution to life insurance
2013/2014	0.968894	-1.104560	0.159429	1.043641
2012/2013	-0.140450	1.015090	-1.251860	0.832880
2011/2012	-2.704390**	-5.043370***	0.674431	-2.546010**
2010/2011	-0.282510	1.635114	0.584879	-1.461500
2009/2010	0.578292	0.960169	0.824256	-1.524890
2008/2009	4.334104***	1.716654*	2.013529*	2.272064*
2007/2008	1.726900	1.703832*	-0.955500	0.648375
2006/2007	2.510966**	0.794419	0.276315	0.530902
2005/2006	0.232456	3.026612**	0.328581	-1.125520
2004/2005	2.324956*	2.293458*	-1.458400	-0.254620
2003/2004	1.268819	0.571776	-0.235690	-0.091610
2002/2003	0.553162	1.449720	-1.046790	-2.958860**
2001/2002	-1.749480*	0.772513	-0.804070	0.417154
1999/2000	0.122068	-0.141980	0.861711	-0.214230
1998/1999	1.779800*	1.529680	0.335020	-1.823660*

*, **, *** Significant at 0.05, 0.01, and 0.001, respectively

4. Discussion and Conclusions

An important benefit that is required by the students is contribution to corporate catering. As can be seen in contribution to corporate catering in half of years analysed is detected dependency studied faculty in choosing this benefit. This benefit is still generally preferred more students FBE than AF. In five years, it was observed a higher percentage rate of popularity among students benefit FBE. Contribution to corporate catering is tax advantages for employers in Czech Republic. Macháček (2013) and Duda (2011) state that employees are eating at a lower price, and the employer may determine the level of costs for meals apply to tax-deductible expenses. Leadership of the contribution to corporate catering among benefits also confirms Kučera (2011) in published a comprehensive study Pay Well PricewaterhouseCoopers. Research of Ministry of Labour and Social Affairs (2013) states the contribution to corporate catering was provided in about 95% of collective agreements employer. Financial sponsorship of food is reflected in the attractiveness of employers and sends a signal to potential job seekers (Backes-Gellner and Tuor 2010; Lazear 1998).

Quite the opposite situation is seen with the benefit additional salary (extra wage). This benefit is very popular with both groups of students, but they are seeing high values of the calculated test criterion for students AF containing values up -7.18185 *** in the academic year 2011/2012. For this benefit it can be said that a very significant percentage of students AF than students FBE, prefers benefit additional salary (extra wage).

Very popular benefit for both groups of students is personal use of company-owned vehicles. This benefit is provided more employees in managerial positions, especially top management due to business trips (Hammermann, 2014). For this benefit can be seen that a higher percentage of students FBE than students AF spontaneously reported this benefit in the top five most desired benefits. Calculated test criterion in eight years of

research in favour of students FBE. In overall terms, the response rate of students FBE significantly greater than the response rate of students AF.

A significantly higher percentage response rate is at FBE students benefit extra week holiday. This benefit is for students FBE always placed in the top ten order of popularity. Students AF, this benefit in the top ten ranking appeared in three cases (Duda, 2014). In table 1 it can be seen that at 9 years sensing a difference in the number of frequencies in favour of students FBE. Significantly higher difference was achieved in 1999/2000; 2003/2004 and 2008/2009. For this benefit, the highest distinction in popularity studied by the faculty.

For employees of companies in the Czech Republic extra week holiday is a very valuable benefit, this fact is also confirmed by Příklad (2012) in study Salary & Benefits Guide 2011–2012 Company Robert Half and Kučera (2011). Also, research conducted by Ministry of Labour and Social Affairs (2013) states that extra week holiday is the second most common benefit provided by the employer. Importance benefit confirms Armstrong (2009) in the study “Survey of Reward Management” where the benefit is also the second most provided benefits (benefit provides 81% of respondents).

In table 2 there can be seen benefit contribution to recreation and contribution to life insurance that the popularity of these benefits is approximately the same for both the students FBE and the students AF. Calculated on the basis of test criteria can confirm the hypothesis H0: the percentage of students who want the benefit, the students FBE same as for students AF.

In another benefit contribution to pension insurance is the overall results only slightly more popularity in favour of students FBE. The importance of contribution to pension insurance for employees is also confirmed by Bubák (2013) in the published survey conducted by ING and the Confederation of Industry. The survey showed that the contribution to pension insurance provides 68% of the analysed companies.

Increased popularity of the benefit employer cover language courses for students FBE can be seen in table 2, but again, this benefit is very popular with students AF too. When analysing the number and order of frequency (Duda, 2014), this benefit enjoyed popularity among both groups of students.

Interesting results can be observed in 1999/2000; 2008/2009 and 2011/2012. Probably due to the greater diversity of choice benefits students AF happened is that the results of the test criteria were in favour of students in all analysed FBE benefits in 2008/2009. In 1999/2000 this was only 4 major benefits. The opposite situation occurred in 2011/2012, due to a greater variety of choice of benefits for students FBE was the fact that the results of the test criteria were in favour of students AF.

In analysed selected 8 benefits, we can say that in only one case (additional salary – extra wage) percentage of students AF who want the benefit is greater than students at FBE. Two benefits (contribution to recreation and contribution to life insurance) have confirmed the hypothesis H0: the percentage of students who want the benefit, the students FBE same as for students AF. For the remaining benefits are analysed confirmed the hypothesis H1: the percentage of students who want the benefit, the students FBE greater than students AF. For the benefit contribution to pension insurance in the overall results only slightly more popularity in favour of students FBE. The most significant difference is for the benefit extra week holiday.

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Liquidity Effects of the Unconventional ECB’s Monetary Policy

Michal Dufek¹ and Svatopluk Kapounek²

¹*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:michal.dufek105@gmail.com*

²*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:kapounek@mendelu.cz*

Abstract

In this paper we examine the liquidity effects of the unconventional monetary policy of the ECB. We estimated cointegration vector to identify long-term causal effects of nonstandard measures of monetary policy on the long-term interest rates of sovereign bonds in the selected core euro-area member countries. The pass-through from the official open market operations to the long-term interest rates also depends on the risk premiums and economic activity expectations. Finally, we adopt the technique of error correction to understand the dynamics between the variables studied in the short and long term. The results are discussed in relation to the monetary policy efficiency at the zero lower bound.

Keywords: financial crisis, deflation, credit easing, quantitative easing, euro area

1. Introduction

The monetary policy of the most word central banks is responsible to maintain of the price stability. In order to the theory of conventional transmission mechanism central banks influence short interest rates on the money market. The short end of the yield curve is fully controlled by the central bank. The inflation and the aggregate demand are consequently affected by manipulation with short – term interest rates (according to the conventional transmission mechanism, Bofinger, 2006). However, the success of the monetary policy in the inflation targeting and stimulating of the aggregate demand can be limited when the short – term rates hit the zero lower bound. In this situation, central banks can no longer stimulate aggregate demand by further interest rates reductions and must use another monetary policy tools, so called unconventional measures. There are a lot of the economic papers about monetary policy alternatives at zero lower bound. Before the financial crisis in the year 2007 only few studies have presented empirical testing of the potential effectiveness of the unconventional measures. For example, Bernanke and Reinhart have undertaken such research on the Japanese data (Bernanke,

Reinhart, 2004). These studies would help central banks for the choice of the appropriate tools in the zero rates policy times.

Bernanke and Reinhart (2004) reached to findings about the likely efficacy of nonstandard policies. Especially, their research confirm a potentially important role for central bank communication to try to shape expectations of the future policy actions and about the path of the future short – term interest rates. They also find evidence that asset purchase in large volume by central bank would be able to affect the price or yields of the purchased assets. Hiroshi Ugai (2006) surveys the empirical analyses that evaluate quantitative easing policy (QEP) performed by Bank of Japan which has the most experience with the unconventional monetary policy. The Japanese researchers in their papers identify three transmission channels through which unconventional zero interest rates policy and the quantitative easing influence macroeconomic magnitudes such as expectations of future path of short – term interest rates, yield curves, risk premium and finally aggregate demand a price development in economy. QEP examine in their research paper Joseph Gagnon, Matthew Raskin, Julie Remache, Brian Sack. More precisely they examine the programme of Federal Reserve System called Large Scale Assets Purchase Programme which was triggered since December 2008 and was running to October 2014. The research paper presents evidence that the quantitative easing (asset purchasing) led to economically significant and long – lasting decline in longer – term interest rates on a wide range of securities even if some of them were not included in the purchase programme.

In this paper we examine one of the alternative monetary policy – the liquidity effect of the unconventional monetary policy of the ECB. We describe how these policy might work and on the data of several European countries we will test the effectiveness of this monetary policy tool. To obtain this evidence concerning the liquidity effect of the asset purchase and its impact on longer – term interest rates we use data from Germany, Greece, France and Austria. The liquidity effect is considered like a significant if the Eurosystem can affect the longer – term interest rates, namely yields of the sovereign bonds with the five years maturity. The European Central Bank use several nonstandard measures, through which performs its expansionary monetary policy. Like other world central banks (Bank of Japan, Federal Reserve System and others), ECB especially use asset purchase to stimulate the aggregate demand in the economy. The individual programs of the asset purchase will be described below.

The objective of this paper is to identify the relationship between the implementation of the nonstandard measures of the monetary policy and longer – term interest rates of sovereign bonds with five years maturity in the selected euro area member countries. The time series are selected so that we can focus on the development of this relationship before (in times when security market purchases and longer – term refinancing operations were rarely used) and after the outbreak of the financial crisis. Our theoretical contribution is the analysis of the effectiveness of the nonstandard measures used by central banks during the zero rates episodes.

2. Theoretical background

Firstly, we revised methodological approach by James Tobin (1958) called *portfolio balance effect* (Tobin, 1958). Tobin identified the primary channel through which unconventional measures appear to work is the risk premium on the purchased assets. By purchasing certain assets, central banks reduce the amount of this securities that

holds the private sector while at the same time are central banks increasing the amount of short – term, risk – free bank reserves held by the private sector. QEP (more precisely the purchasing programs) push the prices of the purchased assets up and hence lower its yield.

In the second step we follow the contribution of Krugman (1998), Eggertson and Woodford (2003), Bernanke and Reinhart (2004), that there are some alternatives of the expansionary monetary policy on the zero lower bound of the short – term interest rates. For securities is the most important component of the risk premium. The risk premium is also called “term premium” and reflects unwillingness of economic agents (investors) to bear the interest rate risk which is connected with holding assets that have long term of maturity (or duration).

We follow model of Gagnon, Raskin, Remache and Sack (2010) and Bernanke, Reinhart, Sack’s model (2004) where are included following variables to capture term premium variation to the business cycle and fundamental uncertainty: *unemployment gap* – measured as the difference between the unemployment rate and the Congressional Budget Office’s estimate of the natural rate of unemployment, *core CPI inflation*, *6-month realized daily volatility of the on-the-run 10-year Treasury yield* – a proxy for interest rate uncertainty, *publicly-held Treasury securities* – with at least one year to maturity, *treasury securities held in the Federal Reserve’s SOMA portfolio* – with at least one year to maturity, *U.S. debt securities held by foreign official agencies* – with at least one year to maturity.

3. Currently used methods

The empirical analysis identifies a long-term relationship given by the open market operations and long term refinancing operations of the ECB at the internal banking market to influence portfolio of the banks (maturity, duration or yield curves of the securities) to affect long-term yield curves represented by the 5-year government bond yields (*Bonds_5Y*) in formula (1):

$$\begin{aligned} Bonds_{5Y_t} = & c + \beta_1 CDS_{t-p} + \beta_2 VIX_{t-p} + \beta_3 ES_{t-p} + \beta_4 IP_{t-p} + \beta_5 P_{t-p} + \dots \\ & \dots + \beta_6 L_{t-p} + \beta_7 LTRO_{t-p} + \beta_8 OMO_{t-p} + \varepsilon_t, \end{aligned} \quad (1)$$

where *CDS* represents insurance paid by buyers against a credit event on the underlying government debt, *VIX* is Chicago Board Options Exchange Market Volatility Index, *ES* represents economic sentiment indicator (ESI) which is calculated by Directorate general for economic and financial affairs (DG ECFIN), *IP* is industrial production index, *P* is harmonized index of consumer prices, *L* is level of loans, *LTRO* represents long term refinancing operations and *OMO* represents open market operations. Finally ε denotes the residual term and *p* represents lag.

The datasets are provided by public available database Eurostat, the dataset regarding implied volatility (*VIX*) is available at website of the Chicago Board of Exchange, the dataset of credit default swaps we obtained in the Bloomberg’s database. We used monthly data in the period 2005M01–2014M08 at levels without seasonally adjustment.

To identify the long-term causality and short-term adjustments we applied cointegration analysis. To estimate multiple cointegrating relations we applied Johansen’s approach and its maximum likelihood approach avoiding conditional estimates (Johansen 1988 and Johansen 1991). To pre-test stationarity of the variables we applied Augmented Dickey Fuller test (ADF test) as a test for unit root in the form:

$$\Delta y_t = \alpha + \beta y_{t-1} + \sum_{i=1}^{p-1} \phi_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

where α represents deterministic term (constant), p the lagged difference terms, Δy_{t-i} are used to approximate the ARMA structure of the errors, and the value of p is set so that the error ε_t is serially uncorrelated. The optimal lag length of the AR-model is obtained on the basis of Akaike and Bayesian information criterion. The criterions are selected according to the parsimony optimality.

The rank of the multiple cointegrating relations r is tested by trace and maximum eigenvalue tests at specific lag structure. The optimal lag order is identified by unrestricted VAR model based on the Akaike information criterion. The tested model with deterministic trend is specified in formula (3):

$$\Delta y_t = AB'y_{t-1} + \sum_{i=1}^q B_i \Delta y_{t-i} + \varepsilon_t, \quad (3)$$

where y_t is an n -dimensional time series of variable i , matrix B_i represents cointegrated relations and combination matrices A and B represents error-correction term $AB'y_{t-1}$, $B'y_{t-1}$ measures the deviation from the stationary mean at time $t-1$ and A is a matrix of adjustment speeds.

This approach reflects that all variables are possibly endogenous. All zero-rows in matrix A indicate a variable that is weakly exogenous with respect to the coefficients in matrix B . According to Johansen's approach, such a variable may affect other variables, but does not adjust to disequilibrium in the cointegrating relation. To identify such variables we applied Johansen's constraint test on adjustment speed of the selected variables.

4. Results

According to the Johansen's methodology we pre-tested all variables in the system to assess their order of integration. The results of Augmented Dickey-Fuller test at the levels and the first differences are presented in the Table 1. In the case of first differenced variables we rejected unit root processes at 0.01 significance level, except the loans in France, where we concluded stationarity at 0,1 significance level. Because the all variables are integrated of the same order, we estimated the model and determined the cointegration rank.

The applied trace test and maximum eigenvalue test assesses null hypotheses of cointegration rank less than or equal to r . The Table 2 shows that there should exist 2 or less cointegrating relationships in Austria, 1 in France, 2 in Germany and 3 in Greece, at the 0.05 significance level. Subsequently, we tested if cointegrating relationship forms a stationary linear combination of the all first-order integrated variables, thus, if certain combinations of variables suggested by economic theory are stationary. The composition of the deterministic term is presented in the form $AB'y_{t-1}$. The results showed that although trace test and the maximum eigenvalue test assume multiple cointegrated relations we cannot confirm more than 1 cointegrating relationship in Austria and France. We also rejected existence of the cointegrating relationship in Greece.

Table 1: Unit root stationarity ADF test

Variables	Levels		First differences		Order of integration	
	ADF stat	Lags	ADF stat	Lags		
Austria	Bonds_5Y	-0.2449	1	-7.7603***	0	1
	CDS_Spreads	-1.3405	1	-9.4114***	0	1
	VIX	-2.6864*	0	-9.0289***	1	1
	Economic_Sentiment	-2.8369*	2	-4.6700***	0	1
	Industrial_Production	-1.6241	12	-10.5981***	4	1
	HICP	-0.6152	12	-8.4555***	3	1
	Loans	-2.8242*	0	-10.4483***	0	1
	Longer_Term_Ref_Operations	-1.8700	1	-7.7654***	0	1
	Open_Market_Operations	-1.6554	0	-11.4674***	0	1
France	Bonds_5Y	-0.5143	1	-7.3376***	1	1
	CDS_Spreads	-1.1661	1	-8.8071***	0	1
	VIX	-2.6864*	0	-9.0289***	1	1
	Economic_Sentiment	-2.8369*	2	-4.6700***	0	1
	Industrial_Production	-0.9558	12	-6.5078***	6	1
	HICP	-0.9725	12	-11.3773***	0	1
	Loans	-2.3228	3	-2.7300*	2	1
	Longer_Term_Ref_Operations	-1.8700	1	-7.7654***	0	1
	Open_Market_Operations	-1.6554	0	-11.4674***	0	1
Germany	Bonds_5Y	-0.5177	1	-7.3430***	0	1
	CDS_Spreads	-1.7114	0	-12.0732***	0	1
	VIX	-2.6864*	0	-11.4349***	0	1
	Economic_Sentiment	-2.8369*	2	-4.6020***	0	1
	Industrial_Production	-1.7464	12	-11.8822***	1	1
	HICP	-1.1287	1	-16.3998***	0	1
	Loans	-2.0569	3	-11.0772***	1	1
	Longer_Term_Ref_Operations	-1.8700	1	-16.0748***	0	1
	Open_Market_Operations	-1.6554	0	-11.2537***	0	1
Greece	Bonds_5Y	-1.3960	0	-8.8542***	0	1
	CDS_Spreads	-1.3167	0	-11.7654***	1	1
	VIX	-2.6864*	0	-9.0289***	1	1
	Economic_Sentiment	-2.8369*	2	-4.6700***	0	1
	Industrial_Production	1.0109	11	-5.1289***	11	1
	HICP	-1.4743	12	-11.2576***	4	1
	Loans	-2.8060*	0	-10.0629***	0	1
	Longer_Term_Ref_Operations	-1.8700	1	-7.7654***	0	1
	Open_Market_Operations	-1.6554	0	-11.4674***	0	1

Notes: *, ** and *** denote significance at the 10, 5 and 1% level.

Table 2: Johansen rank test for cointegrated relations

	Austria		France	
	Trace test	Maximum eigenvalue test	Trace test	Maximum eigenvalue test
lag	2	2	4	4
r = 0	237.5150***	64.0791**	270.8452***	72.5387***
r = 1	173.4359***	54.2780**	198.3065***	50.8510
r = 2	119.1579	38.3307	147.4555**	41.8335
r = 3	80.8271	32.9970	105.6219*	32.2953
r = 4	47.8302	17.5420	73.3266	24.4215
r = 5	30.2882	14.8062	48.9052	18.3951
$AB'y_{t-1}$	$A(B'y_{t-1} + c_0) + c_1$		$A(B'y_{t-1} + c_0 + d_0t) + c_1 + d_1t$	
r	r = 1		r = 1	
p-value ¹⁾	0.1990		0.3771	
	Germany		Greece	
	Trace test	Maximum eigenvalue test	Trace test	Maximum eigenvalue test
lag	2	2	2	2
r = 0	279.3894***	70.7874***	345.8571***	92.7009***
r = 1	208.6020***	58.2042**	253.1562***	80.0151***
r = 2	150.3979***	46.8345*	173.1411***	55.6225**
r = 3	103.5634*	38.2384	117.5186***	38.1836
r = 4	65.3250	24.2331	79.3350*	33.1088
r = 5	41.0919	16.3212	46.2262	24.4582
$AB'y_{t-1}$	$A(B'y_{t-1} + c_0)$		$A(B'y_{t-1} + c_0 + d_0t) + c_1 + d_1t$	
r	r = 2		r = 1	
p-value ¹⁾	0.2017		0.0016	

Notes: *, ** and *** denote significance at the 10, 5 and 1% level.

¹⁾ we test stationarity of cointegrating relation

The Figure 1 shows evidence of cointegrating relations represented combination of all variables in different models. Obviously, there are relatively stationary relationship in Germany and Austria, possibly in France we can identify trend stationary process, but we cannot confirm theoretical assumption in the case of Greece. Normalized cointegrating relations with respect to the bond yields we presented in the Table 3. We can see that the coefficients are close to zero in the case of Greece as well.

The cointegrating relationship among the variables in France is also complicated because we assumed intercepts and linear trends in the cointegrating relations and quadratic trends in the data. This model may produce good in-sample fits but would be very poor for out-of-sample forecast. Moreover, the quadratic trends in the all variables are questionable. For these reasons we will discuss only models for Austria and Germany in the next parts of this paper.

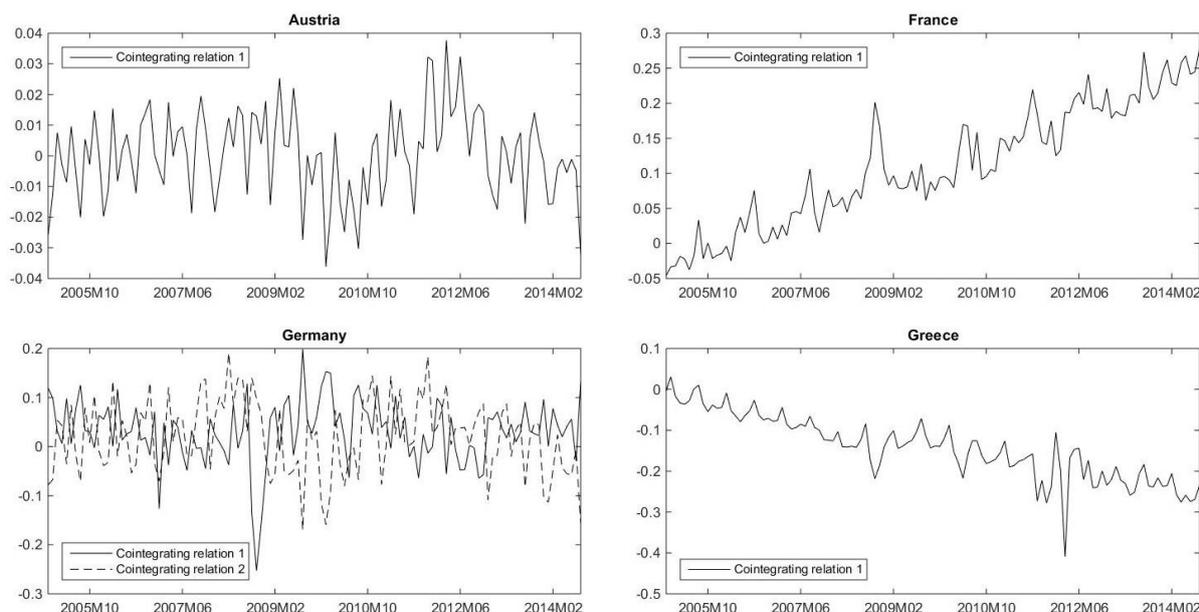


Figure 1: Figure caption

Table 3: Cointegrating vectors estimations

Variables (B)	Austria	France	Germany		Greece
	1	1	1	2	1
CDS_Spreads	-0.0015	-0.0001	0.0088	0.0360	0.0000
VIX	-0.0553	0.0034	-0.1151	-0.0720	-0.0026
Economic_Sentiment	0.0534	0.0021	0.0540	-0.3960	-0.0002
Industrial_Production	-2.4515	-0.0016	-3.2650	4.8067	-0.0001
HICP	0.9644	0.0187	1.4774	-0.5917	-0.0190
Loans	-0.2558	-0.0004	-0.2468	0.3373	0.0000
Longer_Term_Ref_Operations	0.0416	0.0000	0.0934	0.0406	0.0000
Open_Market_Operations	-0.1188	0.0000	-0.2918	-0.1707	0.0000

In the long-run relationship we identified negative effects of economic activity on the bond yields in Austria and the first cointegrating vector in Germany. These results could be explained by consequences of debt crisis and government bond sales. On the contrary, theoretical assumptions were confirmed by the second cointegrated vector in Germany. In that case we identified strong positive impact of the economic activity on the bond yields and negative impact of the prices and the economic sentiment indicator. We also suggest positive relationship between the loans and bond yields. Important result provided long-run relationship between the open market operations and bond yields because the results confirmed our suggestion that the expansionary monetary policy affected long-run interest rates with possible effects on the economic growth and investment activities. This cointegrating relation was confirmed by the all identified models (except France and Greece).

The Table 4 provides the error-correction term estimations under the cointegration rank restrictions. According to these results we can discuss disequilibrium in cointegrating relations and adjustment speeds of variables to disequilibrium. In this sense we identified strong disequilibrium in long-run relationship caused by economic activity and subsequent short-term adjustment of the open market operations and CDS spreads (second cointegrating relation in Germany). The impact of economic activity on

the long-term cointegrated relations is significant also in the case of Austria and the first model in Germany. In these booth cases we can see positive adjustment of long term refinancing operations and CDS spreads. Very small estimations of the adjustment speeds of the other variables imply that these variables are not responsive to last period's equilibrium error.

Table 4: VECM parameters estimations

A (adjustment speeds)	Austria	France	Germany	
	1	1	1	2
Bonds_5Y	0.0003	-0.0003	0.0003	0.0002
CDS_Spreads	0.0233	-2.3435	0.0020	0.0725
VIX	-0.0327	-0.7541	-0.0236	0.0051
Economic_Sentiment	-0.0017	-0.1405	-0.0012	-0.0025
Industrial_Production	-0.0072	1.4470	-0.0065	-0.0037
HICP	0.0004	-0.1255	-0.0008	0.0011
Loans	0.0000	0.3212	-0.0001	-0.0053
Longer_Term_Ref_Operations	0.0300	-8950,0	0.0398	-0.0222
Open_Market_Operations	0.0100	-14004	-0.0115	0.0427
B (cointegrating relations)	Austria	France	Germany	
	1	1	1	2
Bonds_5Y	-53.5109	112.7869	-27.8974	23.5678
CDS_Spreads	0.0789	-0.0089	-0.2450	0.8483
VIX	2.9570	0.3882	3.2101	-1.6962
Economic_Sentiment	-2.8588	0.2395	-1.5078	-9.3333
Industrial_Production	131.1813	-0.1781	91.0856	113.2837
HICP	-51.6041	2.1146	-41.2167	-13.9439
Loans	13.6892	-0.0498	6.8863	7.9494
Longer_Term_Ref_Operations	-2.2255	0.0000	-2.6051	0.9571
Open_Market_Operations	6.3557	0.0000	8.1408	-4.0237

Table 5: Johansen constraint test on weak exogeneity

	Austria	France	Germany
Bonds_5Y	0.0426	0.0336	0.1415
CDS_Spreads	0.5412	0.0655	0.0915
VIX	0.2289	0.1684	0.6082
Economic_Sentiment	0.3260	0.2372	0.2340
Industrial_Production	0.0019	0.0805	0.0000
HICP	0.1823	0.0000	0.0408
Loans	0.0556	0.3178	0.0587
Longer_Term_Ref_Operations	0.3598	0.0530	0.2980
Open_Market_Operations	0.6363	0.0871	0.0208

Notes: p-value estimation of probability of rejecting the null of the each variable adjustment with respect to the other variables in the model

To provide better insight into the dynamic adjustment process in cointegrated relations we tested constraints on adjustment speed of the selected variables and try to reject the null that the selected variable is weakly exogenous with respect to other variables in the system (Table 5). Our results confirmed that the deviation from the

equilibrium in the system will lead to the open market operations adjustment in the future that eventually eliminates the disequilibrium in Germany. The weak exogeneity was rejected for economic activity and consumer prices at the 0.05 significance level. In the case of Austria we can reject weak exogeneity of bond yields and economic activity at the 0.05 significance level.

5. Discussion and Conclusions

In this paper we examined the liquidity effects of the unconventional monetary policy of the ECB in the case when short – term interest rates hit the zero lower bound. We estimated cointegration vector to identify long – term causal effects of nonstandard measures of monetary policy on the long the long – term interest rates of sovereign bonds in the selected core euro – area member countries – Austria, Germany, France and Greece.

We started with the model creation which is based on the Gagnon, Raskin, Remache, Sack (2010) and Bernanke, Reinhart, Sack (2004). We applied cointegration analysis and weak exogeneity test to identify strong positive impact of the economic activity on the bond yields and negative impact of the prices and the economic sentiment indicator. Important result provided long – run relationship between the open market operations and bond yields because the results confirmed our suggestion that the expansionary monetary policy affected long – run interest rates with possible effects on the economic growth and investment activities. This cointegration relation was confirmed by identified models in Germany and Austria. Our results confirmed that the deviation from the equilibrium in the system will lead to the open market operations adjustment in the future that eventually eliminates the disequilibrium in Germany.

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Web Application for sustainability and Reporting for Czech Breweries

Oldřich Faldík¹, Oldřich Trenz, Jiří Hřebíček, Edward Kasem

¹Department of Informatics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: oldrich.faldik@mendelu.cz

Abstract

Sustainability is the ability of a company to remain productive in the time and thus retain the potential of long-term profitability – stability. As a consequence, it is maintaining of the appropriate combination of (key) indicators from many different areas (economic, social, environmental, corporate governance). Along with the support of corporate reporting, it is a powerful tool to support internal financial reporting, distribution of descriptive information about the company into its surroundings, and a way to keep track of key performance indicators (Key Performance Indicators – KPIs).

The aim of this paper is to present a portal, based on cloud technologies, oriented to support corporate sustainability and reporting in the selected subject area, namely the area of small and medium-sized breweries in the Czech Republic. The aim is to offer the required support of sustainability to small and medium-sized enterprises, which are often characterized by considerable instability in their financial behaviour. The Web portal is based on the currently used technologies (HTML5, PHP5) and uses the support of XBRL as the native format for financial reporting. Emphasis is also placed on the support for mobile devices and new trends in the field of Business Intelligence.

Tools for the assessment of financial health of a company from the given segment (benchmarking) are part of the available application. The emphasis is put on clarity and simplicity, together with the possibilities of practical application.

The presented topic continues previous research and is part of the project of GACR (Czech Science Foundation) – Measuring corporate sustainability performance in selected sectors.

Keywords: Sustainability Performance, Brewery, GRI, EFFAS, Key Performance Indicators

1. Introduction

Currently, there are many systems dealing with corporate sustainability reporting.

Corporate results under the situation of the current economic theory and practices is most often measured using the Economic Value Added (EVA) indicators (Stern, Stewart,

1994; Sharma, Kumar, 2010, Qi, 2011). The EVA indicator from the perspective of financial management combines all the basic components.

According to (Vacl, J. 2014) Czech breweries play an important role in the economic and social areas, creating one of the most important economic values and largely participate in the country employment rate.

The aim of this paper is to offer the necessary support of sustainability for small and medium-sized enterprises, which are often characterized by considerable instability of their financial behaviour.

It is necessary to design and implement the resulting portal. This portal will be based on cloud technologies, aimed at promoting sustainable development of companies, and reporting in a selected field, namely in small and medium-sized breweries in the Czech Republic.

2. Method

The current situation in the sphere of corporate reporting and in the sphere of the used was applied and analyzed. Subsequently, the synthesis was performed. Furthermore, web application was designed in accordance with the requirements. Finally, the application was implemented and tested.

3. Project implementation

3.1. Technologies used

Regarding the requirements for availability, the system was implemented as a web application. PHP5 (PHP: Hypertext Preprocessor) was selected as the language for the application implementation. MVC (Model View Controller) framework Nette (Nette, 2015), which allows us to divide the application into particular modules and thereby ensure the sustainability of future development, was used as an extension of this language.

The framework also allows using the ACL (Access Control List) model, which has already been implemented in it. This ACL model allows defining of the roles and their subsequent assignment to particular users. Due to the requirement of authentication and authorization, the user roles (Administrator, Company) are treated with this model.

Since the application is focused on collecting questionnaires, it is necessary to use a database where these will be saved. Given the complexity of the calculations, MySQL (MySQL, 2015), is the best choice.

The frontend Bootstrap framework was used in order to ensure responsiveness of the web design. This technology allows optimization of websites for mobile devices.

3.2. Structure of the application

The application should allow the authentication and authorization. In the application (Figure 1), there are two types of users. The first type of user – the company allows login or a new registration. After registration the user is offered either to complete a new questionnaire or is shown the original questionnaires. In the case of a user of the

administrator type, the user rights are extended with browsing the questionnaires of any company.

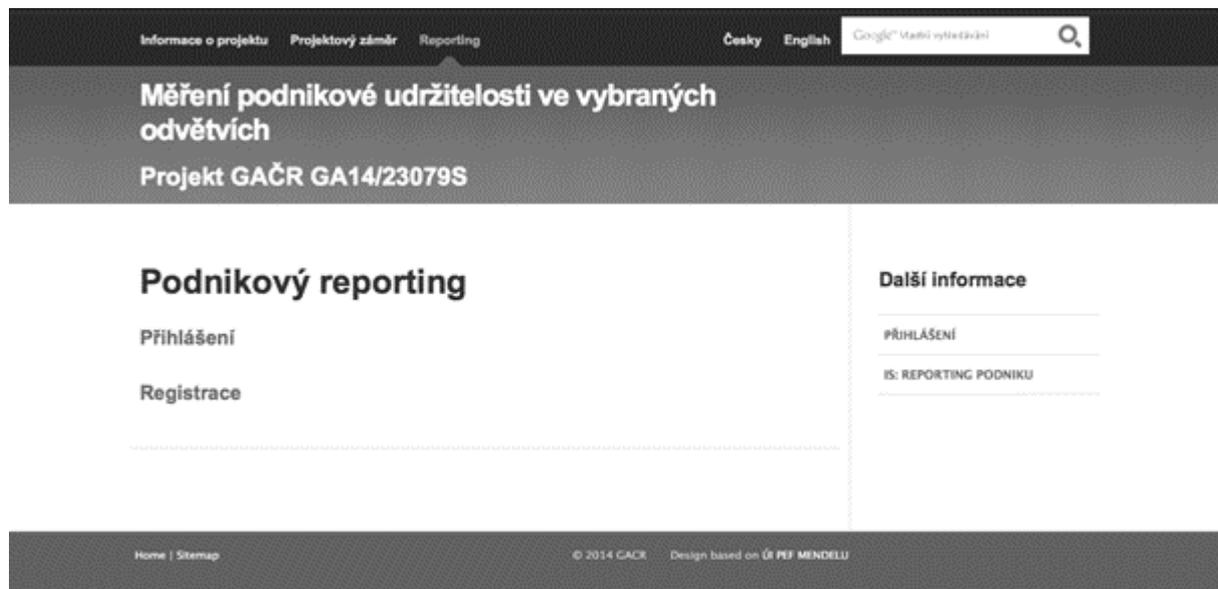


Figure 1: Main screen

The following figure (Figure 2) shows the form for registration of a new company, which will insert the questionnaire. The form is also validated by the client to avoid unnecessary sending to the server. Then, it is again validated in the server for security reasons.

E-mail*:	<input type="text"/>
Heslo*:	<input type="password"/>
Heslo pro kontrolu*:	<input type="password"/>
Titul:	<input type="text"/>
Jméno*:	<input type="text"/>
Příjmení*:	<input type="text"/>
	<input type="button" value="Registrovat"/>

Figure 2: Registration form

In picture (Figure 3), there is the form for entering all necessary values for EVA calculation.

On the basis of the submitted form a diagram is shown which presents how the company's performance in comparison with the average in the sector in the individual values that have an impact on the calculation of EVA. (Figure 4)

Údaje nutné k výpočtu EVA:

Výsledek hospodaření za běžnou činnost:	<input type="text"/>
Nákladové úroky:	<input type="text"/>
Daň z příjmu za běžnou činnost:	<input type="text"/>
Vlastní kapitál:	<input type="text"/>
Bankovní úvěry:	<input type="text"/>
Krátkodobé bankovní úvěry:	<input type="text"/>
Dlouhodobé bankovní úvěry:	<input type="text"/>
Aktiva:	<input type="text"/>
Běžná aktiva:	<input type="text"/>
Krátkodobé závazky:	<input type="text"/>
Běžná likvidita průmyslu:	1.6
rf:	0.0371

Figure 3: Survey

In the report heading, there are buttons for the export of the reporting to the PDF format Add report, suitable for printing and into XBRL format Add report suitable for data exchange with other applications.

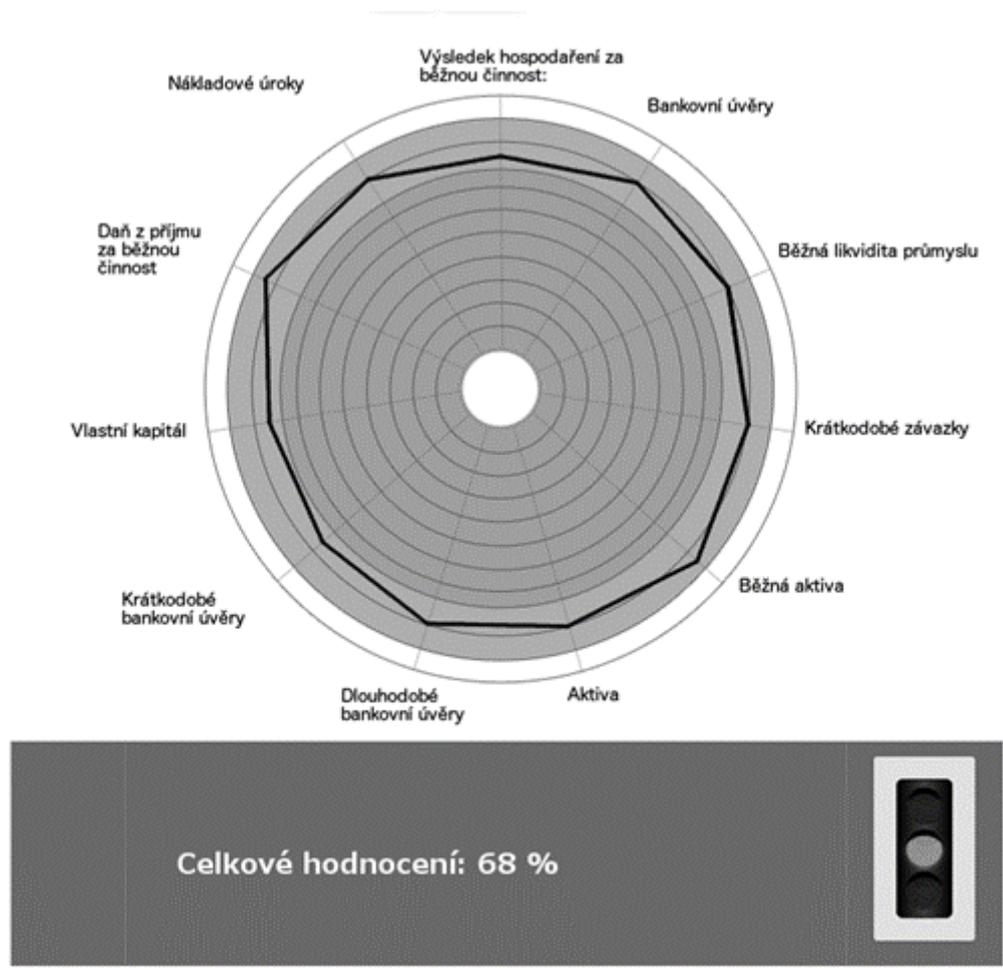


Figure 4: Final report

4. Discussion and Conclusions

Another version of sustainability reporting information system was implemented (Hodinka et al., 2012; Hřebíček, Vernerová, Trenz, 2013; Kocmanová et al., 2013, Popelka et al., 2013) in the past two years. This prototype was made to ensure that the chosen indicators can be computed and implemented successfully and verify the usability of information system for the end user. It concentrated on the assessing sustainability of crop production systems for the conditions of the Czech Republic (Křen, 2011) and differs from new developed SAFA software (SAFA Tool, 2013). In contrast, our application is beside others focused on a mobile access. It contains security ALC model. Obsahuje zabezpečení pomocí ALC modelu.

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Relationship between Integrity in Higher Education and Macroeconomic and Educational Indicators

Tomáš Foltýnek¹ and Jiří Rybička²

¹*Department of Economics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: tomas.foltynek@mendelu.cz*

²*Department of Economics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: jiri.rybicka@mendelu.cz*

Abstract

Academic Integrity Maturity Model (AIMM) was developed earlier to measure the level of integrity maturity in higher education for particular country. The AIMM score is counted from 9 different criteria (e.g. transparency, policies, knowledge...). This paper examines the relationships between particular criteria and other known country indicators (macroeconomic, educational, integrity, corruption). The goal of the paper is to examine whether the AIMM as a whole (or particular AIMM criteria) are related with other indicators – macroeconomic, educational and geopolitical. The research is based on previous promising results showing that the overall AIMM score is in positive correlation with GDP, Corruption Perception Index, and in negative correlation with unemployment.

Keywords: academic integrity, brain gain, productivity

1. Introduction

There are various metrics on integrity in given country, as well as various macroeconomic indicators. Some studies examined the relationship between these two groups of indicators. One of the most taken integrity indicator is Transparency International Corruption Perceptions Index (Transparency International, 2013a and 2013b). This index was compared with GDP by many researchers, e.g. Mauro (1996), Leite and Weidmann (1999) and Tenzi and Davoodi (2000). All of them found negative correlation between the level of corruption and GDP per capita, which means that corruption negatively influences national economies.

Other research proved that honesty is contagious (Innes and Mitra, 2013), which means that people tend to behave more honestly in the environment of overall integrity. Finally, Harding et al. (2004) and Lawson (2004) showed the relationship between

honesty during educational process and honesty in later employment. These findings were the base for Foltýnek and Surovec (2015), who demonstrated the relationship between Academic Integrity Maturity Model (AIMM) (see below) and several macroeconomic aggregates (GDP and unemployment) and showed that AIMM is in correlation with Transparency International Corruption Perceptions Index.

This research is based on previous paper (Foltýnek and Surovec, 2015) and brings new findings. As the concept of AIMM and method of its calculation is not a common knowledge, authors consider appropriate to repeat the description of AIMM (incl. Table 1 and Figure 1). Therefore, this part is the same as in (Foltýnek and Surovec, 2015).

The goal of this paper is to examine the correlation between AIMM overall score and its specific components with other EU country indicators. We focused namely on macroeconomic, educational, geographical and geopolitical indicators: Brain gain, productivity, number of patent applications, education expenditures, PISA assessment results and geographical and geopolitical circumstances (i.e. affiliation with former Soviet Union area of influence).

2. Methodology and Data

2.1. Academic Integrity Maturity Model

Academic Integrity Maturity Model (AIMM) was designed as a part of the project “Impact of Policies for Plagiarism in Higher Education across Europe” as a universal measure for quantifying and comparing the maturity of processes and systems regarding academic integrity for particular country (Glendinning et al, 2013). The development of AIMM was inspired by Carnegie Mellon’s Capability Maturity Model (Paulk et al, 1993).

AIMM consists of nine criteria:

- Transparency in academic integrity and quality assurance;
- Fair, effective and consistent policies for handling plagiarism and academic dishonesty;
- Standard range of standard sanctions for plagiarism and academic dishonesty;
- Use of digital tools and language repositories;
- Preventative strategies and measures;
- Communication about policies and procedures;
- Knowledge and understanding about academic integrity;
- Training provision for students and teachers;
- Research and innovation in academic integrity.

Values for particular criteria were counted from appropriate answers in surveys, focus groups and structured interviews using weighted average, as well as by an expert assessment. The result for each criterion was a value from 0 (lowest maturity) to 4 (highest maturity). Overall level of integrity of each country was counted as a sum of all nine criteria. Details about methodology, questions used for particular criteria and other aspects of AIMM can be found in IPPHEAE final project report (Glendinning et al, 2013). The most important fact is that the base for the data was a survey conducted in all EU countries with more than 5000 responses from students, teachers and senior managers in higher education institutions. Counted values of maturity can be seen in Table I and are visualized in Figure 1. Authors are aware of the fact that AIMM has not been

rigorously tested yet. However, AIMM scores are based on multiple questionnaire items and expert assessments, so possible mistakes affect the overall score to a small extent. To ensure reliability of the data, we looked also to the number of responses the AIMM score was based on. There were 5 countries with less than 20 responses causing anomalies: Luxembourg, Belgium, Italy, Denmark, and Netherlands. Therefore we excluded these countries from the statistics.

Table 1: AIMM scores for EU countries

	Transparency	Strategies	Sanctions	Software	Prevention	Communication	Knowledge	Training	Research	AIMM Total
Austria	2.23	1.59	1.26	1.85	2.00	2.21	2.63	3.02	3.00	19.79
Bulgaria	0.45	1.30	1.30	1.63	0.50	1.19	2.09	1.46	0.00	9.91
Cyprus	1.02	1.91	1.96	1.74	1.90	2.10	2.17	1.83	2.00	16.63
Czech Rep.	1.36	1.79	1.73	1.67	1.00	2.14	1.92	1.53	2.00	15.13
Estonia	1.65	1.87	2.05	0.98	1.00	2.20	2.13	1.93	0.00	13.81
Finland	1.25	1.64	1.67	2.03	1.00	2.31	2.45	2.39	1.00	15.74
France	0.50	1.09	1.23	1.27	0.50	1.36	1.92	1.83	1.00	10.69
Germany	0.59	1.34	1.23	1.45	1.50	1.57	1.92	1.74	1.00	12.33
Greece	1.00	2.17	2.45	0.42	0.00	1.98	2.83	2.94	0.00	13.79
Hungary	0.79	1.43	1.69	0.95	0.50	1.93	1.45	1.63	1.00	11.38
Ireland	1.82	1.87	2.09	2.47	1.25	2.57	2.55	2.33	2.00	18.94
Lithuania	0.66	1.68	1.48	1.18	1.00	1.82	2.27	1.44	2.00	13.53
Latvia	1.43	1.45	1.47	1.29	1.00	1.82	2.18	1.90	0.00	12.56
Malta	1.60	1.88	2.12	2.73	2.00	2.60	2.78	2.15	1.00	18.85
Poland	1.39	1.33	1.33	1.14	1.00	1.55	1.87	1.38	2.00	12.98
Portugal	1.31	1.52	1.15	0.82	1.00	1.53	2.00	1.47	2.00	12.79
Romania	0.92	1.71	1.67	0.72	1.25	1.52	1.59	1.75	0.00	11.13
Slovakia	1.74	1.88	1.91	2.18	1.50	2.19	2.03	1.97	2.00	17.39
Slovenia	1.00	1.83	1.82	1.59	1.00	1.92	2.54	1.84	1.00	14.53
Spain	0.13	1.05	0.86	1.35	1.00	1.55	1.93	1.97	1.00	10.85
Sweden	1.78	2.20	1.82	2.39	2.00	2.52	2.62	1.89	2.00	19.22
UK	2.12	2.45	2.57	2.82	2.60	2.76	2.63	2.55	3.00	23.49

2.2. Brain Gain

European Commission maintains statistics on mobility of qualified professionals between EU countries. The table in (European Commission, 2014) shows for each country number of decisions taken on professionals who obtain professional qualifications in one country and apply for recognition in another country to practice there on a permanent basis.

We took the difference between number of professionals moving TO particular country and number of professionals moving FROM particular country. Positive values mean “brain gain”, negative ones “brain drain”. The values for examined countries are listed in Table 2 and show all “brain” mobility from 1997 to 2014.

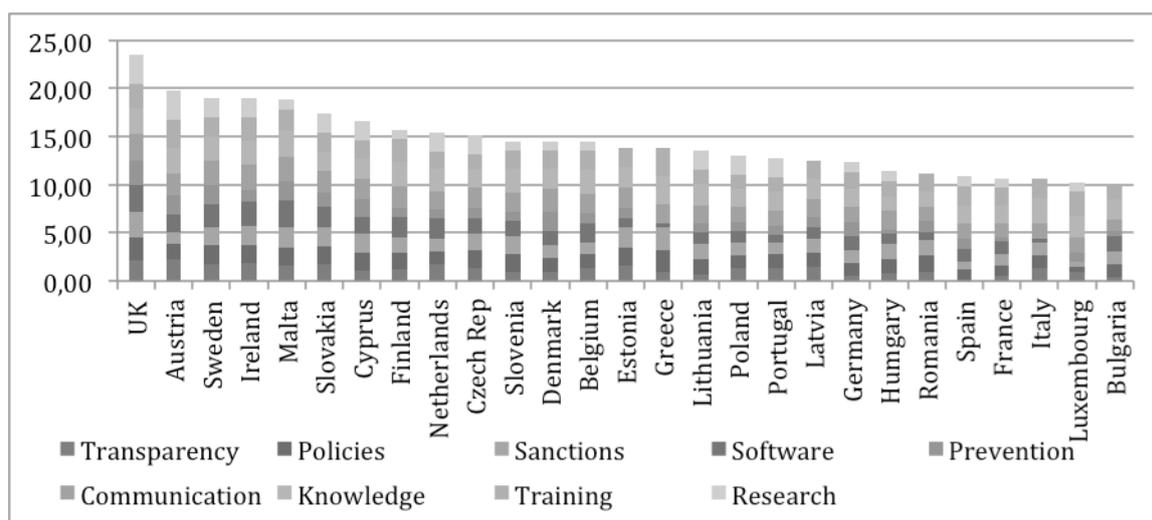


Figure 1: AIMM scores for EU countries

2.3. Economic indicators

GDP growth: We took the data from Eurostat (2015a) and calculated total GDP growth from 2003 to 2013. Table 2 shows by how many per cent the GDP grown in this period according to the year 2002.

Productivity: Productivity of labour is expressed as GDP per hour worked. This indicator is intended to give a picture of the productivity of national economies expressed in relation to the European Union average. If the index of a country is higher than 100, this country level of GDP per hour worked is higher than the EU average and vice versa. Basic figures are expressed in PPS, i.e. a common currency that eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries. Expressing productivity per hour worked eliminates differences in the full-time/part-time composition of the workforce (Eurostat, 2015b).

Eurozone membership: This is binary indicator. We counted with 1 if particular country was member of Eurozone in 2014, 0 if not (see values in Table 2).

2.4. Educational indicators

Education expenditures: We took data from CIA world fact book (CIA, 2015) comparing countries according to the per cent of GDP going to education.

PISA results: OECD assesses countries according to the students' abilities in reading, maths and sciences. Country assessment was taken from the 2012 data (OECD, 2014). Malta did not participate on this assessment, so older data from 2009 (Ministry of education and employment, 2013) were taken.

2.5. Number of patent applications

The total European patent applications refer to requests for protection of an invention directed either directly to the European Patent Office (EPO) or filed under the Patent Cooperation Treaty and designating the EPO (Euro-PCT), regardless of whether they are granted or not. The data shows the total number of applications per country. If one application has more than one inventor, the application is divided equally among all of

them and subsequently among their countries of residence, thus avoiding double counting.

2.6. Geographical and geopolitical indicators

We took the latitude and longitude of each country's capital. Data are listed in Table 2.

The last indicator is the geopolitical one. We considered the fact if particular country was in the area of influence of the former Soviet Union. These countries have value 1 in appropriate column of Table 2; other countries have value 0. There are two countries with non-integer value: Germany and Slovenia. Germany has 0.25 as approx. 25% of today's Germany was Eastern Germany belonging to the USSR influence, whereas the rest (75%) was not. Slovenia, as a part of former Yugoslavia, has 0.5, as Yugoslavia was partly under the Soviet influence.

2.7. Methods

For examination of relationships we took Pearson's correlation coefficient implemented in function CORREL in MS Excel (Microsoft, 2014).

3. Results

Data described in chapter 2 are summarized in Table 2. Table 2 also shows the correlations of the indicators with AIMM (last row).

Table 2: Compared country indicators

Country	Brain gain	GDP growth	Productivity	Euro	Educ. exp.	PISA	Patents per mil. people	Latitude (N)	Longitude (E)	USSR infl.
Austria	13730	17.4	115.10	1	5.90	150051	214.17	48.20	16.37	0
Bulgaria	-7565	42.2	43.20	0	4.10	132189	2.53	42.75	23.33	1
Cyprus	22242	16.5	81.60	1	7.30	132700	7.87	35.17	33.42	0
Czech rep.	1439	31.1	66.60	0	4.20	150067	17.92	50.08	14.37	1
Estonia	-3714	42.4	61.40	1	5.70	157821	32.13	59.37	24.80	1
Finland	1715	13.3	105.40	1	6.80	158789	269.61	60.25	25.05	0
France	-893	12.5	128.70	1	5.90	149953	125.77	48.83	2.33	0
Germany	2366	12.1	126.40	1	5.10	154523	282.17	52.50	13.42	0.25
Greece	-19269	-8.9	74.70	1	4.10	139676	4.72	37.97	23.77	0
Hungary	-9948	14.7	61.50	0	4.90	146050	19.81	47.48	19.08	1
Ireland	8431	17.6	122.40	1	6.40	154692	65.52	53.35	-6.25	0
Lithuania	-3070	20.6	66.40	0	5.40	145173	6.09	54.63	25.32	1
Latvia	-1215	47.7	56.90	1	5.00	148217	7.74	56.88	24.13	1
Malta	-706	26.6	66.90	1	6.90	136600	8.38	35.90	14.52	0
Poland	-32760	53.9	59.90	0	5.20	156198	12.09	52.22	21.00	1
Portugal	-6124	-1.8	65.30	1	5.60	146383	7.01	38.70	-9.17	0
Romania	-27879	44.8	45.10	0	4.20	132092	1.78	44.45	26.17	1
Slovakia	-11907	56.7	76.50	1	4.20	141548	9.58	48.17	17.12	1
Slovenia	-422	17.9	86.00	1	5.70	149641	41.61	46.07	14.55	0.5
Spain	-15635	11.9	109.50	1	5.00	146895	33.12	40.42	3.75	0
Sweden	7831	23.1	116.80	0	7.00	144672	288.67	59.33	18.05	0
UK	64965	17.5	97.60	0	6.20	150800	79.59	51.60	-0.08	0
Correlation with AIMM	0.71	-0.02	0.32	0.00	0.54	0.16	-0.09	0.23	-0.10	-0.33

As we can see from the last row of Table 2, some macroeconomic or educational indicators are in correlation with overall AIMM score. The highest correlation can be found with Brain gain (0.71). The value is near the lower boundary of strong positive correlation. The visualization of the relationship between AIMM and Brain gain is in Figure 2.

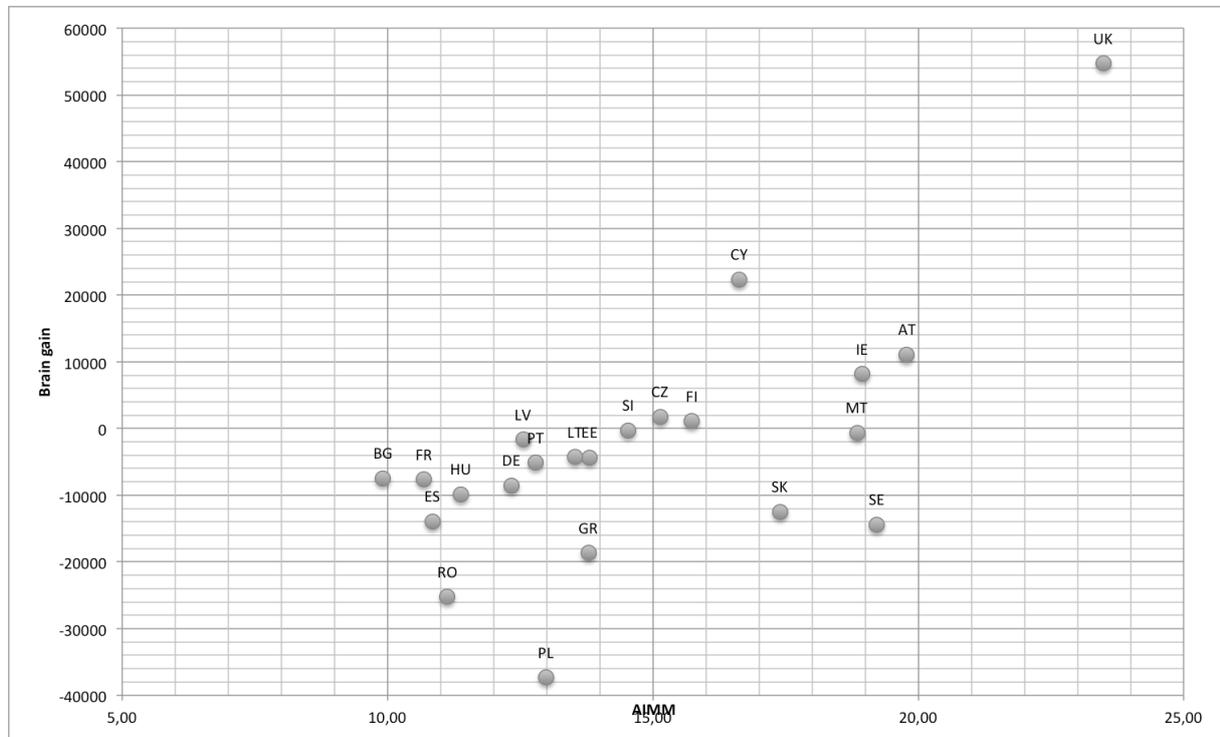


Figure 2: Relationship between AIMM and Brain gain

The second highest correlation of AIMM is with Education expenditures (0.54). The value indicates moderate positive correlation, which is visualized in Figure 3.

Third highest correlation is between AIMM and USSR influence (-0.33). We can see that there is moderate negative correlation between the Soviet influence and academic integrity maturity level. Visualization of this relationship can be found in map in Figure 4. This figure shows that bigger AIMM total score is in relatively small countries without former soviet influence.

The last indicator above the level of moderate correlation is Productivity (0.32). We can conclude that academic integrity is in moderate correlation with labour productivity.

The other values show no correlation. Specifically, there is no correlation between the academic integrity maturity level and GDP growth or membership to Eurozone, there is no correlation between AIMM and PISA results and there is no correlation between AIMM and number of patents per million people. There is no correlation between AIMM and geographical position of the country either.

If we look at particular AIMM criteria, we can see several partial correlations:

There is moderate negative correlation between the criteria Policies, Sanctions and Communication, and the geographical indicators Population and Area. Therefore, bigger countries have problems with agreement on policies and sanction and with their communication.

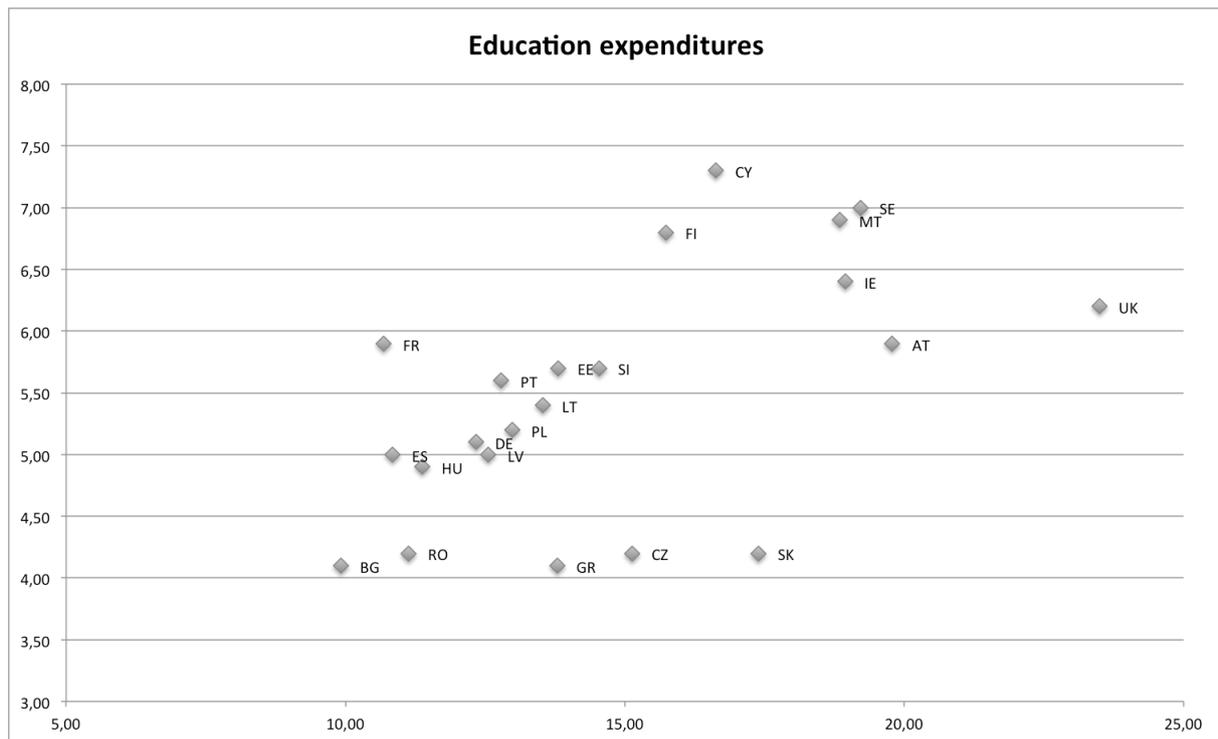


Figure 3: Relationship between AIMM and Education expenditures

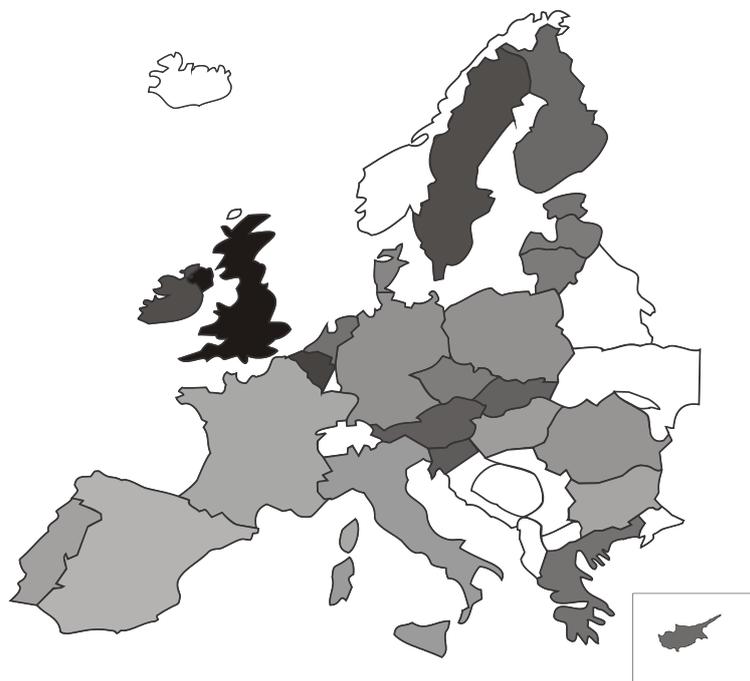


Figure 4: Visualization of AIMM total score (countries not included in IPPHEAE survey are white coloured)

The number of patents is in correlation in partial AIMM criterion Software, which means that countries, which use digital tools and repositories to plagiarism detection, apply for more patents. However, this correlation is just above the lower boundary of moderate correlation (0.33).

The partial AIMM criterion Transparency is in moderate positive correlation with latitude (0.46), i.e. there is more transparency in northern countries and less transparency in southern countries. Also, this criterion is in moderate positive correlation with PISA assessments (0.35).

4. Discussion and Conclusions

Let us think about described correlations. Of course, correlation does not mean causality, however, some of these correlations can have natural (causal) explanations.

Authors of this paper do not see any direct influence between AIMM and Brain gain. However, the influence can be indirect: Academic integrity promotes integrity in business, which makes companies in particular country more attractive for professionals. Therefore, promoting academic integrity gain brains in long-term period.

Authors are also convinced that education expenditure helps to build environment of integrity in education. More financial resources allow higher education institutions to employ plagiarism detection software tools, pay academic integrity officers and/or committees, decrease number of students per teacher, etc.

The correlation between AIMM and productivity can be also explained naturally. If people trust each other, they can spend fewer resources on checking, double-checking and supervising if people are doing their job properly. The absence of trust costs lots of money. Honest society can avoid these costs.

The Soviet influence to academic integrity is also quite obvious. Communist regime destroyed honesty of whole generations and even after 25 years the societies are still affected.

The absence of correlation between AIMM and Euro is not surprising. There are countries with high AIMM scores (UK, Sweden) with their national currencies. The reasons for adopting Euro are more political than rational and are not related to academic integrity.

Although AIMM is related to GDP per capita (Foltýnek and Surovec, 2015), there is no relationship between AIMM and GDP growth. It is probably because of countries with high GDP have smaller potential for growth, whereas countries with lower GDP are trying to equalize with these countries.

Absence of correlation between AIMM and PISA assessment shows that integrity is not necessarily related to direct educational outcomes. Even the environment of lower integrity allows students to learn.

Also, there is no conjunction that promoting academic integrity would help to patent submissions. However, innovative countries submitting more patents (per capita) tend to use software tools and repositories to make educational process more fair and transparent.

Our results also support commonly known conviction that Nordic countries are more transparent. Of course that transparency is not caused by latitude, it is rather the attitude to public administration.

Based on previous findings, authors of this paper are convinced that building environment of academic integrity makes sense. It definitely helps national economy; it helps to attract high-qualified professionals and increases productivity. Also, the education expenditure is important prerequisite for this, but not the only one.

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Recurrent tax on immovable property in tax systems of the EU countries

Lucie Formanová¹, Břetislav Andrlík² and Petra Ptáčková Mísařová³

¹*Department Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, email: xformano@pef.mendelu.cz*

²*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: bretislav.andrlik@mendelu.cz*

³*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: petra.misarova@mendelu.cz*

Abstract

This paper deals with the issue of recurrent tax on immovable property and its significance in the tax systems of the EU Member States. The recurrent tax on immovable property is classified as a property tax, also according to the international methodology of the classification of taxes. This tax is imposed on the owners (in some cases on the lessee or user) of the immovable property in the various tax jurisdictions and belongs to the taxes that the taxpayer cannot avoid and from this perspective it represents a stable source of income for the public budgets of the modern market economies.

From that point of view, the analysed tax is a significant tax in tax system of Member States of the European Union. In detail we will deal with the system of application of analysed tax in the EU Member States, moreover we will focus on fundamental differences in determination of the tax base.

On the basis of the results of our research, we are able to make a recommendation for policymakers in the Czech Republic. We encourage them to change the determination of tax base which involves transition from specific tax base to ad valorem tax base. Within the paper there is discussed a positive significance of ad valorem tax base, which is applied in majority of tax system of the European Union countries.

Keywords: tax system, property tax, recurrent tax on immovable property, tax base

1. Introduction

The paper deals with the issue of recurrent tax on immovable property which belongs according to OECD tax classification to group 4000, specifically in the subgroup 4100. Due to immovable nature of recurrent tax on immovable property, there is no any possibility how to avoid taxes. Simply the tax payers can not shift the tax subject to another EU tax jurisdiction to eliminate their tax liability. Each EU country has a specific tax legislation, which is set on the national level. In many cases it is influenced mainly by the traditions or practices of the individual Member countries. The analysed tax belongs to the property taxes whose existence is often discussed by economists, politicians, but also by citizens (tax payers).

From the theoretical point of view, there are various arguments for the existence of analysed tax in individual tax systems of the EU. Musgraevová and Musgrave (1994) say that the main reasons for property taxation are derived from the principle of utility, respectively ability to tax payment. Taxation according to the principle of utility (benefit) can be understood as a payment that flows from citizens to public budgets from which public goods and services (e.g. infrastructure, police protection, etc.) are subsequently reimbursed. It is important to realize that these goods and services can significantly increase the value of immovable property of the taxpayers, which may be one of the reasons why recurrent tax on immovable property is applied in the majority of countries of the European Union.

Moreover Kubátová (2010), Andrlík (2010), Jackson and Brown (2003) state that the imposition of recurrent tax on immovable property can contribute to a more rational treatment with immovable property. Furthermore, from the historic point of view the real estate represents a significant and relatively stable part of possessions of inhabitants. As a result of that, the tax collection of recurrent tax on immovable property represents a stable source for public budgets. It is also a tax which is minimally sensitive to the economic development.

Controversally, the analyzed tax is among its tax payers considered as unfair and therefore it is very unpopular. Recurrent tax on immovable property is considered as a tax which causes another (sometimes multiple) taxation and that once properly taxed sources of income already made as income tax. Among taxpayers it is also considered as a punishment for their success. Kubátová (2010) adds that the critique is related to all property taxes. Opponents of the tax argue that it is not moral, under the principle of justice, to punish those who are saving or their children that indirectly participated in the accumulated assets. Prabhakar (2008) points out that the unpopularity or aversion is given mainly to the understanding of property taxes as double taxation of the same object. Generally, people feel that they have already paid tax on the income during their active working life and the property has been created by the accumulation of the taxed resources and the existence of property tax is then double taxation.

Široký (2008) adds the list of the characteristics with the fact that it is a tax, which can be very significant in terms of fiscal decentralization, through which the authority in the field of the influencing the final tax liability can be transferred to the local governments on the lower position. Particularly the given units may become the sole beneficiaries of tax collection, as an example can be the tax system of the Czech Republic.

2. Methodology and Data

The partial aim of the paper is to analyse, describe and subsequently evaluate the application of recurrent tax on immovable property in tax systems of the European Union Member States. Furthermore, the objective of the paper is to make a detail analysis of application analysed tax on the territory of the Czech Republic (set by the Act no. 338/1992 Coll.) focusing on the determination of tax base. Final part of the paper deals with comparison of specific and ad valorem tax base. On the basis of achieved results, we will make a final recommendation for Czech policymakers in field of determination of tax base.

To fulfill all above mentioned objectives, it is necessary to study a number of professional resources, particularly theoretical publications about this topic including overview of application of recurrent tax on immovable property in individual EU Member States. A detailed list of expert sources is given in the bibliography of this paper.

Processing of the paper is based primarily on the method of analysis as the approach based on the decomposition of the whole to the elementary parts.

Source data was obtained mainly from the official statistics processed in the field of the European Union or the OECD.

3. The application of recurrent tax on immovable property in the EU Member States

3.1. Recurrent tax on immovable property in Czech tax system

Recurrent tax on immovable property is in Czech tax system known as immovable property tax, which is set by the Act no. 338/1992 Coll., as amended. It is important to mention that the analysed tax is only tax on the territory of the Czech Republic which according to Act no. 243/2000 Coll., on budgetary allocation of taxes, fully flows to municipal budgets (in other words to budgets where the tax object is situated).

Contemporary tax legislation of analysed tax divides the tax object into 2 categories. First one is a tax levied on land situated on the territory of the Czech Republic, secondly tax levied on buildings and units. Tax on buildings and units is levied on all taxable buildings (building according to Cadaster Act or engineering construction houses defined by Act no. 338/2012 Coll.), further on units which includes flats and non-residential space also located on the territory of the Czech Republic. The tax payers of recurrent tax on immovable property are owners, in some cases users or lessee of tax object. To determine final tax liability it is necessary to determine the tax base. In the Czech Republic it is preferred specific tax base to ad valorem. That fact is often the object of critique. The specific tax base is derived from area in square metre of tax object. This way of determination of tax base is used for building land, built-up areas, courtyard and other land. The same methodical procedure is used for a tax on buildings and units; the tax base is calculated on the basis of area in square metre of tax object.

The elements of ad valorem tax base are used only for lands such as arable land, vineyards, gardens, orchards and grassland. In these cases the tax base is calculated by multiplication of the actual area of the land in square metre by the average price per one square metre set by appropriate decree.

On the basis on determination of tax base, there are 2 possible types of tax rates. If the tax base is specific, it is used a tax rate in monetary units. In case of ad valorem tax base, tax rate is percentage.

In the field of recurrent tax on immovable property on the territory of the Czech Republic, there are also 2 correction tools. The first one is called as a *municipal coefficient* (ranging from 1% to 5%), it is determined according to the size of municipality. It is used for calculation of a final tax rate. The second correction tool (coefficient) is called as a *local coefficient*. It was implemented to Czech tax legislation in 2009 and it is regulated in para 12 of Act no. 338/1992 Coll.

3.2. Recurrent tax on immovable property in the other EU Member States

As it was mentioned in the introduction of this paper, recurrent tax on immovable property is a tax which belongs to property taxes (group 4000). Within this paper, we will focus on the subgroup 4100, namely on recurrent tax on immovable property. As Andrlík and Formanová (2014) state the analysed tax is a part of tax system in total 26 out of the 28 EU Member States. The tax is not applied only in Belgium and Malta. Since the European Union is the community uniting the countries from different parts of Europe, so also the regimes of application of recurrent tax on immovable property are very diverse. For that reason, the following part of paper will be focused on a description of application of analysed tax. In a detail, we will concentrate especially on possible ways how to determine tax base. Subsequently, we will compare it with the tax system applied on the territory of the Czech Republic and make a recommendation for Czech tax policymakers.

If we begin with the tax regime of recurrent tax of immovable property which is the most similar to Czech tax system, we will focus on the tax system of Slovak Republic. The tax object is immovable property situated on the territory of Slovak Republic. The difference can be seen in detailed determination of tax object. In Slovak tax system, the tax object is divided into 3 categories (tax on land, tax on buildings and tax on flats) whereas in the Czech Republic there are only 2 categories.

In other Member States, the regimes of recurrent tax of immovable property are different from that which is applied on the territory of the Czech Republic, mainly in the area of determination of tax base. The tax base of analysed tax is specific in the Czech Republic, Slovak Republic and Croatia. The same way of determination tax base is also used in Poland, Stucere and Mazure (2012a) state that the value of immovable property (all tax objects – land, buildings and residential buildings) on one square meter is updated every year there. Also the tax base in Croatia is assessed from area of immovable property in square metre.

From the results of our research, it is obvious that the tax base can be set by another two ways. Firstly, the tax base can be linked with the value of the immovable property, in other words it is ad valorem tax base. Secondly, in some countries (e.g. in Hungary) it is used the combination of specific and ad valorem tax base.

Related to the tax subject, the tax base is determined differently in Poland and Romania. If case of natural person, the tax base is derived from an area of land or building. If the immovable property is used for business purposes, the tax base is set in Poland on the basis of acquisition price, in Romania it is assessed from the value registered in the accounting books of the unit. In the remaining 22 Member States of the European Union, the tax base is set ad valorem. The ad valorem tax base is various, it can

be determined by market, annual rental, assessed or cadastral value of tax object. The specific tax regime of applying recurrent tax on immovable property is in Belgium. There is so called withholding tax on immovable property, which is collected from the annual paid rent arising from the immovable property located on the territory of Belgium. Belgian withholding tax on immovable property tax is calculated from the annual paid rent in 1975. Hence it is necessary to modify it by correction mechanism (coefficient).

In other Member States the tax base of recurrent tax on immovable property is assessed from market rental, market value of immovable property, assessed value or cadastral value. The tax base on the level of the market rental is applied in the UK. All property is classified into 8, or in Wales 9 valuation bands.

The market value as a tax base is applied in Ireland, Lithuania, the Netherlands, Slovenia or in Cyprus. The market value brings the elemental problem, notably the frequency of its updating. It is clear that the more often the value will be updated, the fairer the tax can be. On the other hand we should take into account the administration cost involved. The up-to-date value as a tax base of analysed tax is probably in Ireland. The reason is very simple, the analysed tax was implemented to Irish tax system in 2013; it replaced the local fees imposed on immovable property. On the other hand, there are some countries, where the tax base is determined from considerable historic values. An example can be Cyprus; there the tax base is a market value on 1st January 1980. In Germany the tax base is assessed from the value of immovable property in 1964. However, in the European Union there are countries applying the tax base updated every year. Among such countries belong the Netherlands, Bulgaria or Greece. The ad valorem tax base is used in various forms in Denmark, Estonia, Finland, France, Italy, Latvia, Luxembourg, Portugal, Austria, Spain or Sweden. The way of determination the ad valorem tax base is various, e.g. in Sweden it is set on the level of assessed value. It is calculated as 75% of market value of immovable property. The market value is then updated every 6 years. Another example could be Spain, the tax base is derived from on the national level established cadastral value. It is necessary to update this value, in case of Spain, it is updated every 8 years. The cadastral value is also used in Latvia where the tax base is determined on the state level. Its determination has specific rules, e.g. they consider factors as locality, intention of using and others (Stucere, Mazure, 2012b). In countries such as Finland or the Netherlands, the tax base is determined from the value of immovable property. The value is established by the valuation regulations. Radvan (2012) states that it is not important which way the tax base is determined, in all cases it is set on the national level, in other words on the state level. The only exception is the case of Belgium where the tax base is determined on the level of regions; or Estonia, France, Latvia or Slovenia. In those countries the tax base is set on national and municipal level.

The issue of determination of tax base should be followed by the description of tax rates. In many countries, the right to establish final tax rates belongs to municipal units. Moreover in some cases, the municipal units can determine it autonomously, or else they have to respect the state-defined limits. Radvan (2012) adds and on the basis of our investigation, it is obvious that the determination of tax rates is linked with the type of tax base. In case of specific tax base (e.g. Czech Republic, Slovak Republic and partly Poland) it is used a fixed tax rate, in remaining cases percentage tax rate. The percentage tax rate is not final because it can be modified by decision of municipal units. They cater for needs of municipal units or intention of using the immovable property. As a modification tools can be used, e.g. local surcharges (Belgium) or municipal coefficient

(Germany, Austria). All these correction mechanisms are used for determination the final tax rate. Similar correction mechanism it is possible to find on the territory of the Czech Republic (see above the description in chapter 3.1). In some Member States it is possible to find a progressive tax rate, it is derived from the value of taxable immovable property. This way is used in Ireland, Latvia or Greece. Czech recurrent tax on immovable property is a tax which fully flows to the budgets where the tax subject is situated (simply to municipal budgets). Analogous system of tax income allocation is applied in other Member States of the European Union. For instance in Latvia, the income of recurrent tax on immovable property is a full income of municipal units (Stucere, Mazure, 2012b). The same authors outline that the analysed tax plays an important role in municipal budgets, therefore its tax income creates a considerable proportion on total income of municipal units. Andrlík and Formanová (2014) analysed the budgetary allocation of recurrent tax on immovable property tax in individual Member States. They classify the countries where the tax income of analysed tax is divided into more budgetary levels. Among those countries belong Italy, Sweden, Lithuania, Belgium or Denmark. In remaining countries, recurrent tax is a full income of municipal budgets.

4. Discussion and Conclusions

The purpose of a final discussion is to summarize facts about application of recurrent tax of immovable property on the territory of the European Union and at the end of this paper to suggest a recommendation for policymakers in the Czech Republic. On the basis of description of application the analysed tax in other Member States of EU, it is obvious that it is necessary to make changes especially in field of tax base determination. The tax base of Czech recurrent tax on immovable property is specific one, moreover it is often considered as obsolete. Stucere and Mazure (2012a) realize the disadvantage of it, but on the other hand they state that the specific tax base is low administrative demanding, simple and understable. As a significant disadvantage can be considered the fact that specific tax base leads to disregarding of the real estate market development and uneven distribution of tax burden.

On the basis of our research, there are differences in application of recurrent tax on immovable property in individual EU Member States. The most significant difference is in the area of tax base determination. In the majority of countries of the European Union it is used the ad valorem tax base. Hence the recommendation for tax policymakers in the Czech Republic can be opened by that issue. The tax base is derived from assessed, market or cadastral value. As a main imperfection of assessment value can be considered the subject of a valuer. The valuer could be any authorized expert who works in that field. It could cause corrupt behaviour, and consequently final unfairness of recurrent tax on immovable property. Hence we cannot recommend this way of tax base determination. Also the market value can cause considerable difficulties; it can be caused by its volatility. Considering this fact we can conclude by following statement. To fulfill one of the basic tax principles (principle of fairness), it is necessary to update the market value. On the other hand, we should take into the account the fact of a considerable increased administration cost. This begs the elemental question: How often should the market value be set? Every year? Once a 5 year? These questions point out financial, time and administration demanding of market value as a tax base. On the basis of it, we also do not support this way of establishment of tax base. Another way

how to set the tax base could be a cadastral value. It is a value registered in the special evidence (Cadastral Retistry), therefore it can make the tax control easier and tax administration simpler.

On the basis of existence of ad valorem tax base in the tax system of the Czech Republic (real estate acquisition tax – Act no. 340/2013 Coll.), it is possible to determine the tax base of recurrent tax of immovable property from the method of calculation tax base of that property tax. The tax base of real estate acquisition tax is an acquisition value. It can be derived from a purchase price, a comparative tax value, the price determined by an expert opinion or a special price. The purchase price is used in case if it is equal or higher than comparative tax value, or if the Statutory provision of the Senate states it. As a purchase price, it is considered the payment for taking possession of immovable property. The comparative tax value is calculated as 75% of guide price. The guide price is determined from: a) prices of immovable properties in place where the tax object is situated or b) from assessment value that is calculated according to the Act of Evaluation. It is clear that each value becomes obsolete; therefore there should be in existence some correction mechanism. We suggest implementing to Czech tax legislation a correction coefficient. It should be determined by the state level every year. Such coefficient should be used for modification of a tax base. As a consequence of that, the final tax base will comply with the situation on a real estate market. For that reason, the tax administrator should still be responsible for the imposing the tax.

Referred to above suggested changes in tax base field, it is necessary to conclude with a recommendation for tax rates. The analyzed tax is important from point of view the municipal units, therefore it is essential to strengthen their autonomy and responsibility. The analysis of application of recurrent tax in countries of the European Union offers many ways how to set the final tax rates. In some countries the tax rates are solely set by municipal units, somewhere else they have to respect the limits of national level or there is a combination of both previous. The combined method can be explained as an interval range of tax rates determined by state level; subsequently it is a responsibility of municipal unit to set a final tax rate. We can look for an inspiration in Bulgaria or Latvia. In these countries the government (national level) sets minimum and maximum limit of tax rates. The final decision about tax rates is the responsibility of representatives of municipal units. If the taxpayers (citizens) think that the tax rates are unacceptably high and they do not correspond with the quality or quantity of provided public goods and services, they could express their opinion in local election. Furthermore, Norregaard (2013) emphasizes the importance of recurrent tax on immovable property in municipal budgets. If it is strengthened the position of property taxes, the municipalities will less dependent on transfers. His final statement supports the idea of increased use of property taxes in individual Member States of the European Union. Moreover, he claims that these steps can ease problems with taxes levied on mobile bases (revenue losses).

Thanks to the implementation of recommended suggestions, the tax administration could become easier. Moreover, it could be opened the discussion about abolition of current coefficients (municipal coefficient and local coefficient), which would become redundant in tax system of the Czech Republic. To conclude this paper it is necessary to realize that the tax administration of analysed tax should remain under tax authorities. They are able to collect taxes with lower administration cost, especially thanks to the economy of scale.

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Accounting and Tax Specifics of the Reinsurance of Commercial Insurance Companies

Jana Gláserová¹, Eva Vávrová²

¹Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: jana.glaserova@mendelu.cz

²Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: vavrova@mendelu.cz

Abstract

The relation between an insurance company and a reinsurance company is a contractual relation between two independent entities. A ceding of risk exists from the insurer to the reinsurer at precisely ahead defined contractual conditions. Commercial insurance companies can increase their insurance capacity through reinsurance. They share risks and also profit and income from business with the reinsuring insurers, respectively reinsurers. The accounting of reinsurance operations is very specific part of accounting in commercial insurance companies. The aim of the paper is to analyse accounting and tax specifics of the reinsurance in commercial insurance companies, in accordance with the relevant accounting legislation. The reinsurance operations affect the profit of a commercial insurance company, following the financial statements. The partial aim of the paper is to analyse the Czech accounting legislation for reinsurance operations in commercial insurance companies. Attention will be paid also to the method of accounting for reinsurance operations and their specific reporting in various parts of the financial statements of commercial insurance companies.

Keywords: commercial insurance company, insurance, reinsurance operations, financial statements, result of operations, accounting legislation

1. Introduction

Commercial insurance companies take over the risks mostly based on a contract (insurance policy), in special cases following the law, from individual economic subjects – citizens or companies. Covering large risks, the commercial insurance companies usually diversify risks among several subjects, which means that they reinsure a certain amount of risks. A relation arises between the commercial insurance company and a

reinsurer who takes over the part of the risk; this relation represents reinsurance, in other words cession. The part of the risk from insurance policy made by the primary insurer, i.e. insurance company, is transferred to another subject, i.e. the reinsurance company. The primary insurer pays reinsurance premium to the reinsurance company for the transfer of the part of the risk. If an insured event occurs, reinsured insurance company will pay only part of the entire insurance benefits from its assets, in accordance with the conditions of the reinsurance contract (Kol., 2004).

Cipra (1999) states, that a reinsurer does not have any contractual relationship to insured subjects. According to Cipra (2004), the task of reinsurance is not to remove or to reduce a damage occurred but to reduce the technical risk of an insurer by spreading the insured sum so that in case of insured event the payments of primary insurer and reinsurer do not affect the financial stability of the primary insurer. The reinsurance does not reduce the extent of damage but makes it more economically acceptable for insurance companies and their financial results more stable, according to Fabozzi, Neave, Zhou (2012). Therefore, it is known as a vertical distribution of risk while reinsuring.

The accounting of reinsurance is very specific part of accounting in commercial insurance companies. Other economic subjects neither banks do not account for reinsurance.

2. Methodology and Data

The aim of the paper is to determine the impact of reinsurance operations in commercial insurance companies, in accordance with the relevant accounting legislation, for certain significant items of the financial statements. These items include the items of assets of the balance sheet, such as deposits resulting from active reinsurance and receivables from reinsurance operations, and also items of liabilities of the balance sheet, which include deposits resulting from passive reinsurance and liabilities from reinsurance operations, and also various types of technical provisions which include participation of reinsurers. The balance sheet in total and hence the equity of insurance companies belongs to the affected values. Significant items in the profit and loss statement regarding the technical accounts for non-life and life insurance are also directly affected by the reinsurance operations. Particularly premiums ceded to reinsurers, commissions from reinsurers and reinsurers share on the relevant technical provisions are the affected items within these two essential parts of the profit and loss statement. The reinsurance operations affect the profit of a commercial insurance company following the financial statements. The paper will also analyse the impact of reinsurance operations on the income tax base. The prerequisite for fulfilling the objective of the paper is to analyse the Czech accounting legislation for reinsurance operations in commercial insurance companies. Attention will be devoted to the method of accounting for reinsurance operations and their specific reporting in various parts of the financial statements of commercial insurance companies.

The starting point for exploring the outlined problem is the analysis of legislation regulating the analysed issues in the Czech Republic, in particular Act No. 277/2009 Coll., on insurance, as well as Decree No. 502/2002 Coll., published by the Ministry of Finance of the Czech Republic, implementing certain regulations of Act No. 563/1991 Coll., on accounting, as amended, for accounting entities that are insurance companies, as amended by subsequent regulation, and Czech Accounting Standard No. 203

“Receivables arising from direct insurance operations and reinsurance operations”, Czech Accounting Standard No. 205 “Liabilities arising from direct insurance operations and reinsurance operations”, Czech Accounting Standard No. 204 “Gross premiums written” and Czech Accounting Standard No. 213 “Costs and revenues”.

On the one hand, those legal norms define generally the reinsurance operations, and on the other hand, they define the methods of accounting of receivables and liabilities, incomes and expenses from reinsurance operations always in relation to the definition of the related items of assets and liabilities in the balance sheet and in individual parts of the profit and loss statement. An important determination is the definition of the moment of realization of the accounting transaction regarding receivables and liabilities from reinsurance operations. Also, they define the minimum number of accounts for the commercial insurance companies to be set up in order to report the reinsurance transactions in their accounts, and they define accounting methods for the individual reinsurance operations including their reporting in the relevant parts of the financial statements.

In addition to the basic scientific methods which are the methods of description, comparison and analysis, there are methods used based on principles of logical analysis, particularly the method of deduction. The method of synthesis is used for the purpose of making proposals and own conclusions in the final part of the paper.

3. Results and Discussion

3.1. Analysis of the accounting legislation

The legal regulation of issues related to reinsurance operations in accounting entities that are commercial insurance companies is in the Czech Republic currently regulated with the following legislation: in the Act No. 277/2009 Coll., on insurance; in the Ministry of Finance Decree No. 502/2002 Coll., which implements certain regulations of the Act No. 563/1991 Coll., on accounting, as amended, for accounting entities that are insurance companies, as amended; and in the Czech Accounting Standards No. 203 “Receivables arising from direct insurance operations and reinsurance operations”; and No. 205 “Liabilities arising from direct insurance operations and reinsurance operations” including related Czech Accounting Standards.

Decree No. 502/2002 Coll., which was published by the Ministry of Finance of the Czech Republic, implementing certain provisions of Act No. 563/1991 Coll., on accounting, as amended, for accounting entities that are insurance companies, as amended, defines the content of specific terms within the reinsurance operations in the balance sheet. This is the definition of deposits during active and passive reinsurance, receivables and liabilities arising from reinsurance operations and share of reinsurers on the particular technical provisions. The Decree also deals with the items of profit and loss statement, which arises from the reinsurance operations. These are specific items of costs and of revenues that display duplicated part of the technical accounts for non-life and life insurance. Required items of the annex to the financial statements which are defined and also their determined classification is indicated, are part of the Decree. These items include important facts that are not mentioned in the balance sheet or profit and loss statement, as well as more detailed description of the important items of the balance sheet and profit and loss statement, further used methods of evaluation and methods of accounting.

Table 1: The Decree No. 502/2002 Coll., in relationship to reinsurance operations

Factual definition	Legal purpose	Financial statements
Deposits during active reinsurance	Factual definition of deposits during active reinsurance, impossibility of the mutual accounting with certain items, reported securities deponed by insurer	Balance sheet
Receivables from reinsurance operations	Definition of receivables from reinsurance operations	Balance sheet
Share of reinsurer on the individual technical provisions	Definition of the share of reinsurer reducing gross amount of the relevant technical provisions	Balance sheet
Deposits during passive reinsurance	Factual definition of deposits during passive reinsurance, impossibility of the mutual accounting with certain items, reported securities received as guarantee from primary insurer	Balance sheet
Liabilities arising from reinsurance operations	Definition of liabilities arising from reinsurance operations	Balance sheet
Reinsurance premiums from active reinsurance, share of insurance company on the total premiums in co-insurance	Defining these facts as part of the total gross premiums written	Profit and loss statement
Premiums ceded to reinsurers	Definition of all titles, which this item contains	Profit and loss statement
Change in the unearned premium provision, net, change in other technical provisions, net, bonuses and rebates, net	Defining the content of the change of the particular technical provisions and also all parts of the bonuses and rebates	Profit and loss statement
Costs on insurance benefits, net	Defining parts of the costs on the insurance benefits, a significant amount	Profit and loss statement, Annex
Other technical expenses, net	Defining parts of these specific costs, a significant amount	Profit and loss statement, Annex
Other technical revenues, net	Defining parts of these specific revenues	Profit and loss statement, Annex
Bonuses and rebates	Significant amount	Annex
Result from reinsurance	As the item shown in the Annex, classified into non-life and life insurance	Annex

Czech Accounting Standards No. 203 and No. 205 “Receivables/liabilities arising from direct insurance operations and reinsurance operations” define receivables and liabilities including their definition and the moment of their reporting in accounting that arise in commercial insurance companies while fulfilling their main business activity. They order to establish the minimum number of the relevant income and expense accounts to which the offset accounting of these receivables and liabilities is reflected. They also define requirements for reinsurance contracts that are essential for the subsequent recording in the accountancy. The same facts are actually solved in the Czech Accounting Standards in the case of co-insurance. In the conclusion, it orders to ensure the appropriate level of detailed accounting for deposits during passive reinsurance.

Czech Accounting Standards No. 204 “Gross premiums written” and No. 213 “Costs and revenues” are closely involved in defining the content and methods of accounting for costs and revenues in case of reinsurance contracts. Costs and revenues are reported in gross amount including the share of reinsurers. Subsequently there are separately recorded costs and revenues related to reinsurers in accordance with contracts. In the same manner, there is also accounted for bonuses and rebates, and for commissions from reinsurers and share of profit, to which is special attention given.

3.2. Principles of reinsurance in the commercial insurance companies and possible approaches

The reinsurance activity is based on reinsurance contracts. In the contract, the reinsurance company is obliged to provide benefit in contracted amount to insurance company when a random event specified in the contract occurs. The insurance company agrees in the contract to pay back to the reinsurance company a calculated part of premiums written from insurance contracts concluded by insurance company they are subject to reinsurance contracts. The insurance company keeps a part of the risk from concluded insurance contracts. If an insured event occurs, the reinsured insurance company will not pay the entire payment from its own sources, but will follow the reinsurance contract. It means that reinsured insurance company does not need to create such a high level of technical provisions which are necessary to create in commercial insurance companies to cover liabilities given by insurance contracts (see Zweifel, Eisen; 2012). The relation between an insurance company and a reinsurance company is a contractual relation between two independent entities. A ceding of risk exists from the insurer to the reinsurer at precisely ahead defined contractual conditions. Commercial insurance companies can increase their insurance capacity through reinsurance. They share risks and also profit and income from business with the reinsuring insurers, respectively reinsurers (Čejková, Valouch; 2005).

The reinsurance can be viewed from various perspectives. The primary point of view is a classification whether the insurer is provider or recipient of reinsurance. Based on this perspective, reinsurance is classified into active reinsurance when reinsurance is provided or passive reinsurance when risk is transferred to reinsurance. Kol. (2004) considers this point of view of reinsurance classification as point of view resulting from the accounting. Bokšová (2010) called this classification as reinsurance according to theme.

Another classification of reinsurance is based on the point whether reinsurance is linked to cash flows, i.e., factual, or not, i.e., formal. In the case of factual reinsurance, there is consequently a cash flow in accordance with the reinsurance contract between

an insurance company and a reinsurance company, in the case of formal reinsurance there is not. Only through accountant reporting of correct amount of costs and revenues the relation between two given subjects is reported.

Significant classification of reinsurance is based on forms of reinsurance on which basis it is possible to differentiate facultative reinsurance and obligatory reinsurance. For facultative reinsurance, it is typical that for each insured risk or for each insurance contract there is a particular reinsurance contract. In the case of obligatory reinsurance, the reinsurance contract is made for a group of the transactions with the same risk, i.e., that leads to reinsurance protection for one or more insurance branches. There exist possible combinations of these forms: for example facultative obligatory reinsurance, where the insurance company has the right to decide whether certain risks will be ceded to reinsurance or not and the reinsurer must accept these ceded risks. The second combination is obligatory facultative reinsurance, when the insurance company has an obligation to offer all insured risks to reinsurance and the reinsurance company has the right to choose risks that will be accepted for reinsuring.

Based on the point of view of the liability of the reinsurer in relation to the original insurance, proportional and non-proportional reinsurance can be distinguished, which is further classified more detailed. Huleš and Hornigová (1997) call this aspect as aspect of reinsurance calculations. In the case of proportional reinsurance, the transfer of risk between an insurance company and a reinsurance company is based on amount of premiums written, which is divided between the both subjects in accordance with reinsurance contract. There are three possible options – quota reinsurance, surplus reinsurance or their combination. In the case of quota reinsurance the share of risk is constant between the both companies, in the case of surplus reinsurance it is variable, determined for each contract separately. In the case of non-proportional reinsurance, the transfer of risk to the reinsurance company is based on the insured event, i.e., it depends on the actual amount of damage. Within the non-proportional reinsurance, it is possible to distinguish two basic types: XL = excess of loss reinsurance, when the reinsurance company has to pay for damages exceeding insurers limit; and SL = stop loss reinsurance which is reinsurance of excess of time of damage when the reinsurer pays for reinsured aggregate losses incurred in a given year.

3.3. Reporting of reinsurance in the accounting of commercial insurance companies

In principle, the insurance company ceases a part of risk into reinsurance. Provisions agreed in the reinsurance contract are essential for the subsequent recording in the accounting. The most often these represent a reinsurer's share on the insurance benefits and consequent share on relevant technical provisions, and a commission for insurer.

The starting point for the relation between insurance companies and reinsurance companies arising from reinsurance contracts is the amount of reinsurance premium. Reinsurance premium reflects the relation to reinsurers and it actually represents a part of gross premiums written which was ceded to reinsurers. In the accounting, it is recorded as a reduction in revenues and at the same time as a creation of liabilities to the reinsurer, so it will affect both balance sheet items and also income from insurance operations, so eventually also the amount of equity.

The ceding of gross premiums written is directly connected to the ceding of technical provisions, which is recorded in the accounting as a reduction in the relevant provision and at the same time as a reduction in the related costs. This fact will affect again both

balance sheet items and also the income from insurance operations of the insurance company.

An integral part of the relationship between the insurance company and the reinsurance company is the reinsurance commission which reinsurer provides to the insurance company. This commission is recorded in the accounting of an insurance company as receivable for reinsurer, and revenue. Therefore it affects both balance sheet items and the income from operations of the insurance company. The final consequence of the relation between the insurance and reinsurance company is the costs related to insurance benefits ceded to the reinsurance company which will be recorded as the creation of receivable for the reinsurer and at the same time as a reduction in costs of insurance company. This operation will affect again the balance sheet of the insurance company and also the income from insurance operations.

3.4. Reporting the reinsurance operations in the financial statements and their impact on significant items of financial statements

All relations between insurance company and the reinsurance company have ultimately a direct influence on the income from operations of the commercial insurance company (on the other hand, on the income from operations of the reinsurance company, also) in the amount that results from the concluded reinsurance contract between these subjects, and it is derived from the amount of risk that the insurance company transfers to reinsurance. That means that the impact of reinsurance operations can be seen in the balance sheet and also in the profit and loss statement in accordance with its mandatory division. Annex to the financial statements is also the compulsory part of the reporting of reinsurance operations.

Table 2: Affected items of the balance sheet as the result of reinsurance operations

Items of assets in the balance sheet	Items of liabilities in the balance sheet
Deposits during active reinsurance	Deposits during passive reinsurance
Receivables from reinsurance operations	Liabilities from reinsurance operations
	Share of reinsurer on technical provisions
	Income from operations in current accounting period

The Tab. 2 shows that both items of assets and items of liabilities in the balance sheet can be affected by reinsurance operations. As a consequence, the resulting impact of these operations is on the amount of the equity.

These given items of the above parts of the profit and loss statement of the commercial insurance companies are the items of costs and revenues arising from reinsurance operations. In the profit and loss statement, there is always listed the relevant item of costs and revenues in gross amount and consequently, there is given the share of reinsurers on this item. In the effect, all reinsurance operations are entering into income from operations of the insurance company.

Table 3: Affected items of the profit and loss statement as the result of reinsurance operations

Part I. Technical account for non-life insurance	Part II. Technical account for life insurance	Part III. Non-technical account
Premiums ceded to reinsurers	Premiums ceded to reinsurers	Result of technical account to non life insurance
Share of reinsurers in the change in unearned premium provision	Share of reinsurers in the change in unearned premium provision	Result of technical account to life insurance
Other technical revenues, net	Other technical revenues, net	Profit or loss for the accounting period
Share of reinsurers on the costs on insurance benefits	Share of reinsurers on the costs on insurance benefits	
Share of reinsurers in the change in provision for insurance payments	Share of reinsurers in the change in provision for insurance payments	
Change in other technical provisions, net	Change in other technical reserves, net	
Bonuses and rebates, net	Bonuses and rebates, net	
Commissions from reinsurers and share in profit	Commissions from reinsurers and share in profit	
Other technical costs, net		

3.5. Impacts of reinsurance operations on the income tax base

All income operations arising from reinsurance operations are entering into the income tax base in commercial insurance companies. This means that costs in the full amount reduce the income tax base and revenues are subject to taxation.

Specific cost/revenue items arising from reinsurance operations are premiums ceded to reinsurer, commission from reinsurer, ceded bonus to reinsurer and cease of respective shares of unearned premium provision, provision for bonuses and rebates and provision for insurance payments, including their subsequent use. It includes also share of reinsurers on profit of the primary insurer.

4. Conclusions

The relation between an insurance company and a reinsurance company is a contractual relation between two independent entities. A ceding of risk exists from the insurer to the reinsurer at precisely ahead defined contractual conditions. Commercial insurance companies can increase their insurance capacity through reinsurance. They share risks and also profit and income from business with the reinsuring insurers, respectively reinsurers. The accounting of reinsurance operations is very specific part of accounting in commercial insurance companies. Other economic subjects neither banks do not account for reinsurance. All relations between insurance company and the reinsurance company have ultimately direct influence on the income from operations of the commercial insurance company, and on the other hand, on the income from operations of the reinsurance company also, in the amount that results from the concluded

reinsurance contract between these subjects and it is derived from the amount of risk that the insurance company transfers to reinsurance. That means that the impact of reinsurance operations can be seen in the balance sheet and also in the profit and loss statement in accordance with its mandatory division. Annex to the financial statements is also the compulsory part of the reporting of reinsurance operations.

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Extreme Changes in Exchange Rates as the Reactions on New Information

Radim Gottwald¹

¹Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: radim.gottwald@mendelu.cz

Abstract

The paper is focused on extreme changes in exchange rates. Essentially, the validity of the theory of efficient markets is tested in the foreign exchange market by analysis of daily exchange rates of chosen currencies over the period from 2009 to 2013. USD, EUR, JPY, GBP, AUD and CHF are chosen according to their share in global foreign exchange market. The author presents the characteristics of currency pairs like their average daily change, total change, standard deviation of change and transaction costs. The changes in exchange rates in abnormal days are also analysed. Exchange rates change extremely in such days. Chosen currency appreciates or depreciates relative to the USD in these days, too. Insufficient and excessive responses to new information are examined. Then author analyses exchange rates in days following abnormal days. In order to find out the reasons of abnormal changes, the author analyses a number of political, economic and other information in abnormal days, total number of information and the number of abnormal days. Correlations between currency pairs are also presented. Findings how much various information influence various currencies can be helpful not only for investors and speculators in the foreign exchange market. They can find out, whether the changes are insufficient or excessive and how much are currency pairs correlated. Based on results, as for the appreciation, excessive responses were found out by all currency pairs except USD/GBP. On the other hand, as for the depreciation, insufficient responses were found out by all currency pairs except USD/AUD. The existence of semi-strong form efficiency in the foreign exchange market were not rejected, nor failed to reject, with respect to chosen currencies and chosen period, because of insufficient and excessive responses. Negative correlations were found out in the cases of currency pairs where currencies AUD or CHF were together with currencies EUR, JPY or GBP. In other cases, the correlations were positive. High positive correlation was found out between currencies EUR and GBP, while high negative correlation was found out between currencies EUR and CHF.

Keywords: behavioural finance, exchange rate, currency, currency pair, foreign exchange market, foreign currency, theory of efficient markets

1. Introduction

Many researchers have tested the validity of the theory of efficient markets. Essentially, they have tested the efficiency of chosen segments of the financial market. Regarding the theory of behavioural finance, the potential validity of the theory of efficient markets in foreign exchange market at the present time can be tested. The author focuses on this issue. Extreme changes in exchange rates together with information which cause these changes are analysed in this paper.

The aim of the paper is the assessment of extreme changes in exchange rates as responses to new information over the period from 2009 to 2013. Essentially, the validity of the theory of efficient markets is tested in the foreign exchange market. In general, foreign exchange market can be considered to be efficient because of three main reasons. The first reason is easy availability of information for all market participants, the second low initial costs and the third low transaction costs. The currencies are chosen according to their market share in the global foreign exchange market.

2. Literary Survey

Musilek (2002) describes the assumptions of the theory of efficient markets. He also characterizes strong-form, semi-strong-form and weak-form efficiency and he focuses on the principles of the theory of behavioural finance, which are used within technical and psychological analysis of securities. Rational and psychological aspects of decisions made by market participants are analysed within the theory. According to Sewell (2010), this theory could clarify insufficient and excessive responses of financial asset price to new information. Larson and Madura (2001) analyse foreign exchange market responses to new information. Insufficient responses are mostly found out in the case of currency pairs made up of the developed country domestic currency, while excessive responses are found out in the case of currency pairs made up of the emerging country domestic currency.

Nguyen (2000) measures foreign exchange market efficiency by using historical spot and forward exchange rates and interest rates for 6 OECD countries over the period 1982–1996. Based on results, forward discount is not strong predictor of the rate of currency depreciation. He also points out the model in which the fulfilment of uncovered and covered interest parities is unnecessary for foreign exchange market efficiency, even without transaction costs. According to this model, economic agents hold different expectations concerning political and exchange risks. Wickremasinghe (2004) tests semi-strong and weak form efficiency of the foreign exchange market in Sri Lanka using 6 bilateral exchange rates. Results show that the Sri Lankan foreign exchange market is not consistent with the semi-strong, but with the weak form of the efficient market hypothesis.

Fama (1991) points out important assumption of the strong-form efficiency of the market. In detail, there are no transaction and information costs. He considers this assumption to be only theoretical, so this assumption is not valid in the reality. Hartmann (1999) measures transaction costs and trading volumes in the foreign exchange market. He considers information costs of market making together with inventory holding costs and order processing costs to be sources of bid-ask spreads. Investors and speculators accept a certain level of risk when they invest in foreign currencies. The risk of investment in currencies is, as Kóbor and Székely (2004) point

out, volatile in time. This risk depends on many factors including speculative attacks on currencies.

3. Methodology

At first, the changes in exchange rates in all days are analysed. The characteristics of currency pairs like their average daily change, total change, standard deviation of change and transaction costs are presented. The percentage change in exchange rate in the day t is calculated as follows:

$$R_t = \frac{M_t - M_{t-1}}{M_{t-1}} \cdot 100, \quad (1)$$

whereas R_t is the percentage change in exchange rate in the day t , M_t is the exchange rate for a certain currency to USD at the end of the day t and M_{t-1} is the exchange rate for a certain currency to USD at the end of the day $t-1$. Average daily change in exchange rate in a certain period is calculated as the arithmetic mean of percentage changes in exchange rate. The overall change in exchange rate in a certain period is calculated as follows:

$$TR = \frac{M_2 - M_1}{M_1} \cdot 100, \quad (2)$$

whereas TR is the overall change in exchange rate, M_2 is the exchange rate for a certain currency to USD in the last day of the period and M_1 is the exchange rate for a certain currency to USD in the first day of the period. The standard deviation of the change in exchange rate in a certain period is calculated as follows:

$$SD_t = \sqrt{\frac{1}{N} \cdot \sum_{t=1}^N [R_t - A(R)]^2}, \quad (3)$$

whereas SD_t is the standard deviation of the change in exchange rate in N days, R_t is the percentage change in exchange rate in the day t and $A(R)$ is the average change in exchange rate in a certain period.

Then, the changes in exchange rates in abnormal days are analysed. The responses to new information are expressed as average daily changes in abnormal day and following day. The changes in exchange rates are analysed separately when chosen currency appreciates or depreciates relative to the USD. Thus, insufficient and excessive responses to new information in the foreign exchange market are examined individually for each currency pair. Abnormal days are such days when exchange rate changes abnormally. It is necessary to adapt sufficient number of observations. The change in exchange rates is considered to be abnormal, if absolute value of the percentage change in exchange rate in a certain day is higher than 1.50%. This limit is similar to limits in similar empirical studies.

The number of various information in abnormal days, total number of information and number of abnormal days are found out in order to find out the reasons of abnormal changes. Larson and Madura (2001) divide information into political, economic and other information. Similar division is used in this paper. Political information commonly relates to press conference held by eminent politicians, mostly the president, prime minister, finance minister or central bank governor. Economic information commonly

relates to change in main interest rates, inflation rate, retail sales, unemployment rate, gross domestic product or consumer confidence. Thus, the author analyses information about foreign exchange market related to such a currency of chosen currency pair, which is not USD. Correlations between currency pairs are also found out.

4. Results

4.1. The Choice of the Currencies

Only currencies with market share higher than 2.5% are used. The use of six currencies can be considered to be sufficient to reach the aim of the paper. These currencies are reported in Table 1.

Table 1: Currency Distribution of the Global Foreign Exchange Market Turnover in 2013

Currency	Share	Rank
USD	43.5%	1
EUR	16.7%	2
JPY	11.5%	3
GBP	5.9%	4
AUD	4.3%	5
CHF	2.6%	6

Source: Bank for International Settlements (2013) and own calculations

The dominant position of the USD is clear from Table 1. Presented currencies have significant share in global foreign exchange market turnover. All currency pairs used in this paper consist of the USD and one of the rest currencies in Table 1. The most of exchange rates are directly quoted. It involves quoting in fixed units of foreign currency against variable amounts of the domestic currency, which is the USD in this paper.

4.2. The Changes in Exchange Rates in All Days

Table 2 reports the characteristics of the currency pairs.

Table 2: The Characteristics of the Currency Pairs

Currency pair	Average daily change	Overall change	Standard deviation	Transaction costs
USD/EUR	-0.0013%	-1.1975%	0.3384%	1.20
USD/JPY	-0.0092%	-13.4252%	0.2801%	1.00
USD/GBP	0.0126%	14.1460%	0.3741%	1.20
USD/AUD	0.0222%	26.0624%	0.2960%	1.00
USD/CHF	0.0173%	20.0022%	0.2770%	1.20
Average	0.0089%	9.1176%	0.3124%	1.12

Source: FxPro (2015), The Federal Reserve System (2015) and own calculations

Negative overall change is only in the case of currency pairs USD/JPY and USD/EUR. Only currencies JPY and EUR depreciated relative to the USD, nevertheless EUR only a little. Currencies AUD and CHF greatly appreciated relative to the USD. Transaction costs related to trading foreign exchange are expressed in minimum guaranteed values in

pips. These “price interest points” measure the amounts of change in the exchange rate for a currency pair.

4.3. The Changes in Exchange Rates in Abnormal Days

Such changes in exchange rates, which can be considered to be abnormal are analysed for all currency pairs. The days when the chosen currency appreciated relative to the USD are analysed. Similarly, the cases of depreciation are analysed. The responses to new information in following days after abnormal days are expressed in average daily changes in exchange rates. Table 3 reports average daily changes in exchange rates in abnormal days.

Table 3: Average Daily Changes in Exchange Rates in Abnormal Days

Currency pair	Change in abnormal day (appreciation)	Following day	Change in abnormal day (depreciation)	Following day
USD/EUR	1.9886%	-0.3497%	-1.8386%	-0.2725%
USD/JPY	2.0784%	-0.2273%	-2.1141%	-0.0053%
USD/GBP	2.0682%	0.0397%	-2.1005%	-0.1681%
USD/AUD	2.0126%	-0.1336%	-2.0800%	0.1794%
USD/CHF	1.9543%	-0.1037%	-2.1959%	-0.1697%
Average	2.0204%	-0.1549%	-2.0658%	-0.0872%

Source: The Federal Reserve System (2015) and own calculations

The change is considered to be insufficient, if the rate increases in abnormal day and in following day or if it decreases in abnormal day and following day. The change is considered to be excessive in other cases. As for the appreciation, excessive responses are found out by all currency pairs except USD/GBP. As for the depreciation, insufficient responses are found out by all currency pairs except USD/AUD. Excessive response relates to absorption of all new information, in contrast to insufficient response. If the current asset prices take account of all information contained in past prices and all current information, which are publicly available, then semi-strong form efficiency exists in the foreign exchange market. If these prices do not take account of that, such a form efficiency does not exist there.

Based on found both excessive and insufficient responses, the existence of semi-strong form efficiency in the foreign exchange market cannot be rejected, nor failed to reject, with respect to chosen currencies and chosen period.

4.4. The Reasons of the Abnormal Changes in Exchange Rates

Various information are analysed in abnormal days. Table 4 reports the number of information in abnormal days, total number of information and the number of abnormal days.

Table 4: The Number of Information in Abnormal Days, Total Number of Information and the Number of Abnormal Days

Information	EUR	JPY	GBP	AUD	CHF
Policy	21	14	13	14	6
Interest rates	15	17	8	17	7
Inflation	17	9	13	17	7
Retail sales	9	1	5	11	2
Unemployment	11	2	2	6	1
GDP	5	1	0	5	4
Consumer confidence	4	3	1	6	0
Other	86	46	42	99	38
Total	168	93	84	175	65
Abnormal days	44	45	31	104	53

Source: The Federal Reserve System (2015) and own calculations

Political, economic and other information are analysed in abnormal days. The highest ratio of political information on total number of information (15.47%) is found out in the case of currency GBP, while the lowest (8.00%) is found out in the case of currency AUD. The highest number of information and abnormal days is found out in the case of currency AUD. The lowest number of information is found out in the case of currency CHF, while the lowest number of abnormal days is found out in the case of currency GBP. In one abnormal day we can get a share of 2.11 information, on average. 3.81 is the highest share in the case of currency EUR, while 1.23 is the lowest share in the case of currency CHF.

Information about interest rates, inflation, retail sales, unemployment, GDP and consumer confidence are ones of economic information, thus economic information can be considered to be more frequent reasons of abnormal changes than political information. Table 5 reports correlations between currency pairs calculated based on daily rates.

Table 5: Correlations between Currency Pairs

Currency pair	USD/EUR	USD/JPY	USD/GBP	USD/AUD	USD/CHF
USD/EUR	1.00	0.21	0.93	-0.44	-0.98
USD/JPY	0.21	1.00	0.40	-0.35	-0.15
USD/GBP	0.93	0.40	1.00	-0.36	-0.91
USD/AUD	-0.44	-0.35	-0.36	1.00	0.40
USD/CHF	-0.98	-0.15	-0.91	0.40	1.00

Source: Forex Correlation (2015) and own calculations

Negative correlations are found out in the cases of currency pairs where currencies AUD or CHF are together with currencies EUR, JPY or GBP. In other cases, the correlations are positive. High positive correlation is between currencies EUR and GBP, while high negative correlation is between currencies EUR and CHF.

5. Discussion

It is clear that when analysts assess a number of information in abnormal days according to various information, they should take account of the following relation. The higher is the total number of information (maximum value is 175 in the case of currency AUD), the more is the division of information objective. Similarly to the empirical studies written by other researchers, the author finds out in some cases the existence of insufficient and excessive responses to new information. The database of Forex Factory (2015) does not include all the information, which have impact on behaviour of investors and speculators in the foreign exchange market. For example, information about financial results announcements, which relate to great firms, are not there. The paper is helpful not only to investors and speculators in the foreign exchange market. Several findings are important for other market participants. These findings are, how much various information influence exchange rates, whether the changes in exchange rates are insufficient or excessive and how much the currencies are correlated among themselves.

Research in this current economic field can continue in several directions. Other currency pairs, other time period or other information division could be chosen. The abnormal change in exchange rates could be estimated in a different way. The exchange rates in several days after abnormal day that means not only in one following day, could be analysed. If abnormal changes in exchange rates are analysed not in daily frequency, but hourly frequency, the number of observations will be higher. It leads to higher objectivity of results.

6. Conclusions

The daily exchange rates of the currencies USD, EUR, JPY, GBP, AUD and CHF were analysed over the period from 2009 to 2013. The changes in exchange rates in all days were analysed. Average daily changes, total changes, standard deviations of changes and transaction costs were found out for each currency pair. Negative overall change was found out only in the cases of currency pairs USD/JPY and USD/EUR. The lowest standard deviation was found out in the case of currency pair USD/JPY. Based on the identification of abnormal days according to chosen criterion, insufficient and excessive responses to new information were found, separately when chosen currency appreciated or depreciated relative to the USD. As for the appreciation, excessive responses were found out by all currency pairs except USD/GBP. On the other hand, as for the depreciation, insufficient responses were found out by all currency pairs except USD/AUD. The existence of semi-strong form efficiency in the foreign exchange market were not rejected, nor failed to reject, with respect to chosen currencies and chosen period, because of insufficient and excessive responses. The number of political, economic and other information in abnormal days, total number of information and the number of abnormal days were also found out. The highest number of information and abnormal days were found out in the case of currency AUD. The lowest number of information was found out in the case of currency CHF, while the lowest number of abnormal days in the case of currency GBP. The highest ratio of political information on total number of information (15.47%) was found out in the case of currency GBP, while the lowest (8.00%) in the case of currency AUD. The correlation between the currency pairs were also presented. Negative correlations were found out in the cases of currency

pairs where currencies AUD or CHF were together with currencies EUR, JPY or GBP. In other cases, the correlations were positive. High positive correlation was found out between currencies EUR and GBP, while high negative correlation was found out between currencies EUR and CHF.

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Dynamics of relative efficiencies in fulfilling economic and environmental goals in the EU countries

Ladislava Issever Grochová¹ and Kateřina Myšková²

¹*Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: ladislava.grochova@mendelu.cz*

²*Department of Statistics and Operation Analysis, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: katerina.myskova@mendelu.cz*

Abstract

The increase in requirements on the fulfilment of needs or goals is connected to natural resources depletion and environmental pollution. After the period of maximization of economic indicators, minimization of the effects on environment has been added as a complementary goal recently listed among so-called “beyond GDP goals”. The paper studies the mismatch between economy and ecology from the perspective of optimization. In particular, we focus on the problem of producing maximum achievable product without excessive environmental pollution. The paper then aims at alternative evaluation of fulfilling both environmental and economic development goals. Using Data Envelopment Analysis we assess relative efficiencies of the EU countries taking their economic and ecological aspects into account finding that Denmark, Luxembourg, the Netherlands and Sweden lie on the frontier. Based on the results we also identify the areas in which relatively inefficient country should improve to reach the frontier.

Keywords: DEA, economic goals, environmental goals, EU countries, relative efficiency

1. Introduction

Despite of rapid improvements and innovations in production, the stress on economic performance is reflected in elevated natural resource depletion and emissions (UNEP 2011). The reduction of ecological footprint became a partial goal of degrowth concept aiming at revising production and consumption which enhances human and planet well-being (Schneider et al., 2010). Aiginger et al. (2013) then support the idea of the new path to development with environmental sustainability. Hence, besides economic issues,

reducing emissions or increasing the share of renewables and enhancing energy efficiency are regarded as priorities of nowadays economies.

Once the priorities are set one might be interested whether and how they are fulfilled. The goals can be evaluated either individually (usually using some benchmark) or they can be regarded as a set of goals and then to evaluate the whole set. An intuitive way how to practice the latter more complex approach is to use Data Envelopment Analysis (DEA) which has been originally designed for evaluation of relative efficiencies of decision making units. DEA can be easily applied also to our purpose as we aim to assess relative efficiencies in reaching economic goals with possibly minimum environmental burden. In particular, we follow the strand of research by Burja and Burja (2013), Bruni (2011), Issever Grochová et al. (2014), Santanaa et al. (2014) who focus on the efficiency of particular pillars of sustainable development. In this paper we, thus, present an alternative way of evaluating the fulfilment of both economic and environmental goals, in particular, we aim to assess relative efficiencies of the EU countries in achieving the goals in economic and environmental areas. Specifically, we are interested in the following research questions:

1. Which EU countries are efficient and which are inefficient in fulfilling the economic and environmental goals?
2. To what extend are the EU countries relatively efficient?
3. What are the problematic areas that prevent from efficiency?

The paper is structured as follows: the motivation, goals and research questions are presented in the introductory part, the second section describes the empirical set up, the third part reports and discusses our empirical results and the final section concludes.

2. Methodology and Data

In order to evaluate the EU countries relative efficiencies in economic and environmental dimensions we use DEA, in particular, the BCC model originally proposed by Banker, Charnes and Cooper (1984). Data envelopment models have been designed for evaluation of relative efficiencies of decision making units (DMUs), states in our case, in generating economic outputs.

We use economic and environmental data for the EU28 countries covering the maximum length of available data, i.e. the time span between 2000–2011. The data are obtained from the World Bank and Eurostat. Economic dimension is represented by typical macroeconomic indicators as GDP and unemployment (see Table 2). Environmental dimension is more determined by data availability and comprises available data on the state of environment as presented in Table 1.

A specificity of our research is the way how to treat environmental indicators within DEA models. The most frequent practice is regarding the environmental indicator as an input that should be minimized (Allen, 1999). In our case, this attitude can be used only for environmental variables that are supposed to be minimized, typically pollution or the use of non-renewables. However, the goal related to some environmental indicators is the opposite. For instance, the use of alternative or renewable resources should be improved. Consequently, these variables must be primarily multiplied by (-1) and then can be treated as classical inputs. Economic indicators are considered to be outputs of the optimization process. In particular, we use standard macroeconomic variables for which the desired process of maximization or minimization can be unambiguously

identified – economic output and unemployment. As generally the outputs in DEA are maximized, we first multiply unemployment by (-1) .

Table 1: Input indicators used in DEA (source World Bank)

Abbrev.	Variable	Unit	Correction
ER	electricity production from renewable sources	% of total energy use	-1
EA	alternative and nuclear energy	% of total energy use	-1
EF	fossil fuel energy	% of total energy use	
CO2D	adjusted savings carbon dioxide damage	% of GNI	

Table 2: Output indicators used in DEA (source Eurostat)

Abbrev.	Variable	Unit	Correction
U	total unemployment (aged 15–64)	%	-1
GDP	real GDP per capita	2005 EUR	

Within the DEA concept, a country with the efficiency score of 1 is considered relatively efficient in utilizing its resources to promote its economic development. Input/output slacks indicate the amount of each input/output which should be reduced/raised without changing the current level of economic/environmental performance so that a particular country will become efficient, i.e. move to the frontier.

3. Results and Discussion

The answer to first two research questions is reported in Table 3. Initially, we identify relatively efficient EU countries which are Denmark, Luxembourg, the Netherlands (with the exception in 2005 when less renewables were used and GDP dynamics was lower than in other efficient countries) and Sweden. The relative efficiency is also achieved by Finland in the first 7 years analysed. The successive drop is due a decrease in GDP per capita and low employment of renewables relative to other efficient countries. Rather random relative efficiencies can be found in the United Kingdom and Ireland in 2004 and 2005 as their performance improved relatively to inefficient countries. Gradual movements towards the efficiency which is finally reached in 2005, 2008–2011, are observed in Austria.

In contrast, the relative efficiency is never reached by France, Spain, Greece, Croatia, Italy, Latvia, Poland and Slovakia. Despite of that their performance is rather stable. Within this group of countries we can identify 3 subgroups: France which is inefficient, however, relatively closer to the frontier (the efficiency scores move around 0.8); the overall worst performers are Greece and Poland being able to achieve only one third of the efficiency of the top countries with problems in all areas, and the rest of inefficient countries: Croatia which lies on the boundary between the worst and the second worst performers, Italy, Latvia, Slovakia and Spain whose efficiency score ranges from 0.40–0.55. In general, we can claim that relative inefficiency goes hand in hand with the ratio of using alternative and renewable resources to the traditional ones.

Table3: Efficiency in the EU countries

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUT	0.79	0.81	0.72	0.81	0.93	1.00	0.98	0.91	1.00	1.00	1.00	1.00
BEL	0.46	0.47	0.55	0.48	0.49	0.48	0.46	0.46	0.48	0.52	0.51	0.61
BGR	0.48	0.46	0.53	0.49	0.47	0.46	0.46	0.42	0.56	0.67	0.47	0.46
CYP	0.42	0.49	0.74	0.77	1.00	0.76	0.77	0.74	0.76	0.67	0.56	0.37
CZE	0.39	0.38	0.43	0.43	0.42	0.40	0.40	0.54	0.78	0.63	0.58	0.58
DEU	0.46	0.49	0.55	0.49	0.50	0.48	0.45	0.44	0.45	0.53	0.61	0.67
DNK	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ESP	0.43	0.46	0.49	0.47	0.46	0.44	0.43	0.40	0.46	0.52	0.45	0.45
EST	0.39	0.39	0.43	0.41	0.39	0.38	0.57	0.61	0.50	0.38	0.39	0.39
FIN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.74	0.92	0.68	0.75	0.79
FRA	0.75	0.80	0.88	0.80	0.80	0.77	0.74	0.71	0.75	0.78	0.72	0.72
GBR	0.55	0.62	0.70	0.78	1.00	1.00	0.74	0.65	0.55	0.55	0.53	0.44
GRC	0.37	0.36	0.40	0.39	0.37	0.36	0.36	0.35	0.36	0.35	0.38	0.38
HRV	0.41	0.40	0.43	0.42	0.41	0.40	0.39	0.37	0.39	0.38	0.42	0.43
HUN	0.43	0.42	0.46	0.44	0.69	0.56	0.42	0.41	0.43	0.43	0.46	0.47
IRL	0.60	0.63	0.69	0.86	1.00	1.00	0.89	0.75	0.62	0.58	0.48	0.43
ITA	0.50	0.57	0.62	0.55	0.55	0.53	0.51	0.47	0.50	0.61	0.51	0.46
LTU	0.59	0.59	0.70	0.70	0.65	0.56	0.94	1.00	0.65	0.58	0.46	0.47
LUX	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
LVA	0.55	0.53	0.59	0.57	0.55	0.54	0.54	0.50	0.51	0.52	0.53	0.55
MLT	0.38	0.36	0.43	0.37	0.35	0.42	0.37	0.33	0.36	0.48	0.49	0.52
NLD	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00
POL	0.36	0.36	0.39	0.38	0.36	0.35	0.35	0.34	0.35	0.37	0.37	0.38
PRT	0.69	0.55	0.49	0.45	0.45	0.40	0.42	0.41	0.42	0.41	0.45	0.46
ROU	0.41	0.39	0.43	0.42	0.41	0.48	0.39	0.39	0.45	0.60	0.59	0.48
SVK	0.48	0.47	0.52	0.51	0.48	0.47	0.47	0.46	0.47	0.46	0.49	0.51
SVN	0.50	0.48	0.54	0.52	0.75	0.77	0.73	0.75	0.90	1.00	0.68	0.53
SWE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

More in detail, we can identify countries with a relatively stable efficiency score, countries with diminishing efficiencies, countries with a gradual correction of efficiencies, countries reaching a peak during the economic crisis period analysed and those reaching a bottom with a subsequent recovery.

The first group obviously includes the most efficient countries but also the systematic worst performers as Latvia, Poland and Greece in which almost no relative change can

be seen. The members of the second group of “worsening countries” are Estonia, Finland, Great Britain. The most remarkable drop in efficiency is in Ireland and Lithuania. Whereas Ireland experienced a sharp increase in unemployment from 4.4% to 14.9% in the period analysed and relatively slow improvement of environmental variables, Lithuania intensified the production based on fossil energy and reduced the use of renewables. In contrast, Austria, Belgium, the Czech Republic, Germany, Malta and Romania are countries with improving relative efficiencies. All these countries increased the employment of renewable and alternative resources.

A gradual improvement in relative efficiency followed by its deterioration is observed in Estonia, Hungary, Ireland, Lithuania, Slovenia and the United Kingdom. The turning point is in the economic crisis period which can be attributed right to worsened economic indicators. The peak in the United Kingdom and Ireland is a bit earlier, in the period of the first Eastern enlargement of the EU. The only country to reach a peak in the crisis period is Bulgaria. This can be explained with the speculation on a catching-up process in economic variables moving Bulgaria towards better performers. Actually, in contrast to other countries, steady but slow increase of real GDP per capita is visible. Furthermore, 20% unemployment in 2001 dropped to 5.7% in 2008. The last group is represented by Croatia, Hungary, Latvia, Portugal and Slovakia – small economies strongly hit by economic crisis.

Moreover, based on input/output slacks¹ we identify areas which each individual inefficient country should improve to reach the frontier. Countries that should improve domestic output maintaining the impact on environment are Bulgaria, Croatia, Estonia, Lithuania, Latvia, Poland, Portugal, Romania and Slovakia. These countries should work on intensification of clean economic growth, enhancing productivity of inputs. Reducing unemployment should be of the main interest in Greece, Spain, Latvia but also in Poland and Slovakia. Austria, Belgium, France, Germany, Ireland, Italy, Spain and the United Kingdom should reduce the use of fossils substituting them with alternative resources. Environment friendlier and thus better environment protection should be implemented in Bulgaria, the Czech Republic, Estonia, Lithuania, Poland, Romania and Slovakia. Finally, Greece should remarkably correct all indicators.

4. Conclusions

The aim of the paper is to provide an alternative approach to evaluating the fulfilment of both economic and environmental goals. In particular, using DEA we compute relative efficiencies of the EU countries in achieving the common goal of satisfactory and environmental friendly economic development. Majority of reports and other studies compare national results to some benchmark (European Commission, 2009). However, the issue of how the goals can be fulfilled if the resources were used efficiently, is usually not addressed. This approach has an undoubtful advantage as it is helpful in formulating concrete policy recommendations.

To evaluate two pillars of the sustainable development, namely economic and environmental, we first identify relatively efficient countries: Denmark, Luxembourg, the Netherlands and Sweden. The extent of relative inefficiency varies from 0.3–0.4 on average in Croatia, Poland and Greece, 0.41–0.5 on average in Belgium, Bulgaria, the

¹ Input and output slacks will be provided upon request for a limited space reasons.

Czech Republic, Spain, Estonia, Hungary, Portugal, Romania and Slovakia, 0.51–0.75 on average in Cyprus, Germany, France, Ireland, Italy, Lithuania, Latvia, Slovenia and the United Kingdom, to quasi-efficiency (around 0.9) in Austria and Finland.

After the identification of in/efficient countries and their magnitudes one might be interested in the sources of inefficiencies and thus in the areas which should be improved. In the DEA concept, recommendations are based on input and output slacks. We conclude that without increasing the ecological footprint, GDP per capita should be improved in Bulgaria, Croatia, Estonia, Lithuania, Latvia, Poland, Portugal, Romania and Slovakia, while new job creation should be supported in Greece, Spain, Latvia, Poland and Slovakia. The switch from fossils to alternative resources would help to improve efficiency score in Austria, Belgium, France, Germany, Ireland, Italy, Spain and the United Kingdom. Environment protection should become a priority in Bulgaria, the Czech Republic, Estonia, Lithuania, Poland, Romania and Slovakia. The Czech Republic, Hungary, Malta and Slovenia should slightly improve all indicators. General reforms should be accepted in Greece.

To sum up, our study presents a new alternative perspective of evaluating the EU countries with respect to the set of economic and environmental goals. DEA is able to identify relatively in/efficient countries, compute the magnitude of relative inefficiency and to suggest areas of improvement to achieve the frontier. Finally, this approach enables also a dynamic insight into the efficiency topic.

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Real effective exchange rate: is it influenced by the oil price?

Vladimír Hajko^{1*} and Václav Šebek²

^{1}Corresponding author, Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: vladimir.hajko@mendelu.cz*

²Department of Economics, Faculty of Economics and Administration, Masaryk University, Lipová 507/41a, Brno 602 00, Czech Republic, e-mail: vaclav.sebek@mail.muni.cz

Abstract

This paper employs co-integration and causality tests to investigate the influence of real crude oil price on the real effective exchange rates of USA and Eurozone during the sample period 1998–2014 in monthly frequency. The paper contributes to the literature by including both monetary and real exchange rate channel for the oil price effects propagation into the economy, as well as the inclusion of non-linear measure of oil-price and the realized oil price volatility measure. Results show no co-integration between real exchange rates, either in US or Eurozone, even though there is a causal link from real effective US dollar exchange rate to Brent oil price. In our sample, the measures of oil volatility do not provide any improvement of the estimation and show no causal links with real exchange rates in US and Eurozone.

Keywords: effective exchange rate, oil prices, co-integration

1. Introduction

In this article, we investigate the proposition that there is a strong linkage between the real exchange rate, economic activity (using IPI as the proxy) and the oil prices. As discussed in the literature, regarding the potential influence of oil on other important economic indicators, we also include monetary channel in the model. We follow the most common VAR/VECM modeling approach, and focus on the US and Eurozone area, during the period 1998–2014.

1.1. Presumed oil price influence

Notably since the oil shocks in the 1980s, the purported prominent role of the oil price on the economic growth has been investigated in the economic literature. Virtually any

macroeconomic aspect has undergone some research on its relation with the oil price shocks.

There have been articles on the links between the oil prices and economic growth (e.g. Hamilton (1996; 2011a; 2011b); Mork (1989); Hooker (1996); Jiménez-Rodríguez and Sanchez (2005); Kilian (2009)), inflation (e.g. Chen, 2009; Cunado and Pérez de Gracia, (2005); Cologni and Manera (2008)), exchange rates (Narayan et al.(2008); Campa and Goldberg (2002); Yousefi and Wirjanto, (2005); Lizardo and Mollick (2010); Reboredo (2012); Zhanget al. (2008); Chen and Chen (2007)), terms of trade (e.g. Backus and Crucini (2000); Hammoudeh et al. (2004); Bidarkota and Crucini (2000)), stock exchange markets (Ewing and Thompson (2007); Cong, et al. (2008); Henriques and Sadorsky (2008), Apergis and Miller (2009); Narayan and Narayan (2010)) or unemployment (Ewing and Thompson (2007); Doğrul and Soytas (2010); Andreopoulos (2009)).

One of the prominent expectations of the oil price influence is based on the enhancement of macroeconomic production function. This can be differentiated to two basic types. The first one assumes that the changes in the oil price will be reflected in the joint productivity factor. The second type is more direct and assumes that energy is a separate production factor. In both cases, an increase of the oil price has a negative impact, either on the productivity or on the equilibrium quantity of the production factor(s). On the other hand, increased economic activity boosts the derived demand for energy and energy commodities. The setback in economic activity would therefore lead to lower derived demand and consequently to lower prices of energy and energy commodities.

The empirical ambiguity regarding the link between GDP and oil price motivated the investigation of possible other channels of influence. One of the prominent channels is the inflationary channel. Since oil has relatively little substitutes and is widely used (and transportation costs in turn influence the costs and prices of other products), the customer demand is rather inelastic. Thus the changes in the oil prices are prone to be reflected in the overall price level. Since most of the central banks follow the inflationary targets, this is often met with a monetary policy response (see Bernanke, Gertler, Watson 1997). The emergence of the investigation of links between the price of oil and exchange rate appeared roughly at the same time, again motivated by the oil shocks in the 1970s and 1980s.

The US dollar serves as global currency for nearly all oil trade which implies that even with the absence of any other factual links, there might still be an influence caused by money demand for US dollars as a result of increased oil trade. At the same time, this is a double edged sword for other countries. Due to the appreciation of Euro to US dollar, we could observe that the increase in the oil price during 2002–2004 was not as prominent in the Eurozone. Today, the falling oil prices are not as prominent in Europe due to the depreciation of Euro to US dollar. The literature argues the real exchange rate fluctuations can be attributed primarily to non-monetary shocks.

The controversy regarding the presumed oil price shock influence on the US recession is well known in the energy economics literature. The empirical results finding the evidence for this relationship were subject to strong criticism (e.g. Olson 1988; Hooker 1996; Barsky, Kilian 2004) – essentially, the problem is closely linked to the estimation sample used. Samples ranging back to 1970s (or sometimes even 1950s) support the theory of oil being strongly influential for main macroeconomic indicators. More recent samples are unable to find the evidence of oil significance. This controversy is still present in the literature, though some prominent authors argue the link is still valid and

significant (see e.g. Hamilton (2011b) claiming that 10 of 11 recessions in the USA were preceded by steep oil hikes).

In time, the proponents of the oil-macroeconomy relationship proposed various improvements for their models to deal with the lack of significance. Among the most notable are the asymmetric measure proposed by Mork (1989) and nonlinear oil price measures (e.g. NOPI¹ (Hamilton 1996) NOPI or SOPI² (Lee, Ni, Ratti 1995)).

Several authors claimed that the oil-macroeconomy relationship is much more likely to be reflected in the exchange rate models. Amano and van Norden (1998) and Chaudhuri and Daniel (1998) found evidence for co-integration between price of oil and the US real effective exchange rate, with link running from oil price to US dollar real exchange rate. Bénassy-Quéré et al. (2007) argue that there is a stable long run relationship between oil and real exchange rate of US dollar, with causality running from the oil price to US dollar (oil being weakly exogenous in the VECM). Huan and Guo (2007) investigate similar setup in the structural VAR framework for Chinese renminbi and Camarero and Tamarit (2002) argue that oil prices influenced the real exchange rate of the Spanish peseta. Rautava (2004) finds a strong link between the oil prices and real exchange rate in Russia, using quarterly data during 1995–2002. Chen and Chen (2007) investigate the relationship in the panel of G7 countries on the time frame 1972 to 2005. Lizardo and Mollick (2010) look at the oil-REER relationship for oil exporter and oil importer countries, They conclude that an increase in the real oil price leads to the appreciation of the exporters' currencies and depreciation of importers' currencies.

However, virtually all the papers investigating the relationship between the oil price and real exchange rate also use rather long time periods (typically regarding US dollar and covering the sample from the beginning of 1970s onwards). These papers provide the evidence there is a long-run co-integration relationship between real oil price and real exchange rate and that the Granger causality runs from oil price to exchange rate, but not vice versa.

In our paper, we are unable to find this type of relationship both for US and Euro real exchange rates and real oil price in the more recent sample 1998–2014. We find an evidence of causality running in the opposite direction, i.e. from US real effective exchange rate to oil price, but this causality is not strong enough to maintain a co-integration.

2. Data

The oil price data were collected from the U.S. Energy Information Administration³, measured as the daily spot price of Brent blend in nominal USD per barrel.

Harmonised CPI and Narrow Money (M1) indices are available from OECD Main Economic Indicators database⁴, real effective exchange rate indices from BIS (real, CPI-based, broad indices)⁵ and Industrial Production Indices from St. Louis FED database (US data) and Eurostat (Eurozone data). In order to investigate the influence of real oil price changes, we adjusted the nominal oil prices using US harmonized CPI. All data were converted to natural logs. The overview of the data is provided in Figure 1 (note

¹ Net Oil Price Increase.

² Scaled Oil Price Increase.

³ Available at http://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm

⁴ Available at <http://stats.oecd.org/>

⁵ Available at <http://www.bis.org/statistics/eer/index.htm>

the OIL_RV refers to realized nominal oil price volatility using the daily data for the given month, and NOPI_r refers to the NOPI for l_brent_r using previous 4 periods).

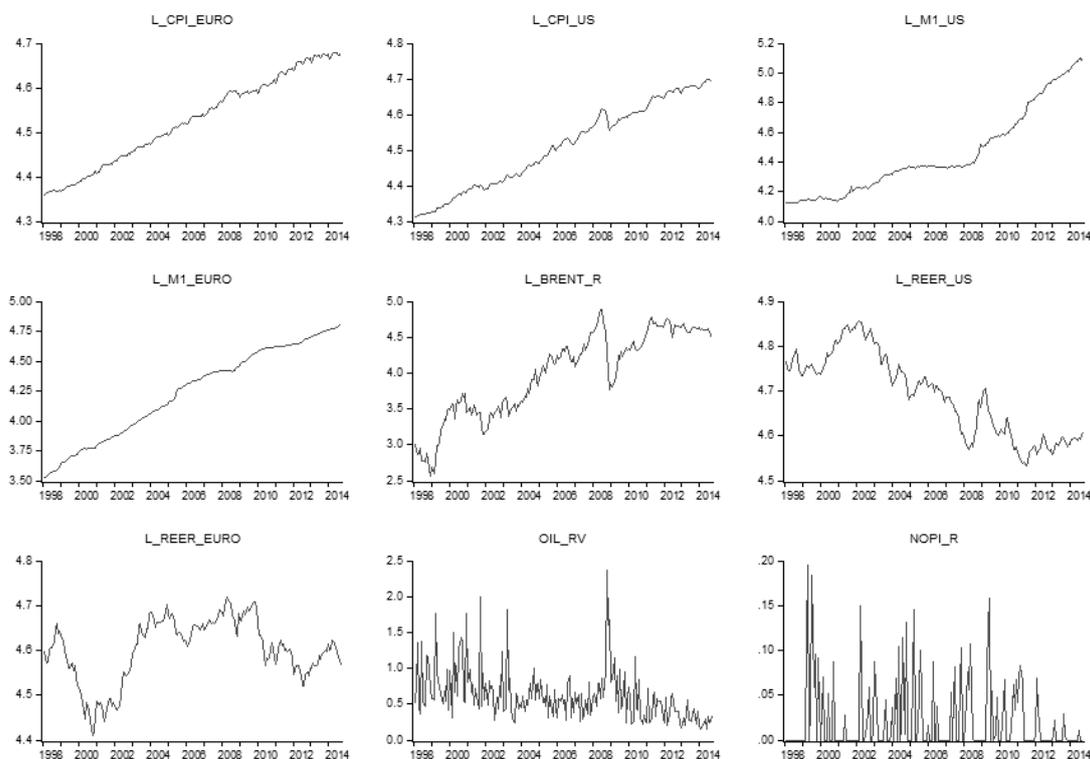


Figure 1: Data overview

Real *effective* exchange rate measures the global purchasing power of a currency. It is calculated using the weighted average of effective exchange rates (where weights represent the share of trade with the foreign partners) multiplied by price deflator and expressed as an index number relative to a base year. In other words, it is a weighted average of the bilateral real exchange rates between the given country and all⁶ (or most) of its trading partners, with weights based on trade intensity between the given two countries.

3. Methodology

Engle and Granger (1987) shown the standard statistical inference is not valid if time series used for estimation exhibit non-stationarity, unless these series are co-integrated. In order to test for co-integration, it is necessary to examine the stationarity of the data first. To test for unit root, we employ the following tests: Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS).

One rather interesting side result of the unit root investigation is the so-called long run purchasing power parity hypothesis. In essence, this states that the p_t , price of a basket

⁶ In practice, international statistics are not available for all countries in the world, thus limiting the calculation to a certain subset of countries (e.g. BIS effective exchange rate indices, used in this article, use 63 world economies for its broad indices; a recent contribution by Darvas (2012) employs up to 178 countries – unfortunately the REER for Eurozone (i.e. with 18 members) is not included in their database).

of goods in one (domestic) country should equal the p_t^* , the price of the same basket of goods in another (foreign) country and the domestic price of foreign currency (s_t , which represents the exchange rate).

This relationship can be tested by using unit root tests on the real exchange rates, which can be seen in the equation:

$$q_t = s_t - p_t + p_t^* \quad (2)$$

Where q_t is the real exchange rate (note that for the estimation purposes, the equation 2 is often estimated with an intercept, even though a strict version of the hypothesis implies the intercept coefficient should be zero). The null hypothesis of a unit root, based on testing the real exchange rate from equation (2) basically states that mean reversion is not found and, if not rejected, indicates that PPP in the long-run does not hold.

To study the long run relationship and the short run adjustment of the oil price and the exchange rate we use the standard VAR/VECM methodology, i.e. for a vector of endogenous variables Y_t we estimate

$$Y_t = \boldsymbol{\theta} + \sum_{i=1}^{p-1} \boldsymbol{\Gamma}_i Y_{t-i} + \boldsymbol{\varepsilon}_t \quad (3)$$

If the variables in Y_t are not stationary, this specification does not provide reliable inference, unless the variables are co-integrated. To test the co-integration, we employ Johansen (1988) and Johansen and Juselius (1990) test procedure. This procedure is based on testing the properties (trace or rank) of the parameter matrix Π_k in the following equation:

$$\Delta Y_t = \boldsymbol{\theta} + \sum_{i=1}^{p-1} \boldsymbol{\Gamma}_i \Delta Y_{t-i} + \boldsymbol{\Pi} Y_{t-1} + \boldsymbol{\Theta} Z_t + \boldsymbol{\varepsilon}_t, \quad (4)$$

where Y_t represents vector of the tested variables, p is the lag order, Z_t represents any dummy or exogenous variables and $\boldsymbol{\Pi} = \boldsymbol{\gamma}\boldsymbol{\beta}'$ represents the so-called long-run matrix. The rank of this matrix indicates the number of co-integration relationships.

If no evidence for co-integration is found, standard (Granger 1969) and modified (Toda, Yamamoto 1995) causality tests will be used in the reduced vector autoregressive model (VAR), i.e. a model in (3) without the Y_{t-1} term (expressed in first differences for standard causality tests and in levels for modified causality tests).

First we estimate the co-integration only between the two main variables of interest, i.e. oil and exchange rate. As the visual inspection of the data suggest, and contrary to the prevailing opinion in the literature, there hardly is any long-run relationship between the real oil price and examined real exchange rates. We therefore enhance the model by endogenous variables of monetary base, industrial production index (as the proxy for economic performance) and CPI (as a proxy for the inflationary channel).

We therefore test the equation (3) with $Y_t = \begin{pmatrix} l_brent_r \\ l_reer \\ l_M1 \\ l_CPI \\ l_IPI \end{pmatrix}$.

Finally, we test whether the US real exchange rate has significant explanatory power for two measures of the oil volatility: Net Oil Price Increase (NOPI) and Realized Volatility (RV). RV is calculated from the daily data as the standard sample deviation of the log oil price in the given month. NOPI is calculated as follows:

$$NOPI_t = 100 \times \max \left(0; l_{oil_t} - l_{oil_{t-1}}; l_{oil_t} - l_{oil_{t-2}}; l_{oil_t} - l_{oil_{t-3}}; l_{oil_t} - l_{oil_{t-4}} \right) \quad (5)$$

4. Results

The unit root test results are summarized in Table 1. We conclude all examined series exhibit I(1) properties. Especially note the test results for the real effective exchange rates, which clearly indicate the rejection of the long run PPP hypothesis.

Table 1: Unit root test results

	Levels			First differences		
	ADF (p-values)	Phillips-Perron (p-values)	KPSS7 (test statistic)	ADF (p-values)	Phillips-Perron (p-values)	KPSS (test statistic)
L_BRENT_R	0.639	0.578	1.577	0.000	0.000	0.044
L_CPI_EURO	0.751	0.759	1.754	0.102	0.000	0.219
L_CPI_US	0.879	0.892	1.759	0.000	0.000	0.030
L_IPI_EUR	0.169	0.268	0.293	0.000	0.000	0.150
L_IPI_US	0.283	0.497	0.721	0.008	0.000	0.085
L_M1_EURO	0.345	0.137	1.753	0.001	0.000	0.507
L_M1_US	1.000	1.000	1.591	0.000	0.000	1.007
L_REER_US	0.695	0.786	1.497	0.000	0.000	0.098
L_REER_EURO	0.329	0.447	0.410	0.000	0.000	0.092

Table 2: Co-integration, Johansen test results, p-values

	Trace Test	Maximum Eigenvalue Test
USA, bivariate		
$r = 0$	0.2993	0.3236
$r \leq 1$	0.2747	0.2747
Eurozone, bivariate		
$r = 0$	0.5786	0.8116
$r \leq 1$	0.1094	0.1094
USA, multivariate		
$r = 0$	0.0007	0.0177
$r \leq 1$	0.0221	0.0213
$r \leq 2$	0.3523	0.6170
$r \leq 3$	0.2979	0.2424
$r \leq 4$	0.6383	0.6383
Eurozone, multivariate		
$r = 0$	0.0000	0.0029
$r \leq 1$	0.0075	0.0561
$r \leq 2$	0.0677	0.1594
$r \leq 3$	0.1907	0.3962
$r \leq 4$	0.0605	0.0605

⁷ 5% critical value: 0.463, 1% critical value: 0.739

The results of the Johansen co-integration test are provided in Table 2. As Figure 1 indicated, it is apparent that our results do not provide any evidence for the co-integration in the bi-variate models (between the REER and oil price) neither for Eurozone or USA. We have also tested multivariate specification, i.e. including oil price, REER, monetary base M1, industrial production index and harmonized CPI.

We can see that we have indication for at most 2 co-integration relationships both in USA in Eurozone in the multivariate model. The results of the bivariate models are clearly in conflict with the results in Bénassy-Quéré et al. (2007), Amano and van Norden (1998) and Chaudhuri and Daniel (1998) who found the evidence for co-integration between the oil prices and real exchange rates. In VECM specifications, both for Eurozone and USA, the EC terms in exchange rate are not significant.

The results of Granger causality are presented in

Table 3. As is evident, the real exchange rate is not influenced by oil prices. However, there is an evidence for the influence of US industrial production on US dollar real exchange rate and, more importantly, from US real exchange rate to Brent oil price.

Table 3: Granger causality tests, p-values, asterisks indicate rejection of null hypothesis

			Standard Granger causality in VECM		Modified Granger causality in VAR	
			EUROZONE	USA	EUROZONE	USA
REER	→	M1	0.307	0.826	0.201	0.120
REER	→	CPI	0.138	0.028*	0.112	0.114
REER	→	IPI	0.595	0.302	0.651	0.088
REER	→	BRENT	0.934	0.029*	0.259	0.050*
M1	→	REER	0.724	0.344	0.424	0.293
CPI	→	REER	0.580	0.172	0.058	0.557
IPI	→	REER	0.424	0.000*	0.453	0.012*
BRENT	→	REER	0.463	0.329	0.637	0.704

The causality runs in the opposite direction than what is presumed in the literature using the samples ranging back to 1970s. We also considered an argument proposed in the oil-GDP debates, and re-estimated the above using the oil realized volatility and NOPI instead of oil price itself. We were unable to confirm any causal influence either from or to oil volatility in these models. We conclude that the models investigating the exchange rate influence of oil prices suffer from the same problem as the studies investigating the direct link to economic performance – the results are limited to the time frame ranging back to 1970s, while the more recent samples do not indicate the oil prices are a significant factor for real exchange rate development.

5. Discussion and Conclusions

Hamilton and other proponents of oil-macroeconomy significance responded to vanishing empirical significance with proxies such as NOPI and claimed that oil still had predictive power. That was in 1990s, almost twenty years ago. Oil price nowadays seems to lose most, if not all, predictive power for major macroeconomic indicators. The presumed link in the literature shifted from GDP to exchange rates. Our results show no such relationship (even though there is an indication of a causal relationship with US industrial production) and also that the oil volatility measures are even less influential

than price itself. Given changes in the world economy, illustrated by Apple becoming more valuable than ExxonMobil on NYSE, perhaps the time has come that oil sensitivity of contemporary economies decreased. This might be considered in the oil-related policies. Further research of oil predictive power is certainly not dead, especially in import dependent EU (with a strong emphasis on energy security), but it should be performed with regard to most recent findings, instead of clinging to the presumed links that vanished decades ago.

Acknowledgements

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The causal relationships between Brent and Urals oil price benchmarks

Vladimír Hajko^{1*} and Jiří Neubauer²

^{1}Corresponding author, Department of Econometrics, Faculty of Military Leadership, University of Defense, Kounicova 156/65, 662 10 Brno, Czech Republic, e-mail: vladimir.hajko@unob.cz*

²Department of Econometrics, Faculty of Military Leadership, University of Defense, Kounicova 156/65, 662 10 Brno, Czech Republic, e-mail: jiri.neubauer@unob.cz

Abstract

The article investigates the relationship between two major oil price indexes – the most prominent “western” index (Brent) and the most prominent Russian oil price index (Urals). The comparison of the most established benchmark with the less well known price index is performed to determine the nature of the price differential and causality between them, using the high frequency commodity market data. Using sample from September 2009 to December 2013 in weekly frequency, there is a significant non-zero price differential (around 1.6 USD per barrel) between the two series, but we attribute this difference primarily to the difference in the oil blend quality. We find that the Russian market can be considered integrated with world oil market. We also find, rather surprisingly, the Urals is weakly exogenous in the VECM model, while Brent responds to changes in equilibrium. Causality tests confirm that the causal relationship likely is from Urals to Brent, rather than vice versa.

Keywords: oil price, Urals, Brent, co-integration, causality

1. Introduction

Significant oil price changes (sometimes called oil shocks) are often considered an important determinant in the economic growth. Nevertheless, the economic research typically only considers one of the primary benchmarks (Brent, Dubai or WTI) of oil price, most commonly Brent. A significant portion of the oil consumption in Europe (especially in Middle and Eastern Europe) is supplied from the Russian Federation.

Furthermore, in economics there is a common view of the crude oil¹ (or most commodities in general) as perfectly homogenous good. The actual daily practice is a bit

¹ For the sake of brevity, we will denote crude oil, or petroleum, simply as oil in the subsequent text.

more complicated and naturally differentiates between vast amounts of grades and properties of various so-called oil blends.

Apart from the different value of crude oil grades, the existence of regional markets might cause that the prices of textbook example of seemingly perfect substitutes do not correspond to each other as perfectly as the theory might suggest.

If the oil markets are not global, but regionalized, we would expect that the differences in the prices will not necessarily be efficiently corrected by arbitrage. In econometric terms, the existence of regionalized markets implies the absence of price co-integration.

It is obvious we cannot label any price differential as the evidence of market regionalization. The most apparent reason is the fact there are different specifications for different market contracts. If the product is not delivered to the same place, it is necessary to take into the account the transportation costs. If the transportation costs outweigh the nominal price difference, it is apparent the arbitrage would not be profitable.

The other side of the explanation of the price differential is the observable difference in the product itself. As is explained in the text below, the crude oil is typically sold in specific blends. Each blend has slightly different value for a refinery, because the differenced physical and chemical properties influence the ability to transform certain grade of input into various the refined products and ratios of said refined products on the output.

The problem investigated in this article is the causal relationship between leading world oil price benchmark (Brent) and the Urals price benchmark. The law of one price implies that for a homogenous good, given it is traded on the competitive market, any two prices of said good should form a relatively stable equilibrium. If a price shock creates a spread between the two prices, market arbitrage will ensure the return to market equilibrium. Therefore, a market spread between any two oil prices should be stationary mean reverting series. A non-zero mean would reflect the transaction costs of the arbitrage (typically representing transportation costs from a different point of delivery) and a difference in quality.

1.1. Oil blends

As mentioned above, it can be expected the oils with different quality will be valued differently by the primary customers, i.e. refineries. There are two most frequently used categories (or measures) to differentiate between various blends of oil.

Crude oil is typically characterized as either light or heavy and sweet or sour. The distinction between heavy and light oils depends on the so-called API gravity.² Generally speaking, oils with API gravity 38 or more are classified as light oils, oils with API gravity between 22 and 38 are referred as medium crude oils and those with API gravity below 22 are classified as heavy crude oils (Neste Oil, 2015). Whether the given oil blend is categorized as sweet or sour, depends on the sulfur contents. Oil with less than 0.42% sulfur is classified as “sweet”, while the “sour” oil typically contains more than 0.5% sulfur. For refineries, light sweet crude oil is the most desirable type, as it requires less refining and produces a higher yield of high-value products.

In order to facilitate the trade and to avoid ambiguity, the buyers and sellers in the oil market use various price benchmarks (or markers), describing the price of certain blend

² API gravity compares the weight of oil to water: API gravity greater than 10 indicates the oil is lighter than water and therefore floats on it; API gravity less than 10 indicates it is heavier than water and therefore sinks in it.

of oil. The three most prominent³ benchmarks are Brent Crude, West Texas Intermediate (WTI)⁴ and Dubai Crude⁵ (sometimes also called Dubai's Fateh⁶). It is noteworthy that among these, the Brent has gained the leading position as an international benchmark. On today's markets, the Brent benchmark is the most prominent, and arguably, the most important and most widely used oil price benchmark (EIA, 2010; ICE, 2012). Among the most influential use of the price benchmark is the so-called formula pricing.

1.2. Regionalization of oil markets

Regionalization of oil markets refers to a situation when the price setting mechanism in a certain region does not follow the movements of "world" oil price. This situation might be caused by variety of reasons (typically political and/or strategic). The necessary condition for regionalization however is the absence (or forced prevention) of market arbitrage. In fact the identification of the areas that exhibit either price co-integration or bi-directional causality is one of the crucial steps in the product market delineation in competition economics. Hajko and Bil (2013) is an example of market delineation based on the price co-integration and causality.

In a similar fashion, the financial economics also has a long tradition in the investigation of the dependence and causality in the international financial markets (primarily regarding the stock prices, see e.g. Gupta and Guidi, 2012 or Aslanidis, Osborn and Sensier, 2009).

In less numerous instances this approach has been applied to the oil markets.

Weiner (1991) concluded there is a "surprisingly high" degree of regionalization in the oil markets, and attributed this evidence to the ability of oil sellers to engage in price discrimination. Gülen (1997, 1999), Ewing and Harter (2000), Bachmeier and Griffin (2006) or Bentzen (2007) argued for the opposite case, finding the evidence for world oil market integration (based on co-integration of the prices). Kleit (2001), Milonas and Henker (2001), Hammoudeh et al. (2008) or Fattouh (2010) also found the evidence for the oil markets integration, but with certain limitations, such as significant transaction costs, asymmetric adjustments or multiple threshold effects in the adjustment process. Reboredo (2011) used copula functions to analyze the dependence structure between four oil benchmarks and argued in favor of the globalization hypothesis with no asymmetric adjustment during market booms or busts. Jacks, O'Rourke and Williamson (2011) argued that the absence of commodity market integration is associated with much greater commodity price volatility in the isolated countries. Arguably some of the countries in the world can be considered as special cases of interest – for instance one of the largest energy commodities consumers such as China, or one of the most prominent energy commodities exporters such as Russian Federation. ICC (2013) classifies both

³ Apart from Brent, Dubai, and WTI, other popular oil blends are the OPEC Reference Basket, Urals benchmark (traded in Russian Federation), Tapis Crude (traded in Singapore), Bonny Light (Nigeria), Isthmus (Mexico) and Western Canadian Select (Canada).

⁴ Brent and WTI are light sweet oils (typically with API ratings of 38.5 and 39.6 respectively), typically quoted for the "Free On Board" delivery at certain major oil hub (typically Amsterdam-Rotterdam-Antwerp (ARA) Hub for Brent and Cushing, Oklahoma (USA) for WTI).

⁵ Unlike the Brent and WTI, this blend is so-called medium sour oil. As such it might be more relevant for pricing of lower quality oils. However, only a relatively small percentage of Dubai Crude is traded on the spot market, instead term deals are favored.

⁶ The name makes a reference to the *Fateh* oil field (meaning "good fortune" in Arabic), discovered in 1966.

Russian Federation's and China's openness as below average. Liu, Chen and Wan (2013) investigated the price differences between China's and international oil prices using nonlinear correlations. They argue that price co-movement is stronger in the long-term than in the short-term and that the international oil prices influence Chinese oil prices towards the long-term equilibrium level, but not vice versa. No such investigation has yet been done for the Russian oil market.

In general, there seems to be a certain consensus in the literature that the world oil market is more or less integrated. If this is the case, the "world" price innovations then can be manifested in the markets in two ways. If the new information enters all markets simultaneously, all price adjustment is instantaneous on all integrated markets. This condition would imply that the co-integrated series would adjust to the long-run equilibrium, even though the short run dynamics might not be strongly influenced by the lagged values (on condition this adjustment process to new information is not faster than the lowest observable frequency measure in the dataset – in reality, this might happen on the intraday markets). It may also be the case the information is primarily reflected on a certain market (probably the most well known and/or most frequently traded) and only consequently this information "spreads" to the other less "popular" markets (e.g. traders on these markets intentionally adjust their behavior in response to the changes in the leading benchmarks). If this is the case, the co-integration may or may not be present, but we should be able to at least detect Granger causality (this reasoning, however, strongly implies the unidirectional causality).

Nowadays the use of Brent price as the "world oil price" is a common practice. In this article we compare the Brent oil price benchmark with the less common one, the so-called Urals blend.⁷ Our null hypothesis is in essence the integration of Russian market with the world oil market. Given the Brent is higher quality oil blend (more valuable to refineries), we expect the presence of small non-zero differential, which can be viewed as an approximation of the agreed-upon differential in actual traded contracts. Other than that, if there is no significant regionalization of the Russian oil market, the two series should exhibit a common behavior.

2. Methodology and Data

The oil price data were collected from the database published by topoilnews.com. Data were collected in the daily frequency, covering the time period September 21st 2009 to December 31st 2013 and converted to weekly frequency (by taking average observations for the given calendar week).⁸ Given the relatively high number of observations, we opted for 1% level of significance. During this period, the price differential was significantly different from zero, on average 1.643 US dollars per barrel.

We focus on the vector autoregression (VAR) and vector error correction model (VECM) as description of the investigated system. In general, VAR model estimates a system equation for each variable in the vector, with each variable being explained by its own lagged values and the lagged values of all other variables.

⁷ Urals is categorized as medium, sour crude oil (with API gravity around 32 and sulfur content of approximately 1.2%). Usually, the delivery points are Augusta (Italy) or Amsterdam-Rotterdam-Antwerp hub.

⁸ We also replicated the estimations using series transformed to natural logs, but we found no substantial change or improvement in the results over the estimation in levels.

Engle and Granger (1987) shown the standard statistical inference is not valid when dealing with non-stationary variables, unless these series are co-integrated. In order to test for co-integration, it is necessary to examine the stationarity of the data first. To test for unit root, we employ the Augmented Dickey-Fuller (ADF, Dickey and Fuller, 1979) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS, Kwiatkowski et al., 1992) tests.

To determine the presence of co-integration we use Johansen test (cases 2 and 3, i.e. with restricted constant and with unrestricted constant⁹). Since there is an evidence for a co-integration between the two series, we subsequently estimate VECM model (for lag order p):

$$\begin{aligned} \begin{pmatrix} \Delta brent_t \\ \Delta urals_t \end{pmatrix} &= \begin{pmatrix} \partial_1 \\ \partial_2 \end{pmatrix} + \sum_{i=1}^{p-1} \begin{pmatrix} \varphi_{1,2*i-1} & \varphi_{1,2*(i)} \\ \varphi_{2,2*i-1} & \varphi_{2,2*i} \end{pmatrix} \begin{pmatrix} \Delta brent_{t-i} \\ \Delta urals_{t-i} \end{pmatrix} + \\ &+ \underbrace{\begin{pmatrix} \alpha_1 \\ \alpha_2 \end{pmatrix} \left((1 \quad -\beta) \begin{pmatrix} brent_{t-1} \\ urals_{t-1} \end{pmatrix} + \mu \right)}_{\text{EC terms}} + \begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{pmatrix} \end{aligned} \quad (1)$$

To describe the causal relationship between the two series, apart from the standard inference using Wald tests in VAR, we also opted for the Toda and Yamamoto (1995) testing procedure. This procedure tests the causality of the integrated variables by setting up VAR in levels and augmenting the lag order by the maximum order of integration of the variables, with Wald tests restricting the coefficients of the non-augmented lag order.

3. Results

Table 1 summarizes the unit root tests. We conclude both examined series are $I(1)$ so we proceed with the Johansen test – the results of which are presented in

We can see there is a sufficient evidence for co-integration only for case 2. As mentioned above, since we might reasonably expect a non-zero mean in the co-integration relationship, we proceed with the VECM estimation of Case 2. Estimation of of equation (1) yields the co-integrating relationship (std. errors in parentheses)

$$\text{Brent} = \begin{pmatrix} 1.06 \\ (1.266) \end{pmatrix} + \begin{pmatrix} 1.006 \cdot \text{Urals} \\ (0.013) \end{pmatrix}$$
. Surprisingly enough, as indicated in Table 3, only Brent responds to co-integration disequilibrium, with Urals being weakly exogenous.

⁹ In Equation (1) we apply $\begin{pmatrix} \partial_1 \\ \partial_2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ for restricted constant and $\mu = 0$ for unrestricted constant.

Table 2 (the optimal VAR lag length based on the information criteria was 2).

Table 1: Unit root test results

	AR(p)	ADF test	p-value	KPSS test statistic	KPSS test critical values:
BRENT	2	-2.178	0.215	2.307	
Diff BRENT diff.	1	-10.352	0.000	0.147	10% 0.348
URALS	3	-1.887	0.339	2.411	5% 0.463
URALS, diff.	2	-9.285	0.000	0.142	1% 0.739

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. Surprisingly enough, as indicated in Table 3, only Brent responds to co-integration disequilibrium, with Urals being weakly exogenous.

Table 2: Co-integration, Johansen test results, p-values

	Trace Test	Maximum Eigenvalue Test
Case 2, Restricted constant		
$r = 0$	0.001	0.001
$r \leq 1$	0.021	0.021
Case 3, Unrestricted constant		
$r = 0$	0.001	0.001
$r \leq 1$	0.191	0.190

Causality (block exogeneity) test results are provided in Table 4. Again we can see that the influence could be primarily attributed to Urals, rather than Brent.

Table 3: EC term coefficients, weak exogeneity tests

	EC term, Coefficient values (std. errors in parentheses)	Weak exogeneity restriction test , p-value
Brent	-0.439 (0.180)	0.033
Urals	-0.282 (0.178)	0.162

Table 4: causality test results, p-values

	Toda and Yamamoto	Standard Granger causality (VAR in differences)
Brent \rightarrow Urals	0.0192	0.0236
Urals \rightarrow Brent	0.0089	0.0066

4. Discussion and Conclusion

Our results are rather surprising and unexpected. Despite the well established position of the Brent as the leading world benchmark, our results show that Urals, not Brent, is weakly exogenous in the (arguably expected) co-integration relationship. In other words, it seems that the price development of Russian oil price benchmark is not influenced by being out of long run equilibrium.

Given the expected high competitiveness of commodity markets, this might indicate the data generating process of the Urals oil price is not entirely based on the market forces alone. At the same time, Brent spot market prices do seem to adjust to disequilibrium (although not spectacularly fast (recall the estimation is done for weekly frequency). Based on our results, it seems plausible to claim Russian oil market is not regionalized, but there are some limitations to pure market adjustment.

Most likely the case is much more complicated, and a further investigation is required before an argument regarding the position of the Russian oil market is made. Furthermore, it should be stressed that the data available for estimation need to be enhanced to encompass the more recent development in the oil market, which unfortunately were not available to us at the time of writing this article.

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The Impact of the Implementation of CSR on the Economic Performance of Czech Business Entities

Kateřina Halíčková¹ and Marcela Basovníková²

¹*Department of Business Economics, Faculty of Business and Economics, Mendel University
in Brno, Zemědělská 1, 613 00 Brno, Czech Republic,
e-mail: katerina.halickova@mendelu.cz*

²*Department of Business Economics, Faculty of Business and Economics, Mendel University
in Brno, Zemědělská 1, 613 00 Brno, Czech Republic,
e-mail: marcela.basovnikova@mendelu.cz*

Abstract

Social responsibility is a much discussed topic worldwide, not only in relation to its contents, but also in connection with the financial management of the company. Customers require their suppliers' evidence that they are socially responsible. One option for assessing the social responsibility of vendor is ownership certificate associated with CSR. In most countries worldwide, CSR is required primarily in companies operating in countries that are known mainly for human rights violations, such as China and India. In the Czech Republic corporate responsibility standards have become demanded after 2005. In that time one of the first of complex certificates that was already used worldwide, the SA 8000, was introduced.

The basic idea of social responsibility within the company lies in trying to meet the wishes of customers and thereby increase enterprise sales. The higher turnover is associated with growth of the economic performance of the company. This article deals with the measurement of economic performance of enterprises in connection with the implementation of SA 8000 certification. The basic approach lies in comparing the economic situation of the company before obtaining a certificate of social responsibility and after its implementation. A set of traditional and modern indicators is used for the measurement of economic performance. According to current data 8 companies operating in the Czech Republic has certificate SA 8000, and this article explores in detail the economic performance of 7 of them.

Keywords: corporate social responsibility, ISO, SA 8000, economic performance, social and environment impact, corporate citizenship, sustainability

1. Introduction

Corporate social responsibility (CSR) is still a frequent subject of extensive discussions and the concept is variously interpreted. Currently, increasingly more businesses deal with social responsibility. For this problematic area, however, there is no single definition. The most famous interpretation is one that is listed in the Green Book (European Union): CSR is the voluntary integration of social and environmental aspects into everyday corporate operations and interactions with corporate stakeholders. Although there is no single and universally accepted definition of CSR, this term generally refers to linking business interests with ethical values and complying with legal standards. There are many rules and standards that help implement social responsible strategies within corporates that were created by both government and non-governmental organizations. The group of standards that are certified – and there are not many – include SA8000 certification, which can only offer certification bodies that are accredited to audit by Social Accountability International (Kunz, 2012). This standard is based on international standards of human rights and national labor law that protects and strengthens all workers in the framework of affection and the influence of an undertaking. This includes both workers which are employed by certified enterprise, and workers of suppliers (Social Accountability 8000, SAI 2008).

In connection with the implementation of CSR into business management, every company is considering the benefits of this implementation. Authors Pavlik, Bělčík (2010) suggested that some empirical studies have showed that the implementation of CSR into the company contributes to increasing profits. Furthermore, these authors also suggest that corporates that operate by taking into account the requirements of all interested parties (stakeholders) show better financial results than organizations that have not done so. It is therefore from that stated that for many enterprises, implementing CSR into business management become a competitive advantage, from which flow benefits in the form of higher profits? Or, on the contrary, economically stable companies can afford the financial demands of implementation standards of social responsibility? The beginnings of research related to the influence of CSR on the performance of the business entity by authors Bragdon and Marlin date back to 1972. No studies, however, still have not clearly determined whether the introduction of CSR into business management has a positive impact on performance in the form of higher profits or other indicators related to economic performance such as economic value added.

The great competitive advantage of each company is hardworking employees. Therefore, the research applied especially to those companies that have an established standard SA 8000 and focuses on monitoring of employees' working conditions and the treatment of employees. The results of this research will build on previous research by the authors Basovníková, Abramuszkinová and Vavřina in 2013.

Worldwide interest in this certificate is growing. This fact is illustrated in Table 1, which shows the number of certificates throughout the world, and then also in selected states. On the contrary, in the Czech Republic, interested in this certificate is gradually decreasing. Currently (up to June 30th of 2014) in the Czech Republic, there are 8 companies with certificate SA8000.

Table 1: Number of certificates SA8000 worldwide

Country	Number of Certificates		
	2012	2013	2014
Total in the World thereof	3083	3257	3388
China	473	569	601
India	656	769	847
Italy	966	1076	1124
Romania	269	175	148
Pakistan	164	60	62
Czech republic	25	9	8

Source: Own work based on data from <http://www.saasaccreditation.org/certifacilitieslist>

There is total number of 3388 companies that own certificate SA 8000 based in 71 countries around the world. Certified companies operate in 65 different industries and employ a total of 2,019,193 workers. Compared to the statistics, which was released on the same date in 2012, there was an increase of 305 enterprises. The number of countries with socially responsible companies was increase by six. Proportionately the number of employees was increased also (about 178,347 people), only the number represented industries remained stable.

2. Methodology and Data

Although it was stated that in the Czech Republic there is 8 companies certified with SA 8000, with regard to the availability of data only 7 of them will be analyzed. The common characteristic of these companies is to obtain mentioned certificate in 2011, and has it still in 2014.

The research sample containing analyzed corporations is divided according to the CZ-NACE classification into several major categories. Four of the companies operating in sectors classified in the group of CZ-NACE F, which stands for Construction. The two companies operate in a group of CZ-NACE C, which stands for Manufacturing. Of the last two companies, each one represent single industry, firstly CZ-NACE E (Sewerage, Waste Management and Remediation Activities), secondly CZ-NACE L (Real Estate Activities).

Summary information is available on the list of companies holding certifications SA 8000 both from the middle of the year 2012, and from the middle of 2014. After comparing SA 8000 certified companies from both lists it can be stated that all companies based in the Czech Republic which currently meets the standard SA 8000 already owned the SA 8000 certificate in 2012.

Basovnicková, Abramuszkinová and Vavřina in 2013 conducted a study involving nine selected enterprises. Five of them were by CZ-NACE situated section F. The survey was in 2013 also included data CENTRA as classified in section CZ-NACE L.

The aim of this research is to define the differences in economic performance between long periods before and after implementing SA 8000 certification in selected companies. The results can be compared across sectors and also with data obtained in research executed by Basovnicková, Abramuszkinová and Vavřina in 2013.

Table 2: Czech enterprises with SA 8000 certificate

Name of company	CZ-NACE code of main business	scope of	CZ-NACE industry classification	peer group
AGC Flat Czech, a.s.	CZ-NACE 23		C (Manufacturing)	
CENTRA a.s.	CZ-NACE 68		L (Real Estate Activities)	
ČKV Praha s.r.o.	CZ-NACE 42		F (Construction)	
EKKL a.s.	CZ-NACE 25		C (Manufacturing)	
METROSTAV a.s.	CZ-NACE 42		F (Construction)	
Purum s.r.o	CZ-NACE 38		E (Sewerage, Waste Management and Remediation Activities)	
Skanska a.s.	CZ-NACE 42		F (Construction)	
SYNER Morava a.s.	CZ-NACE 41		F (Construction)	

Source: Own work based on data from <http://www.saasaccreditation.org/certifacilitieslist>

The main observed measure is the economic productivity, expressed as the value added divided by personnel costs. Selected companies have been characterized primarily on the level of value added generated by one crown of personnel costs. Standard SA 8000 addresses the issue of labor relations between employers and employees. Ensures appropriate working conditions for workers, i.e. in terms of payments for work or the working environment. The impact of obtaining certification SA 8000 on the economic performance should be reflected in the context of labor productivity.

As an additional indicator of the economic status of the company were elected:

- Taffler model referring to the company's bankruptcy risk,
- Index IN99, creditworthy model made from the perspective of business owner
- Return on equity (ROE)

Processing of statistical data was done by MS Excel spreadsheet and interactive environment for the promotion of technical computing Matlab.

3. Results

Data of individual sectors are available on the website of the Ministry of Industry and Trade of the Czech Republic. Sorted by CZ-NACE classification, data are recorded in period from 2007 to 2012. Companies within the most represented industry, Construction (CZ-NACE F), are showing a declining trend of return on equity. Compared to the first observed period is ROE in 2012, almost at its half, reaching just 6,8%. Industry experienced a sharp increase in 2009, when ROE was almost 20%, but since then it drops sharply. Quite the opposite development of return on equity can be seen in Manufacturing industry (CZ-NACE C). In 2009 was recorded a sharp decline to 6,5%. ROE values are showing a slight increase ever since, up to 12,1% in last recorded period. The most stable values are in the sector Sewerage, Waste Management and Remediation Activities (CZ-NACE E). Return on equity oscillates around 4.5% for long-term period. The highest value reached in 2009 was 6.6%. The lowest values of ROE were in sector Real Estate Activities (CZ-NACE L). At the beginning of the period are numbers negative, in fact down to -2.33%. Gradually increase up to 3.1% is recorded since.

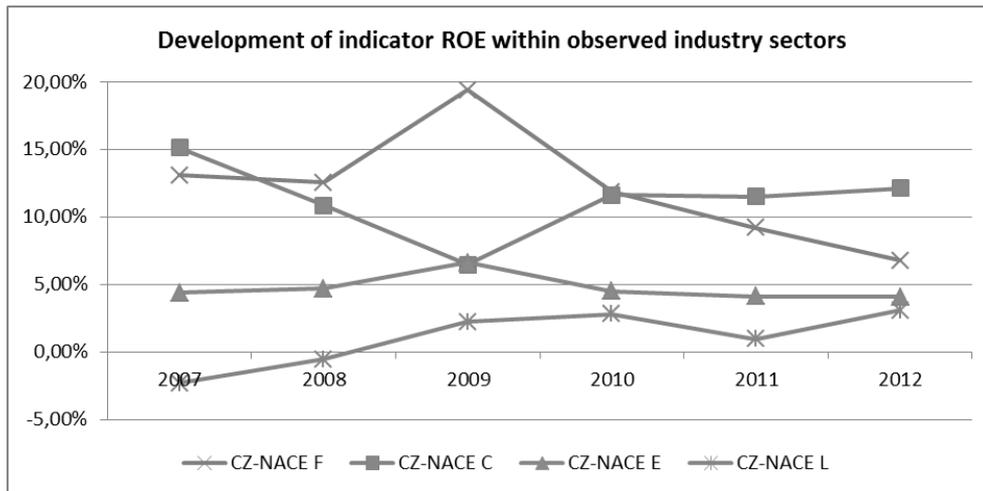


Figure 1: Development of indicator ROE within observed industry sectors

Source: Own work based on the benchmarking information system INFA of Ministry of Industry and Trade of the Czech Republic

In individual companies from four observed sectors there are monitored economic data captured between year 2004 and 2013. Half of the companies are in the business sector Construction, by CZ-NACE classified as section F. Because the sample of companies contains extreme values, the median was chosen to capture the development of return on equity, rather than arithmetic average. The incidence of extreme values is exceptional and it is caused by changes in key financial parameters associated with restructuring in business entity. The development of ROE in the surveyed enterprises is identical with developments in the industry. There is observed a sharp increase in the value of ROE in 2009 and subsequent downward trend in future periods. Significantly different trends can be observed between 2009 and 2010 when the average return on equity of the industry decrease sharply, but within a median of four monitored companies is almost negligible decline (only about half a percentage point).

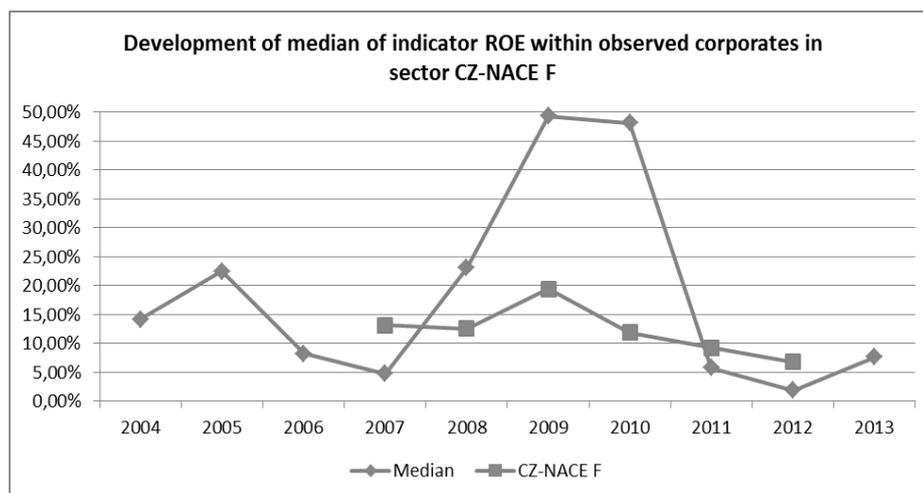


Figure 2: Development of median of indicator ROE within observed corporates in sector CZ-NACE F

Source: Own work based on the benchmarking information system INFA of Ministry of Industry and Trade of the Czech Republic and corporate data

In all selected companies from section CZ-NACE F, certification process of standard SA 8000 was conducted in 2011. The ROE reflects this fact as a slight decline between 2011

and 2012 (by about four percentage points), but in the following period a significant growth and the beginning of a growing trend is recorded already.

Manufacturing industry is characterized by an almost contradictory developments compared to section CZ-NACE F. The curve showing the evolution of return on equity of the observed company with certificate SA 8000 has a similar pattern as the rest of the section until 2010. Then comes moderate growth within the industry, but ROE of the corporate AGC Flat Czech a.s. is slightly decreasing until the end of the reporting period in 2013.

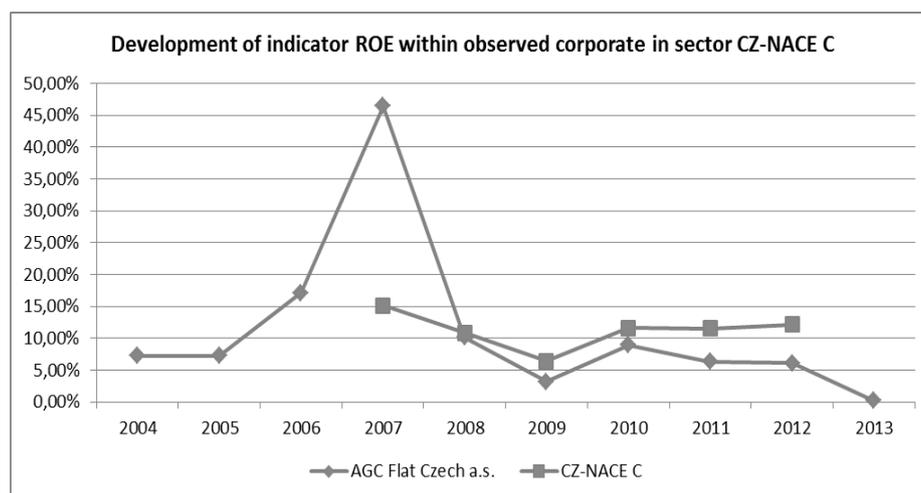


Figure 3: Development of indicator ROE within observed corporate in sector CZ-NACE C

Source: Own work based on the benchmarking information system INFA of Ministry of Industry and Trade of the Czech Republic and corporate data

Company operating in the CZ-NACE C acquired SA 8000 certificate in 2011. Return on equity from this year declined slightly in the beginning, then between 2012 and 2013, the decrease was more significant (almost six percentage points).

Values of ROE of company which operate in the sector of Sewerage, Waste Management and Remediation Activities and owning SA 8000 certification are highly unstable. In absolute numbers, they are completely different from average ROE in whole sector. Only a decline since 2009 can be considered as identical, but even this trend is too gradual. Return on equity of the selected company has a rather abrupt character. Collected values between 2009 and 2012 decreased to almost one fifth (a decrease of 41 percentage points).

Principles, that form Standard SA 8000, were in company Purum s.r.o. introduced in 2011 and then again in 2014. Immediately after obtaining the certificate for the first time the value of return on equity dropped sharply. On the other hand, between 2012 and 2013 the values of ROE show a significant increase (eight percentage points).

The lowest values of return on equity are in section CZ-NACE L, in the Real Estate Activities. While was the average value of ROE in sector negative in 2007 and 2008, for the company CENTRA a.s. is ROE negative only in 2004. In 2005, there was the highest value of the entire reporting period already. Within the sector, return on equity increase gradually. On the other hand, in the enterprise with standard SA 8000 ROE decreases significantly. Despite the decline, values of ROE in observed company holds above industry averages, in 2012 ROE is still higher than average in the sector.

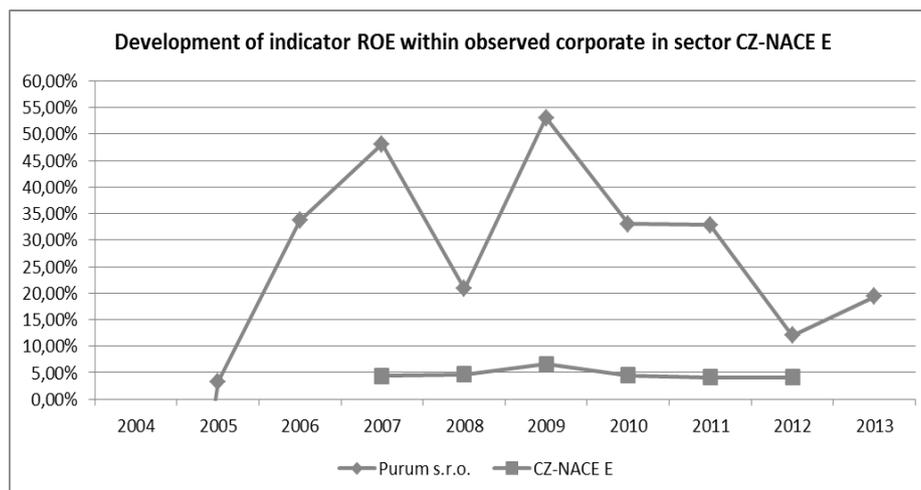


Figure 4: Development of indicator ROE within observed corporate in sector CZ-NACE E
Source: Own work based on the benchmarking information system INFA of Ministry of Industry and Trade of the Czech Republic and corporate data

CENTRA a.s. was certified in 2010 and then in 2013. After the first certification, there was a sharp decrease (by 2012 up to 35 percentage points) in return on equity. Among the last observed period, there was very modest increase (one percentage point).

Certificate SA 8000 is within sections CZ-NACE F and CZ-NACE C in companies that achieved lower return on equity in periods after obtaining the certificate, than are averages in sectors. On the other hand, companies in sectors CZ-NACE E and CZ-NACE L, have considerably higher ROE than the average.

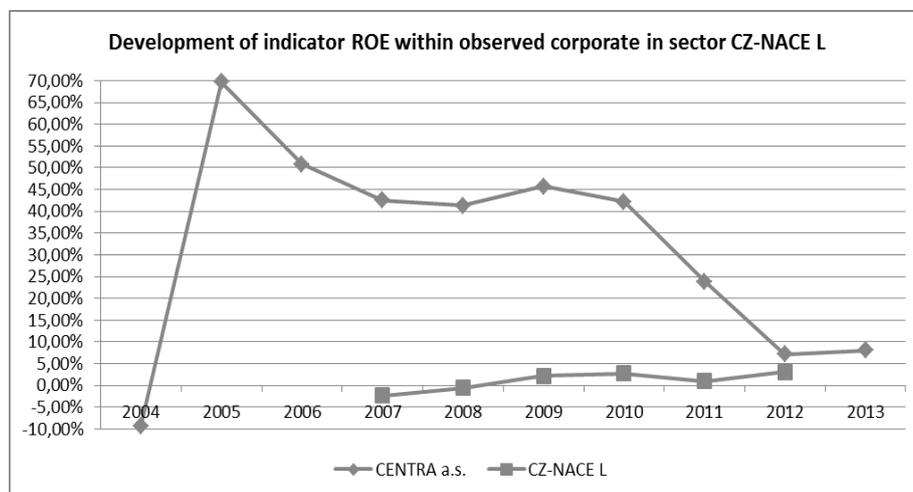


Figure 5: Development of indicator ROE within observed corporate on sector CZ-NACE L
Source: Own work based on the benchmarking information system INFA of Ministry of Industry and Trade of the Czech Republic and corporate data

Other sections, without CZ-NACE E, have decreasing development of value of ROE after getting the certificate SA 8000 but only until 2012. Then the values are rising again. However, the decline in return on equity cannot be associated solely with the standard SA 8000. Companies within all sectors are concurrently reaching limits in year 2009, and this phenomenon can be associated with the economic crisis. The decline in ROE in all of

the observed companies did not start in the year of certification, only resumed previous developmental trend.

Additional Taffler model did not reveal any period in which would be some of the monitored companies threatened with bankruptcy. Only four of all of the periods for all the selected corporates were evaluated as suspicious. The resulting value of Taffler model in these periods was in the interval from 0,2 to 0,3, so a probability of bankruptcy is not high, but it is also not negligibly low. Namely it is the year 2013 for the company Skanska a.s. and the years 2005, 2012 and 2013 for the company AGC Flat Czech a.s. The last named company operates in section CZ-NACE C and in 2013 it was ranked by Taffler model by the value 0,203. This value indicates relatively high but still tolerable risk of bankruptcy.

Creditworthy model IN99 does not acquire values as positive as the previous model. The sample companies owning certificate SA 8000 are under the limit that estimates creation of shareholder value. Therefore EVA is reaching only negative values. Exceptions are only CENTA a.s. in section CZ-NACE L, and only until 2010, when it was certified with SA 8000.

Labor productivity indicator monitors the amount of CZK in added value created by personnel costs. From this perspective, it can be stated that the selected companies are having satisfactory results in whole observed time period.

In trends of labor productivity, it is possible to detect some similarities across all surveyed sectors. Selected companies wholly independently reported a decline in labor productivity between 2011 and 2012, in the time period immediately after certification with SA 8000. In five of the seven chosen companies was the trend of decreasing labor productivity already from the previous period, except for the company Purum s.r.o. from section CZ-NACE E and SYNER Morava a.s. in section CZ-NACE F.

Subsequent development between 2012 and 2013 is negative in three of the selected companies. A positive development is observed within three of the four enterprises in section CZ-NACE F and again by the company Purum s.r.o. In the last observed period the personal costs are higher than the value added only at the company Skanska a.s. In this case it is a long-term downward trend of labor productivity beginning as early as 2008.

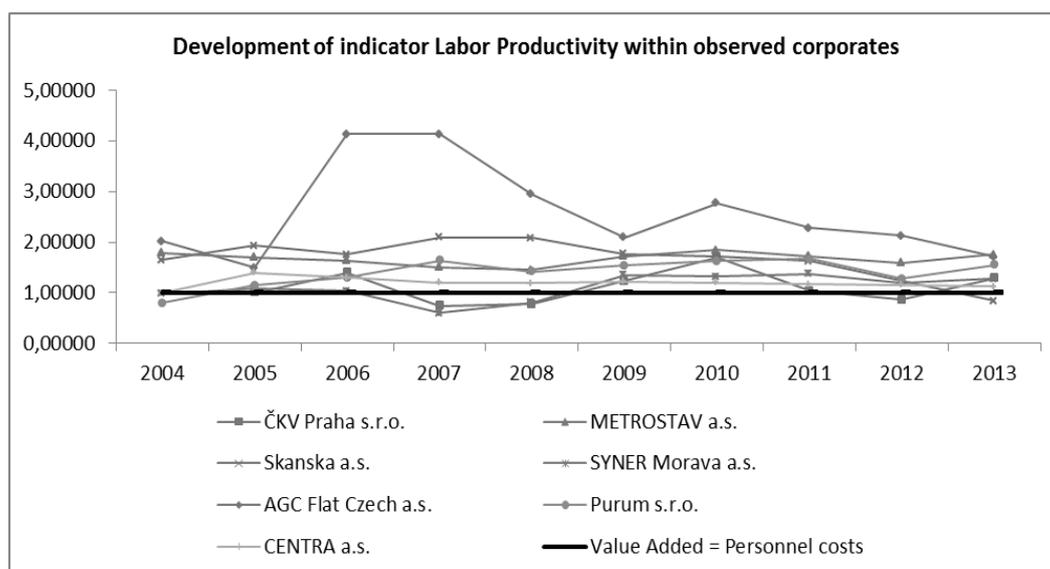


Figure 6: Development of indicator Labor Productivity within observed corporates

Source: Own work based on corporate data

4. Discussion and Conclusions

Implementation of the principles of social responsibility in corporate is a welcome activity especially for stakeholders. Both buyers and suppliers will find in CSR significant advantages. Enterprise strengthens its competitiveness and become more attractive for investors.

The object of this research was to reveal the relationship between corporate social responsibility and economic performance. Adherence to the principles of CSR was established on the basis of ownership the certificate SA 8000. Enterprises in the research group were certified in 2011 and for the purposes of research divided into four categories according to the classification CZ-NACE. Indicators of economic performance were analyzed in each of the categories in the period prior to certification and after obtaining the certificate.

Four of the seven selected enterprises were in section CZ-NACE F. Development of return on equity is within this category below average sectorial values throughout the whole observed period. The median of ROE of selected enterprises decline in 2011 after obtaining the certificate SA 8000, but in the following period ROE shows a rising trend already.

The worst rating of ROE is in the section CZ-NACE C. The values of return on equity of the company are below industry averages in whole observed period. ROE is steadily decreasing since 2010. Between 2012 and 2013, declining results of Taffler model are just above the interval which indicates a high risk of bankruptcy.

The company in section CZ-NACE E exhibits throughout the period ROE above average value. Return on equity for the enterprise has been steadily decreasing since 2009. But since 2012 there has been an increase.

The best results of indicators of economic performance belong to company in section CZ-NACE L. ROE values are always above the average value in the sector. Until 2010 Index IN99 was referring to positive economic value added. Development of return on equity is identical to section CZ-NACE E.

Across all sections of the CZ-NACE classification was labor productivity observed. All enterprises have a decline in labor productivity between 2011 and 2012. But five of the seven companies were on a downward trend continued from previous periods.

In all four companies in the sector Construction there was decrease in profit between 2011 and 2012, while the downward trend is long-lasting. Decreasing ROE value is long-lasting within both the selected enterprises and in the sector average. On the other hand, the increase in ROE between 2012 and 2013 can be associated with “absorption” of rules of CSR in the ordinary workflow of the company.

Similar development has labor productivity. Immediately in the period after the certification is labor productivity decreasing in all seven companies. But since 2012 a growing trend is following. This development can also be explained by employees slowly getting used to working with new rules caused by social responsibility. After transforming new rules into habits the CSR show its impacts in increasing labor productivity.

Previous research by the authors Basovníková, Abramuszkinová and Vavřina in 2013, evidenced the indicators of economic performance in section CZ-NACE L above the section average value and the indicators of economic performance in section CZ-NACE F below the section average value. These results were confirmed in the context of current research.

The results reveal the connection between the SA 8000 certification and selected indicators of economic performance in the sample group of companies. It will be continued in monitoring relationship between corporate social responsibility and economic performance. Data in the research sample will be extended. Among the welcome expansion should be include extending the time period after the implementation of CSR, including more business enterprises representing more sections of the classification CZ-NACE, tracking other indicators of economic performance of the company etc. Obtained data will be used to facilitate the decision-making process about the implementation of the principles of social responsibility in the company.

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Corporate Social Responsibility and Human Resource Management

Darja Holátová¹ and Vlasta Doležalová²

¹*Darja Holátová, Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: holatova@ef.jcu.cz*

²*Vlasta Doležalová, Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: dolezalovav@ef.jcu.cz*

Abstract

Small and medium sized enterprises present the driving force throughout the economy. There is a wide range of characteristics, that make small and medium-sized enterprises significant actors. New direction of development is given by trend of sustainability, which has already penetrated to all spheres of society. In the corporate sector, we are talking about corporate social responsibility. This philosophy integrates into business not only economic issues but also social ones trying to find balance between profitability and responsibility. CSR strategy can bring enough benefits, if it becomes part of everyday business governance. The paper focuses on the area of the characteristics of a sample of firms and the further evaluation of key processes throughout the sample along with subsequent analysis, according to the categorization of businesses, using ideas about the importance and function of key processes as estimated by representatives of each company, including practices of CSR. The aim of this paper is the analysis Corporate Social Responsibility and creating of a strategy for the area of Human Resource Management, all within evaluation the processes of small and medium-sized enterprises. The presented research was funded through grant project registered under No. 039/2013/S with Grant Agency of South Bohemia University entitled: Human resource management of SMEs.

Keywords: Small and Medium-sized Enterprises, Corporate Social Responsibility, Process, Evaluation, Human Resource Management.

1. Introduction

The idea of increasing the profits of enterprises is becoming a phenomenon of the present times, as well as a factor in sustainability and sustainable development. Sustainable development should be included in thinking and in doing business.

Combining business, successful entrepreneurial activities and the fulfilment of other corporate interests would be for the benefit of all involved and even for the whole of society (Haid, Járková, 2012). The public demands that companies adhere to the rules, respect the environment, maintain a good relationship with employees and business partners and show an interest in what is happening around them. This increases the pressure of groups and individuals who have an interest in the organisations or who are affected by the activities of the organisation. They attempt to directly or indirectly influence the operation of companies and their actions.

The global term is “Corporate Social Responsibility”. By this is understood the social responsibility of people who make decisions in a given company, i.e. owners and managers. However, these are not only obligations towards natural resources, this responsibility is executed on several levels. It is a voluntary adoption of the environmental, economic and social liabilities of the company. Corporate Social Responsibility cannot be summarised in one definition recognised by a company. It is a complex concept. Corporate Social Responsibility, according to ČSN EN ISO 26000:2010 (2010), is the responsibility of the organisation for the impacts of its decisions and activities on society and the environment, and for ethical behaviour contributing to the sustainable development, health and welfare of society; it takes into account the expectations of stakeholders; is in accordance with the applicable legislation and international standards of behaviour and is integrated throughout the organisation and applied in its relations. Corporate Social Responsibility means a re-evaluation of the company’s operations. It is a philosophy, a concept and often already an implemented strategy. Initiatives in the field of the environment within the region in which the company develops its activities, integration of the principles of management and administration of companies, maintaining of a dialogue with representatives of regional authorities as well as non-governmental organisations operating within it, can contribute to the increasing competitiveness of the company, may significantly contribute to the sustainable development of the region in which the company operates, and to the overall improvement of the state of society (European Commission, 2002). Kolektiv autorů (2005) define the social responsibility of companies as a voluntary integration of social and environmental aspects into everyday corporate operations and interaction with stakeholders. This is therefore a voluntary activity. The main idea of this direction is the voluntary integration of social and ethical considerations and environmentally friendly principles into the daily activities and interactions with involved interest groups and individuals. Corporate Social Responsibility implies the initiatives and activities of companies with significant economic and social consequences, and also impacts on the environment (Mishra, Modi, 2013).

Corporate Social Responsibility is reflected in the integration of positive attitudes, practices and programmes in the corporate business strategy at the top level of management. Specifically, social responsibility is reflected by the integration of positive attitudes, practices and programmes in the business strategy of the company at the level of its top management. It requires a shift in perspective on own social role from the level of “profit only” to a broader perspective in the context of the often-mentioned three Ps – “People, Planet, Profit”. This entails functioning with regard to what is known as the “Triple Bottom Line”, where the company, in addition to concentrating on economic growth, concentrates also on the environmental and social aspects of its activities. This is because a company does not operate in isolation from the outside world, but is a direct part of it. In addition, evaluation of the activities of a company by its surroundings and the state of its environment directly affects the commercial success of any given

company. CSR is a method that appeals to the reorientation from short-term to long-term goals, from maximum to optimal profit. The Triple Bottom Line principle has a framework of three parts: social, environmental and financial. Many organisations have adopted this framework and evaluate their performance in the broader context (Slaper, Hall, 2011), indicating that the company concentrates not only on economic growth, which is primarily its objective, but also on the social and environmental aspects of its activities.

Among the most important aspects of social responsibility is the internal dimension related to practices, organisation and work relations. These comprise practices in the area of human rights; organisation and work relationships; safety and health protection at work; development and education, motivation and stabilisation in the area of promotion. The practice of organisation in the area of work relations includes all the policies and processes relating to the work carried out within the organisation/organisations or on its behalf. Socially responsible practices in the area of work relations can have a significant positive impact on the organisation's ability to recruit, motivate and keep employees and thus to increase the organisation's ability to achieve its goals. Responsible practices in the area of work relations generally have an impact on increased employee efficiency and can lead to greater employee involvement. Responsible practices in the area of work relations can also have a positive impact on the reputation of an organisation (ISO 26000).

Corporate Social Responsibility was originally created as a response to the growing negative impact of large, typically multinational companies. As pointed out by Jenkins (2009), the issue was increasingly being associated merely with large companies. However, as stated by Enderle (2004), in the past decade there has been a significant shift, combined with the recognition by SMEs of the growing importance of these very small fish to focus on social and environmental impacts.

SMEs differ in some important aspects compared to larger enterprises and corporations (Bateman, 2003):

- their market area is usually much more local and compact;
- they operate in many small areas with strong dependence on the local environment, most employees come from this area, as well as most of their customers;
- they have the relevant space for investment in activities that directly affect this environment and are accurately directed at the specific circumstances and environment;
- they have a shorter planning horizon, the benefits resulting from investments soon being shown in the form of orders. The stability of a business thus in turn strongly influences its commercial success and is a benefit to the local area (tax, employment, etc.);
- it is difficult for SMEs to find a way to come together and begin to share information;
- reports on their activities are spread with ruthless efficiency;
- the purpose of donations are often without linkage to corporate strategy;
- they do not have the administrative facilities to implement changes quickly and at low cost.

2. Methodology and Data

The primary data were obtained by means of a questionnaire survey of 302 respondents (owners and managers) of small and medium-sized enterprises in the Region of South Bohemia in the Czech Republic in 2013 and 2014 with focused on the characteristic features of the surveyed enterprises and their human resource management strategies, evaluation of individual processes and areas of human resource management process and corporate social responsibility area. The information database was formed by data of a quantitative as well as qualitative nature. Based on technical literature, 9 basic processes were determined that are implemented in enterprises in general:

- Marketing,
- Manufacture of Products and Services,
- Trade and Sales,
- Financial Management,
- Human Resource Management,
- Quality Management,
- Information Internal Processes,
- Corporate Social Responsibility,
- Communication with the Public – Media.

Engaged of companies in various activities of social responsibility are divided into:

- donations, voluntary actions and sponsorship,
- minimising the negative impact on the environment,
- superior employment policy,
- other activities,
- not engaged in any activities.

In the examined sample is represented in the sectors: trade 20%, transport 6%, services 26%, construction 10%, manufacturing 30% and agriculture 8%. The average age of companies in the sample is 16 years. The longest survival of the enterprise within the research sample is 50 years old and least is 1 year old. Most enterprises 58% are older than 15 years and only 25% of companies are younger than 10 years.

3. Results

In the context of the survey of European SMEs, it can be seen that competitive advantage is not the first priority for SMEs. Issues of dialogue with stakeholders become existential for them. The most important topic for small and medium-sized enterprises is work relationships and therefore Human Resource Management. However, during our research, was found prioritisation of individual processes in small and medium-sized enterprises (evaluated by managers or respondents authorised by managers) was identified. Owners and managers of enterprises reviewed the various processes in order of importance, at levels of 1 to 9 (integers), with a list that reviewed processes for each undertaking separately. Evaluation of importance by an enterprise as level 1 means the most important process in the company, while the value of 9 is equal to the least important process, selected from a list of 9 evaluated processes. In practice, this meant that the owners and managers of businesses chronologically compiled the importance of consecutive processes. Each process has its specific value, i.e. No two processes are located on the same level of importance. Table 1 shows evaluated process of Human

Resource Management at 6th place and process of Social Corporate Responsibility at 8th place according to the importance.

Table 1: Respondents' evaluation of the order of importance of individual processes

Process	Values in the ranges 1 – the most important; 9 – the least important	Order of important
Manufacture of Products and Services	1.80	1.
Trade and Sales	2.25	2.
Financial Manangement	3.01	3.
Quality Management	3.08	4.
Marketing	4.41	5.
Human Resource Management	4.48	6.
Information Internal Processes	5.28	7.
Corporate Social Responsibility	6.04	8.
Communication with the Public – Media	6.26	9.

Evaluation of functionality of processes was recorded at a level of 0–100%, where 100% meant a faultlessly functioning area and 0% corresponded to a malfunctioning area.

Following this research was evaluated the functioning of individual processes by managers or respondents authorised by managers. Functioning of processes was evaluated as very weak. The management quality of Corporate Social Responsibility was evaluated at 7th place and management quality of human resources at 5th place from all evaluated processes (table 2).

Table 2: Respondents' evaluation of the level of the operation of individual processes

Process	Mean	Order
Manufacture of Products and Services	87.99	1.
Quality Management	81.39	2.
Trade and Sales	80.60	3.
Financial Manangement	79.07	4.
Human Resource Management	69.09	5.
Information Internal Processes	65.25	6.
Corporate Social Responsibility	61.82	7.
Marketing	61.32	8.
Communication with the Public – Media	52.18	9.

A statistical evaluation shows table 3, that the value of the first quartile (X1st.Qu.) was 49 250; the value of quartile (median) was 70 000; the value of the third quartile (X3rd.Qu.) was 90 000. The simple arithmetic average of evaluation of the level of the

functioning of processes was 61 820 (mean) and the standard deviation (sd) for the analysed variable in the file was 36 922.

Table 3: Evaluation of the functioning of processes of social responsibility

Min.	X1st.Qu.	Median	Mean	X3rd.Qu.	Max.	NA.s	sd
0.000	49.250	70.000	61.820	90.000	100.000	15.000	36.922

This evaluation testifies to the fact that the managers evaluated of processes as insufficiently important although they still speak about this as about the essential.

The research also showed in which areas of social responsibility the surveyed companies are involved. 62.7% of respondents in the companies show engagement in social responsibility primarily in activities of donations, volunteering and sponsorships. Another area in which firms are involved is the area of minimising the negative impact of business on the environment — 43.32% of respondents. Respondents also reported that 13.2% of companies are committed to superior employee policy and 20.79% state that they are engaged in other unspecified activities. 17.16% reported that they are not engaged in any activities. All businesses showed an absence of foreign capital — 1 cooperative, 1 joint-stock company, 2 personal companies; other business entities were limited liability companies.

Table 4: Percentage of companies engaged in various activities of social responsibility

Engagement of companies in activities	Engagement of companies in %
donations, voluntary actions and sponsorship	62.70
minimising the negative impact on the environment	43.23
superior employment policy	13.20
other activities	20.79
not engaged in any activities	17.16

Human capital is the accumulation of knowledge and skills that exists within a company and among its employees. Human capital can be measured by attraction of employees, level of labour turnover, training and development costs, and the ability of a company to innovate. However, the management of human and intellectual capital involves more than just attracting and keeping employees. It also entails enabling employees to develop, as this will extend both the basic knowledge of the individual and the knowledge society. Good working conditions and a good reputation assist a company to be attractive, and to maintain and develop human capital.

The results of the research carried out showed that 37.09% of businesses create a strategy for Human Resource Management. However, out of the total surveyed sample, in only 5.96% is HRM strategy anchored in a written form (table 4).

4. Discussion and Conclusion

Behaviour in accordance with the principles of CSR produces both tangible and especially intangible benefits. In the same way as tangible assets are important to a

company, in the form of real estate, stock or financial assets, intangible assets are also crucial to a company, in the form of human capital, capital contained in natural resources, brand value, reputation, relationships of trust and partnerships. Involvement in Corporate Social Responsibility by a business not only distinctly contributes to a better society, but more importantly, the company gains visibility and creates a good image. And this is a clear advantage to a company.

The corporate sector and mostly small and medium-sized enterprises are coming under increasing pressure to demonstrably engage in activities that are referred to as socially responsible (Jenkins, 2009). While many such activities become part of the legislation, companies practising social responsibility should go beyond this framework. Kotler and Lee (2005) suggest that, just like taking care of our bodies is manifested in appearance and in a longer and happier life, social responsibility has the same effect on corporate practice. An increasing number of experts has pointed out the fact that the image which the company presents to its customers, employees, business partners and other entities, is beginning to play a key role in the global economy. Customers want to buy products from companies that are credible. Enterprises want business partners they can rely on. Employees want to work for companies that are worthy of their respect. Investors want to support companies that are socially responsible. Non-profit and non-governmental organisations want to collaborate with companies which have similar objectives to their own (Werther and Chandler, 2011).

If it wants to show serious interest in area of monitoring, reviewing and measuring social responsibility, a company must be involved in all three areas of social responsibility. Currently, the number of firms declaring this strategy is increasing. Many people are starting to see this activity not as a competitive advantage, but as a duty without which an organisation cannot be in a competitive position. It is necessary to provide proof of these activities, as all companies can certainly state that they themselves are socially responsible. A company itself should present its data in a credible way. Many techniques have been developed, but there are no generally accepted criteria for this measurement. The methodology chosen is up to the company itself. To achieve sustainable success in the constantly changing and uncertain environment, it is essential that organisations regularly monitor, measure, analyse and review their performance (ISO 9004). According to authors Pérez and Rodríguez del Bosque (2013), precise and detailed measurement of corporate responsibility is a complicated task.

In future, Corporate Social Responsibility should be discussed at a higher level than at that which is done at present. In my opinion, to measure social responsibility without the possibility of certification/verification of its authenticity is devoid of all meaning. It is companies which have the greatest financial potential to make changes in society. The public should be familiarised with this fact. However, it is probably naive to hope that man, in addition to taking care of profit, will also care about the needs of society.

The involvement of employees in a company plays a less obvious, albeit important role. It assists employees to develop new skills, increases their motivation and can lead to greater innovative activity and creativity. An international study conducted by authors Kim and Scullion (2013) deals with the effect of the concept of Corporate Social Responsibility on employee motivation. Here, corporate responsibility is understood in the context of responsibility among employees. Effective Human Resource Management in an international environment is taken as the main condition for success in business. Previous studies on this topic have refuted this association. Fifty-three extensive interviews were conducted in the UK and Korea. The study also discussed the difference

in influence between Asian and European corporate organisations. Three main results of the study were published. Firstly, the relationship of responsibility management aimed at employees improves their motivation and morale. With regard to the differences between the UK and Korea, in the UK responsibility management motivates employees to achieve higher individual performance, while in Korea this responsibility of employees supports their need to integrate themselves into the organisational culture. Employees in Europe appreciate responsibility management in relation to themselves and it motivates them to work harder. In Asia, job satisfaction is again important. Employees mostly want to be part of the relevant company, they do not migrate between companies so often, therefore satisfaction with their current job is important. These differences arise from different historical, political, institutional and cultural reasons — and not only from cultural differences, as might seem at first sight. The aforementioned reasons influence human perception and ways of thinking and behaviour in both the private and business environments.

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Entrepreneurial characteristics of students from various fields: challenges for entrepreneurship education

Marian Holienka¹, Jana Holienková² and Peter Gál³

¹*Department of Strategy and Entrepreneurship, Faculty of Management, Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovak Republic, e-mail: marian.holienka@fm.uniba.sk*

²*Department of Psychology, Faculty of Arts, University of SS. Cyril and Methodius in Trnava, Nám. J. Herdu 2, 917 01 Trnava, Slovak Republic, e-mail: jana.holienkova@ucm.sk*

³*Department of Strategy and Entrepreneurship, Faculty of Management, Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovak Republic, e-mail: peter.gal@fm.uniba.sk*

Abstract

The aim of our paper is to examine the entrepreneurial characteristics of university students in different disciplines, and to develop implications and recommendations for entrepreneurship education according to the observed differences. The main research question is to identify whether students from different selected disciplines exhibit different rates of enterprising potential, and if so, which are the differentiating attributes. In order to answer this question we conducted a pilot study using the General Enterprising Tendency v2 Test (GET2test) and analysing the enterprising potential of students in four different majors (business administration, applied informatics, psychology and pedagogy). Our sample comprised of 370 students from three different faculties at two universities in Slovakia. Our findings suggest that there are significant differences in the general enterprising tendency, as well as in three out of five its components (namely need for achievement, calculated risk taking and internal locus of control). Thus, students in different disciplines exhibit different rates of entrepreneurial predispositions. In our paper we present and discuss these findings, especially from the entrepreneurship education perspective in its broadest sense.

Keywords: enterprise, enterprising tendency, entrepreneurial characteristics, students, entrepreneurship education

1. Introduction

The growing importance of enterprise and enterprising in nowadays economies is undisputable. The current trends such as extreme dynamics of the environment, rapid changes and increasing cognitive complexity in all aspects of life lead to changing nature of interactions of individuals within the society. These interactions contain various aspects of individual self-realization, including (but not limited to) the professional work career. Thus, the enterprising concept gains on importance in various different contexts. Therefore, enterprising tendency embodied is important not only for those individuals who intend to pursue the entrepreneurial path as owner-managers of traditional for-profit businesses. It is essential for everyone who aims to start and successfully run projects in various environments, either as an employee, or in social and community ventures, education, science and technology, public sector or NGOs. Entrepreneurship education plays a crucial role in developing enterprising tendencies and shaping the entrepreneurial characteristics. In nowadays context, its role is not limited to foster the formation of independent for-profit businesses. Its aim should be much broader – to enhance creativity, innovativeness and ability to identify opportunities and execute ideas into reality, equipping students with so called “enterprising mindset” that can be realized in different (not only profit-oriented business) activities.

Thus, the challenges for entrepreneurship education are clearly set. However, these challenges frequently face diverse reality in different fields of study. These fields may generally attract various personalities of students and develop their enterprising tendencies in different ways. Different levels of enterprising tendencies imply the need for different approaches in entrepreneurship education. Thus, the aim of our study is to examine the entrepreneurial characteristics of university students in selected different disciplines and to develop implications and recommendations for entrepreneurship education. The main research question is to identify whether students from different selected disciplines exhibit different rates of enterprising tendency (i.e. a tendency to start up and manage projects), and if so, which are the differentiating attributes.

2. Literature Review

2.1. Enterprise, enterprising individuals, entrepreneurial characteristics

The concept of enterprise, in this context related to personal attribute (not to activity or unit of economic organization), is used in a number of situations with a number of different meanings. While the narrow view of enterprise (or being enterprising) is related to entrepreneurship specifically concerning business ventures, a broader view has more general human meaning (Bjerke, 2013). As we have indicated above, our understanding of this concept is rather broad and related to wide array of different contexts. Thus, we incline to definition characterising enterprise as set of individual's abilities to take initiative, discover and introduce new ideas, turn them into real activities and take responsibility for their execution (Orbanova and Velichova, 2013).

Analogically, an enterprising individual can be defined as a person who sets up and runs a project in wide array of different contexts (Caird, 1990), and enterprising tendency can be understood as the set of psychological characteristics associated with

the tendency to set up and manage projects (Caird, 1991). Since the traditional profit-oriented business venture is a considerable type of such projects, entrepreneurs can be understood as a subset of a wider category of enterprising individuals (Caird, 1990), who have shown and executed the tendency to start and manage projects – their business ventures. Because this subset has attracted the vast majority of scholars' and researchers' attention to enterprising individuals, knowledge on attributes of such individuals has been based mostly on knowledge on entrepreneurial characteristics.

Entrepreneurial characteristics can be defined as specific personality traits that are typical for entrepreneurs, i.e. individuals owning and managing entrepreneurial ventures and engaged in entrepreneurial projects in various stages of development. The question whether and how personality traits should be considered in relation to entrepreneurship has always been provoking a lively debate. Some of the first works in this field tried to establish the entrepreneurship as an action related with particular qualities, such as risk taking (Knight, 1921), innovativeness, achievement orientation, dominance (Schumpeter, 1934), knowledge and entrepreneurial discovery (Hayek, 1941) or achievement motivation (McClelland, 1961). Later, among other similar works, a ground-breaking work by Gartner (1988) argued that asking “who is an entrepreneur?” is a wrong question. In other words, many serious doubts have been proposed on efforts to determine typical personality traits of an entrepreneur, as they were considered too diverse and inconsistent, descriptive and missing solid theoretical grounding, and often methodologically weak. However, recently, the interest in a personality of an entrepreneur has revived, but with more sophisticated focuses (Rauch and Frese, 2012). Thus, Rauch and Frese call for revival of personality research in the field, and suggest that certain specific personality traits play a considerable role in individual propensity to entrepreneurship, its various aspects and outcomes.

Existing literature and empirical evidence provide several suggestions about which specific personality traits can be perceived as entrepreneurial characteristics. One of such efforts is the conceptual model proposed by Rauch and Frese (2007, 2012). It assumes that broad personality traits influence traits proximal to entrepreneurship that, in turn, influence goals and action strategies and, as a result, business success. Moreover, the effects of specific traits are hypothesized to be dependent on environmental variables. In particular, the specific personality traits, according to meta-analysis by the authors (Rauch and Frese, 2007) are: need for achievement, risk-taking, innovativeness, autonomy, locus of control and self-efficacy. A considerable effort to determine the specific traits attributed to enterprising individuals has been executed by Caird (1990, 1991, 1993). In her opinion, psychological characteristics of entrepreneurs and enterprising people may be identical, the only difference being the entrepreneur's specific association with a business enterprise (Caird, 1990). In particular, the proposed significant entrepreneurial characteristics are: calculated risk-taking, creative tendency, high need for achievement, high need for autonomy, and an internal locus of control. Moreover, Caird has also developed an instrument to measure the level of these characteristics together with the overall enterprising tendency (Caird, 1991). Thus, in our paper we will incline to her work and employ the proposed instrument to investigate for the answer to our research question.

2.2. Entrepreneurship education: importance, goals and challenges

Generally speaking, entrepreneurship education seeks to prepare people, especially, youth, to be responsible, enterprising individuals who become entrepreneurs or

entrepreneurial thinkers and who contribute to economic development and sustainable communities, with a fundamental premise that entrepreneurial characteristics and skills are capable of being taught (IAC, 2006). It is necessary to understand that aims of entrepreneurship education may not only be related to development of entrepreneurs, but also to development of enterprising life and work skills among people who may enter employment rather than start a business (Caird, 1990). With such broad impact it is clear that such education is one of keys to face the challenges of nowadays economies. In this context, more general term of “enterprise education” would better describe the complexity of the entire issue. Generally, goals of entrepreneurship education can be grouped into several categories. Caird (1990) recognizes three main categories: education for enterprise (with main aim to support initiation and development of a business), education through enterprise (with main aim to develop life skills and competencies of enterprising individuals), and education about enterprise (with main aim to develop awareness and understanding of business and industry).

In this paper we focus particularly on education within existing education systems, especially university education. The entrepreneurship education programming should develop the particular educational initiative according to clearly defined goal, but also considering the particular target group and its characteristics. Important attribute that need to be taken into account is the level of entrepreneurial characteristics of the target group. Therefore, information about the current level of enterprising tendencies and entrepreneurial characteristics of different groups of students is inevitable for efficient and effective entrepreneurship education design and delivery. Different levels of entrepreneurial characteristics of students from various fields would set different challenges for entrepreneurship education at universities.

2.3. Entrepreneurial Characteristics of Students in Different Fields

University students are frequently subjects of interest when it comes to entrepreneurial characteristics. Generally, there is a hope that part of students will utilize entrepreneurial characteristics to start their own business venture, thus entering the path to economic self-sufficiency, self-employment and creation of employment opportunities for others. In our opinion, the context with this respect is much broader. Enterprising individuals who exhibit ability and willingness to take initiative, discover and introduce new ideas, turn these ideas into real activities and take responsibility for their execution can create value for themselves and the entire society not only by creating business ventures. Moreover, they can utilize their potential to start and successfully run projects in various environments irrespective the particular context. With these projects, they contribute to society by creating a value for different stakeholders, but they also increase their qualification and value on the labour market.

The assumption about differences in levels of entrepreneurial characteristics and enterprising tendency between students in different fields is based on two main preconditions. Firstly, different disciplines may, in general, obviously attract various personalities of students and develop their enterprising tendencies in different ways. This is because of the nature of the discipline itself, as well as because of the nature of education in this discipline. Secondly, differences in enterprising levels have been confirmed among different occupational groups (Caird, 1991). Since students will join the respective occupational groups after their graduation, and we already expect their certain conformity with these groups, the differences in enterprising tendency may be already observable. Therefore, we assume the existence of differences in overall

enterprising tendency as well as in particular entrepreneurial characteristics between university students in different fields of study.

Empirical findings about this phenomenon are rather scarce. There have been several studies dealing with different students' attributes and characteristics in relation to entrepreneurship worldwide (Koh, 1996, Yusof, 2007, Pfeifer et al., 2014) as well as in Slovakia (Fleskova and Babjakova, 2011, Mesarosova and Mesaros, 2013). Foreign studies have identified several psychological attributes related with entrepreneurial inclination, such as risk-taking propensity, innovativeness and tolerance of ambiguity (Koh, 1996, Yusof et al., 2007); need for achievement (Yusof et al., 2007); or strength of entrepreneurial identity, self-efficacy and entrepreneurial outcome expectation (Pfeifer et al., 2014). Concerning studies conducted in Slovakia, broad personality traits in relation to entrepreneurial intentions have been analyzed by Fleskova and Babiakova (2011), who found no significant difference in big five personality traits between students planning to start their own business and those preferring employment career path. On the other hand they found significant difference in four out of five personality traits (except of agreeableness) when dividing students according to self-confidence about having required entrepreneurial skills. Particularly in relation to entrepreneurial characteristics, Mesarosova and Mesaros (2013) have compared enterprising tendencies and their predictors among students in two different disciplines and business owner-managers. According to their findings, enterprising tendency of business owner-managers was higher than among students, while differences between economy and philosophy students' enterprising tendencies were not found to be significant.

3. Methodology and Data

3.1. Sample

The sample of the presented pilot study comprised of 370 students from two Slovak universities (Bratislava, Trnava) studying in four different fields of study. The only sampling criteria was an active full-time university study in one of the analysed majors, without any gender or age limitations. The respondents were acquired using a convenience sampling technique. The sample comprised of 157 students of business administration, 49 students of applied informatics, 101 students of psychology and 63 students of pedagogy. The respondents attended both bachelor and masters level. The data were gathered from October 2013 to October 2014.

3.2. Measure and Variables

The overall level of enterprising tendency as well as its different attributes (entrepreneurial characteristics) were measured using the General Enterprising Tendency v2 Test (GET2 test), a foreign survey method developed by Caird (1991). This method has been previously verified in several empirical studies (Cromie, 2000).

GET2 test is a self-assessment scale comprising of 54 statements that aims to measure key attributes of enterprising individuals by assessing five key characteristics, namely calculated risk taking, creative tendency, need for achievement, internal locus of control (each represented by 12 items), and need for autonomy (represented by 6 items). The overall enterprising tendency score is calculated as a total of all items. The score of 44 to 54 points (high score) indicates that individual is considered as very enterprising, the

medium score (27 to 43 points) indicates possession of some enterprising qualities, and low score (0 to 26 points) indicates low levels of general enterprising tendency. The particular characteristics are scored as follows: high (10 to 12 points/4 to 6 points), medium (7 to 9 points/3 points) and low (0 to 6 points/0 to 2 points).

The GET2 test questionnaire has been translated by the authors to Slovak language following the requirements for survey instruments translation, and it has been distributed in Slovak language version. The internal consistency analysis on our sample provided satisfactory values of Cronbach's alpha coefficient for the entire questionnaire ($\alpha=0.840$) as well as for its particular factors (calculated risk taking: $\alpha=0.767$, need for achievement: $\alpha=0.766$, need for autonomy: $\alpha=0.755$, creative tendency: $\alpha=0.802$ and internal locus of control: $\alpha=0.621$). The factor analysis confirmed the existence of five factors that together explain 55.48% of overall variance.

3.3. Method

The main goal of this pilot study was to investigate whether university students from different fields of study exhibit different level of overall enterprising tendency as well as of particular entrepreneurial characteristics. The obtained data were analysed using a parametric statistics with Fisher's F-test One-Way ANOVA (analysis of variance). This method was selected due to comparison of several populations (students from different fields of study) according to quantitative variable (overall enterprising tendency, entrepreneurial characteristics). The analysis was executed in SPSS v.21 software.

4. Results

The results of our investigation suggest that there are statistically significant differences in the overall enterprising tendency as well as in case of three (out of five tested) entrepreneurial characteristics between students in different fields of study.

In the first step of our investigation we analysed the differences in overall enterprising tendency between the different fields of study. Basic descriptive statistics and results of one-way analysis of variance are provided in Table 1.

Table 1: Overall enterprising tendency levels according to field of study

	Field of study	Mean	SD	ANOVA	
				F	p
Overall enterprising tendency	Business administration	34.605	0.1084	5.856(*)	0.001
	Applied informatics	31.184	0.3103		
	Psychology	31.871	0.706		
	Pedagogy	30.444	0.935		

As can be seen in Table 1, results of Fisher's F-test One-Way ANOVA suggest that differences in overall enterprising tendency between the fields of study are statistically significant ($F=5.856$; $p=0.001$). This finding suggests that students of different fields of study exhibit differences in the overall level of enterprising tendency, and these differences are in direction of higher levels for students of business administration > students of psychology > students of applied informatics > students of pedagogy.

The average values of overall enterprising tendency (Table 1) further suggest that, among the fields of study analysed in our investigation, students of business

administration exhibit the highest enterprising tendency ($M=34.605$; $SD=0.594$), while students of pedagogy seem to be the least enterprising ($M=30.444$; $SD=0.935$). However, according to interpretation of GET2 test evaluation, average values of all analysed groups fall into the same category of enterprising tendency – a medium range indicating possession of some enterprising qualities. The medium score indicates that individuals are likely to have strengths in some enterprising characteristics and may be enterprising in certain contexts. At the same time, they are less likely to set up an innovative high growth business venture, and may be able to express their enterprising tendency rather within an employment (as intrapreneurs) or in their leisure time (e.g. through voluntary community projects). On the other hand, the results also indicate that students of business administration are on average more inclined to possession of high enterprising qualities than the other groups.

In further investigation we have focused on the analysis of differences in particular entrepreneurial characteristics between the assessed fields of study. Basic descriptive statistics and results of one-way analysis of variance are provided in Table 2.

Table 2: Entrepreneurial characteristics according to field of study

Subscale	Field of study	Mean	SD	ANOVA	
				F	p
Need for achievement	Business administration	7.5669	2.28786	5.074(*)	0.002
	Applied informatics	6.6939	2.80033		
	Psychology	6.5743	2.01170		
	Pedagogy	6.6667	2.30007		
Calculated risk taking	Business administration	8.5605	2.17308	6.106(*)	0.000
	Applied informatics	7.6327	2.62753		
	Psychology	7.6535	2.20652		
	Pedagogy	7.3492	2.32905		
Need for autonomy	Business administration	3.2611	1.35470	1.501	0.214
	Applied informatics	2.8776	1.42350		
	Psychology	3.0594	1.37711		
	Pedagogy	2.9365	1.30598		
Internal locus of control	Business administration	8.0764	2.20297	4.109(*)	0.007
	Applied informatics	7.0408	2.69227		
	Psychology	7.8713	1.84750		
	Pedagogy	7.2540	2.14753		
Creative tendency	Business administration	7.1401	2.23164	2.179	0.090
	Applied informatics	6.9388	2.86071		
	Psychology	6.7129	2.38469		
	Pedagogy	6.2381	2.69237		

The differences in entrepreneurial characteristics measured using the Fisher's F-test (Table 2) between the analysed fields of study were found to be statistically significant in case of three attributes, namely in case of need for achievement ($F=5.074$; $p=0.002$), calculated risk taking ($F=6.106$; $p=0.000$), and internal locus of control ($F=4.109$; $p=0.007$). Thus, our findings suggest that students in different fields of study exhibit different levels of need for achievement, ability to take calculated risk and having an internal locus of control. On the other hand, differences in levels of need for autonomy and creative tendency were not found to be significant. The average values of particular entrepreneurial characteristics evaluations (Table 2) further suggest that, among the

fields of study analysed in our investigation, students of business administration (like in the case of the overall enterprising tendency) exhibit higher average values than their counterparts in other fields of study in case of all five measured attributes.

Looking at the evaluation of particular entrepreneurial characteristics according to scoring categories provides some suggestions on differences between the students in different fields of study. In case of need for achievement, medium level of this attribute (indicating inclination to considering rather “tried and tested” enterprising ideas) was exhibited only by students of business administration. All remaining groups exhibited low level of this attribute (indicating probability that running an enterprise would be too much hard work and commitment). Same situation was identified in case of creative tendency. Medium score among business administration students indicates preference to somehow more straightforward rather than completely novelty enterprising ideas, while low score among students of other disciplines indicates satisfaction with proven, traditional approaches. In case of all remaining attributes, average values of all groups fell into medium level. Medium level of calculated risk taking indicates orientation on “tried and tested”, less risky enterprising ideas or ideas where risk is taken by the partner. Medium level of need for autonomy indicates rather indifference to work as an intrapreneur, member of a team, or to run independent projects. Finally, medium level of internal locus of control indicates need to further development of self-confidence and enterprising skills to exert a greater control over the development of ones ideas, due to possible over-reliance on others in running the projects.

5. Discussion and Conclusions

The results of our analysis suggest that the levels of overall enterprising tendency and particular entrepreneurial characteristics among university students vary across the analysed fields of study. These findings contribute to the existing body of knowledge. Unlike the previous similar study (Mesarsova and Mesaros, 2011), we have indicated differences between the analysed disciplines. Based on these findings, we have developed several implications and challenges for entrepreneurship education programming.

The overall enterprising tendency in all analyzed fields of study can be defined as medium and rather inclining to low, according to GET2test-based classification. This is a serious challenge for education, as in our opinion, the gap between current and desired levels of enterprising tendency is rather high. Obviously, not all students can or should be entrepreneurs (in terms of owner-managers of profit-oriented businesses). However, we do not appeal for more entrepreneurship. Instead, we call for development of enterprising spirit and skills among current and future generations of students, and their realization in various contexts (e.g. entrepreneurship, intrapreneurship, social and community ventures, education, science and technology, public sector or NGOs), for the benefit of themselves as well as of the entire society. We understand that enterprising qualities development should start in earlier phases of education (in our opinion, even in kindergartens and elementary schools). However, emphasis on university students is crucial since they stand on important crossroads of their professional career, and their decision to pursue the enterprising path can affect their entire career orientation.

In our opinion, development of enterprising tendency and entrepreneurial characteristics is important in all fields of study that we have considered in our analysis. Namely, students of psychology will need the enterprising qualities to systematically

build and develop their professional career, constantly educate themselves and innovate, and build own professional identity. Pedagogy students as future teachers should be enterprising in developing various projects, activities and innovations in education process; in creating challenging and stimulating classroom atmosphere; and last but not least, in stimulating and encouraging enterprising qualities among their students and pupils. Applied informatics students would utilize enterprising qualities in inventing innovative solutions, starting new projects or in some cases also own business ventures. Generally, they possess a marketable hard skill, but often lack skills to transform their virtuoso knowledge into practical products accepted by general population. Thus, with sufficient enterprising spirit they would have good precondition to create and market a value that can secure them economic self-sufficiency. Finally, business administration students will need to be enterprising to run their own business or work as professional executives or project managers. Moreover, they would also need to support an enterprising culture in their organizations. The entire management profession is about leadership and development of new directions, opportunities and ideas, i.e. about application of enterprising qualities in different contexts.

To respect and account for the identified differences, the entrepreneurship education design and delivery should follow the customization principle. We encourage to follow a “language school-like” principle, where levels of input characteristics in different groups are tested, groups are sorted into particular “levels”, and approach that best corresponds with their characteristics is applied. Moreover, the tailor-made principle should not stop on this level. Basic customization on the level of particular fields of study should be further developed on lower levels, i.e. particular study groups, teams and students. Everyone should have a chance to develop and execute his/her enterprising potential at highest possible level. However, such education requires well-trained and highly-motivated teachers and favourable ecosystem providing the necessary support.

More specifically speaking, in terms of aims of entrepreneurship education according to levels of enterprising tendency, we suggest to focus on education for enterprise (aimed to strengthen and capitalize the enterprising tendency by supporting initiation and development of projects, especially businesses) for students with high enterprising tendency; on a combination of education for enterprise and through enterprise (aimed to develop enterprising life skills and competencies and guide about their usage in different contexts) for students with medium enterprising tendency; and on education through enterprise for students exhibiting low tendency for enterprising.

The highest level of enterprising tendency among business administration students can be explained by several reasons. In our opinion, it should be obvious “by definition”, because these students usually decide for this field of study with motivation to become leaders, managers or entrepreneurs in the future. Also, as indicated by significantly higher need for achievement, they may possess higher drive and desire for self-realization in leading positions in different kinds of projects/contexts (executives, project managers, owner-managers, etc.). Thus, entrepreneurship education in this field of study should strengthen its focus “for enterprise”.

Rather worrying are the results of pedagogy students, indicating the comparatively lowest overall enterprising tendency. Nowadays situation requires building and developing enterprising tendency already from childhood, and current pedagogy students / future teachers are those that will play a key role with this respect. If we want them to guide children towards enterprising, they need to be more enterprising themselves. For this reason, the role of entrepreneurship education among pedagogy students should be strengthened, with main aim on education through enterprise.

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Prevalence and Interdependence Between Obesity and Health Care Cost in Brno – Preliminary Results From Kardiovize Brno 2030

Martin Homolka^{1 2}, Luboš Střelec³, Ida Vajčnerová¹, Ondřej Sochor²

¹*Department of Management, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: martin.homolka@fnusa.cz; ida.vajcnerova@mendelu.cz*

²*International Clinical Research Center, Department of Cardiovascular Diseases, St. Anne's University Hospital Brno e-mail: Sochor@fnusa.cz*

³*Department of Statistics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: lubos.strelec@mendelu.cz*

Abstract

Insurance companies in the Czech Republic spent on the treatment of diseases associated with being overweight and obese considerable resources. Diseases associated just with obesity are often very serious and very expensive for the insurance company. This study aims to find out what is observed in a random sample of the Brno population prevalence of normal weight, overweight and obesity, and cost of each group according to health insurance company annually worth

Methods: For the purpose of the work was selected by a random sample of 1,302 volunteers from the Brno population aged 25–64 years (707 women and 595 men).

Results: In the sample of the Brno population prevalence of obesity was 18.36%, 34.72% for the overweight according to BMI. Normal weight was 44.62% of the respondents, 2.30% are underweight. With the growing BMI was statistically increasing of health care cost. The underweight has lower healthcare costs (16.97%) compared to the group normal weight, group characterized as overweight cost more (6.66%). The group with obese people costs 48.23% more compared to people with normal weight.

Conclusion: Obesity is defined different methodologies is a significant risk factor for serious cardiovascular disease. These diseases are manifested by increased amount of resources that must expend additional insurance cost. It was clearly demonstrated that the reported cost of health care rises with increasing weight. Therefore, insurers should make serious efforts to interventions aimed at weight reduction and in the long run reduce costs for this high-risk group. At the same time control in obese should be more numerous than the population with normal weight.

Keywords: BMI, medical spending, ANOVA, Health Care Cost

1. Introduction

Obesity has substantially increased and is one of the major global health problems [MALIK V.S. et al., 2012]. In the Czech Republic, the problems associated with obesity slowly began to emerge since 1993. If I had a little ironically paraphrased sentence “We will catch up the western country!” – According to problem with obesity, we have already reached them.

The large obesity-related health burden negatively impacts many relevant health outcomes (e.g. quality of life, disability, mortality) and leads to increased healthcare utilization. This excess service use is the main driver behind high healthcare costs of obese individuals [HASLAM et al., 2005]. Findings indicate that costs rise with increasing body mass index, especially among the obese. As more individuals of a country's population become obese or overweight, a larger share of total annual national healthcare expenditure is spent on obesity and obesity-related health problems by insurance company. In addition to escalating healthcare costs, obesity goes along with indirect costs through decreases in workforce productivity. The empirical evidence has shown beyond doubt that obesity negatively impacts individuals, healthcare systems, employers, and the economy as a whole. This article provides a brief overview of selected economic consequences associated with excess-weight.

There is an undeniable link between rising level of weight (normal, overweight, obesity) and rising medical spending of insurance company [LEHNERT T et al., 2013]. Eric Finkelstein and colleagues [FINKELSTEIN EA et al., 2003], demonstrated the extent to which excess weight increased annual medical spending for public and private sector. That study showed that the costs of overweight and obesity could have been in US as high as \$78.5 billion in 1998 and that roughly half of this total was financed by Medicare and Medicaid. Since 1998–2008 burden of obesity has risen to almost 10 percent of all medical spending and could amount to \$147 billion per year in 2008. Other studies have also quantified the extent to which obesity influences aggregate health spending. For example, Kenneth Thorpe and colleagues [Finkelstein EA et al., 2009], found that obesity was responsible for 27 percent of the rise in inflation-adjusted health spending between 1987 and 2001 [Thorpe KE et al., 2004],

Insurance companies in the Czech Republic spent on the treatment of diseases associated with being overweight and obese considerable resources – according to studies carried out in different countries current economic costs of obesity represent 5–8% of all direct health costs and still rising [FINKELSTEIN et al., 2010] [CAWLEY et al., 2012]. Diseases associated just with obesity are often very serious and very expensive for the insurance company. This study aims to find out what is observed in a random sample of the Brno population prevalence of normal weight, overweight and obesity, and cost of each group according to health insurance Company annually worth.

2. Methodology and Data

2.1. Study participants

The primary aim of the first phase of Kardiovizie Brno 2030 is to assess the prevalence of major cardiovascular risk factors in the population of Brno City district. For the purpose of the work was selected by a random sample of 1,302 volunteers from the Brno population aged 25–64 years (707 women and 595 men). Study participants were contacted based on databases of health insurance companies and examined by the methodology of Czech Post-MONICA Study [R. Cífková et al., 2010],[R. Cífková et al., 2014]. Patients set a number of parameters: weight, height, (on the basis of which was determined BMI) were also recognized on the basis of health care cost – costs of the insurance company.

2.2. Health care cost

The state-run General Health Insurance Company (keeping, by law, a registry of all individuals insured with all Czech health insurance companies) randomly selected a representative sample 3600 insures aged 25–64 years, permanent residents of Brno City district. According to data released by the Czech Statistical Office, the city of Brno had a population of 373,327 as of 1st January 2013) [CZSO, 2013], our goal was to enroll a representative sample of 2000 volunteers corresponding to about 1% population sample aged 25–64 years. Since January 31, 2015, a total of 1302 participants were enrolled with all data – including health care cost. Health care cost were as sum of 2 consecutive years

2.3. Body mass index

The inclusion of variables depicting each person's BMI category (underweight: BMI <18.5, normal: BMI 18.5–<25, overweight: BMI 25–<30 and obese: BMI ≥ 30) allows for predicting the impact of these variables on health care cost of medical spending.

2.4. Statistical analysis

For the analysis we used the two-way analysis of variance (ANOVA). Therefore, we examine the influence of two different categorical independent variables, concretely the BMI and gender, on the health care costs (pvp). Individual respondents were divided into four different categories depending on the value of BMI, as follows: underweight: BMI <18.5, normal: BMI 18.5–<25, overweight: BMI 25–<30 and obese: BMI ≥ 30. Subsequently, we also used the information on gender and thus, our research not only aimed at assessing the main effect of BMI and gender, but also if there is any interaction between them.

Due to the correct use of the two-way ANOVA, we also verified the basic assumptions of normality and homogeneity of the samples. For the normality testing we used the Shapiro-Wilk test as the most popular omnibus test of normality for a general use, the Jarque-Bera test as the most widely adopted omnibus test of normality in finance and related fields, and the Lilliefors test as the most famous tests of normality based on the

empirical distribution function. For the homogeneity testing we used the Bartlett test, the Fligner-Killleen test and the Levene test.

3. Results

A total of 1302 individuals were included into this preliminary analysis. Prevalence of people with malnutrition was 2.30% (n=30), normal weight was 44.62% (n=581) of the population, there are 34.72% (n=452) of overweight, and 18.36% of Obese patient. Across all payers, malnutrition people cost 21709.83 CZK, people characterized as normal weight cost 26149.38 CZK, overweight patients cost 27888.16 CZK and obese people had per capita medical spending that was 38760.57 CZK in the monitored period (for details, see Table 1). The variability between groups is visible different, e.g. the standard deviation for costs of obese patients is more than three times higher than the costs of people with malnutrition. Similarly, the distributions are visible non-normal, because costs distributions of individual groups are right skewed and have oversized kurtosis.

Table 1: Descriptive statistics

	BMI				Gender	
	<=18.5	<25	<30	>=30	Female	Male
n	30	581	452	239	707	595
mean	21709.83	26149.38	27888.16	38760.57	30201.48	27497.22
median	12127.33	13491.91	14922.45	20329.52	17555.86	11169.21
sd	21391.33	45967.99	45978.56	65937.9	42387.88	57820.01
skewness	0.8559	6.4281	6.6456	6.6011	5.4740	7.2288
kurtosis	2.3678	59.5005	64.7190	63.9237	48.3174	71.9301

Now we focus on the analysis of variance. Firstly, we verify the prerequisites of the correct use of the analysis of variance. Violation of the fundamental assumptions was already evident from the indicators mentioned above. Nevertheless, we verify these assumptions exactly using statistical tests. Thus, Tab. 2 and 3 present test statistics and p-values of the selected normality and homogeneity tests for the original data of the health care costs (pvp). Based on this analysis we can conclude that samples are not normally distributed as well as the hypothesis of homogeneity was rejected. However, we can also consider that health care costs are a realization of a probabilistic process which can be fitted by several non-negative right skewed probability distributions, such as log-normal, Pareto, Weibull or gamma distributions, from which especially lognormal distribution is often used (see e.g. French and Jones, 2004). And as it is generally known, if the random variable X is log-normally distributed, then $Y = \log(X)$ has a normal distribution.

Table 2: Testing for normality – pvp

	Jarque-Bera test		Lilliefors test		Shapiro-Wilk test	
	statistic	p-value	statistic	p-value	statistic	p-value
<=18.5	4.162	0.125	0.211	0.001	0.845	<0.001
<25	81282	<0.001	0.287	<0.001	0.445	<0.001
<30	75068	<0.001	0.275	<0.001	0.470	<0.001
>=30	38698	<0.001	0.280	<0.001	0.461	<0.001
Female	64029	<0.001	0.245	<0.001	0.537	<0.001
Male	122976	<0.001	0.318	<0.001	0.391	<0.001

Table 3: Testing for homogeneity – pvp

	BMI		Gender	
	statistic	p-value	statistic	p-value
Bartlett test	83.113	<0.001	83.113	<0.001
Fligner-Killeen test	24.328	<0.001	24.328	<0.001
Levene test	2.346	0.071	2.346	0.071

Therefore, we transformed the health care costs by logarithmic transformation – results of the selected tests of normality and homogeneity are presented in Tab. 4 and 5. The results indicate fulfillment of the basic assumptions of normality and homogeneity what is also visible from Fig. 1 and 2, which present histograms, Q-Q plots and boxplots for logarithm of the health care costs – log(pvp).

Table 4: Testing for normality – log(pvp)

	Jarque-Bera test		Lilliefors test		Shapiro-Wilk test	
	statistic	p-value	statistic	p-value	statistic	p-value
<=18.5	1.990	0.370	0.122	0.305	0.939	0.086
<25	23.655	<0.001	0.025	0.520	0.993	0.007
<30	1.013	0.603	0.025	0.722	0.997	0.657
>=30	4.380	0.111	0.028	0.913	0.995	0.549
Female	4.713	0.095	0.026	0.274	0.996	0.084
Male	5.216	0.074	0.028	0.313	0.996	0.201

Table 5: Testing for homogeneity – log(pvp)

	BMI		Gender	
	statistic	p-value	statistic	p-value
Bartlett test	1.366	0.714	38.609	<0.001
Fligner-Killeen test	4.411	0.220	28.493	<0.001
Levene test	1.247	0.291	29.627	<0.001

Now we can conduct the analysis of variance. The results of two-way analysis of variance are presented in Tab. 6. The tests for the main effects of BMI and Gender, respectively, show significant effects on the health care costs (both with $p < 0.001$). From the ANOVA table we can also see that there is no evidence of a statistically significant

interaction effect ($p=0.256$). We therefore cannot conclude that there is an interaction between BMI and Gender.

For the purpose of finding the means that are significantly different from each other we use the Tukey-Kramer method of post-hoc multiple comparison. Results of the Tukey-Kramer method are presented in Tab. 7 which indicate that the significant differences are between obese people (BMI 30+) compared to the other groups. Other differences based on BMI are not statistically significant. Note, that Tab. 7 also contains the Tukey-Kramer 95% confidence intervals. Based on them we can conclude that the health care costs of obese patients are significantly higher than the health care costs of the other groups, i.e. people with BMI <30. We can also conclude that the health care costs for women are significantly higher than for men. Interaction between BMI and Gender is not statistically significant.

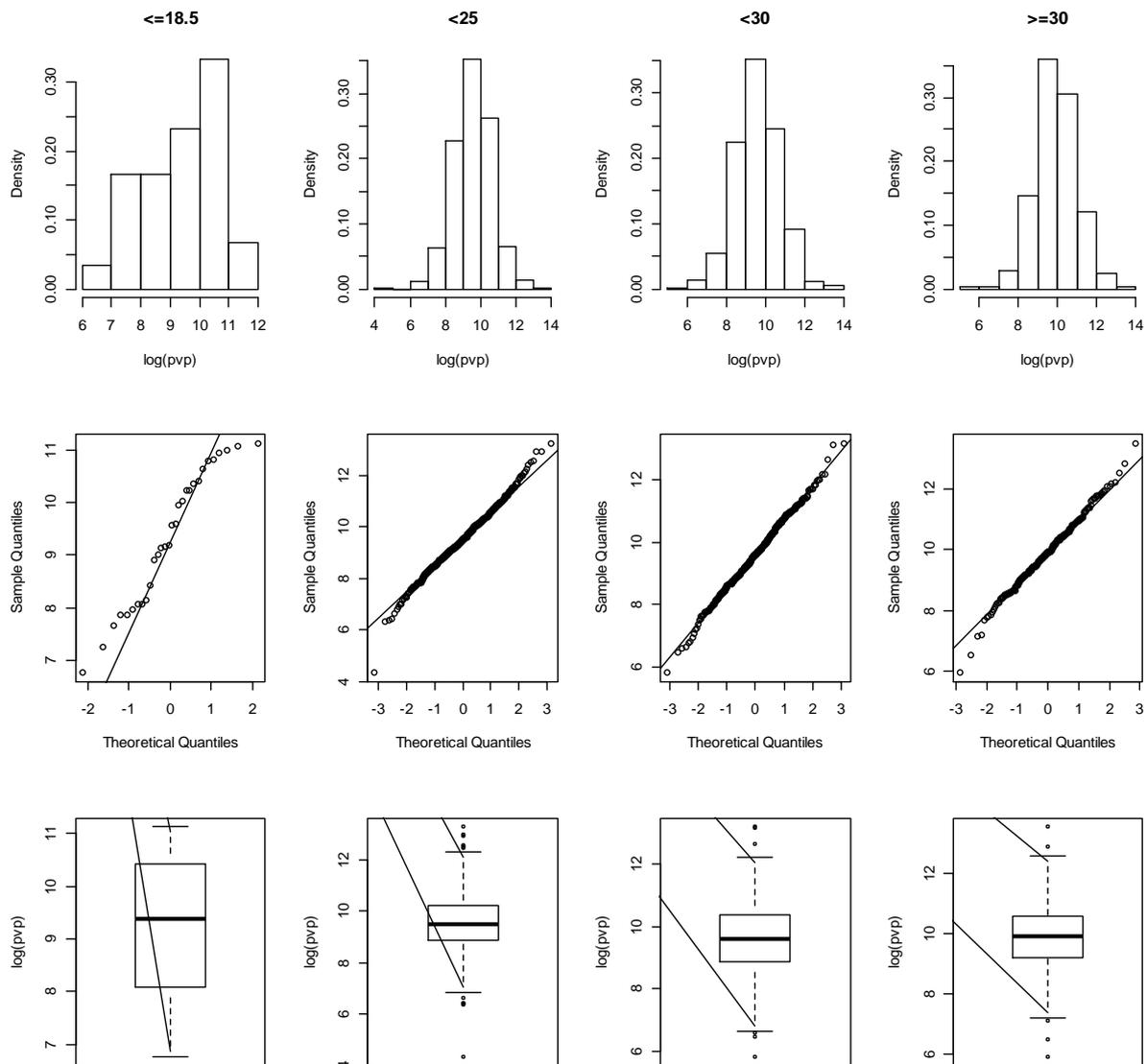


Figure 1: Histograms, Q-Q plots and boxplots based divided by BMI - $\log(pvp)$

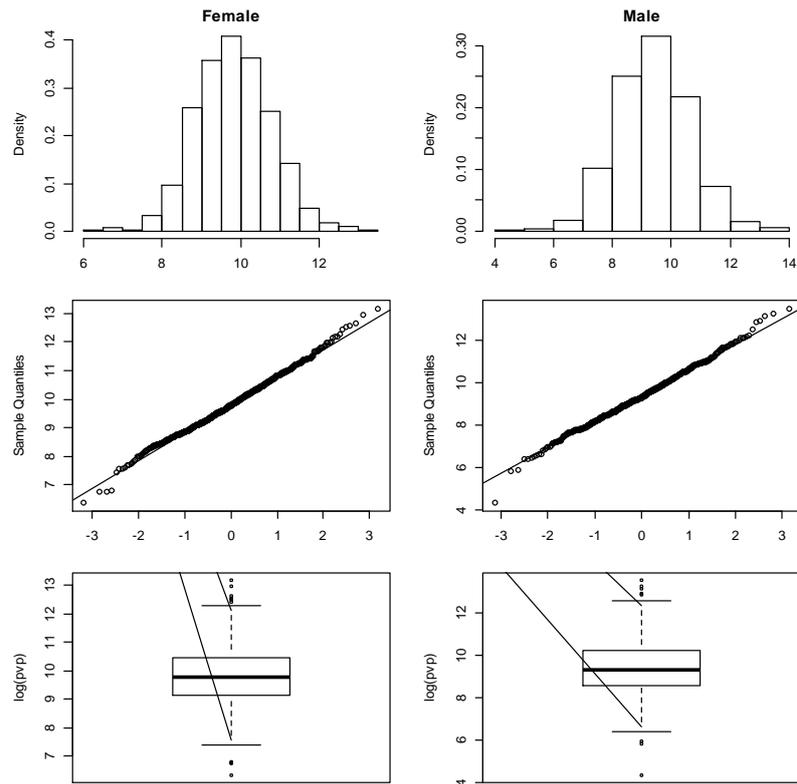


Figure 2: Histograms, Q-Q plots and boxplots based divided by Gender – log(pvp)

Table 6: ANOVA results – Response: log(pvp)

	Df	Sum Sq	F-statistic	p-value
BMI	3	41.24	11.515	<0.001
Gender	1	66.73	55.894	<0.001
BMI*Gender	3	4.84	1.352	0.256
residuals	1294	1544.96		

Table 7: Post-hoc comparison – Tukey-Kramer method, 95% confidence intervals – log(pvp)

	Diff.	Lower	Upper	p-value
<=18.5 – <25	-0.188	-0.725	0.350	0.806
<=18.5 – <30	-0.265	-0.807	0.276	0.588
<=18.5 – >=30	-0.584	-1.140	-0.028	0.035
<25 – <30	-0.078	-0.258	0.102	0.683
<25 – >=30	-0.396	-0.617	-0.175	<0.001
<30 – >=30	-0.318	-0.578	-0.089	0.002
Female – Male	0.421	0.292	0.533	<0.001

4. Discussion and Conclusions

This article provides a brief overview of selected economic outcomes associated with overweight and obesity. Empirical findings have shown positive association between excess weight and medical expenditures/costs.

In the sample of the Brno population prevalence of overweight or obesity was 53.07% according to BMI. Normal weight was 44.62% of the respondents, 2.30% are underweight. With the growing BMI was statistically significantly increasing of health care cost. The group characterized as underweight has lower healthcare costs (16.97%, – 4439.525 CZK) compared to the group normal weight, group characterized as overweight cost more (6.68%, +1738.78 CZK). The group with obese people costs even more compared to people with normal weight (41.6%, 12611.19CZK)

From the results of the study it is evident that health care cost is the highest in obese patients (compared to other groups, BMI 30+). Other differences are statistically insignificant. Therefore, we can say that people with a high BMI have a significantly higher cost than any other groups. The costs are also lower for men than for women – the interaction between BMI and gender has not been proved

Obesity is defined different methodologies is a significant risk factor for serious cardiovascular disease. These diseases are manifested by increased amount of resources that must expend additional insurance cost. It was clearly demonstrated that the reported cost of health care rises with increasing weight. Therefore, insurers should make serious efforts to interventions aimed at weight reduction and in the long run reduce costs for this high-risk group. At the same time control in obese should be more numerous than the population with normal weight. Obesity is also a suitable target for interventions aimed at reducing the risk of hypertension. In order to fight the huge economic burden of overweight and obesity, cost-effective interventions should be implemented. Based on the findings of this study, it is clear that the reduction of BMI can generate huge savings for insurance company.

A limitation of our study is the lower response rate of our sample compared with other Czech post-MONICA study regions. There may be two possible explanations: no financial compensation provided to Brno volunteers participating in project KardioVize and a low level of motivation of Brno citizens to have their health status in a setting with good availability of health care. Another limiting factor is a calculation based on the BMI index, which does not sufficiently reflect muscle mass and its interpretation may not be accurate. For more accurate determination of obesity should be used bio impedance method for determining target body fat.

Acknowledgements

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Low-cost data mining application via unused smartphone devices using computer vision and relevant data security issues

František Hortai¹

¹Institute of Informatics, Faculty of Business and Economics, Brno University of Technology, Kolejní 2906/4, 612 00 Brno, Czech Republic, e-mail: hortai@fbm.vutbr.cz

Abstract

The main aim of the article is to propose a “technology recycling” possibility, a way for reusing unused smartphone devices. For this issue a possible solution is created, a design and implementation of low-cost data mining application for smartphones. Computing power of smartphones is sufficient for computer vision methods, such as optical pattern recognition and character recognition in images and in camera stream which briefly explains the theoretical part. This article contains a specific proposal for data mining application for licence plate detection and recognition from image and from real time camera input. It can be used for automatic vehicle detection operations as information mining process (customers origin, the frequency of visits) and also to verify the vehicle (access control, check whether the car is stolen, etc.). To ensure data safety of recognized information and additional data from the device (date, time and GPS position, etc.) the possible software security techniques are explained (encryption methods, the possibility of using steganography in images). To show the whole concept and functioning a smartphone application was created on Android platform which is the most widespread operating system among smartphone devices. Application and software is based as an open source core project and can be set further for specified commercial purposes used in practice or for academic and teaching activities.

Keywords: data mining, computer vision, automated data acquiring, licence plate, OCR, Android, smartphone, image evaluation

1. Introduction

The smartphone devices sales is growing year after year. Users replace their older types of devices with new versions released by the device manufacturers so the older devices remain unused and often end up as scrap, although in terms of functionality they have

no defect. So the idea came up to find a solution for reusing unused smartphone devices. After several ideas this article represents one of the solutions, a data mining application. The database for data mining is created via automated data acquired with computer vision method. To acquire information of the car owners, customers, visitors and so on, it is achieved from their vehicle number plate. This information can be further analysed. This information acquiring can be done on the subjects without noticing.

Computer vision is a field of science that includes methods for acquiring, processing, analysing, and understanding images. The reason for the development in this field has been to duplicate the abilities of human vision by electronically perceiving and understanding an image. (Shapiro, Stockman, 2001) This image understanding can be seen as the disentangling of symbolic information from image data using models constructed with the aid of geometry, physics, statistics, and learning theory (Forsyth, Ponce, 2003). One field of research in pattern recognition, artificial intelligence and computer vision is the optical character recognition, usually abbreviated as OCR. OCR is the mechanical or electronic conversion of scanned or photographed images of typewritten or printed text into machine-encoded/computer-readable text.

Data mining is a collection of techniques for efficient automated discovery of previously unknown, valid, novel, useful and understandable patterns in large databases. The patterns must be actionable so they may be used in the decision making of an enterprise. (GUPTA, 2011)

To demonstrate this possibility of reusing unused smartphones a software project was made which ended with a functional application named HFimage. The application and software is based as an open source core project and can be set for further specified commercial purposes used in practice or for academic and teaching activities. In case of interest the project and detailed documentation can be sent to you.

2. Literature review – related work

There are dozens of methods for licence plate detection, for example licence plate detection through Haar-like features or detection through edge detection. Some methods with references are listed: An edge-based color-aided method for licence plate detection (Abolghasemi, Ahmadyfard, 2009). A hybrid licence plate extraction method based on edge statistics and morphology (Bai and Liu, 2004). Research on Automatic licence plate recognition technology (Xuezhong et al., 2013). Android-based patrol robot featuring automatic licence plate recognition (Chen et al., 2012)

These references should serve as a representation how this technology works. This article is not focused to compare these methods or invent new methods, but use computer vision methods to collect data for database.

2.1. Smartphone devices and market

To understand the problem some data are explained. Year after year the production of smartphone devices increases. The next section with some historical data illustrates how many smartphones have been produced.

According to statistics (Statista, 2015) the number of smartphones sold to end users worldwide from 2008 to 2013 are represented below. In 2008 139.29 million smartphones were sold worldwide. In 2013 the number of smartphones sold to consumers stood at over 967 million units, an increase of over fifty percent on the figure from 2011. This means that almost 20 percent of the world's total population owned a smart device in 2013. The total number of smartphone users over the world has risen to 1.25 billion by the end of 2014.

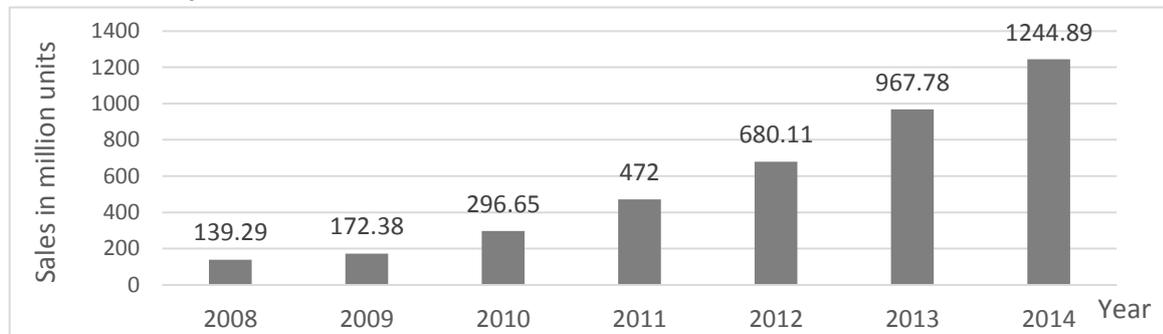


Figure 1: Number of smartphones sold to end users worldwide from 2008 to 2014 (Statista, 2015)

The smartphones sold to end users in the final quarter of 2013, almost 78 percent ran Android operating system, equating to sales more than 200 million units. Based on unit shipments of these smart devices, Android's market share increased further in 2014 with the company holding over 80 percent of the global smartphone operating system market in the first quarter of 2014. (Statista, 2015) Currently Android is taking the lion's share, spread across over 180 tracked vendors.

It is well known that smartphones are becoming more popular all over the world. An increasing number of those who must use a mobile phone now prefer to buy a smartphone over a feature phone.

3. Methodology and Data

To prove the theory of using data mining project on smartphones, an application was created. As the literature review shows there are more software platforms possibilities on the smartphone market. To access most smartphones the Android operating system was chosen which is the most spread operating system among the smartphone market nowadays (more than 80% of the smartphone market).

While the latest versions of Android often provide great APIs for the applications, the developer should continue to support older versions of Android until more devices get updated. The system compatibility based on the advantage of the latest APIs was chosen while continuing to support older versions as well. This project supports systems versions from Android 2.3 (Gingerbread) to the latest version 5.0 (Lollipop). According to Google this range included approximately 99.5% of the Android system market (Google, 2015).

3.1. Evaluating algorithm

In this article the licence plate detection is through a simplified edge detection which will be explained. A licence plate has a form of a rectangle. So the task is to find rectangle objects within an image which includes numbers or characters. The first step is to find

edges on the image for creating the rectangles. There are more possibilities how to achieve this. At the end the licence plate is expected to be returned in coloured image if it is possible to achieve it from the analysed picture. The first step is to load the image or the acquired camera frame into the memory.

Licence plates have reflective surfaces with high contrast so they do not need to be searched in coloured pictures. The first step of the algorithm is to make a greyscale copy of the original input. So from “3D matrix” we retrieve a “2D matrix” which numbers represent the input’s pixels in 1 byte (value from 0 to 255). If the camera gives us already a grayscale picture this step is skipped.

The built-in cameras which mostly have small lens accumulate noise on the acquired picture. To reduce this unwanted noise a Gaussian filter is used as effective noise suppression. With naked eye we cannot see the difference but after evaluating the edges there will be a difference. The smoothing reduces the amount of edges.

The next step is to make a binary value matrix from this greyscale image. Simply said: grayscale picture into a black-and-white picture. This can be achieved by a threshold. This binary matrix is further used to find edges. The pixels are represented by values 1 and 0.

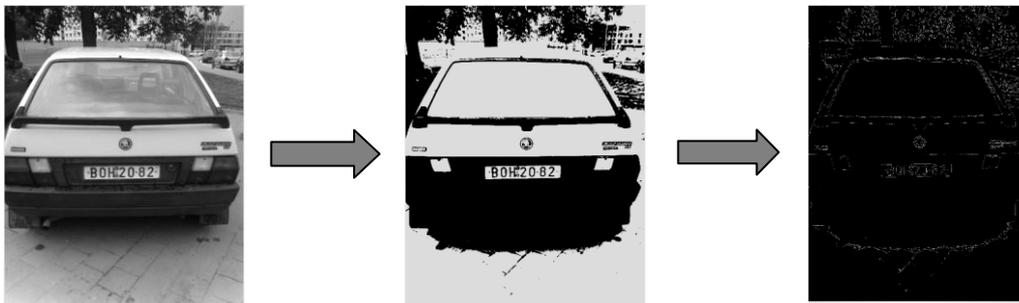


Figure 2: Greyscale image (after Gaussian filter), black & white (middle), applied Canny algorithm (right)

To find edges in an image the Canny86 algorithm was used. This function finds edges in the input image and marks them in the output map edges. The smallest value between threshold1 and threshold2 is used for edge linking. The largest value is used to find initial segments of strong edges.

The next step was to find rectangles from these edges. There are several morphological operations to achieve this. For contour extraction in a binary image the algorithm [Suzuki85] was chosen. The contours are a useful tool for shape analysis and object detection and recognition. The next step was to approximate contours into curves. It was necessary to approximate polygonal curve(s) with a specified precision. These functions approximate a curve or a polygon with another curve/polygon with fewer vertexes so that the distance between them is less or equal to the specified precision. The approximation accuracy parameter was specified. This is the maximum distance between the original curve and its approximation. From these curves rectangles are bounded. For example I put picture below.

From these rectangles the ones which do not meet the condition of licence plate ratio are sorted out. The ratio is within a tolerance range. The remaining rectangle(s) should show the coordinates of the licence plate(s). This can be cut out from the original picture for further evaluation. In this case it will be character recognition (OCR).

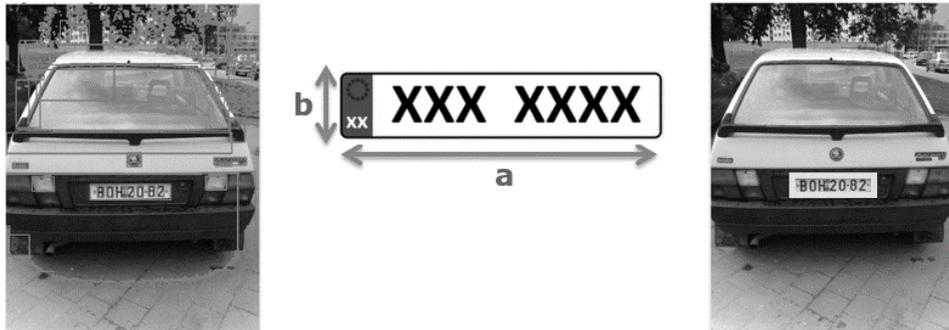


Figure 3: Detected rectangles and filter the licence plate

3.1.1. Optical Character Recognition

After a small research of some existing OCR libraries an open source OCR engine was chosen which is known as Tesseract OCR. It is free to use under the Apache Licence 2.0. The conclusion is that Tesseract is very usable OCR tool, especially for people who can fix minor problems in the source and can enable to use it on android. The project implements these parts: the Tesseract OCR v3.03, Leptonica 1.70 image processing libraries and a v3.02 trained data file for a language (tessdata).

To summarize the character recognition algorithm in three steps:

- Pre-processing: `bitmap.Config.ARGB_8888` – to put the input to the correct form
- OCR (`bitmap, tessdata`) function – use it on the picture with the learned language data.
- Post processing: filter `['a-z' || 'A-Z' || '0-9']` characters and return it as data.

3.1.2. Data post processing

The extracted text is necessary to check through a filtering algorithm which checks a licence plate text correct form. It is the retrieved text, the licence plate alphanumeric data, or just some recognized error from the complex scene. If the data is ok then the further steps can be executed. It can be stored in the database or sent to a server and so on, depending on the demanded evaluation.

3.2. Creating the basis of the application

Android applications are programmed in java. In the case of Android the Byte-code is compiled by the Dalvik virtual machine at Android Runtime to execute the instructions on the CPU. This is what gives Java its portability to run “anywhere”. This Java’s “gift” needs computing time for compiling the Byte-code into the hardware’s machine language. This advantage to run “anywhere” has the disadvantage in speed reducing. For better understanding, look up Android’s system architecture.

In case of computer vision when we are doing masses of computing, where every bit of the computer performance is needed. So to solve this problem it was necessary to bypass the Dalvik VM layer and run the program directly on the kernel. Android supports this with the Android NDK to compile C and C++ code on the Android kernel. OpenCV image processing libraries written in C and C++ comes with Java wrappers so it can be used as Java code, but to run it, the source code needs to be compiled first.

After the development environment was installed and all the tools, plugins and libraries were implemented within it and this all was tested then the application’s code writing part began. Which included mainly:

- Naming and creating icons for the application
- Using the camera (get picture, camera frame)
- Load and save data, data security issues.
- Get actual location (using location manager) and other available data.
- Implement the OCR and licence plate recognition algorithm.

At the end an *.apk file is created and named HFimage.apk what is the install pack for Android system.

3.3. Data collecting

For automatic data collecting for evaluating visible information via computer vision it is necessary to find a proper monitoring location. Depending on the monitored location accessibility and type of the collected data there can be more than one monitoring location set. The first step is to get the android device, in this case it will be a smartphone, then install the created application on it. The next step is to check the camera function. If it is working properly then the process can be continued further. If there is no implemented camera on the device or the implemented camera has not enough high resolution for correct scene evaluation, an external camera can be connected as an external peripheral.

Android supports a variety of USB peripherals and Android USB accessories through two modes: USB accessory and USB host. The primary purpose of a USB connector on a mobile device is to make connection with a PC (or other devices) and for charging battery. In these situations the PC has the role of a USB host and the mobile or tablet acts as a USB device. For image processing purposes it can be used to connect an external camera to the device to get images or video stream. Most of the phones have already a built-in camera, but these cameras have small lens so the captured picture has lower quality than pictures from professional cameras. To get a better picture through higher resolution or greater focus lens can be achieved with an external camera.

For long term data collecting the device needs to be connected to an external power source. For mobile stations it can be done with accumulators or to expand the system with solar panels. These devices has relatively small power consumption.

For “one way observation” the device is set to observe the road where the analysed vehicles are passing by. The camera’s centre is focused to the height of the road where the vehicles have most probably situated their licence plate.

For “two way observation” two devices are needed to observe the road where the analysed vehicles are passing by. The camera is situated similar than in “one way observation” but the two devices observe the road from the opposite direction.

These data can be retrieved: licence plate characters itself, when the vehicle passed on the road and in case if needed where it was (GPS location). The data can be stored on the device or sent instantly to a server where other data can be collected from other devices. Smartphones can easily reach internet via Wi-Fi or other mobile telecommunications technology (3G, 4G, SMS, MMS and so on). To eliminate possible data loss all accesses to the analysed location should be covered with these observation devices.

These collected data can be gathered into a database. If the database is big enough it can be analysed for data mining options, for example:

Where are the customers from (state, region, and city).

How long were they staying (time elapsed from their arrival to their leaving).

Frequency rate in time (when were the most visitors and when the least).

Frequency of returning (do our customers return to us?).

The data can be used to reduce criminality by accessing external data base (read only access is enough) whether the vehicle is stolen or wanted. This system can be also used for automatic authentication for vehicles, for example parking policy issues or employers inspection. Any other statistics can be done further with the database for enterprise decision making.

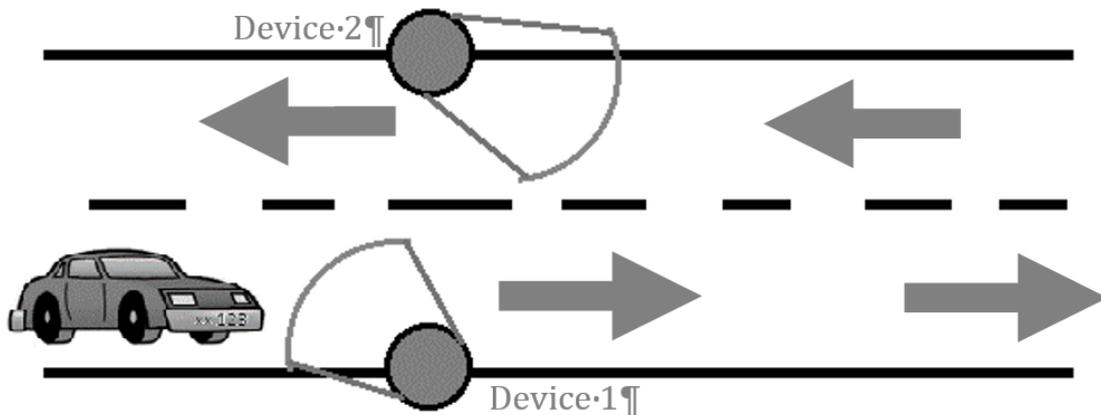


Figure 4: Picture of an example when situating the devices in “two way observation”

3.4. Data security

To ensure data security when sending pictures, user authentication and safe data sharing cryptology and cryptography methods are used in order to ensure “safe” communication on a network or to defend software assets against misuse or unauthorized access if the attacker somehow managed to accede to these assets.

3.4.1. Confidentiality

Confidentiality of a message generally using cryptography is provided via cryptographic transformation. Transforming the messages (encryption) is performed by a secrecy cryptosystem. Encryptor (E) encrypts the entering message with the encryption key K_E and so the message in which the encoded information is transforms into a cryptogram via the encryption process. This cryptogram C is transmitted through the transmission channel. Inversion of the encrypting transformation is the decrypting transformation, which is done by the decryptor (D). Decipher using the decryption key K_D transforms the cryptogram into the original message. This process ensures secure transmission of information via the transmission medium.

In the application there are two possibilities: one is the encryption of the recognized data (licence plate number and characters plus the other possible information). The second possibility is to keep the useful part of the recognized pattern (snipped licence plate picture from the original photo or video stream) and encrypt this information. The encryptor (E) and the decryptor (D) is set in the application. The encryption key (K_E) is stored encrypted in a hidden file among the other data. If it is missing an error report is generated and shown.

3.4.2. Authenticity of messages

Message in which the information is encoded enters into the cryptosystem and via using a secret private key $K_{private}$ creates a signature (S) on the given message. This signature is attached to the message and then it is transmitted through the data transmission channel. Recipient of the message can use the attached signature by the originator of the

message to verify the origin and authenticity of this message. The process of verifying the authenticity of messages is done using two inputs, the message and public key K_{public} .

The authenticity is created by the picture data with the other gathered data (such GPS location, time and date, etc.) this all is put into hash function with the users key and an output is created. This output is the authenticity information which is stored with the other data in the picture metadata in the image file (Exif – Exchangeable image file format for JPEG). The hash function is set in the application. The private key is stored encrypted in a hidden file among the other data of the application. If it is missing an error report is generated and shown.

3.4.3. Authenticity of users

The users can authenticate themselves with PIN or passwords which are asked when the app starts. This user-authentication is optional for saving metadata to pictures and can be used for user authentication issues. The PIN or password is encrypted in a hidden file among the other data of the application. If it is missing an error report is generated and shown. If the hidden file is missing or “no user” can be authenticated the application runs with the possibility to create a new user but it is not necessary to define one.

3.4.4. Security summary

All these parts are optional and can be combined to ensure fully data security if necessary. The key and password distribution can be hidden from the user in an encrypted file or allow to set by the user themselves.

4. Results

The chosen platform is Android, the most spread operating system among the smartphone market nowadays. The Android version system compatibility was chosen based on take advantage of the latest APIs, but mostly focused on the support of older versions as well (versions from Android 2.3 to the latest version 5.0) which altogether means that the final application according to the smartphone market analyses is compatible approximately with 80 percent of the current devices already made.

The application has been tested for various distances; the proper distance when it is functioning correctly is from 0.5 to 5 meters in daylight. When greater tolerance is allowed it can evaluate even licence plates within a rotation tolerance but the false evaluation numbers grow. To show which types of licence plates can be evaluated a picture is also shown with various licence plates in it. To show these operations more examples are shown below.

Hyperlinks below demonstrates the application. There are 4 demonstration videos uploaded to YouTube. The link to the videos is below, there is a playlist created to watch all parts together as a YouTube playlist: goo.gl/zOApSv.

The main goal was to prove that smartphones which would be unused (replaced with new versions of devices) do not need to end up as scrap but they can be used further for their computing power. For this case a computer vision aided data mining application was created which evaluated vehicles licence plate to make their database to work with. To reach most of the smartphones already produced, Android system was chosen as the working platform.

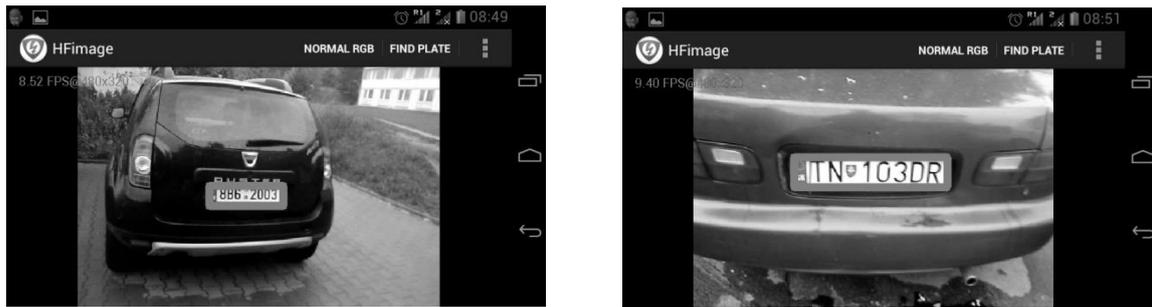


Figure 5: Find plate from greater distance and from closer (rectangles around the plates)

Comparing this project to other professional camera evaluating systems it has less accurate results. Professional camera evaluating systems can be expensive, compared to this low cost project which uses hardware sources from unused smartphones as a type of “technology recycling”. This project costs for electronic system is close to zero, only the attached costs are to install the smartphone device to observe. For better evaluating result visibility conditions can be improved (eliminate weather condition influence, eliminate low visibility) but this expands related system installing cost.

In case the device would be stolen or hacked data security issues are represented to reduce possible harm or misuse.

This project is based as an open source project which can be used for further application or expand/improve to other use. In case of interest for details or get the whole project contact: hortai.frantisek@gmail.com.

5. Discussion and Conclusions

The main aim of the article reflects the fact that smartphone devices sales are growing year after year. A “technology recycling” possibility is proposed as a way for reusing unused smartphone devices. For this issue a possible solution is created, a low-cost data mining application for smartphones. Computing power of smartphones is sufficient for computer vision methods. This article contains a specific proposal for data mining application for licence plate detection and recognition from image and from real time camera input. It can be used for automatic vehicle detection operations as information mining process (customers origin, the elapsed time and frequency of visits) and also to verify the vehicle (access control, check whether the car is stolen, etc.). To ensure data safety of recognized information and additional data from the device (date, time and GPS position, etc.) the possible software security techniques are explained. To show the whole concept a smartphone application was created on Android platform which is the most widespread operating system among smartphone devices. Application and software is based as an open source core project and can be set further for specified commercial purposes used in practice or for academic and teaching activities.

To see more of its functions please see the videos hyperlinks which can be found in the results part, there are hyperlinks to online demonstration videos, how the application works. From the evaluated licence plates a database can be created. This database can further undergo data mining methods.

Of course this can be expanded further, set more precise parameters of evaluating, to try other evaluating methods and compare them with themselves, to enable language selections for other counties. This work represents mainly a universal application core which can be further modified depending on the specific issue or request.

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Overcoming the Uncertainty in the Du-Pont Graph of Profitability

Jan Hron¹, Tomas Macak² and Pavel Andres³

¹*Department of Managemt, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamycka 129, 16521 Prague 6, Czech Republic, e-mail: hron@pef.czu.cz,*

²*Department of Managemt, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamycka 129, 16521 Prague 6, Czech Republic, e-mail: macak@pef.czu.cz*

³*Department of Engineering Pedagogy, Economics, Czech Technical University in Prague The Masaryk Institute of Advanced Studies Kolejní 2637/2a 160 00 Prague 6, e-mail: pavel.andres@muvs.cvut.cz*

Abstract

Financial analysis of a company requires a wealth of information. There is so much information available and so much of the analysis can be computerized, that the task of the analyst is to select the appropriate tools, gather the pertinent information, and interpret the information. Analysis is becoming more important following the recent scandals as investors and financial managers are learning to become more sceptical of accounting information and look more closely at trends in data, comparisons with other firms, the relation between management compensation and earnings, and footnote disclosures.

One of the best tools for predicting profit from financial analysis is the use of Du-Pont graph of profitability. It sees a connection between profit and turnover of operating assets. Each company has, however, individual curve of this dependence, therefore, the determination of turnover for the planned profit vague matter (values create the array of values). The aim of this paper is to propose a method to resolve uncertainty in planning for asset turnover target profit. Will be used polynomial interpolation theory and posterior information.

Keywords: Du-Pont Graph of profitability, asset turnover, polynomial interpolation, posterior information

1. Introduction

Understanding the principles of business profitability has been a longstanding domain of interest for researchers (see, e.g., Wu et al. (2010), Tecles (2010), and Thomas (2011)). Research documents of the DuPont components of represent an incremental information source about the operating aspects of a firm. It is also useful tool for market participants [Soliman, \(2008\)](#). Many textbooks of the financial statement analysis often argue decomposing profitability into profit margin because of their usefulness in company performance analysis (Stickney and Brown, 2006). Therefore financial performance has been widely accepted in practice since its development.

In essence, DuPont analysis is an expression which separate return on equity (ROE) into three profitability factors: (1) operating efficiency - which can be measured by profit margin (PM); (2) asset use efficiency - which is usually measured by asset turnover (ATO); and (3) financial leverage effect -which is usually measured by equity multiplier (EM), [Nair \(2003\)](#). PM and ATO are the components of return on assets (ROA). ROA measures how efficiently the company's assets are generating profits. In addition, ATO measures asset efficiency such as use of working capital. Whereas PM can be used as an indicator of the firm's profitability related to company's revenue. Disaggregating ROA into these components allows users (e.g. managers, market participants) to understand the sources of superior (or inferior) return within industry and across industries. Separating ROA into its component parts allows us reach better return within industry and across industries, [Kahtryn \(2014\)](#).

Our study of profitability limits itself to the three DuPont profitability ratios: profit margin, asset turnover and return of investment. Our study of profitability limits itself to the three DuPont profitability ratios: profit margin, asset turnover and return of investment. It can be useful to visualize these three profitability drivers in a two-dimensional area, with ATO on the X-axis, OPM on the Y-axis and the RNOA c levels (where OPM times ATO is equal to c) can then be illustrated as the Iso-Curves. Related research are focused on the incremental benefit of looking at the decomposed profitability ratios OPM and ATO and their predicting future earnings. [Fairfield and Yohn \(2001\)](#) study changes in profitability and look at the incremental profit of ATO and OPM specifically. They find that disaggregating the change in return on assets into the change in ATO and the change in OPM helps to better predict future profitability. [Soliman\(2008\)](#) similarly finds the profitability measures to be informative for stock market prices.

Unlike them we have been trying to handle with these quantities in aggregated form. This brought the problem in the form: How to clearly determine the value of profit margin, with knowledge of the net asset turnover, operating (and a priori ignorance ROA). According to Figure 1 is a value OPM ATO does not create a functional relationship but it creates a certain field values.

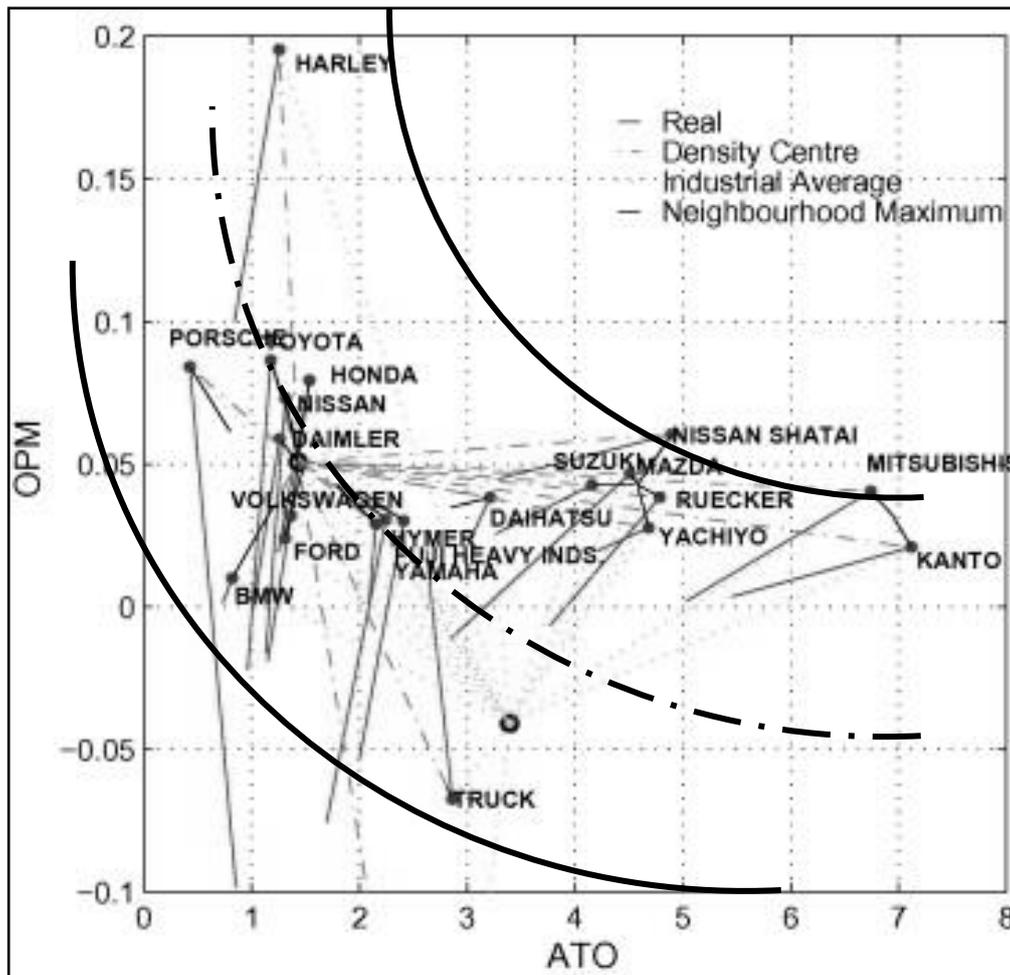


Figure 1: Directions of German, USA and Japanese car manufacturers showing the borders of the set of values and the median ROA isoquant

2. Methodology and Data

In terms of methodology, first we measured extreme values defining a set of values (respectively OPM-ATO system). Using several reference points of the edges of OPM-ATO system, we made a polynomial interpolation. Based on this interpolation, we defined a set of values of ATO-OPM system. In next step, we calculated the mean value of isoquant of the ATO-OPM system and also the maximum estimation error. After delivery posteriori information we could determine the real isoquant for the concerned producer. We used data published in the study “Profitability in the car industry”, that had been published in the European Journal of Operational Research in 2013 (written by Hans van der Heijden), to verify the functionality of the new method, which we designed and presented in this paper.

3. Results

There were 8 measured data in the chain and that is why the table 1 contains 4 real points.

Table 1: Values for calculation of the polynomial interpolations

Variable	order of measured values			
	<i>Lower limit</i>			
X: ATO	1	2	3	4
Y: OPM	-0.01	-0.05	-0.07	-0.09
	<i>Upper limit</i>			
X: ATO	3	4	5	6
Y: OPM	0.18	0.10	0.06	0.05

Polynomial interpolation is a method of estimating values between known data points. When graphical data contains a gap, but data is available on either side of the gap or at a few specific points within the gap, an estimate of values within the gap can be made by interpolation. If a set of data contains n known points, then there exists exactly one polynomial of degree $n-1$ or smaller that passes through all of those points. The polynomial's graph can be thought of as "filling in the curve" to account for data between the known points. This methodology, known as polynomial interpolation, often (but not always) provides more accurate results than regression model.

We have four values for lower polynomial construction, so we can interpolate these values using the third order polynomial in the following of the form:

$$f1(ATOi) = a_0 + a_1 \times ATO + a_2 \times ATO^2 + a_3 \times ATO^3 \quad (1)$$

By putting the data from the table 1 into equations (1), we will get a homogeneous system of four linear equations with four unknowns:

$$-0.01 = a_0 + a_1 + a_2 + a_3 \quad (2)$$

$$-0.05 = a_0 + 2a_1 + 4a_2 + 8a_3 \quad (3)$$

$$-0.07 = a_0 + 3a_1 + 9a_2 + 27a_3 \quad (4)$$

$$-0.09 = a_0 + 4a_1 + 16a_2 + 64a_3 \quad (5)$$

By subtracting the vector of variables situated on the right hand side of the system, we will get a homogeneous system of four linear equations with four unknowns.

$$A \times P = 0 \quad (6)$$

Where A is the vector with a_1, a_2, a_3, a_4 states. P is a parametric matrix determined from the values in Table 1. If we express the matrix product using the extended matrix of the system, we get:

$$\left(\begin{array}{cccc|c} a_0 & a_1 & a_2 & a_3 & -0.01 \\ a_0 & 2a_1 & 4a_2 & 8a_3 & -0.05 \\ a_0 & 3a_1 & 9a_2 & 27a_3 & -0.07 \\ a_0 & 4a_1 & 16a_2 & 64a_3 & -0.09 \end{array} \right) \quad (7)$$

According to the Frobenius theorem, the system of equations is solvable if and only if the rank of a matrix is equal to the rank of the augmented matrix of the system. In this

case, the determinant of \mathbf{P} matrix is nonzero. In order to verify that the augmented matrix (7) is solvable, we will compute the determinant of the polynomial parameters \mathbf{P} (using the Saruss rule or by expansion according to row/column for determinants greater than '3×3').

$$\text{Det (P)} = \det \begin{pmatrix} a_0 & a_1 & a_2 & a_3 \\ a_0 & 2a_1 & 4a_2 & 8a_3 \\ a_0 & 3a_1 & 9a_2 & 27a_3 \\ a_0 & 4a_1 & 16a_2 & 64a_3 \end{pmatrix} = 12 \quad (8)$$

As $\det \mathbf{P} \neq 0$, the previous system has only one solution. The solution for the upper margin range of values provides the following parameter values:

$$a_0 = 0.07; a_1 = -0.1066; a_2 = 0.030; a_3 = -0.0033$$

Polynomial interpolation for the lower margin of ATO-OPM system then has the following form:

$$f_1(\text{ATO}_i) = 0.07 - 0.1066x + 0.030x^2 - 0.0033x^3 \quad (9)$$

If we express the matrix for the upper margin of ATO-OPM system (using the extended matrix of the system), we get:

$$\left(\begin{array}{cccc|c} a_0 & 3a_1 & 9a_2 & 27a_3 & 0.18 \\ a_0 & 4a_1 & 16a_2 & 64a_3 & 0.10 \\ a_0 & 5a_1 & 25a_2 & 125a_3 & 0.06 \\ a_0 & 6a_1 & 36a_2 & 216a_3 & 0.05 \end{array} \right) \quad (10)$$

Polynomial interpolation for the upper margin of ATO-OPM system then has the following form:

$$f_2(\text{ATO}_i) = 0.76 - 0.2983x + 0.040x^2 - 0.2983x^3 \quad (11)$$

Mean values expressed by the Central polynomial of the PMO-ATO system is calculated by the following formula:

$$\overline{\text{ATO}} = \frac{1}{2} \times \left[\text{Upper polynomial} + \text{Lower polynomial} \right] \pm \frac{1}{4} \left[\text{Upper polynomial} - \text{Lower polynomial} \right] \quad (12)$$

After achieving calculated values of parameters we obtain the following prediction equation. On this basis, we can predict (estimate) ROA.

$$\overline{\text{ATO}} = 0.415 - 0.202x + 0.035x^2 - 0.0248x^3 \quad (13)$$

To eliminate the variation of the ATO-OPM system is necessary to add a posteriori information. In our case, we can make a correction of estimated ROA by comparing the calculated and actual values using historical data from financial management. Deviation between actual and theoretical values of the RAO (calculated using polynomial) shows what direction and how much it is necessary to move the central polynomial.

4. Discussion and Conclusions

Although numerous techniques of financial statement analysis exist, there is a stream of literature in equity valuation examining how DuPont components can be used to improve forecasts of future profitability. In this paper we studied the estimation of the ROA in relation to the profit and turnover of operating assets.

Each company has, however, individual curve of this dependence, therefore, the determination of turnover for the planned profit vague matter (values create the array of values). The aim of this paper was to propose a new method to resolve uncertainty in prediction RAO using the ATO-OPM system. We have used polynomial interpolation theory and posterior information to achieve the objective. The main problem with polynomial interpolation arises from the fact that even when a certain polynomial function passes through all known data points, the resulting graph might not reflect the actual state of affairs. This problem most often arises when "spikes" or "dips" occur in a graph, reflecting unusual or unexpected events in a real-world situation. Such anomalies are not reflected in the simple polynomial function which, even though it might make perfect mathematical sense, cannot take into account the chaotic nature of events in the physical universe.

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Gamma Hedging of Crude Oil Asian Options

Juraj Hruška¹

¹Department of Finance, Faculty of Economics and Administration, Masaryk University in Brno, Lipová 41a, 602 00 Brno, Czech Republic, e-mail: 206887@mail.muni.cz

Abstract

Since Black-Scholes formula was derived, many methods have been suggested for vanilla as well as exotic options pricing. More of investing and hedging strategies have been developed based on these pricing models. Goal of this paper is to derive gamma hedging strategy for Asian options and compare its efficiency with gamma hedging combined with predictive model. Fixed strike Asian options are type of exotic options, whose special feature is that payoff is calculated from the difference of average market price and strike price for call options and vice versa for the put options. Methods of stochastic analysis are used to determine deltas and gammas of Asian options. Asian options are cheaper than vanilla options and therefore they are more suitable for portfolio creation. On the other hand their deltas are also smaller as well as profits. That means that they are also less risky and more suitable for hedging. Results, conducted on chosen commodity, confirm better feasibility of Asian options comparing with vanilla options in sense of gamma hedging.

Keywords: Asian option, gamma hedging, investment decision making

1. Introduction

Exotic options are mostly considered as plainly mathematical issue, since they are not widely traded on world derivative markets. In case they are traded it is usually on OTC markets. Asian options are one of those which are at least occasionally listed on the greatest derivative markets such as CBOT or EUREX. Their underlying assets are for example crude oil, ethanol, iron ore and places on the cargo ships between Europe and east coast of USA and between Persian Gulf and Japan.

Papers published about the topic of Asian options are focused either on their pricing, with usage of various mathematical methods or their application in investment process. Black-Scholes methodology was used for pricing Asian options with discrete averaging (Zhang, 1998). This method is sometimes considered as out of date and is being replaced with more sophisticated methods. Dubois is using partial differential equations for their pricing (Dubois, 2004). These equations are solved with various approaches;

perturbation method (Zhang, 2003) for example. In modern research jump processes are preferred to simple Wiener process in derivative pricing, because they can better reflect the nature of stock price movements (Bayraktar, 2010).

Investment strategies in particular assets could be hedged with Asian options or they can be used for direct investment. Lévy's models with jump processes were considered as effective possibility for static hedging (Albrecher, 2005). Gamma hedging itself was used in several researches evaluating investment opportunities of this method (Dengler, 1996 and Jarrow, 1994). It is also used as a tool for hedging mortality and interest rates (Luciano, 2012).

In this paper Asian options are being applied in investment strategy based on creating delta and gamma neutral portfolio. This method was developed for hedging plain-vanilla options (Šturc, 2010). Investment strategy is enhanced with simple decision model based on past movement of underlying asset. Gamma hedging had been proven to be successful with plain vanilla options. The main disadvantage of gamma hedging, as well as in all portfolio optimizing strategies, are the optimal weights in portfolio. They are difficult to achieve in practice, because of trading in lots and limited available capital. This can be solved by using Asian options instead of European. The fact that the spot price is averaged in pay-off function makes them much cheaper than plain-vanilla options (Haug, 2007). Although this strategy is called hedging it carries certain amount of speculation, because we are always choosing price direction, which is supposed to be hedged. The opposite price direction should bring us profit all the time, if all the requirements hold.

2. Methodology and Data

We can distinguish between Asian options with floating strike and with the fixed strike. Position of averaged price in pay-off function is the main difference. Average price replaces strike price in floating strike options and spot price in fixed strike options. The average can be calculated in arithmetic or geometric form. In the next analyses only those with fixed strike are considered, because, they are more common in practice. Hence more data are available for adequate model selection.

2.1. Methodology

All the calculations in this paper are based on Zhang's model for pricing Asian options with fixed strike and continuous geometric averaging (Zhang, 1998). This model was chosen after comparison with other known models for pricing options with continuous as well as discrete averaging. Tests were conducted on real options daily prices with large variety of strike prices and maximal available observations. Pay-off function of these options is using arithmetic discrete averaging. Models using geometric averaging are commonly used for pricing options with arithmetic averaging as an approximation (Zhang 1995), because pricing models using arithmetic averaging have no closed form (Hull, 2012). But it is still surprising, that models for geometric averaging are more suitable. Mentioned Zhang's model is defined as:

$$V = ke^{-\frac{1}{2}(r-g-\frac{1}{6}\sigma^2)T} S_t N(kd) - ke^{-rT} KN\left(k\left(d + \sigma\sqrt{\frac{T}{3}}\right)\right) \quad (1)$$

where

$$d = \frac{\ln\left(\frac{S_t}{K}\right) + \left(r - g - \frac{1}{2}\sigma^2\right)\frac{T}{2}}{\sigma\sqrt{\frac{T}{3}}}$$

Spot price of underlying asset is noted as S_t , K represents strike price, r is used for risk-free interest rate. Volatility is marked as σ , cost of carry g and time to maturity as T . In case call option is calculated $k = 1$. On the other hand, if put Asian option price is calculated $k = -1$. N is the distribution function of normal standardized distribution.

Using first and second derivation of option price value the formulas for delta and gamma of this option were identified.

$$\Delta = ke^{-\frac{(r+g+\frac{\sigma^2}{6})T}{2}} N(kd) \quad (2)$$

$$\Gamma = e^{-\frac{(r+g+\frac{\sigma^2}{6})T}{2}} N'(d) \frac{1}{S_t\sigma\sqrt{\frac{T}{3}}} \quad (3)$$

The main idea was to create portfolio of call and put options that would be hedged against the price movement in chosen direction. Therefore the weights of options should reflect the change in price of the opposite option. To estimate anticipated change in the option price we can use Taylor polynomial with deltas and gammas as function derivations. Expected changes in call and put option prices in up and down direction can be expressed as:

$$call_{up} = \frac{\Delta_{call}}{1!} dS_{up} + \frac{\Gamma_{call}}{2!} (dS_{up})^2 \quad (4)$$

$$call_{down} = \frac{\Delta_{call}}{1!} dS_{down} + \frac{\Gamma_{call}}{2!} (dS_{down})^2 \quad (5)$$

$$put_{up} = \frac{\Delta_{put}}{1!} dS_{up} + \frac{\Gamma_{put}}{2!} (dS_{up})^2 \quad (6)$$

$$put_{down} = \frac{\Delta_{put}}{1!} dS_{down} + \frac{\Gamma_{put}}{2!} (dS_{down})^2 \quad (7)$$

These changes are largely depended on anticipated movement of underlying asset (dS_{up} and dS_{down}). In this case they were calculated as average decrease in prices and average increase in prices of past 20 adequate observations (days) before the portfolio creation. If the change of the asset price is constant in both directions gamma hedged portfolio can keep its value in one selected direction and increase its value in opposite direction. All parameters of call and put options must be the same.

Gamma hedging is not taking time into account. Hence portfolio needs to be rebalanced with high frequency or the strategy must be closed in short time, otherwise hedging would not be effective. I used daily price changes for my analysis and I have excluding Fridays, because weekend is already too long time difference, between opening and closing positions. All portfolios created before non-trading days were omitted.

If we want to hedge our portfolio against decline in price it should be constructed as

$$put_{down}V_{call} - call_{down}V_{put} \quad (8)$$

or as

$$-put_{up}V_{call} + call_{up}V_{put} \quad (9)$$

if we are anticipate prices to decrease and want to hedge against the increasing prices. This method was originally used for plain-vanilla options (Šturc, 2010), but there are no boundaries for its application on Asian options.

Certainly, this is only theoretical concept and real price changes could strongly affect the strategy performance. Therefore I had to optimize the choice of the options so the profit from movement opposite to the hedged one, would be maximal. This can be accomplished by maximizing function:

$$put_{down}call_{up} - call_{down}put_{up} \rightarrow max \quad (10)$$

After applying first order condition with respect to the spot prices of underlying asset we obtain the formula for the optimal spot price at which should be the profit from the strategy maximal.

$$\tilde{S}_t = Ke^{-(r-g+\frac{5}{6}\sigma^2)\frac{T}{2}} \quad (11)$$

It is impossible to choose the spot price, because it is given by market. It is also possible to wait for the spot price to fulfill this rule. On the other hand, we can find option pair with appropriate strike price, which holds the relationship (11) in accordance to observed spot price. Options were chosen if the difference between the real and optimal strike price was less than 20 cents. Expected changes of the underlying asset price have no effect on the value of optimal spot price. That means that they affect only the weights in portfolio.

Even when the positions are theoretically hedged, it is still possible to gain loss after all, because the price changes act as was expected rather occasionally. Simple predictive model was created to decide which price movement is anticipated in next observation (day in this case).

$$up_i = \alpha + \beta S_{i-1} + \sum_{j=1}^7 \gamma_j up_{i-j} + \sum_{k=1}^3 \varphi_k t^k + \sum_{l=1}^7 \phi_l \kappa_l + \epsilon_i \quad (12)$$

Where up is a dummy variable representing upward movement of underlying asset, S is the spot price of underlying asset, t depicts time (in number of observations) elapsed since the last occurrence of upward movement and κ is dummy variable identifying levels of variable t . Maximal time between two upward moments was 7 days, hence it was set as maximal level for variables up and κ . Variables t and κ are applied with accordance to the methodology of dealing with time dependency in dummy time series (Carter, 2010). Logit transformation was applied and the coefficients were estimated with MLE (Heij, 2004). This model was rebalanced every 100 trading days.

These models were set to suggest growth portfolio in cases when predicted probability of price increase was greater than 0.55, decline portfolio if the predicted probability was lower than 0.45 and in the other cases investor have to wait till next day. Models were estimated in 5 steps. First estimation was based on 560 observations prior the first trade realization. These estimations were applied next 100 trading days. After

this time, new observations were added to data set and model was reevaluated. This procedure was repeated after every 100 days, until the end of simulation.

2.2. Data

All the calculation are based on the prices of call and put WTI Asian options with fixed strike price and with expiry date on 30.4.2014 (G9J4C Comdty). The underlying asset of all analyzed derivatives was Light Sweet Crude Oil futures with maturity on 30.4.2014 (CSSJ14). Figure1 suggests that there were no huge changes in trend movement. Even volatility seems to be stable for entire time, without any peaks, that would cause radical changes in strategy performance.

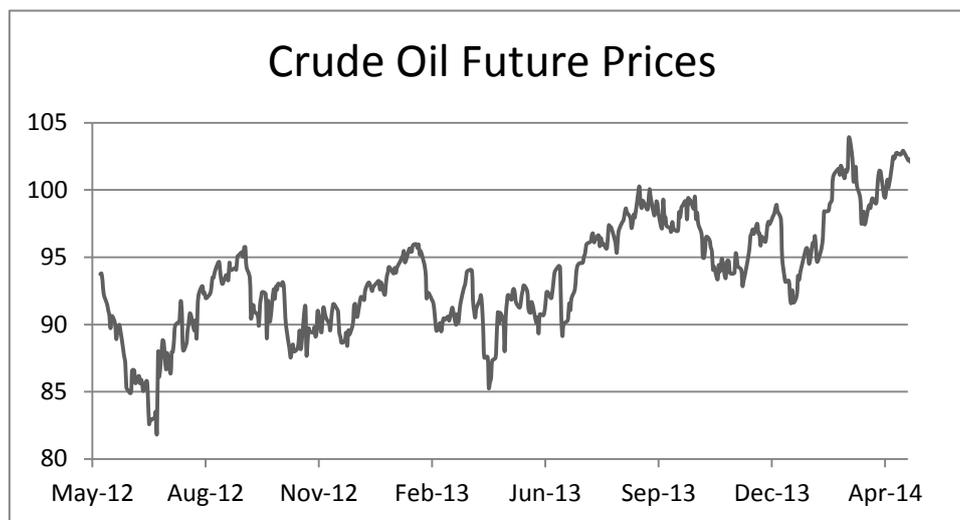


Figure 1: Development of Crude Oil futures prices with maturity date on 30.4.2014 (in American dollars) from 8.5.2012 to 30.3.2014

Averaged price is calculated from the prices from the end of last calendar trading day. Including new price into average is called fixation. Options with strike prices from \$64 to \$125 were chosen into selection sample. But only those where both call and put options were available. Figure 2 shows how many days before maturity were the options with certain strike price issued on the market. As we can see most of options were issued for approximately one year (from 200 to 250 trading days). However option pair with strike price \$100 was available more than 800 days before maturity. Also options with strike prices \$95 and \$99 were available nearly 600 days before maturity. These three option pairs were used in majority of cases, during the first year of simulation.

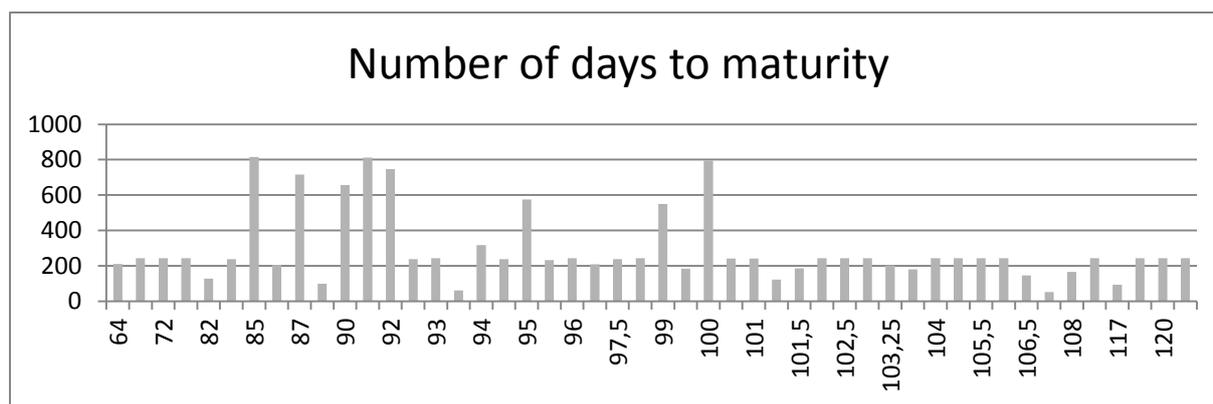


Figure 2: Availability of Crude oil Asian options (in days)

Risk-free interest rate is represented by 10-year US government bonds. Volatility of underlying asset was estimated from implied volatility calculated from plain vanilla option with same underlying asset. Costs of carry are considered to be 0. All data were obtained from the Bloomberg database.

Simulated trading was evaluated from the first observation, when there were actually existing options with desired parameters. That occurred on 8.5.2012 (476 trading days before maturity). Some of the options were available even before that date, but the optimal strikes defined by relationship (11) were always much higher. Simulation was stopped one month before the expiry date, because even pricing models performed strong inaccuracies during the last days before the options maturity. That could have cause imbalance in portfolio weights, which are derived from these pricing models.

3. Results

The hedged portfolios are certainly unable to perform the same results in practice. During the whole observed period the strategy based on gamma hedging without predictive model was rather inconsistent and outcomes were volatile, which was caused by the errors in price changes predictions. Hedging was not working perfectly, but it was able to reduce significant part of the losses. Hence, the growth portfolios managed to create profit 15.71% and the decline portfolios were even better with profit 23.17%. This positive outcome was mostly created by leverage effect, partial hedging and minimal time between opening and closing of positions.

To enhance the profit and lower the volatility of returns I have combined this strategy with predictive model. Chosen model (12) did not show astonishing predictive power, but its results were significant. The success rate and coefficient estimations of prediction models for selected periods when they were applied are shown in Table 1.

Table 1: Predictive models

Period	8.5.2012 24.9.2012	24.9.2012 14.2.2013	15.2.2013 11.7.2013	12.7.2013 2.12.2014	3.12.2014 30.3.2014
Const.	0.0515 (0.7858)	-0.1610 (0.4421)	-9.9599 (0.0091)	-0.1157 (0.4970)	0.0811 (0.5098)
up(-3)	0.4903 (0.0038)	0.3474 (0.0247)	0	0.2586 (0.0573)	0.2225 (0.0882)
up(-5)	-0.4087	-0.2653	0	-0.2175	-0.2599

up(-7)	(0.0149) -0.3098	(0.0859) -0.2983	0	(0.1085) 0	(0.0427) 0
time	(0.0648) 0	(0.0534) 0.1986	9.5949	0.1403	0
time^2	0.0324	0	(0.0074) -2.7598	(0.0255) 0	0
time^3	(0.0203) 0	0	(0.0076) 0.2457	0	0.0048
day after growth	0	0	(0.0080) 2.8067	0	(0.0211) 0
Accuracy	58.3%	56.1%	54.5%	56.3%	55.8%
Sommer`s D	0.166	0.122	0.09	0.126	0.116

First and second lag of dependent variable were omitted due to strong correlation with *time* variable and others due to insignificance. The value of coefficients is changing over time, but their character seems to stay the same. Third lag of dependent variable has always positive effect on the probability of the next upward movement of the crude oil futures prices. On the other hand longer lags have completely opposite effect. This suggests that the dependent variable is moving in approximately 3 day trends, during the observed period. Next three *time* variables confirms exponentially rising probability of next up movement with the rising time since the last upward movement. The last variable identifying day after upward movement has also positive effect on the explained variable. This can be explained by the herd investing, when most of the investors are expecting the rising trend in prices to continue. Reconfiguration of the model is definitely necessary; probably with even higher frequency than every 100 days.

After the implementation of the predictive model into gamma hedging strategy, significant improvement in its performance is observed. During the observed period of 23 months 62 portfolios were created. Positions were closed next day to minimize time impact on the estimated changes in option prices. Initial capital was increased by 126.95%, with average profit 1.44% per realized portfolio. It means that the average profit was eight times higher than the average profit of growth portfolio and 5 times higher than decline portfolios. All three strategies are relatively similarly risky (measured by standard deviation of returns). If we compare strategies by the maximal drawdown, strategy with predictive model is definitely less risky than other two strategies. Detail comparison can be seen in Table 2.

Table 2: Summary statistics of gamma hedging strategies

Portfolios	Num. of Trades	Avg. Return	Std. deviation	Maximal Drawdown
growth	165	0.0018	0.0444	0.2571
decline	165	0.0026	0.0530	0.4127
predictive	62	0.0144	0.0480	0.0602

Prices of the underlying asset and the prices of Asian call option with strike price \$100 (this option was used in portfolios in most of the cases) were used as benchmark for gamma hedging strategy. Investment to crude oil futures would bring profit 6.19% during observed period (average return was 0.0217% with riskiness 1.0377%). In case of Asian call option the outcome will be loss 78.67% of initial value (average return was

-0.3110% with riskiness 11.2515%). In both cases investments were also combined with the same predictive model used with gamma hedging. Under these circumstances average return of underlying asset is 0.0145% with riskiness 0.7343% and average return of Asian call option is 0.1904% with riskiness 7.6248%. Hence, the risk-reward ratio of these two alternatives was 50.61 and 40.04. If we compare it to the growth portfolio with risk-reward ratio 24.21, decline portfolio with 20.58 and predictive portfolio 3.33, we can see that, even though gamma hedging carries a certain amount of risk, it is still much better option than investing to the crude oil futures and crude oil Asian options directly without hedging.

Gamma hedging was working nearly ideally during the first year of testing. The original value of the portfolio was stable. On the other hand, outcomes of strategies became much more volatile in time closer to the options maturity as can be seen in Figure 3. This could not be created by the increasing volatility of the underlying asset. There are no evidences of such influences in Figure 1. The cause of the strategy errors must be intrinsic. One of the explanations could be that the specification of the pricing model is inappropriate. I was using model for pricing Asian options with continuous averaging, because this model best fit the real data. But these options are using discrete monthly averaging, which may not play role when only a few prices were included into the average and many of the prices remain uncertain. Most of all, time value is much higher and covers the differences in averaging type.

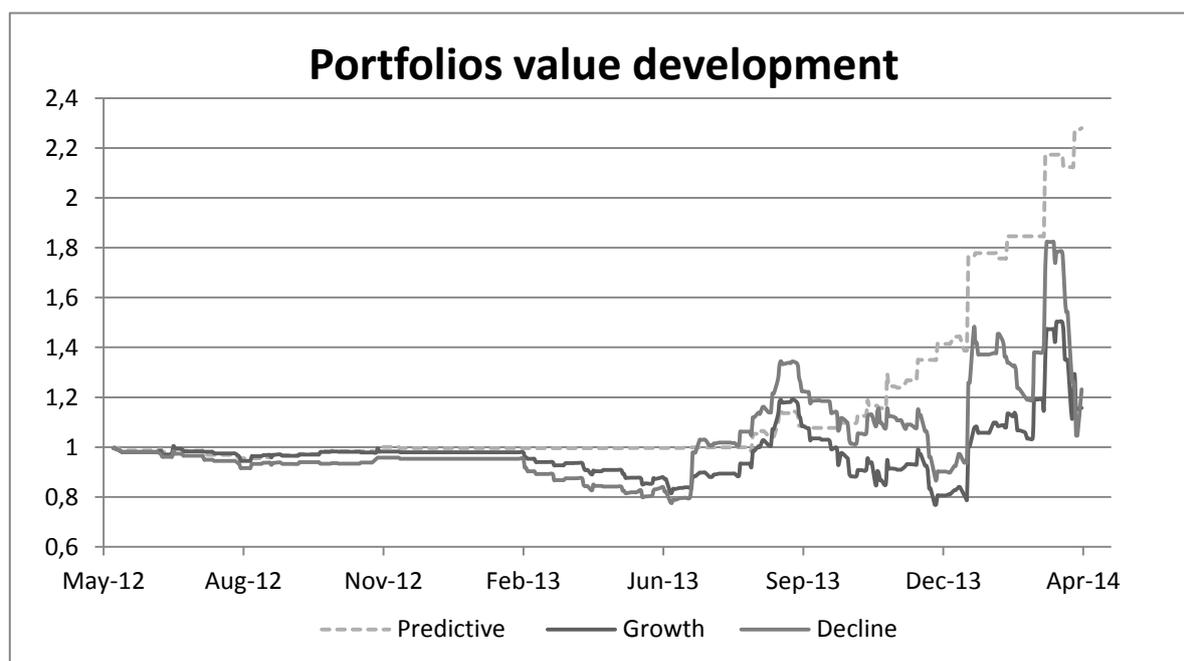


Figure 3: Development of the performance of the strategies from 8.5.2012 to 30.3.2014

However, when the time to maturity was shrinking, this model could not bring adequate results, because the time value of the options were largely reduced and difference between continuous and discrete average became significant; especially after one before the last fixation. During this period daily profits of the strategies were in range from -30% to 40% (with standard deviation 21.12%, which means four times higher volatility). If I would continue with trading even after the last price fixation, the predictive portfolio would create 138.58% of total profit, the growth portfolios 42.41%

and the decline portfolios 70.40%. The profits are much higher but the risk connected with them is not worth of it.

4. Discussion and Conclusions

Results presented in this paper confirm that Asian option with fixed strike price can be hedged successfully using the first and second derivation of the option price. The profit of 126.95% in 62 realized trades is really satisfying outcome. This method could be used in long position in call or put options to assure position for short time or to profit from the short term speculations. Hence I have explained that Asian options are as good for gamma based strategies as plain-vanilla options. Also it is more suitable for these purposes because they are cheaper and therefore much suitable for fitting the portfolios with specific weights.

Gamma hedging could be upgraded to Speed hedging, but adding third derivation with respect to price of the underlying asset would have only slide effect on the portfolios. Amending the model with theta would theoretically allow us to incorporate the time effect into the weights. That would mean that portfolios could be hold for the longer time and hence reduce the commissions originally needed for portfolio rebalancing. Spreads and commissions are one major phenomenon that has not been considered in analyses, but has the potential to reduce the profit and efficiency of the strategy.

As the time changes are considered to be zero, gamma hedging is most suitable as high-frequency strategy for investors with the possibility to invest with minimal commissions on the market with low spreads. More sophisticated methods for estimating price changes (than simple average) should be used on data with daily frequency. For example Box-Jenkins methodology or other predictive econometrical models or models working with stochastic volatility.

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Influence of printed leaflets on consumer purchase behaviour

Jan Huml¹, Kateřina Kuralová², Jiří Čerkasov³ and Pavel Kulfánek⁴

¹*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: huml@pef.czu.cz*

²*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: kuralova@pef.czu.cz*

³*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: cerkasov@pef.czu.cz*

⁴*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: kulfanek@pef.czu.cz*

Abstract

This article deals with the way customers perceive individual non-direct response printed leaflets and it is simultaneously focused on the question whether this material has any importance in general for customers during their purchase realization. The research is further concerned with the issue of the differences between customers living in family built-up areas and those who are living in residential housing. The research explores the differences related to preferences of various target groups. It identifies whether customers wish to receive printed advertising material into their letter boxes, what sort of media they read and what kinds of assortment are most frequently requested to appear in this form of promotion by customers. Preferences are aggregated by means of data classification based on different criteria and they provide a clue for better orientation in customer thinking.

Keywords: marketing management, customer behaviour, effective resource allocation, printed advertising materials, customer preferences, target group.

1. Introduction

Detection of customer behaviour represents an incessantly recurring process monitoring their customary habits, specific responses to a particular product, group of products or promotional materials. Customer needs and behaviour and their analysis are crucial in relation to the review of decisions implemented so far by the management but they are decisive primarily as for the extrapolation of at least short-term trends in their development. Contemporary market economy is characteristic for the high level of

market interconnection, their information interconnectedness and complexities in general, rapidity and accuracy of processes. A way to ensure the efficiency of these processes lies in the necessity to be acquainted with the customer opinions and wishes and to carry out, on a regular basis, statistical examinations related to the deviations in these views and their development. The article surveys customer response to the distribution of non-direct response printed advertising material (printed leaflets) by chains within the whole Czech Republic.

2. Methodology and Data

Advertising is any paid form of non-personal presentation and promotion of ideas, goods, and services by an identified sponsor. Mcquail (2005) sees advertising as a paid publicity in media for goods or services directed at customers. Among the printed advertising material can be included catalogues, sales pamphlets, brochures, leaflets, posters, signs and other advertising materials and Khan (2012) says that the formal sources of consumer buying behavior. Effective advertisement influences the attitude towards brand and finally leads to purchase intention (Goldsmith & Lafferty, 2002). Ideally, consumers buying behavior is the products purchase decision (Adelaar et al., 2003).

The aim of the advertiser is to inform, persuade and convince the consumer and the aim of the advertiser is to inform, persuade and convince the consumer and the consumer is central to the success of the advert. The theory of consumer behaviour explains the processes consumers go through in making a decision whether to buy a product or subscribe to the services of an organization. As the consumer decides whether or not to buy the product, the advertiser is able to develop the interest of the consumer towards accepting the products being offered. (Owusu, Nyarku, 2014) By Assael (1995) successful marketers must first define the benefits sought by consumers in the market place, followed by the drafting of marketing plans supporting the needs of consumers. According to Hawkins (2007) can be summarized that all marketing decisions are based on assumptions and knowledge of consumer behaviour. Studies carried out by reputable agencies demonstrate that the popularity of printed advertising material and special offers included in them has been on increase. It is therefore essential to pay attention to their quality as far as their delivery is concerned (process adjustment in accordance with customer wishes).

The research aimed to find out what are customer preferences and needs in relation to the distribution of non-direct response printed advertising material.

The method employed in this article consists above all in the analysis and synthesis of primary data, and the method of deduction is used as well. Respondent opinions were detected by means of assisted questionnaire research within the whole Czech Republic (all fourteen regions). There were 550 respondents addressed in total. After the filtration of incomplete questionnaires, 514 questionnaires could be used for the purposes of the research results evaluation. The questionnaire's returnability was relatively high and it amounted to 93.5%. High returnability of questionnaires was achieved especially due to personal addressing of customers. The inquiry concerning household income was regarded too personal by customers and as a result, there were some incompletely filled in questionnaires, which made them unfit for the research and they were consequently disregarded as for the purpose of the research.

Within the frame of the assisted questionnaire research respondents were asked close questions with a preselected option for answer.

The closing part of the research involved the objective to classify respondents within a particular group. Respondents were asked questions with a close option of answer.

3. Results

The first subject of the questionnaire research was the importance of printed advertising material in general. Printed advertising material including special offers is regarded as very important by 340 (66.1%) respondents whereas it seems to be less important for 119 respondents. Printed advertising material is then perceived as unimportant by 55 respondents. The total average of answers amounts to 1.446 which implies that customers most frequently supported the answer no. 1, "very important". Majority of respondents thus considers the printed advertising material as an important factor for the choice of goods within purchase behaviour. As emerged from the research, the interest in printed advertising material in regions is closely related to the rate of unemployment. It may be deduced that the interest in printed advertising material is subsequently linked with the social status of respondents. The following chart (Figure 1) illustrates that the income of respondents decreases depending on the rate of unemployment, which results in the growth of their interest printed advertising material.

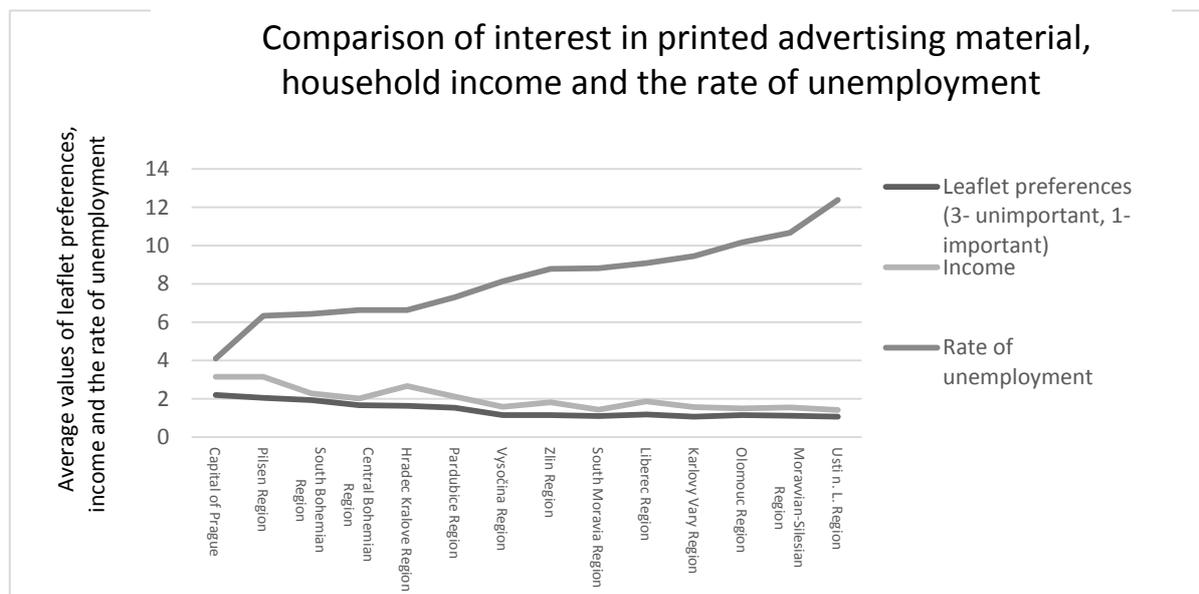


Figure1: Interest in printed advertising material

The second subject of the questionnaire research deals with the regularity related to the obtention of printed advertising material. It was reported to be very important for 330 respondents. 129 respondents in total stated that the obtention of printed advertising material is less important for them. Regular obtention of printed advertising material is perceived as unimportant by 55 respondents. This result of questionnaire research corresponds to the result of the question no. 1).

The third subject of the carried out questionnaire research focuses on the type of built-up area where the respondents live since it influences the way in which printed

advertising material is delivered to customers. Out of the total number of respondents (514), majority of them lives in apartment buildings from which those including up to ten apartment units are occupied by 246 respondents. An eleven-unit apartment buildings are a place of residence for 171 customers. Family houses are occupied by 97 respondents. The average size of houses in which respondents live is no more than ten apartment units.

Customers living in apartment buildings (417) tend to prefer to receive printed advertising material onto a prepared place instead of a letter box; usually a shelf or a stand. 272 respondents wish to receive printed advertising material into their letter boxes. For 194 respondents it is less important to receive printed advertising material into their letter boxes. 48 respondents consider the obtention printed advertising material into their letter boxes as unimportant – though it concerns the respondents not interested in printed advertising material.

282 respondents from those living in apartment buildings (417) wish to receive printed advertising material on a shelf serving as a place reserved for the delivery of printed advertising material. With the respondents living in family houses, on the contrary, printed advertising material is distributed into their letter boxes. The total number of 116 respondents considers the delivery of printed advertising material on a prepared shelf in a house as less important. 19 respondents do not wish to receive printed advertising material on prepared shelves. All 19 respondents stated that printed advertising material is unimportant for them. The total average value of answers provided by these 19 respondents on the questions no. 1) and 2) amounts to 3. It may thus be assumed that these respondents show no interest in printed advertising material; the way of distribution thus becomes irrelevant with respect to their answer as it is rather their lack of interest in printed advertising material that counts.

The research further reveals that customers do not wish to receive printed advertising material into boxes placed under the letter boxes or in front of an apartment building. Only 46 respondents out of their total number is willing to collect printed advertising material from the box placed under the letter boxes (often used as a waste disposal place). It concerns a significantly small number of respondents, which may more likely indicate considerable interest in printed advertising material of a concrete customer rather than preference of this distribution place compared to the others. A group of 127 respondents considers the described way of distribution as less important. 199 respondents disagree with this way of distribution. Based on the detected data a comparison of respondents' preferences was carried out, which is illustrated in the charts (Figure 2, Figure3) below. As the charts reveal, customers not preferring to receive printed advertising material in waste disposal boxes or in front of a house favour by contrast to receive printed advertising material into letter boxes.

Within the frame of the evaluation related to the part of questionnaire research focused on customer preference in relation to distribution place, the following results were found out. 282 respondents in total (67.6%) wishes to receive printed advertising material on prepared shelves inside apartment buildings. 272 respondents would like to receive printed advertising material into their letter boxes, which is 52.9% out of the total number of respondents. Only 46 (11%) respondents wish to receive printed advertising material in a box placed under letter boxes or in front of entrance door.

The overall comparison of customer preferences is described in the chart below (Figure 3).

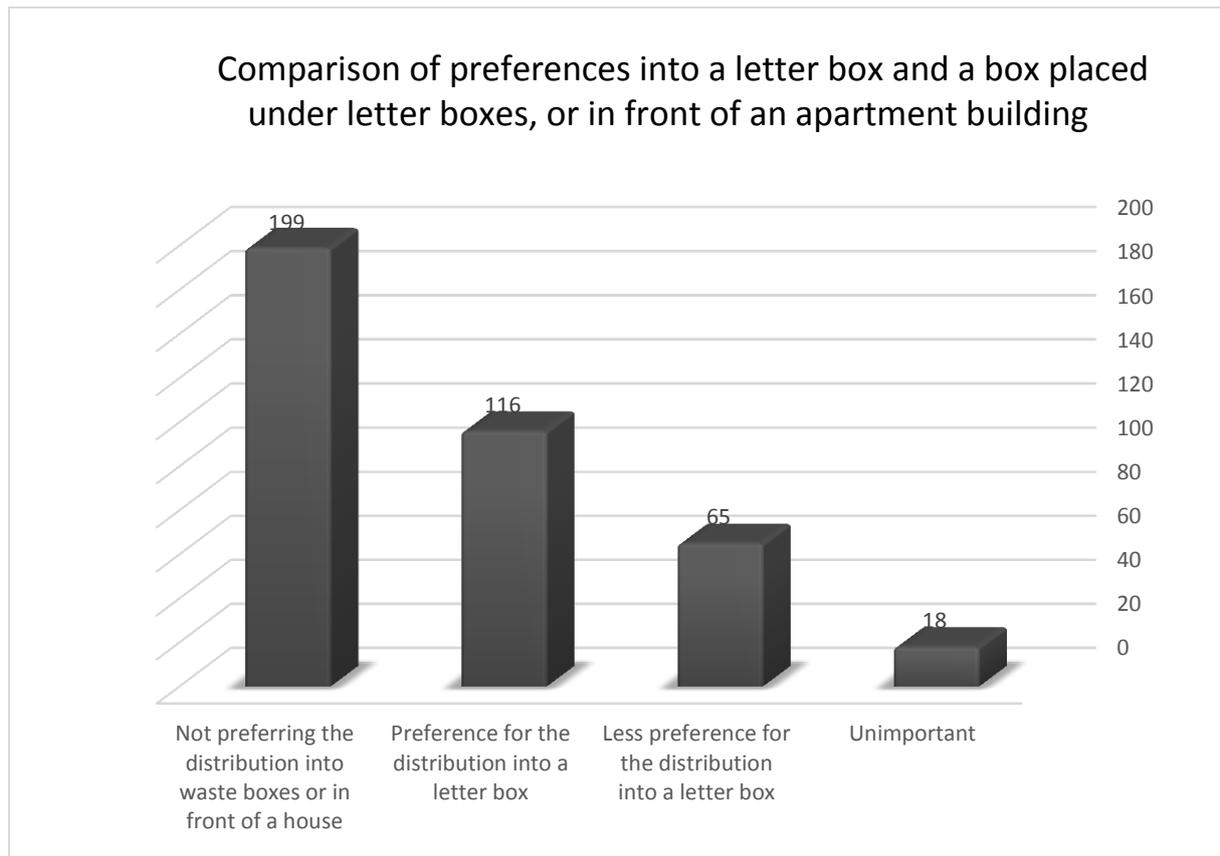


Figure 2: Preferences of distribution points

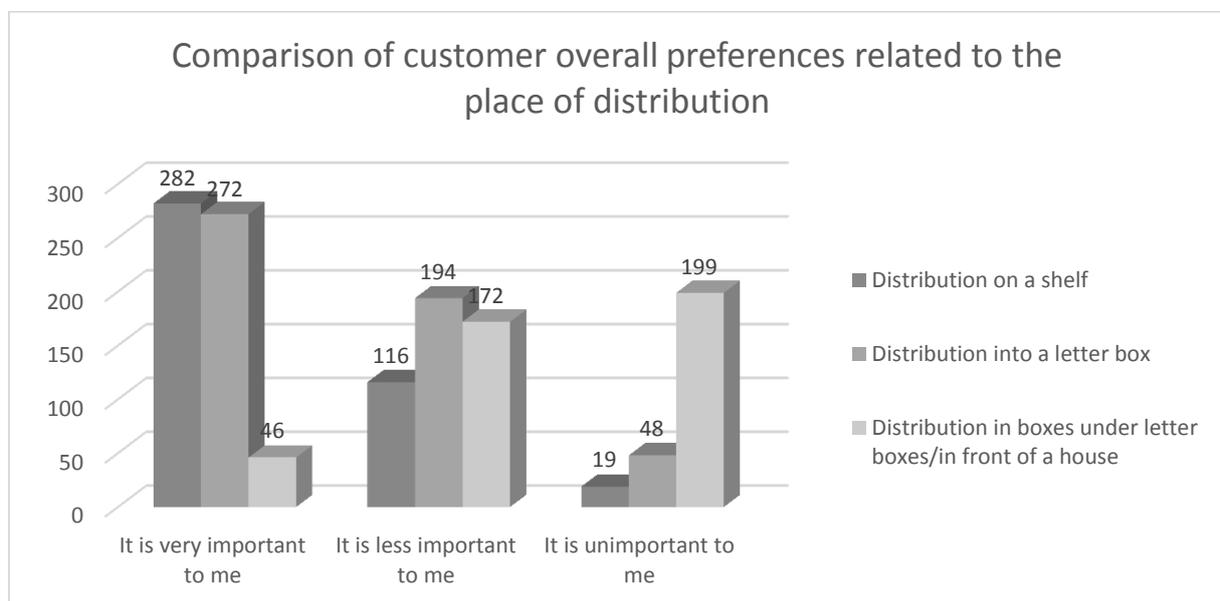


Figure 3: Preferences related to the place of distribution

The fourth part of the research deals with preferences related to types of printed advertising material (Figure 4). Respondents had a tendency to prefer the printed advertising material focused on food the most, in particular it concerned 348 cases (67.7%). The second position in terms of customer preferences was occupied by printed advertising material offering chemist-related goods. Interest in this type of printed

advertising material was recorded with 298 (58%) respondents. The offer of furniture firms was the third most interesting preference of respondents. Popularity of this type of printed advertising material is expressed by the average value of answers which was calculated to be 1.562. There were 286 (55.6%) respondents considering these printed advertising materials very important as for their purchase decision. Some shoemaking firms also present their offer by means of non-direct response distribution of printed advertising material. Customers perceive printed advertising material of shoemaking firms as interesting. This fact is illustrated by the total arithmetic average value of respondents' answers being 1.568. There are 284 (55.3%) who find the offer leaflets delivered by shoemaking firms as very important. 283 (55.1%) respondents feel appealed by the offer presented by clothes sellers; they put it straight that the printed advertising material is very important for them as far as their decision on the purchase of clothes is concerned. The offer of hobby markets is very interesting for 253 (49.2%) respondents. Respondents were asked the questions related to printed advertising material offering loans and credits. As the stated answers indicate, respondents are not concerned with such a type of printed advertising material. 369 respondents regard them as unimportant, which is the majority of respondents. As emerged from the following findings, the companies promoting their offer by means of non-direct response printed advertising material may find it suitable to combine their distribution with some company operating in food industry. As the research results show, customers tend to focus primarily on this type of printed advertising material. Provided that a printed advertising material of a company not dealing with food products or a small and not a well-known company is inserted within an advertising material of a food firm, more intensive penetration into households and the ability to address a broader spectrum of potential customers will be achieved.

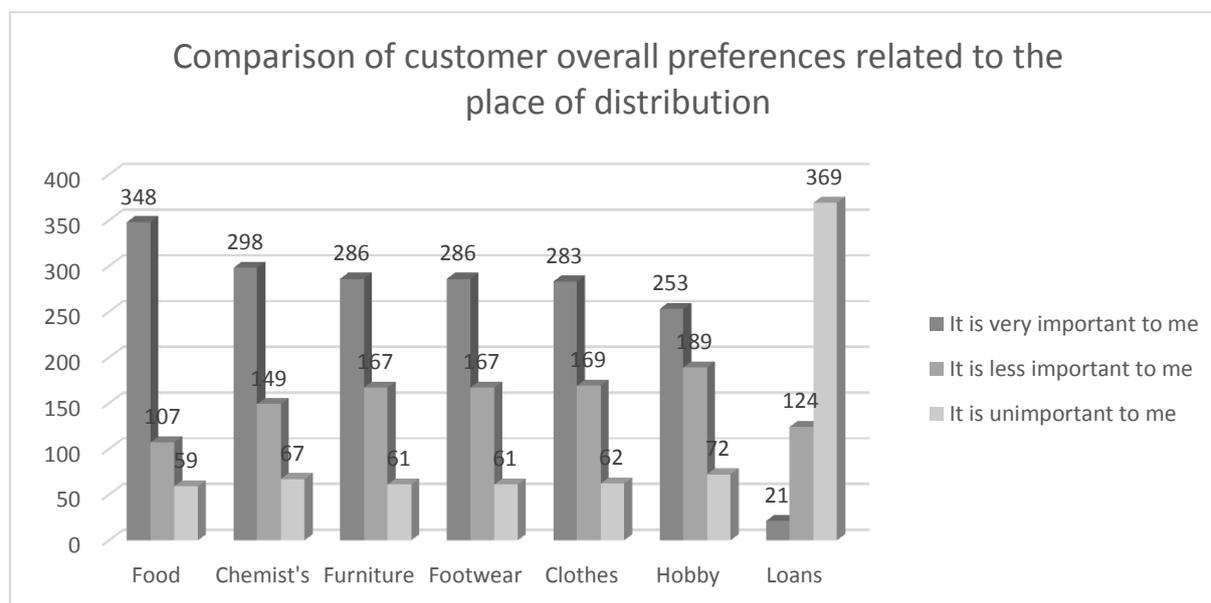


Figure 4: Preferences related to the type of printed advertising material

Question related to general characteristics of respondents are analysed below in a way described. The first sub-theme deals with the age scale of respondents (Figure 5).

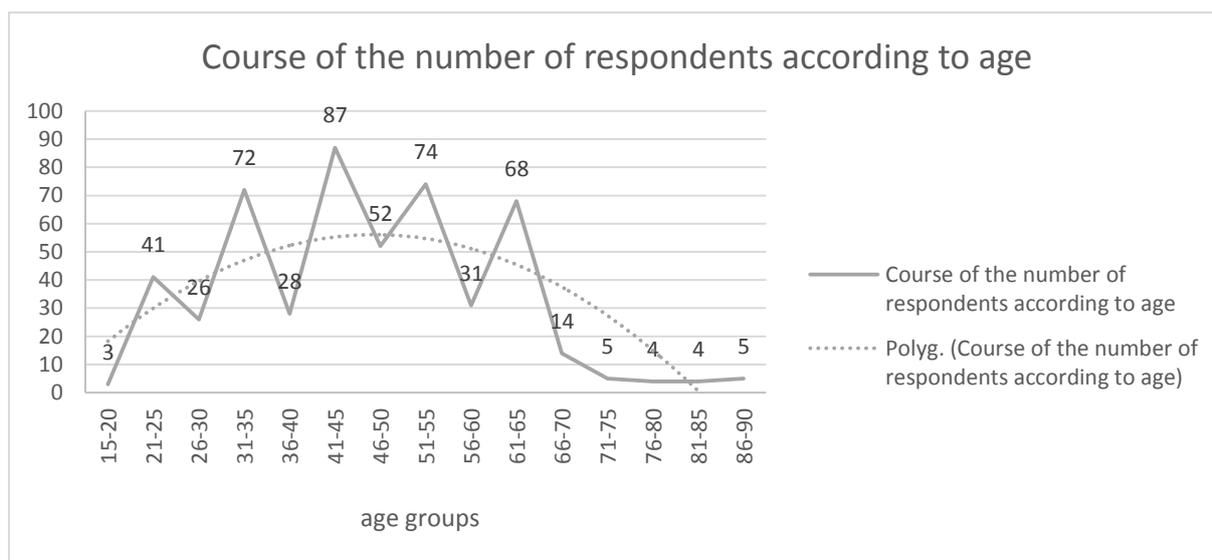


Figure 5: Age of respondents

Respondents were also classified according to their sex. Female opinions represent 60% (306 in total) of answers. The percentage of men answering the question amounts to 40% (208 in total). Average age of respondents is 46.4.

The question no. 17) monitored customer initiative in case they would not receive printed advertising material. As the research results show, customers make a complaint about these printed advertising material; approximately one third of respondents (28.6%) considers making a complaint about non-direct response printed advertising material as very important, within the absolute terms it concerns 147 respondents. The group of 268 respondents indicates making a complaint about non-direct response printed advertising material as less important, which is 52.1% in relative terms. Making a complaint about the given printed advertising material is unimportant for 19.3% (99 respondents).

In order to find out concrete experience of respondents and their actual behaviour the question no. 18) "Have you ever made a complaint about the non-delivery of printed advertising material?" was included. The evaluation of results revealed that 38.5% standing for 198 respondents made a complaint about printed advertising material at least once. 316 respondents (61.5%) have never made a complaint about printed advertising material.

The comparison of results related to these two questions imply that the actual customer initiative expressed in terms of a complaint about printed advertising material exists and that it is even by 9.9% higher than the group of those regarding making a complaint about printed advertising material as important. The group of 9.9% of customers comes from the number of respondents considering making a complaint about printed advertising material as less important. In terms of the question no. 2) there were 330 respondents who stated that they insisted on a regular delivery of printed advertising material. Not every customer would thus make a complaint about the non-delivery of printed advertising material. The number of customers ready to make a complaint is lower by 25.7% than the number of those insisting on a regular delivery.

The question no. 21) deals with the detection of total monthly income of a household. It concerns sensitive data of respondents, which made the answers being protected by strict anonymity. The inquiry concerning household income was chosen deliberately so

that a respondent would be free of fears related to possible abuse of concrete data. The specific amount of income was not intentionally required from respondents since they were more likely requested to categorize their household within the definite scale of income. Despite all these measures a certain number of questionnaires must have been disregarded due to the unwillingness of respondents to answer this question.

Total average of answers related to respondents' income is 2.25 and it is close to household income of 16–20 thousand crowns. Determinant deviation is calculated to the value of 1.10 and it may be thus interpreted that the biggest percentage is represented by households having the income of 10–15 thousand crowns.

Questionnaire research is also focused on the detection of respondents' education. Total average achieves the value of 1.89. As the results show, majority of respondents disposes of secondary education.

The closing part of the research included the question focusing on the detection of the origin of respondents according to regions. The share of regions was deliberately balanced (37 or 36) in each region so that geographical connection for further research might be estimated.

4. Discussion and Conclusions

An average respondent was a man or a woman being 46 years old, having a secondary education, with the household income ranging from sixteen up to twenty thousand crowns and living in an apartment building of no more than ten apartment units (Ø2.14). An average respondent considers leaflet special offers as very important (Ø1.44), it is important for him/her to receive printed advertising material on a regular basis (1.46) and they prefer to be delivered the printed advertising material on a shelf in an apartment building (Ø1.83). The greatest number of respondents (living in apartment buildings (417)) wishes to receive printed advertising material on a shelf in an apartment building (Ø1.36). Fewer respondents (Ø1.50) wish to receive printed advertising material into their letter boxes. The way of distribution into boxes placed under letter boxes inside a house or in front of an apartment building is refused by respondents (Ø2,36) especially due to sanitary reasons (printed advertising material becomes dirty upon their delivery into boxes on the ground of a house). An average respondent considers the advertising information on the internet as less important (Ø1.95). An average customer tends to search the most for the printed advertising material offering food (Ø1.43), chemist's-oriented goods (Ø1.55), furniture assortment, (Ø1.56), footwear (Ø1.56) and clothes (Ø1.57). Printed advertising material focusing on hobby assortment is perceived as less important (Ø1.64). Printed advertising material offering loans and credits are unimportant for respondents (Ø2.68). This question may be interpreted as defaming and it is therefore necessary to understand the result with a certain degree of reservation. An average respondent considers making a complaint about the non-delivery of printed advertising material as less important (Ø1.91). This summary allows for the deduction that customers in general search for printed advertising material though the type of assortment is important to them. The way of distribution plays an important role as well. Making a complaint of printed advertising material is not much commonly employed by customers.

In order to ensure the completion of individual researches, suggestion concerning the way of distribution of printed advertising material might be made in the future out of

these outputs for each region (frequency of distribution, type of assortment – a less popular printed material may be inserted within the more favourite one and thus the increase relating to the penetration into households may be achieved, place of delivery) which will reflect customer interests and will thus be tailored to customers' needs and wishes and will be consequently able to address the largest segment of the target group of customers.

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The development of business models of the enterprises forming cluster networks in Poland

Adam Jabłoński¹

¹*The Department of Management, the University of Dąbrowa Górnicza (Wyższa Szkoła Biznesu w Dąbrowie Górniczej), Zygmunta Ciepłaka Str. 1c, 41-300, Poland, e-mail: adam.jablonski@ottima-plus.com.pl.*

Abstract

The changes that occur in the modern world are creating a new dimension of business. The ubiquitous network environment calls for new market opportunities for companies that make up this environment. In such a system, business models of enterprises that are in the network are particularly important. Applying the principles of the structuring business network, for example, we have to deal with cluster networks. It is important to answer the question: how do cluster networks contribute to the development of the business models of enterprises embedded in these networks? The aim of this paper is to discuss the key mechanisms for the development of business models of the enterprises which form cluster networks in Poland. The author conducts extensive analysis of cluster networks in search of their characteristics which are crucial for the development of business models of the companies. The author presents the comparative analysis of cluster networks for the optimal configuration of networked business models that are applicable in cluster networks. For this purpose, the author uses bibliographic research, comparative analysis and a categorized interview.

Keywords: business models, cluster network, enterprises, Poland

1. Introduction

A network environment creates a new dimension of business. This, in turn, creates new mechanisms of strategic company management with particular emphasis on its core attributes such as a business model, strategy and business processes. Embedding a company in the network environment determines the dynamics of these three ontological entities. In this approach, a network creates company development and companies create network development. A formal instrument combining these two views is widely spread and constantly emerging cluster networks in Poland. Cluster networks are permanently part of the development of innovative, knowledge-based economy. In Poland, the number of new cluster networks is growing and the first cluster networks have moved from the incubation stage to the maturity stage. A cluster network

business model is gaining more and more importance as well as the place and role of the company's business model embedded in this cluster network. The aim of this paper is to discuss mechanisms governing cluster networks, taking into account the conditions in Poland as well as to present and discuss the research findings related to the longitudinal research on a cluster type preferred by cluster networks in Poland and the research on selected cluster networks in the Province of Silesia, Poland, using the method of a categorized interview. The author presents the comparative analysis of cluster networks for the optimal configuration of networked business models that are applicable in cluster networks. For this purpose, the author uses bibliographic research, comparative analysis and a categorized interview.

2. Methodology

As a research instrument, one basic method was used, i.e. a critical analysis of the literature devoted to the network environment, cluster network and business models. The author presents the comparative analysis of three cluster networks for the optimal configuration of networked business models that are applicable in cluster networks. For this purpose, the author uses bibliographic research, comparative analysis and case study research. The author adopted an interpretative approach as the methodology of scientific research, based on the literature studies and systematic retrospective assessment of business models of companies in the course of conducting own business activity and during his consulting practice. The paper is structured as follows. First, the theoretical introduction and discussion of the literature is presented. The main sources of theoretical analysis are scientific journals, specifically those publications devoted to a network environment as a platform for improving business effectiveness. The following section focuses on the development of a network cluster (from incubation to maturity) and the development of its business model and a cluster network business model and a business model of the company embedded in the network. Finally, the author presents the findings of the research on business models of cluster networks in Poland.

3. A network environment as a platform for improving business effectiveness

A network is an impenetrable business environment difficult to grasp, which gives business opportunities to all participants but only those who recognize them in numerous links and relationships are capable of creating new assumptions of building competitive advantage not by a destructive fight but cooperation. Due to the dynamic character of changes in the network environment, high effectiveness may be short-term, thus companies embedded in the network should still foster relationships underlying new competitive advantages. The durability of the network is also important, which can extend the time horizon to maintain high effectiveness. The variability of the network may, however, be favourable to the emergence of new opportunities and chances of achieving high performance by a company. Companies in the network are subject to violent turbulence, which gives its members the chances of finding opportunities for performance growth, sometimes very dramatic. A network environment should therefore contribute to the growth of company performance more than effective

companies to the development of networks, although these two streams of action are not mutually exclusive. High effectiveness of the network can be understood as the company's ability to capture more value than its competitors and other network participants. High effectiveness increases company value and creates new opportunities for the use of networks. High effectiveness depends on the network but only when the company accepts the network as a natural environment for doing business. It therefore seems reasonable to assume that an opportunity to increase effectiveness is to look for the potential of value inherent in the network. A key factor enabling the full use of the potential of the network environment is the formalization of the network in the form of structures that ensure a so-called network effect. The synergistic effects of the cluster network is related, *inter alia*, to the transfer of knowledge, the ability to absorb innovation, the migration of resources in the network and especially the migration of business models and their components. In the markets which may cause the network effect, pioneering organizations can use the so-called first mover advantage (Varadajan, Yadav, 2008), which is based on winning a large number of customers quickly, which from the beginning can cause barriers to entry for future entrants into this market. Network effectiveness is defined here as the attainment of positive network level outcomes that could not normally be achieved by individual organizational participants acting independently. Although individual organizational participants may, and probably should benefit as well, effectiveness is viewed here at the network level. Network effectiveness may come at a cost that is too high to sustain the involvement of individual network members. A network is not simply one more community provider organization; it is a collection of programs and services that span a broad range of cooperating but legally autonomous organizations (Provan, Kenis, 2008). For example Andreas B. Eisingerich, Simon J. Bell, Paul Tracey expect that the positive effects of network openness on cluster performance will increase as environmental uncertainty increases. Indeed, environmental uncertainty is likely to place a premium upon innovation as a key dimension of competitive advantage. Network openness is crucial in this respect, because new sources of information are more likely to enter a cluster both if it comprises a diverse range of actors, and if new actors are continually being absorbed (Eisingerich, Bell, Tracey, 2010). As a result, the cluster network becomes an accelerator of the growth of the value from the network. Coopetition is necessary here, which becomes a source of dynamic growth of this value.

4. The development of a network cluster (from incubation to maturity) and the development of its business model

Due to the strong development of the network paradigm, also in the context of the emergence of networked business models, some of the definitions that describe the issue in theoretical terms have been presented below. A networked business model goes beyond its own company and is a model, part of which is formed as a result of the activity of other business models. Their presence in the market stimulates and determines the existence of this model. (A. Jabłoński, M. Jabłoński, 2013). Networked business models are models in which:

- the nature and content of organization life cycle phases change,
- the product life cycle changes radically,
- values delivered to business partners and customers are understood differently,

- competitive advantage is gained by building own original key competences,
- knowledge increases are circular, spiral, asymmetric and irregular,

it is necessary to reject the classical elements and instruments of marketing and use instead postmodern techniques of establishing long-term relationships with internal customers (cooperators) and external ones (K. Perechuda, 2013). A business model is the concept of core values offered to customers and a value delivery network configuration consisting of own strategic capabilities and other values in the network (e.g. outsourcing, alliances) and the company's unceasing pursuit of change and meeting the objectives of the stakeholders (S. Voelpel, M. Leibold, E. Tekie, G. von Krogh, 2005).

Analysis of the presented definitions shows that they highlight the life cycle of the network in the context of the business model development. The life cycle of a cluster network is determined by the dynamics of its development. The most difficult process in managing the life cycle of a cluster network is to leave an incubation stage and move to a maturity stage. In order to move from the incubation stage to the maturity stage it is necessary, first of all, to have the ability to expand attributes of its networked business model. Original attributes guarantee the functioning of the network.

For example, the original attributes of a cluster network business model can be defined as follows: changes in the size of the network, changes in the density of the network, changes in the intensity of the relationship, changes in the diversity of the network, rotation changes in the network. These attributes determine the assumptions of the measurement system used to evaluate cluster network effectiveness. An expanding, ever-growing configuration of secondary networked business models emerging based on the original attributes of the network results in the appropriate dynamics of a networked business model in a designated function of time. This results in a continuous increase in the effectiveness of the whole network developed by a network coordinator making his or her networked business model move. The determinants of network dynamics may include: the migration of network actors in the function of time (the rotation of actors in the network, exits from and new entries to the network), quality changes in the structure of network actors, the impact of other networks, interpenetration and overlapping of other networks, the transfer of knowledge, innovation and technology in the network, the migration of network resources. A business model of the cluster network is implemented by the network coordinator acting as a so-called facilitator. It is a kind of an entity, who on the one hand coordinates and formalizes the work of the network but who also acts as a "facilitator" in the process of creating shared value in the network, establishing new relationships and knowledge transfer. A business model of the cluster network should have a configuration that ensures the dynamic development of the network and companies functioning in the network. Then a suitable bond between network participants can be created, which should be constantly strengthened through mutual interaction of network members with each other and the network coordinator. A network coordinator designs and operationalizes a business model of the cluster network. Certain logic must be adopted for this purpose. Regardless of the method, the appropriate configuration of a business model that will make it consistent must be determined.

5. Results

5.1. An environment of scientific research on cluster networks in Poland

In Poland, for the last few years there has been the dynamic growth of new cluster networks in different sectors of economy and services. Many cluster initiatives are currently moving to the maturity stage after the incubation period. According to the assumptions of many EU projects, Polish cluster initiatives finish the incubation stage within two years since the founding of the cluster network. Cluster networks are basically formed in most key sectors of economy.

It is worth noting that in Poland for three years the Polish Agency for Enterprise Development conducted research involving cluster benchmarking. The research was conducted in 2010, 2012 and 2014. The main objective of this project was to determine the current state of the cluster development, to analyze the changes that occurred in clusters over the last few years, and to recommend actions for the future. The material presented is an interesting knowledge base of clusters in Poland, which is useful in a number of areas related to supporting the growth of company competitiveness and innovation as well as the regional development. In 2014, 35 clusters were invited to the benchmarking research, including 31 involved in previous research. This made it possible to determine the trends of change in the main areas of cluster activities, i.e. resources of clusters, their processes, results and growth potential. In this edition, approx. 620 representatives of cluster members were invited for the first time to the research, in particular entrepreneurs, whose opinions on subjects related to the benefits of participating in the cluster or the quality of the coordinator's work were taken into account in formulating conclusions and recommendations from the research.

5.2. The findings of the research on the business models of cluster networks in Poland

In order to achieve the objective of this paper, the findings of the longitudinal research on a cluster type preferred by cluster networks in Poland have been presented as well as the research findings on selected cluster networks in Poland, the Province of Silesia, using the method of a categorized interview.

5.3. The longitudinal research on a cluster type preferred by cluster networks in Poland

J. R. Kimberly defines longitudinal research as “these techniques, methodologies and activities that allow you to observe, describe and/or classify phenomena, provided that the process is identified and empirically documented.” In this case, the process is understood broadly as any sequence of changes in studied variables (Kimberly, 1976).

The author applied this type of research to observe the type of cluster models used by cluster networks in Poland. The following is a typology of cluster models adopted for the research.

Table 1: A typology of cluster models.

TYPOLOGY OF CLUSTER NETWORK MODELS		
Italian model	Danish model	Dutch model
No formal structure	Network broker – a cluster initiator	Knowledge broker
No capital ties	Developed strategy of cluster development	Close cooperation with a scientific institution
No isolated management board	Support of a government programme	Emphasis on technology and innovation
Close family ties	Providing training, access to diagnoses, analyses	Lowering costs of prototype equipment and technology implementations
Local identity		Active regional policy

Based on the bibliographic research and longitudinal research over the last 10 years of the cluster policy development in Poland and the author's own observations it can be concluded that in Poland, the Dutch model of cluster networks works best, in which a cluster is centred around research centers, serving the special role of a knowledge broker. Transfer of technology and knowledge is its key strategic priorities and the active regional policy is the basis for dialogue between the network and its stakeholders. Research centres and research institutes are heavily involved in cluster initiatives in Poland, and this group is active in cluster initiatives, even more than entrepreneurs.

5.4. The research on selected cluster networks in the Province of Silesia, Poland using the method of a categorized interview

In the research on selected cluster networks in the Province of Silesia, Poland a categorized interview was used. An interview is a method of data collection during direct conversations conducted by the researcher. Interviewed people are those who, as the researcher supposes, have data on a research problem. So they can be both participants in the studied organization and people from outside it. Interviews can be overt and covert, categorized and uncategorized, individual and collective, controlled and uncontrolled. In order to determine the assumptions of building cluster network business models, the author conducted three categorized interviews with three cluster network coordinators in the Province of Silesia, Poland. These clusters operate in completely different sectors:

1. The Southern Railway Cluster based in Katowice – the railway sector
2. The Creative Business Cluster based in Zabrze – the creative services sector
3. The Silesian EcoCluster based in Katowice – the ecology sector

To conduct the interview, the author used the Business Model Canvas.

Based on the above canvas, answers on nine key components of the cluster network business model were received, as shown in Table 2.

Based on the list in Table 2, the following conclusions can be drawn:

1. All three cluster networks had no problem with describing the nine key elements of the business model by Osterwalder and Pigneur.
2. Key partners of these networks are mostly own cluster network members.
3. Key actions are based on mutual cooperation.
4. The value proposition is mainly the transfer of knowledge and technology, the transfer of relationships and increasing the range of the value chain.
5. Relationships with customers are treated as a dynamic process, which requires continuous interaction.
6. Customer segments are relevant to the represented sector in which a network operates.
7. Key resources are not too large, they are mainly office equipment needed for the organization of the network and its virtualization through IT solutions.
8. Channels are a network of relationships and the Internet.
9. The cost structure is based mainly on the financial element combining fixed and variable costs.
10. Revenue streams are the financial engineering of funds obtained from commercial activity and EU funds. An attempt to earn revenue from the materialization of the relationship between network participants documented in the form of contracts, alliances concluded via the cluster is also interesting.

6. Conclusions

To sum up the theses contained in the paper, the core conclusions that are the basis for further scientific discussion should be defined.

The development of a network paradigm in management sciences significantly shapes the nature of the current business. This is materialized through the continuous emergence of networks, and their maturation in the design and operationalization of their business models.

So far, in the relevant literature there has not been a lot of research on networked business models. The author took this challenge by attempting to define core assumptions of the design and operationalization of networked business models.

Prospects for further scientific research may include:

1. The development of cluster network business models.
2. The search for the optimal configuration of the cluster network business models.
3. The search for best practices in the operationalization of cluster network business models.

Table 2: A description of the key components of the business model of the three selected clusters operating in the Province of Silesia, Poland.

Southern Railway Cluster (PKK) based in Katowice	
Key partners	PKK network members ERCI members (a super network which PKK belongs to)
Key actions	According to the strategy and roadmap A developed roadmap precisely defines key activities of the cluster and the ways of performing them
Value proposition	Technology transfer Transfer of relationships in the network Transfer of innovation Common alliances, joint contracts, joint products, joint profits
Customer relationships	Building relationships through all forms of cooperation between the network and network members and customer segments The aim is to continuously strengthen ties
Customer segments	The railway sector : Manufacturers Carriers Infrastructure managers Entities responsible for maintaining of railway vehicles Suppliers, manufacturers for railway transport
Key resources	Office and office equipment Access to company cars Competent and dynamic staff
Channels	Technology e-platform allowing it to offer technology through the Internet, the model of technical dialogue with technology stakeholders Classic sales channels
Cost structure	Fixed costs and variable costs: Costs of office use and rental Network coordination costs Staff remuneration Costs of implementing undertakings with network members Costs of participation in different types of industry meetings Complex financial engineering: Funding from the Marshal's Office of the Province of Silesia
Revenue streams	Commercial revenue from the implementation of the Innovation Leader in the Railway Transport competition Commercial revenue from training, thematic seminars and conferences
Creative Business Cluster based in Zabrze	
Key partners	The Association of Creativity Mine, Przedsiębiorstwo Górnicze Demex Sp. z o.o., the Bytom Culture Centre, the Academy of Fine Arts, K. Szymanowski Academy of Music, the Association of Art Mine a total of 22 businesses operating in the widely understood creative sector
Key actions	Initiating the cluster and simulating its development, promoting the cluster, a laboratory of creativity, organizing conferences, seminars, workshops, specialist consultancy
Value proposition	Increasing value within the supply chain and value chain through the synergy of entities, reducing promotion costs through joint information campaigns, increasing a scale of effects in the market by e.g. joint negotiations of contracts, which directly affects the minimization of operating costs; building organization capital through the exchange of experience, transfer of know-how and innovation
Customer relationships	Expanding distribution channels and building a common catalogue of services; building common brand and taking joint promotional activities
Customer segments	Creative business, creative business services customers
Key resources	Cluster infrastructure, the cluster coordinator
Channels	Internet, relationship marketing
Cost structure	The overall costs of operation, marketing costs, management staff costs, costs of specific, event type actions
Revenue streams	Membership fees, grants from operational programmes, sponsorship, donations

Silesian EcoCluster based in Katowiece	
Key partners	Research institutes and companies in the industry of wastewater management and waste management oriented at aspects of energy efficiency. It is a large, research and business area, with a lot of growth prospects
Key actions	Cooperation between specific institutes and cluster companies to develop dedicated market solutions. Starting from laboratory research, through pilot-plant installations to implementations. This is the preferred and implemented model of cooperation.
Value proposition	The synergy of actions between science and specialized companies gives substantial value to both through innovative dedicated implementations. In addition, the potential for further projects and growth arises.
Customer relationships	The cluster does not have legal personality. Therefore, it is only a keystone for building relationships between cluster members. It has a role of linking the interests of the parties in the current formula. It does not participate in implemented projects.
Customer segments	Mainly SMEs, Scientific and research units, Technical universities (a structure of members)
Key resources	Office, computer and communication equipment, Coordinator and assistant
Channels	Direct marketing, a network of relationships with cluster participants and other networks, seminars, meetings, conferences
Cost structure	Office, staff and cluster promotion expenses. In addition, costs of establishing business relationships between cluster members
Revenue streams	Membership fees from cluster members, funding for cluster development. In addition, we consider introducing the model of revenue share from business projects implemented by cluster members and initiated by the cluster.

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The study on selected indicators of the business entities operating in Slovakia

Ladislav Kabát¹ and Monika Majková-Sobeková²

¹*School of Public Administration, Bratislava, ladislav.kabat@vsemvs.sk*

²*Pan-European University, Bratislava, monika.majkova@uninova.sk*

Abstract

The results of economic activities of business entities are the constant object of research interest. Theoretical analyses study the statistical data that are significantly different from the theoretically expected values. Government authorities focus on monitoring and evaluation of indicators, which have the direct relationship to the tax duties of individual enterprises. They follow also the consistency of the accounting procedures applied by the company with the generally set financial accounting rules, particularly the tendencies to minimize the tax obligations of the firms.

The extensive violations of the accounting and financial rules, forces the State bodies, as well as corporate executives to take measures to prevent, or minimize the damage resulting from such practices. The control and audit therefore increasingly deploys the highly sophisticated methodological tools (of mathematics and statistical nature) that are capable to detect not only violations of the principles of accounting, but also the intentional distortion of the accounting data.

The main objective of this article is to contribute to study of this problem. We present an overview of the selected economic indicators, namely the volumes of assets and for a set of approximately 5000 small and medium enterprises operating in Slovakia (during 2010–2012). In particular, we underline the significant differences in the economic parameters of the different NACE groups and recommend, where appropriate, the deeper statistical analysis for the data under consideration.

Key words: creative accounting, assets, sales, economic results, variability of statistical data

1. Introduction

The results of economic activity of firms belong to constant objects of interest of academic as well as government institutions. The reasons for the interest in these results are different and so are the tools by which the data is analyzed.

Academic analysis is largely focused on economic and technological characteristics of the enterprises and their mutual comparisons, the possibility of their adaptation for

modeling the firm functioning and simulating and finding the optimal production-economic parameters. Government authorities focus in particular on the monitoring and evaluation of indicators, which have a direct relationship to the tax avoidance of enterprises.

Individual indicators are examined and evaluated from different points of view. Theoretical analysis of the statistical characteristics of the data sets, for example, reveal the indicators and data, which are significantly different from those of the other firms, or from the data of the theoretically expected values (Lane, 2012).

The approach presented by WU (2014) includes in measure of the firm performance the return on assets, the return on stock and Tobin's Q values. His empirical results "... indicate that firm performance is in negative and significant relation to board size, CEO duality and deviation between voting right and cash flow right. On the other hand, firm performance is in positive and significant relation to board independence and insider ownership..."

Other approaches are built on the basis of both, objective and subjective evaluations of the firms. According Santos (2012) "... Firm performance is a relevant construct in strategic management research and frequently used as a dependent variable. Despite this relevance, there is hardly a consensus about its definition, dimensionality and measurement, what limits advances in research and understanding of the concept..."

The above presented approaches suggest the pitfalls of attempts of construction the generally applicable, which would be applicable to all market-oriented businesses. An illustration of the application may be problems models type Altman (1968).

In study of the data quality the consistency of the accounting procedures in a particular firm with the generally accepted accounting and financial rules is checked. Particular attention is given to applications of the so called "creative accounting", which aims to minimize the tax and other financial obligations of the company toward the State authorities.

According Gosh (2010) "... creative accounting is the transformation of accounting figures from what they actually are to what agents desire by taking advantage of the existing rules and/or ignoring some or all of them..."

In general, the creative accounting does not violate the rules of accounting methodology. Its application cannot therefore be regarded as an ex-ante deception. Because of this we agree with Jones (2011a) according whom "... The difference between creative accounting and fraud is that creative accounting is working within the regulatory framework but fraud involves breaking the law or violating regulatory framework..."

The literature stresses that the implementation of tax obligations is not secured by tax laws and rules. According Slemrod (2007) "... No government can announce a tax system and then rely on taxpayers' sense of duty to remit what is owed. Some dutiful people will undoubtedly pay what they owe, but many others will not. Over time the ranks of the dutiful will shrink, as they see how they are being taken advantage of by the others..."

Respect for the principles of accounts in the calculation of financial indicators is also an acknowledgement of their general accuracy and, therefore, largely confirming their fair calculation to the authorities of the State Government.

Many legal cases however show that respecting the accounting principles may not be sufficient proof that the tax obligations are fulfilled by individual firms in accordance with the spirit of the law on tax obligations. More details could be found in McLeay (2011).

Confirmation of the continuing problems with the creative accounting implications are extensive fraud at the corporate level, in national and international companies' level. Many are widely known. Among them, at least the cases in which heavy damages to business entities or clients have been committed – Madoff Investment (65 billion USD), Lehman Brothers (691 billion USD), Enron (101 billion USD) could be named. The various information shows, however, that the intensity of the accounting fraud, which take advantage of accounting and tax inconsistencies continue.

In accordance with Jones (2011b) however, it can be stated that “... every country has its own accounting scandals...” Their source, frequency, nature and scope may vary considerably and may therefore need to be monitored, analyzed and solved in the context of the domestic financial and accounting legislation.

The extensive violation of the accounting and financial rules force the State bodies, but also corporate executives to take extensive measures to prevent, or minimize the damages resulting from this.

In the control and audit practice they therefore increasingly deploy the sophisticated methodological tools of mathematics and statistical nature that are capable to detect not only violations of the accounting principles but also deliberate and intentional distortion of the economic and financial data processed for the purpose of gaining unauthorized benefits for the initiators of such operations. As an example the application of Benford law, as well as the application of the XBRL language could be noted.

Direct personal initiative of the “offenders”, but also frequently changing legislative environment, which defines the obligations of businesses, the ambiguity of the legislative norms can be considered as the factors contributing to the violation of tax rules and obligations.

In this paper, we present an overview of the selected economic characteristics of about 5000 small and medium-sized enterprises operating in Slovakia. In particular, we underline the extreme deviations of some indicators from the average values and we suggest their more thorough checking.

The objective of this paper is to set up to mirror the selected segment of business entities from a set of almost 100 000 small and medium-sized enterprises. In particular, we want to highlight the significant differences in the economic parameters of the different NACE groups.

2. Methodology and data

The background information for our study has been provided by the STATISTICAL OFFICE of the SLOVAK REPUBLIC on the basis of the contract no ZML_6_7/2014_800. The data are selected from the annual balance sheets and final statements of enterprises for the period 2010–2012.

In the following parts of our paper, we present the two selected economic indicators, namely the assets and sales, for the individual enterprises and NACE groupings of enterprises. We present the number of businesses in the relevant NACE groupings, minimum, maximum, mean values and coefficient s of variability.

Regression analysis allows us to study analytically the relationship of the selected indicators of businesses under different NACE groups. Subsequently, the significant differences in values of the parameters are presented also graphically.

We apply the simple regression model of type

$$Y = a + bx \quad (1)$$

where Y and X represent the dependent and independent variables. The **a** is location coefficient and **b** is the regression coefficient. For measuring variability of the data sets we apply the coefficient of variation (CV) defined as

$$CV = \text{standard deviation/mean} \quad (2)$$

3. The selected indicators

The **assets** of the firm consists of the tangible, intangible and financial assets of the firm and may have the character of current and noncurrent assets. They represent the resource with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit. The **sales** of the firm represent, in general, a transaction between two parties where the buyer receives goods (tangible or intangible), services and/or assets in exchange for money.

The volume of sale is considered an important economic parameter. The declining sale suggests the potential financial problems of the respective company. The zero volume of sale indicates that the enterprise cannot produce products (or services), or is not able to sell them, or, that the company does not perform any economic activity.

We decided to study and monitor these indicators, because we want to utilize them in the estimation of parameters of the discriminatory model of the Altman type. For easier comparison, we present the results for assets and sales for all three consecutive years – 2010, 2011 and 2012.

4. Results and discussion

The assets characteristics, which include the minimum, maxim, average values and coefficient of variation of the observed indicators are presented in Table 1.

The lowest values in 2011 were reported by NACE 78, 14 and 80, while the highest values achieved the NACE A, 25 and 71. In terms of averages the lowest assets were reported by NACE 78, 47 and 80. The highest values reported NACE 35, 11 and 68. In 2012 the lowest values of assets were identified in NACE 78, 14 and 15, while the highest values in NACE A, 73 and 46. In 2012, the lowest volumes of the assets were reported by NACE groupings 78, 14 and 15, the highest volumes reported groupings A, 73 and 46. In terms of the average volumes, the highest value in NACE 11 and 48.

Concerning the dynamics of the volume of assets for all three reference periods the lowest values reported enterprises in NACE 78 and 14. The highest values of assets, the situation remained largely unchanged. The highest average amount of assets presented businesses in groups of 35, 11 and 68. Annual dynamics of assets shows that in years 2010 and 2011, the average amount of assets grew the fastest in groupings NACE 78 and 82. The biggest decline was in the NACE R. During 2010 and 2011 out of 53 NACE groups in five of them reported fall in the volume of assets. During the 2011–2012 years we experienced a drop in assets up to 33 enterprises. Chart 1. presents the variability of the indicator of assets for 2010 and 2012 years for all NACE groups. It is evident that the

variability of the mean values changes significantly. The coefficients of variation range from 0.5 (NACE 61) up to almost 2.0 (NACE 73). Special attention deserve the groups NACE 73 and 78, which exhibit significant inter-annual changes in the value of their assets.

Table 1: Assets

Table 1. Assets													
NACE	N	Assets 2010				Assets 2011				Assets 2012			
		MIN	MAX	Assets-2010	CV-2010	MIN	MAX	Assets-2011	CV-2011	MIN	MAX	Assets-2012	CV-2012
10	125	88 426	11 059 140	3 106 572	0,96	64 161	12 761 978	3 203 840	0,94	151 866	13 442 900	3 140 254	0,98
11	16	2 142 856	12 213 461	5 530 708	0,55	2 926 060	14 597 856	6 404 953	0,59	2 471 783	18 229 017	5 979 727	0,68
13	32	142 382	8 815 657	3 032 884	0,98	124 314	12 985 278	3 315 682	1,09	108 925	17 131 860	3 228 909	1,13
14	69	21 959	9 604 938	1 533 770	1,32	36 659	11 357 211	1 573 242	1,32	12 490	13 301 247	1 569 283	1,40
15	29	44 392	4 700 282	1 615 815	0,97	79 259	6 525 897	1 836 748	1,04	30 741	6 981 625	1 745 738	1,13
16	58	154 570	10 999 416	2 349 970	1,04	186 665	19 632 332	2 406 850	1,26	166 962	29 033 932	2 476 475	1,63
17	26	194 058	8 622 624	3 362 088	0,72	224 048	11 663 473	3 396 111	0,80	143 323	11 182 793	3 717 339	0,83
18	22	701 389	8 069 757	3 048 801	0,69	961 026	6 903 770	3 009 869	0,62	926 605	7 469 968	2 985 657	0,62
22	96	150 356	11 621 552	3 365 556	0,73	116 541	11 182 730	3 397 047	0,71	90 331	15 714 823	3 508 718	0,80
23	54	226 220	12 666 185	4 209 851	0,77	427 362	15 197 342	4 193 475	0,87	500 013	14 675 531	4 040 504	0,84
24	31	480 866	8 448 710	2 448 137	0,71	558 874	13 792 083	2 796 856	0,96	317 015	12 804 316	3 470 825	0,94
25	229	159 505	12 975 511	3 078 265	0,86	133 150	12 044 795	3 239 894	0,86	123 368	20 290 620	3 322 206	0,94
26	39	129 236	6 232 597	2 762 159	0,72	118 832	7 466 030	3 035 788	0,70	66 208	10 411 083	3 361 505	0,81
27	78	99 589	9 852 041	2 747 716	0,95	140 602	14 291 180	2 822 056	0,99	120 140	10 450 923	2 701 781	0,96
28	116	296 480	12 400 792	3 519 028	0,91	231 263	19 165 459	3 815 847	0,96	256 261	20 249 550	3 896 865	1,03
31	56	220 080	9 950 762	2 436 713	0,93	244 661	18 050 474	2 697 401	1,13	126 369	15 898 802	2 801 638	1,06
32	19	241 383	11 187 625	3 649 250	0,90	228 673	14 221 843	4 096 671	0,99	252 482	12 182 774	3 991 617	0,89
33	61	112 562	11 064 830	3 524 683	0,89	127 787	15 632 702	3 361 655	0,96	87 227	15 433 088	3 272 542	0,95
35	47	750 797	9 864 854	5 052 908	0,55	716 854	14 994 139	5 284 642	0,63	778 654	16 856 611	5 275 130	0,66
41	140	126 186	9 901 820	2 452 280	0,82	71 401	10 486 383	2 461 934	0,91	92 108	10 526 307	2 375 717	0,89
42	69	61 700	10 206 328	2 545 980	0,82	171 236	16 404 966	2 884 924	0,99	92 108	11 343 504	2 497 705	0,86
43	158	109 066	11 161 540	2 607 421	0,86	53 089	19 228 959	2 767 611	0,94	147 660	15 326 167	2 574 937	0,94
45	114	495 738	12 611 084	3 581 322	0,64	490 033	14 962 389	3 913 878	0,71	340 672	16 083 245	3 714 770	0,74
46	335	182 209	11 918 751	3 687 991	0,64	212 074	19 185 522	3 853 805	0,71	296 244	61 510 049	3 901 227	1,03
47	118	97 071	11 990 850	2 794 890	0,89	19 152	30 255 035	3 234 812	1,13	78 255	28 549 519	3 100 145	1,13
55	66	68 709	12 411 727	2 939 952	1,07	48 403	26 254 299	3 196 587	1,32	56 785	21 594 032	3 170 028	1,26
56	56	94 279	7 034 023	1 220 371	1,24	87 959	8 831 572	1 332 731	1,26	67 811	7 537 944	1 473 012	1,23
61	3	935 868	4 749 841	3 691 060	0,50	1 545 127	5 687 983	3 796 575	0,46	1 893 823	11 739 392	7 304 486	0,56
68	49	77 070	12 828 187	5 899 127	0,72	105 420	17 443 059	6 778 504	0,75	205 733	17 687 207	6 257 689	0,78
69	16	196 526	8 687 741	3 308 737	0,81	603 098	10 516 899	3 556 518	1,02	527 606	8 611 467	3 175 586	0,87
70	21	178 627	8 068 679	3 062 102	0,90	192 129	11 350 179	3 273 771	1,00	282 841	11 525 530	2 840 806	1,00
71	67	155 121	12 855 112	2 888 736	0,91	95 038	11 207 177	2 772 131	0,94	80 706	12 275 210	2 639 315	0,99
73	32	43 477	5 896 565	2 567 117	0,64	295 601	26 899 743	3 489 773	1,34	289 764	39 955 035	3 626 796	1,89
77	13	458 970	7 920 913	3 686 928	0,69	726 297	9 012 193	3 699 554	0,71	886 055	7 002 497	3 207 739	0,64
78	30	0	2 698 722	788 069	0,95	3 321	14 072 021	1 326 091	1,91	2 669	3 682 756	1 071 506	0,99
79	11	384 759	5 267 350	1 836 277	0,94	618 888	6 592 454	1 877 742	0,92	513 679	4 238 698	1 859 582	0,68
80	85	26 685	5 650 967	566 874	1,58	23 197	6 188 238	592 719	1,64	40 490	4 419 229	524 216	1,42
81	49	55 794	5 372 804	1 178 559	1,06	64 161	7 990 315	1 155 227	1,25	33 179	7 602 791	1 302 425	1,32
82	15	114 832	8 292 484	1 688 410	1,62	115 920	19 165 459	2 478 885	1,97	127 921	15 695 054	2 290 550	1,75
85	16	102 159	5 166 898	2 439 747	0,76	118 823	6 733 316	2 658 624	0,82	174 311	6 816 599	2 368 696	0,81
19+20+30	27	691 717	9 448 375	3 674 362	0,65	511 355	15 510 065	4 287 975	0,85	310 815	26 871 719	4 406 377	1,15
29+30	48	583 367	9 532 022	3 604 558	0,67	576 746	10 791 720	3 709 860	0,72	563 769	9 420 420	3 821 033	0,67
49+50+51	120	245 680	12 357 886	3 206 915	0,77	222 938	18 444 325	3 502 686	0,92	325 271	16 522 943	3 440 825	0,86
52+53	53	199 892	11 998 738	2 891 345	0,94	295 718	10 145 839	2 933 142	0,73	443 447	18 991 905	3 364 094	1,06
58+59+60	23	289 910	9 392 933	3 505 345	0,79	437 214	8 566 666	3 566 339	0,75	422 891	9 658 826	3 520 934	0,83
62+63	76	262 185	8 872 790	2 816 755	0,79	109 663	10 420 237	3 252 018	0,77	178 706	16 238 434	3 229 888	0,84
72+74	15	100 455	8 000 726	2 994 895	0,80	23 197	5 939 103	2 691 623	0,79	40 490	7 017 227	3 171 219	0,79
A	505	425 071	12 996 345	4 016 634	0,66	430 669	18 100 379	4 158 940	0,70	344 434	31 803 882	4 094 365	0,78
B	26	340 688	9 667 479	4 783 527	0,68	652 656	15 689 120	5 279 040	0,79	705 291	15 528 297	4 801 109	0,87
E	56	101 184	11 351 989	3 306 109	0,93	104 136	13 692 709	3 526 328	0,98	143 969	29 750 400	3 715 622	1,29
Q	128	88 342	12 819 727	3 306 687	0,96	63 265	25 248 500	3 552 214	1,09	81 968	25 945 753	3 549 916	1,12
R	16	424 484	12 469 859	4 474 820	0,87	176 026	9 843 863	3 952 627	0,84	242 348	10 795 635	4 040 855	0,84
S	25	303 812	7 345 684	2 319 424	0,94	257 480	6 811 200	2 328 833	0,99	236 589	7 499 832	2 375 633	1,01

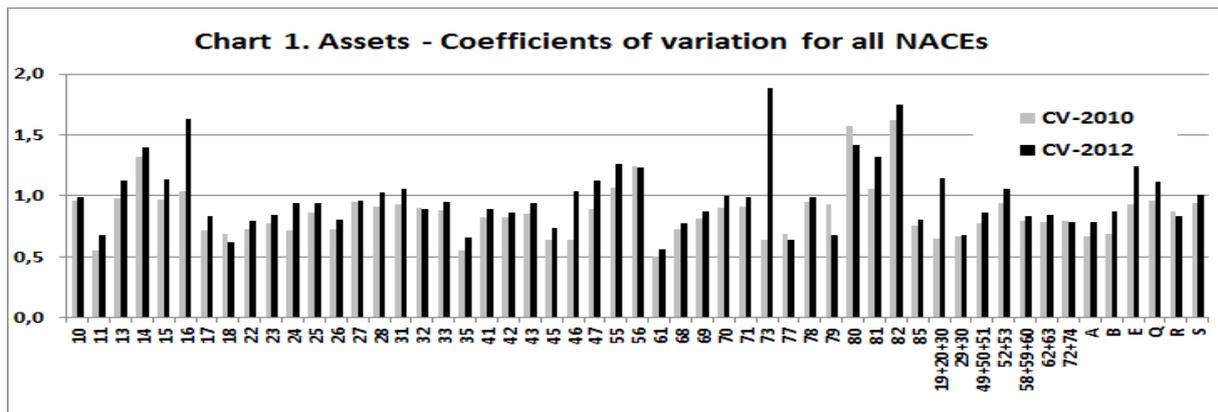


Figure 1: Assets – coefficients of variation for all NACEs

In 2010, when economic crisis peaked many firms canceled their contracts with media companies and PR agencies and under this new situation they started to cover these program by themselves, which also helped them to reduce the costs of production.

The high variability of the values of the parameter “assets”, which we have identified in the NACE 61 may also reflect the high sensitivity of these enterprises, to the changes in the market environment. Businesses in this groups belong to the area of services, and those belong to the most common implementers of creative accounting procedures¹.

To verify the nature and intensity of the changes in the values of the assets of businesses, the regression analysis has been applied. The inter-annual changes in assets have been estimated. According our calculations the volume of assets between years 2010 and 2011 has increased by 4.23%, Chart 2. The similar changes could be identified in the volume of assets in two year period 2010–2012, Chart 3. In 2012, however, the extremely high change in volume of assets was found in the grouping NACE 61. The value of the assets has nearly doubled. A huge change in the amount of the assets can be explained by the new technologies, which were capital intensive.

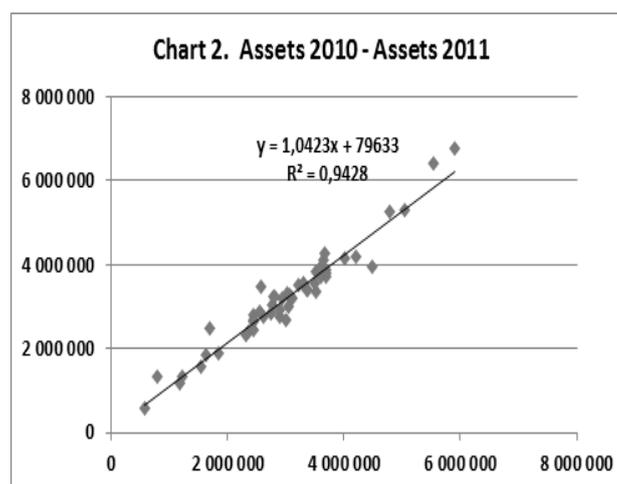


Figure 2: Assets 2010 – assets 2011

¹ More details could be found in journal Kriminalistik, No 4/2014.

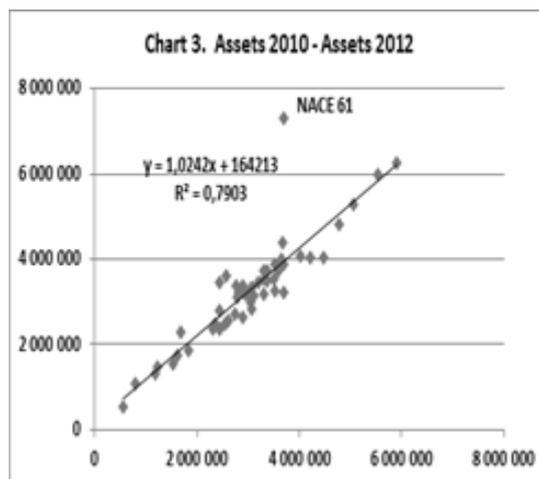


Figure 3: Assets 2010 – assets 2012

Sales — account the revenue from the sale of own products and services and from the sale of goods, they represent the basic component of the income of the enterprises. In this paper, we present the value of the **sales** for the three-year period, according to the NACE groups, Table 2. When assessing the dynamics of sales of the entire three-year period we found the following results: the lowest values observed in groups of NACE 73, 70 and 47 and the highest in the Group NACE 47. When comparing the average values observed in all three years, the highest average amount of sales reported the NACE groupings 46 and 79. The highest average volume of sales presents the NACE 79 groupings (travel agencies). The lowest volume of sales, was reported by the NACE 80 (Security and search services).

In view of the inter-annual dynamics some interesting changes in the volume of sales has been identified. When comparing the years 2011 and 2010 there was a rise in sales in 45 NACE out of 53. Only 8 groups reported decline in volume of their sales. When comparing the years 2012 and 2011, the situation deteriorated significantly. The decrease was observed in 23 groupings of the NACE. The highest variability showed the enterprise groups of NACE 68, 78 and 85. Strong momentum in sales achieved the businesses in the Group NACE 73 (Advertising and market research). Special attention deserves a group of firms, with negative result for several years in a row.

5. Discussion and conclusion

The above information provides the suggestions for deeper evaluation of the individual accounting data of the firms and groupings of firms. Some of the accounting data show the significant inter annual changes, or they significantly differ from the indicators of the other firms in the same NACE group. For the analysis of these situations it is necessary to adopt the more sophisticated mathematics and statistical methods.

The objective of this paper was to derive the core information on the attributes of the selected economic indicators which characterize the outputs of the business entities operating in Slovakia. In this paper we present only two indicators – namely assets and sales. To identify the statistical attributes of these indicator almost 5000 individual firms have been scrutinized. The derived information will be further utilized in discussion on the construction of the bonity models of the Altman type. For modelling applications we

recommend the preliminary analysis of the accounting data, in particular the scope of applications of the “creative accounting”.

Table 2: Sales

Table 2. Sales												
NACE	Tržby 2010				Tržby 2011				Tržby 2012			
	MIN	MAX	AVG	CV-2010	MIN	MAX	AVG	CV-2011	MIN	MAX	AVG	CV-2012
10	413 880	12 806 824	4 213 635	0,82	385 747	19 281 549	4 692 748	0,92	353 050	29 706 511	4 938 456	1,02
11	852 758	9 096 772	4 098 675	0,58	1 120 254	14 384 677	5 701 472	0,75	1 084 920	16 007 030	5 297 104	0,89
13	661 002	12 908 616	4 073 731	0,86	553 085	23 211 790	4 686 915	1,02	397 999	16 743 979	4 632 022	0,92
14	178 910	8 942 199	2 086 798	1,01	191 658	8 745 585	2 142 637	0,91	210 124	7 971 958	2 095 611	1,00
15	395 692	11 764 363	3 422 820	1,05	370 317	11 409 159	3 558 128	1,03	345 616	12 757 446	3 326 319	1,13
16	500 265	10 976 937	2 862 103	0,84	388 725	16 483 866	3 143 823	0,90	405 298	19 038 648	3 125 020	1,02
17	403 307	12 199 366	4 183 672	0,72	334 638	18 105 075	4 751 026	0,86	294 195	44 513 114	5 828 261	1,44
18	856 205	7 654 054	3 242 085	0,64	865 210	13 698 983	3 495 589	0,81	1 087 305	14 119 973	3 248 736	0,87
22	420 703	12 651 611	4 494 973	0,69	330 455	18 449 646	5 190 303	0,75	168 250	23 661 814	5 396 104	0,82
23	434 253	12 892 149	4 391 564	0,85	375 692	14 995 290	4 278 018	0,85	184 820	14 123 862	4 189 342	0,96
24	839 393	10 579 614	3 981 028	0,67	997 572	22 074 048	5 097 959	0,83	834 270	29 035 410	5 803 860	0,95
25	436 359	11 679 046	3 608 648	0,77	281 371	13 537 227	4 247 593	0,78	372 626	18 103 271	4 288 660	0,81
26	322 621	9 496 537	3 682 826	0,75	490 920	14 342 648	4 180 067	0,79	245 461	17 459 845	4 472 729	0,88
27	238 205	12 362 604	3 638 260	0,84	260 029	17 616 528	4 136 175	0,91	241 051	16 303 312	3 981 376	0,90
28	391 265	12 402 030	3 980 859	0,77	450 223	18 205 828	5 000 471	0,86	426 127	28 997 256	4 997 085	0,95
31	412 891	10 423 853	3 318 965	0,77	514 392	17 279 841	3 913 562	0,89	301 232	20 173 951	4 084 518	1,03
32	585 777	12 007 612	4 566 769	0,93	634 282	25 957 317	5 749 886	1,08	815 542	18 947 357	5 545 716	0,96
33	362 947	11 314 090	4 499 516	0,74	380 291	20 098 164	4 603 772	0,89	558 131	19 074 997	4 622 016	0,86
35	1 224 305	12 800 568	4 667 919	0,66	1 355 708	13 991 753	4 817 014	0,68	1 552 933	36 855 564	5 778 865	1,02
41	274 799	11 707 387	3 655 850	0,71	247 140	20 001 870	3 439 858	1,00	144 068	18 352 505	2 919 835	0,99
42	411 906	10 378 855	3 226 949	0,75	386 681	20 972 882	3 703 815	1,02	276 683	18 867 799	2 904 715	1,03
43	77 803	12 931 863	3 740 025	0,78	245 126	15 838 768	3 769 056	0,83	180 578	17 674 713	3 373 865	0,87
45	839 412	12 835 019	5 892 596	0,55	597 428	20 430 229	6 747 138	0,67	620 378	26 459 152	6 626 941	0,72
46	435 679	12 772 640	6 341 217	0,46	449 744	23 886 371	7 012 562	0,56	502 694	29 845 327	6 958 365	0,58
47	315 704	12 935 964	4 831 878	0,72	260 533	24 177 343	5 369 148	0,83	270 357	23 559 308	5 509 054	0,86
55	312 956	7 875 887	1 438 006	0,89	268 680	9 909 497	1 502 830	0,97	335 661	8 018 262	1 503 339	0,93
56	313 290	12 227 762	1 912 192	1,18	290 117	14 520 745	2 022 389	1,30	335 296	13 397 145	2 032 619	1,06
61	313 290	10 780 118	5 947 757	0,78	442 787	6 846 399	4 765 796	0,62	856 960	13 643 239	6 612 975	0,80
68	137 977	10 605 783	1 774 563	1,10	95 088	22 813 075	2 345 634	1,66	96 969	13 909 499	2 127 317	1,41
69	529 467	12 238 898	4 437 069	1,01	534 359	18 384 894	5 021 999	1,01	845 446	20 879 628	5 771 372	1,01
70	136 631	11 464 504	4 666 545	0,85	74 700	18 298 173	5 259 791	0,95	78 810	19 632 181	5 863 507	0,95
71	387 172	12 846 095	2 858 099	0,94	259 495	23 943 010	3 051 041	1,18	149 186	39 629 498	3 309 324	1,57
73	86 830	11 112 769	5 216 501	0,63	0	20 022 819	5 071 311	0,83	1 136 728	68 508 027	7 237 673	1,69
77	398 622	7 327 636	3 267 463	0,60	592 387	8 850 994	4 545 173	0,59	491 768	12 193 074	5 190 189	0,73
78	2	7 710 694	2 225 574	0,97	3	26 835 011	3 765 441	1,49	1 389	20 352 775	3 689 451	1,33
79	5 343 039	9 423 976	7 517 133	0,19	2 168 686	17 331 586	9 274 062	0,42	3 542 373	21 420 185	9 915 803	0,50
80	189 053	5 875 507	1 331 081	1,04	160 888	14 488 168	1 564 262	1,46	176 513	5 904 960	1 294 137	1,09
81	225 144	11 014 048	2 254 603	1,01	274 055	20 059 813	2 488 584	1,33	123 689	19 310 239	2 590 277	1,33
82	205 085	8 103 966	2 486 601	0,88	181 072	16 490 193	2 969 460	1,37	111 856	11 803 440	2 992 602	1,09
85	207 162	9 033 161	2 323 213	1,26	114 893	5 827 197	1 925 615	1,03	108 053	7 228 743	2 137 315	1,15
19+20+30	677 152	10 673 844	3 747 284	0,69	853 555	22 357 133	5 026 081	1,03	587 941	18 452 711	4 513 264	0,87
29+30	613 704	12 427 892	4 224 006	0,78	887 972	17 618 460	5 897 121	0,87	776 664	21 062 165	5 722 916	0,85
49+50+51	728 307	12 955 119	4 797 040	0,58	375 692	17 576 440	5 369 466	0,66	496 156	18 236 799	5 474 678	0,71
52+53	116 718	11 335 227	4 932 309	0,67	379 032	15 589 784	5 442 266	0,72	414 891	22 179 994	5 959 320	0,78
58+59+60	286 103	9 295 548	4 359 629	0,59	427 593	10 177 078	4 386 155	0,62	455 856	19 261 879	4 697 197	0,91
62+63	461 832	9 712 064	4 187 050	0,61	546 788	11 869 155	4 538 845	0,62	404 576	30 821 282	5 107 647	0,89
72+74	274 085	5 739 711	2 435 526	0,78	236 793	8 476 090	3 190 174	0,83	176 513	6 508 020	2 950 535	0,72
A	91 937	10 442 302	1 627 257	0,87	94 878	12 389 658	2 002 639	0,91	95 211	28 550 221	2 118 902	1,10
B	547 214	8 857 520	4 343 266	0,60	466 068	10 763 963	4 118 532	0,64	377 775	12 289 100	3 581 534	0,76
E	490 747	10 195 672	3 032 835	0,76	477 054	20 197 738	3 365 239	1,02	469 502	20 301 142	3 079 981	1,01
Q	212 402	12 476 342	3 650 345	0,90	95 732	14 958 967	3 746 640	0,95	12 987	22 441 190	4 109 182	1,01
R	683 784	10 767 862	3 814 912	0,88	391 968	18 586 192	3 549 376	1,22	468 368	28 696 316	5 395 352	1,34
S	190 259	7 992 486	2 860 505	0,91	271 165	9 262 620	2 844 114	0,94	413 080	14 424 995	3 083 330	1,07

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Determinants of Bank Lending in CEECs: Evidence from Bayesian Model Averaging

Svatopluk Kapounek¹

¹*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: kapounek@mendelu.cz*

Abstract

The paper deals with the impact of solvency from weakened balance sheet after the financial crisis, selected macroeconomic shocks and institutional determinants. The results show that economic freedom, equity and liquidity indicators have positive impact on the lending activities of the banks in CEE countries. The empirical analysis adopts cross-sectional regression model, the dataset contains 2370 banks in 16 countries. Bayesian model averaging is using as a stochastic variable selection method of balance sheet indicators.

Keywords: banking industry, macroeconomic shocks, financial crisis, institutional factors, ownership structure

1. Introduction

It is generally agreed that lending activities tends to increase during the economic expansion and decrease during its contractions. The fall down of the lending activities was significantly observed during the financial crisis and its consequences after the year 2007 which was caused by decrease in investment demand and economic activities (Poměnková and Kapounek, 2013). However, the lending activities are not influenced only by demand side factors. Cuaresma, Fidrmuc and Hake (2014) found that supply factors play a more significant role than the demand factors. Adams-Kane, Jia and Lim (2015) contributed that important bank lending determinants are changes in willingness to lend from increased economic uncertainty, funding availability from interbank liquidity markets, and solvency from weakened balance sheets after the crisis. Therefore the empirical analysis in this paper combines specific banking controls represented supply side factors and macroeconomic shocks related to investment demand and inflation shock.

The emerging economies in Central and Eastern European countries (CEECs) have been hit particularly hard by the financial crisis. This is generally viewed as a result of vulnerabilities that have accumulated during the pre-crisis period. The excessive consumption growth was associated with a lending boom, and the credits were provided

mainly by foreign banks which invested massively in CEECs. During the financial crisis this development was negatively affected by several factors. First, several CEECs let their currencies depreciate massively in order to improve competitiveness and deal with capital flight and sudden stops of capital inflows. Second, growth forecasts for CEECs and especially for private consumption were significantly revised downward.

Both factors have important implications for foreign banks active in CEECs. Luca and Petrova (2008) and Basso, Calvo-Gonzales and Jurgilas (2011) argue that foreign banks used the easier access to international capital markets and foreign funds from their home countries for credits in CEECs. The depreciations reduced the foreign currency value of credits provided in East European currencies, thus imposing significant losses on foreign banks. As far as many foreign banks engaged in foreign currency lending, the exchange rate depreciations increased the risk of foreign currency loans (Beckmann, Fidrmuc and Stix, 2012) with similar negative implications on profits of foreign banks. The financial vulnerability in CEECs was further increased by adverse income shocks of the borrowers (Beckmann, Fidrmuc and Stix, 2012).

Frömmel and Srzentic (2013) showed that banks with foreign ownerships are much less significant on macroeconomic conditions in the host country but their lending activities are primarily influenced by the equity growth. However, the role of the bank ownership is reduced by cross-border lending. Fidrmuc, Hake and Stix (2013) showed that the foreign currency lending activities are driven by stability of local currency. In the related analysis Fidrmuc and Hainz (2013) argued that cross-border lending activities are motivated by low interest rates and regulatory harmonization. Therefore the provided analysis is extended by different ownership structure of the banks differentiating especially between locally-owned and foreign banks in this paper.

Moreover, lending may be influenced not only by macroeconomic shocks per se but also by institutional factors. Property rights and the enforcement of rules are crucial for well-functioning markets (Ostrom, 1998). Djankov, McLiesh and Shleifer (2008b) show, that creditor protection is associated with more developed financial systems. In related research, Djankov, Hart, McLiesh and Shleifer (2008a) show that financial development is also related to debt enforcement rules. Property rights and enforcement rules are especially important for transition economies where new institutions were created (Raiser, Rousso, Steves and Teksoz, 2008). Ranciere, Tornell and Vamvakidis (2010) view the general expectations of bailout policies (including not only bailouts of banks but also the retention of unsustainable exchange rate pegs) as one of the major motivations for foreign currency borrowing. While bailouts were not promised ex ante, several CEECs have provided funds to banks during the recent financial turmoil. Moreover, IMF programs and international coordination (e.g. the Vienna Initiative) can be viewed as specific bailout policies. In turn, such policies might have repercussions on borrowers.

Our research builds upon and is related to previous literature. The contribution of this paper is in detailed analysis of banking controls and selection of specific solvency determinants influenced lending activities of the banks in CEECs after the financial crisis. The problem of long list of potential explanatory variables and absence of appropriate theoretical background is solved by the Bayesian Model Averaging proposed by Sala-i-Martin (1997).

2. Methodology and Data

As I mentioned in the previous section the possible determinants of bank lending are macroeconomic shocks, institutional factors and a quite long list of banking controls which represent weakened balance sheets after the financial crisis. The empirical analysis is based on the cross-sectional regression where net loans of bank $i = 1, \dots, N$ are regressed on an intercept α and number of explanatory variables selected from a set of k variables in a matrix X of dimension $N \times K$. Assume that $\text{rank}(\iota_N : X) = K + 1$, where ι_N is an N -dimensional vector of ones, and define β as the full k -dimensional vector of regression coefficients:

$$y = \alpha \iota_N + X_r \beta_r + \varepsilon, \quad (1)$$

where we assume $r = 1, \dots, R$ models, denoted by M_r and X_r is a $N \times k_r$ matrix containing (or all) columns of X . The N -vector of errors, ε , is assumed to be $N(0_N, h^{-1}I_T)$. Thus, $R = 2^K$ because there are 2^K possible subsets of X and 2^K possible choices for X_r (Koop, 2003).

I consider up to 43 regressors to be included in the model. That means 2^{43} different models to deal with which is far too many to evaluate. To solve this problem I applied Markov chain Monte Carlo techniques (MC³) pioneered by Madigan and York (1995). The results are based on taking 1 100 000 draws and discarding the first 100 000 draws models as burn-in replications.

In a Bayesian framework I receive posterior model probabilities $p(M_r|y)$, for $r = 1, \dots, R$, where each model depends upon a vector of parameters θ_r and is characterized by prior $p(\theta_r|M_r)$ likelihood $p(y|\theta_r, M_r)$ and posterior $p(\theta_r|y, M_r)$. Assume vector of parameters ϕ which is function of θ_r for each of $r = 1, \dots, R$. Then I should obtain results for every model under consideration and average them where the weights in the averaging are the posterior model probabilities:

$$p(\phi|y) = \sum_{r=1}^R p(\phi|y, M_r) p(M_r|y), \quad (2)$$

alternatively, if $g(\phi)$ is a function of ϕ , the rules of conditional expectation imply that

$$E[g(\phi)|y] = \sum_{r=1}^R E[g(\phi)|y, M_r] p(M_r|y), \quad (3)$$

where $E[g(\phi)|y, M_r]$ and $p(M_r|y)$ are calculated by posterior simulation. (Koop, 2003)

To ensure that the noninformative prior for the intercept has the same implication for each model I followed approach applied by Fernandez et al. (2001), who recommended standardization of all explanatory variables by subtracting off their means.

Due to the singularity of inversed matrix the generalized inverse, especially Moore-Penrose pseudoinverse concept were applied to compute regressions.

The dataset covers 2370 banks in 16 CEE countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia and Slovenia) and two traditional bank-based economies (Austria and Germany) in the year 2011. The yearly microeconomic

data were obtained from Bankscope database. The individual bank data are merged with aggregate data on macroeconomic shocks and institutional environment.

Macroeconomic shocks were represented by the changes of economic activity (GDP), deflator and bilateral exchange rates (national currency/EUR). These aggregate data were obtained from the Eurostat.

The institutional environment was analysed by indicators of economic freedom, financial openness and political risk. The applied index of economic freedom (The Heritage Foundation, 2014) is composite index of 10 specific components which are grouped for ease into four key categories: (1) rule of law (property rights, freedom from corruption), (2) limited government (fiscal freedom, government spending), (3) regulatory efficiency (business freedom, labor freedom, monetary freedom) and (4) open markets (trade freedom, investment freedom, financial freedom).

The financial openness was analysed by Chinn-Ito Index (Chinn and Ito, 2006) which measures a country's degree of capital account openness. The index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. This index takes on higher values the more open the country is to cross-border capital transactions. By construction, the series has a mean of zero.

To assess political risks I take into account a country's underlying political and regulatory structure. One of the suitable indicator is political constraint index (Polcon) offered by Henisz (2002). This index identifies measurable number of veto points in a political system, multiple branches of the government and judicial independence. The interpretation of the POLCON index is that a political system with no checks and balances would have no constraints on the leading politicians because nobody dominates the power to veto key decisions. The scale ranges from 0 to 1. The low level of index means that political changes may become highly unpredictable which represents a lot of risk for the lending activities in the country. I applied two versions of the political constraint index applied (Polcon III and Polcon V) which are constructed in a similar way, but Polcon V includes two additional veto points: the judiciary and sub-federal entities.

The most of the data were obtained as the ratios. The data at levels were transformed by the first order differences (fod) or natural logarithms (ln). The transformation and list of all variables is presented in Table 1.

3. Results

The results of Bayes Model Averaging are presented in the Table 1. The first column provides information about the probability that the corresponding explanatory variable should be included in the model. The results present strong evidence of positive impact of economic freedom and equity on the net loans. However, many posterior means of balance sheet indicators are small relative to their standard deviations. Obviously, these indicators do not provide clear explanatory power.

The analysis was performed for CEECs included traditional bank-based economies (Austria and Germany) and separately for 14 CEE countries. It is not surprising that impact of economic freedom is significant only in the first sample. In the second model we can identify significant impact of net interest income on the lending activities in CEE. All other variables do not provide clear story. One reason of low explanatory power is significant decrease of banks in the sample (only 365 banks in CEECs).

Table 1: Bayesian Model Averaging Results

Explanatory Variable	CEECS + AT + DE			CEECS		
	BMA Post. Prob.	Post. Mean	Post. St. Dev.	BMA Post. Prob.	Post. Mean	Post. St. Dev.
Equity (ln)	1.000	0.977	0.013	0.047	-0.004	0.027
Net Income (ln)	0.228	0.000	0.000	0.024	0.000	0.000
Total Capital Ratio (%)	1.000	-0.024	0.003	0.142	-0.002	0.006
Capital Funds/Liabilities (%)	0.257	-0.001	0.002	0.024	0.000	0.001
Net Interest Margin (%)	0.531	0.063	0.062	0.118	-0.015	0.071
Return on Avg Assets (ROAA, %)	0.280	0.013	0.026	0.057	-0.002	0.009
Return on Avg Equity (ROAE, %)	0.691	-0.002	0.002	0.023	0.000	0.000
Cost to Income Ratio (%)	0.153	0.000	0.001	0.065	0.000	0.000
Liq Assets/Cust & ST Funding (%)	0.527	-0.002	0.002	0.075	0.000	0.001
Loan Loss Prov/Net Int Rev (%)	0.241	0.000	0.000	0.071	0.000	0.000
Tier 1 Ratio (%)	1.000	0.020	0.004	0.043	0.000	0.003
Equity/Tot Assets (%)	1.000	-0.073	0.009	0.026	0.000	0.001
Equity/Cust & Short Term Fund (%)	0.290	0.001	0.001	0.029	0.000	0.000
Equity/Liabilities (%)	0.991	0.005	0.002	0.028	0.000	0.001
Cap Funds/Tot Assets (%)	0.395	-0.007	0.009	0.025	0.000	0.002
Cap Funds/Dep & ST Funding (%)	0.458	-0.001	0.002	0.023	0.000	0.001
Cap Funds/Liabilities (%)	0.229	-0.001	0.002	0.025	0.000	0.001
Subord Debt/Cap Funds (%)	1.000	0.009	0.002	0.023	0.000	0.001
Net Int Rev/Avg Assets (%)	0.280	0.011	0.026	0.055	-0.004	0.028
Oth Op Inc/Avg Assets (%)	0.045	0.001	0.016	0.026	0.000	0.002
Non Int Exp/Avg Assets (%)	0.041	-0.001	0.016	0.024	0.000	0.002
Pre-Tax Op Inc/Avg Assets (%)	0.116	-0.003	0.011	0.042	-0.001	0.008
Non Op Items & Taxes/Avg Ast (%)	0.084	0.002	0.014	0.022	0.000	0.008
Non Op Items/Net Income (%)	0.023	0.000	0.000	0.023	0.000	0.000
Recurring Earning Power (%)	0.884	-0.043	0.025	0.027	0.000	0.006
Interbank Ratio (%)	0.021	0.000	0.000	0.025	0.000	0.000
Liq Assets/Dep & ST Funding (%)	0.484	-0.002	0.002	0.069	0.000	0.001
Liquid Assets/Tot Dep & Bor (%)	0.999	-0.003	0.001	1.000	-0.018	0.003
Deposits & Short term funding (ln)	0.021	0.000	0.000	0.044	0.004	0.028
Int Income/Avg Earning Assets (%)	1.000	-0.053	0.009	1.000	-0.106	0.018
Res Imp Loans/Impaired Loans (%)	0.028	0.000	0.000	0.026	0.000	0.000
Cust Dep/Total Fund excl Deriv (%)	0.990	-0.004	0.001	0.024	0.000	0.000
Net Interest Income (ln)	0.095	0.000	0.000	1.000	0.818	0.053
Net Int Inc/Avg Earning Assets (%)	0.484	0.058	0.063	0.222	0.029	0.083
Number of Employees (ln)	0.084	0.000	0.000	0.086	0.008	0.032
Foreign ownership (%)	0.030	-0.002	0.016	0.062	0.010	0.050
Gross Domestic Product (fod)	0.039	-0.106	0.824	0.051	0.184	1.089
Consumption Prices (fod)	0.088	-0.253	1.027	0.023	0.000	0.318
Exchange rate (fod)	0.050	0.204	1.210	0.023	-0.006	0.578
Political Constraints Index III	0.037	-0.017	0.133	0.023	0.001	0.100
Political Constraints Index V	0.123	-0.097	0.317	0.030	-0.012	0.129
Financial Openness	0.092	-0.008	0.032	0.025	-0.001	0.012
Economic Freedom Index	0.736	1.757	1.379	0.036	0.048	0.414

Table 2: Posterior Model Probabilities for Top 10 Models

	$p(M_r y)$ Analytical	$p(M_r y)$ MC ³ estimate
1	0.1260	0.1446
2	0.1260	0.1581
3	0.1177	0.1064
4	0.1177	0.0985
5	0.1021	0.1106
6	0.1021	0.0924
7	0.0778	0.0780
8	0.0778	0.0731
9	0.0764	0.0688
10	0.0764	0.0694

Table 3: Posterior Results for the Preferred Model

Explanatory Variable	BMA Post. Prob.	Posterior Mean	Posterior St. Dev.
Equity (ln)	1.0000	0.9749	0.0126
Total Capital Ratio (%)	1.0000	-0.0247	0.0033
Net Interest Margin (%)	0.4867	0.0603	0.0640
Return on Average Equity (ROAE, %)	0.5828	-0.0016	0.0016
Liquid Assets/Cust & ST Funding (%)	0.5101	-0.0020	0.0020
Tier 1 Ratio (%)	1.0000	0.0205	0.0041
Equity/Tot Assets (%)	1.0000	-0.0637	0.0049
Equity/Liabilities (%)	0.9998	0.0035	0.0008
Cap Funds/Tot Assets (%)	0.9982	-0.0191	0.0046
Cap Funds/Dep & ST Funding (%)	0.1968	-0.0003	0.0006
Subord Debt/Cap Funds (%)	1.0000	0.0102	0.0019
Recurring Earning Power (%)	0.9880	-0.0384	0.0112
Liquid Assets/Dep & ST Funding (%)	0.5001	-0.0020	0.0020
Liquid Assets/Tot Dep & Bor (%)	1.0000	-0.0035	0.0007
Interest Income/Average Earning Assets (%)	1.0000	-0.0556	0.0066
Cust Dep/Total Funding excl Derivatives (%)	0.9968	-0.0038	0.0010
Net Interest Income/Average Earning Assets (%)	0.5304	0.0674	0.0656
Economic Freedom Composite Index	0.7174	1.4004	1.0616

Table 2 shows posterior model probabilities calculated by MLM function and MC³ algorithm. We can see very small differences between the results. It confirms the convergence of the MC³ algorithm and correctness of the results in Table 1. Finally, Table 3 presents the results of the most preferred model. The posterior probability associated with this model is 0,126 (Table 2). However, comparison of Table 1 and Table 3 confirmed that posterior means of the explanatory variables are roughly the same. Thus, the similarity of the results in Table 1 and 3 supported the relevancy of the Bayesian Model Averaging approach.

4. Discussion and Conclusions

The results of empirical analysis confirmed that institutional factors represented by the index of economic freedom affected the lending activities of the banks in the sample countries (CEECs, Austria and Germany). However, these results were not obtained in the sample consists only from CEECs. Obviously, economic freedom is crucial for well-functioning and more developed markets.

The results also confirmed the effect of equity on lending which is consistent with other authors (Frömmel and Srzentic, 2013). The significance of this determinant relates to the higher liquidity requirements on the banks after the financial crisis. Unsurprisingly, only the banks with higher equity relative to the risks are able to increase lending activities during financial market turmoil.

We also identified that the net interest margin is important determinant of bank lending in CEECs. It means that profitability of a bank's investing and lending is very important, but the resulted causality pointed out low competition in CEECs.

Finally, the empirical analysis confirmed that the Bayesian Model Averaging approach is robust method to select reasonable determinants of lending activities from the long list of balance sheet indicators.

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Key Performance Indicator Analysis for Czech Breweries

Edward Kasem¹, Oldřich Trenz, Jiří Hřebíček and Oldřich Faldík

¹*Department of Informatics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: edward.kasem@mendelu.cz*

Abstract

Sustainability performance can be said to be an ability of an organization to remain productive over time and hold on to its potential for maintaining long-term profitability. It is a combination of goal-achievement with respect towards social rights, a clean environment, extraordinary experiences, and of keeping a productive and healthy workforce. Since the brewery sector is one of the most important and leading markets in the foodstuff industry of the Czech Republic, this study depicts the Czech breweries' formal entry into sustainability reporting and performance. It draws upon the analysis and results of the 14_23079S “Measuring Corporate Sustainability Performance in Selected Sectors” project of the Czech Science Foundation solved at the Faculty of Business and Management of the Mendel University in Brno.

The purpose of this paper is to provide an optimal set of key performance indicators (KPIs) based on two international standard frameworks: the Global Reporting Initiative (GRI) and its guidelines GRI 4 and the guideline KPIs for ESG 3.0 which was published by the DVFA Society of Investment Professionals in Germany in conjunction with the European Federation of Financial Analysts Societies (EFFAS). Four sustainability dimensions (economic, environmental, social and governance) are covered, making it thus possible to adequately evaluate sustainability performance in Czech breweries. Each dimension consists of a set of KPIs which identify both the strengths and the weaknesses of the given brewery. Utilizing the previously mentioned GRI and DVFA sustainability performance frameworks will help us in determining the risks and opportunities, as well as in improving the brewery management systems, benchmarking and goal-setting.

Keywords: brewery, DEA, EFFAS, GRI, key performance indicators, sustainability performance.

1. Introduction

Brewery sector is one of the most important and leading markets in the foodstuff industry of the Czech Republic (CBMA, 2014). Since, Czech brewing has a long history

and tradition. Beer has always been one of the most significant parts of Czech culture by having a special position among other commodities. In addition to all above, the Czech Republic is the highest beer per capita consumption in the world (Walle, 2014). Also the Czech beer is the country's second important attraction for foreigner people after the historic sites (Vacl, 2014). According to previous, Czech breweries play a major role in the economic and social dimensions generating one of the most significant economic value and employment rate in the country. At the same time, Czech breweries are highly sensitive to the quality of the business environment.

In order to help the breweries in understanding, measuring and communicating their main four performance pillars (economic, environmental, social and governance) sustainability assessment (Epstein et al. 2014) should be applied. Corporate sustainability focuses on both minimizing risks arising from environmental, social and corporate governance (ESG) aspects (Grant et al. 2013) and proactively seeking to gain advantages from “translating” ESG issues into a company's product and service portfolio. It can provide an early warning in time to prevent economic, social and environmental damage (Singh et al. 2012). Measuring corporate performance is difficult and challenging. In different decision-making contexts stakeholders tend to use different criteria and methodologies, thus arriving at different and contrasting assessments of the sustainability of corporate performance in practice.

In our research, we considered a methodology which depends on optimization algorithms and used sustainability assessment. It consists of many different models like eco-efficiency models, multi-attribute, multi-criteria decision making models (Jablonský, 2007) and Data Envelopment Analysis (DEA) models. DEA is a very powerful tool used for decision making and proposed to evaluate the enterprises efficiency (Wang and Chin 2010). It can be also described as a non-parametric methodology aimed at evaluating the relative efficiencies of comparable decision-making units (DMUs) by means of a variety of mathematical programming models (Charnes et al. 1978, Lee and Saen, 2012). In our case, the efficiency represented as the level of sustainability performance and depicted a share of output in weighted sum of inputs.

The main goal of this paper is optimize corporate performance of Manufacture sector of Czech breweries. For this reason Global Reporting Initiative (GRI) methodology (G4 Guidelines, 2013a, 2013b) and the guideline (ESG 3.0, 2010) for Key Performance Indicators (KPIs) published by the DVFA Society of Investment Professionals in Germany are presented in Section 2. The DEA model which is used for our sustainability assessment is described in Section 3. Section 4 depicts the relation between the companies score and simple ESG factors to development and computation of pressure-specific composite indicators of corporate performance. Finally, Section 5 concludes the paper.

2. Methodology and Data

There are many standards available for companies interested in reporting on sustainability and environmental, social and governance performance. From the ISO standards (divided into ISO 9000 for quality, ISO 14000 for environment, ISO 18000 for occupational health and safety and ISO 26000 for social responsibility) (ISOHelpline, 2014; ISO, 2014), Eco-Management and Audit Scheme (EMAS) (EMAS, 2014), the GRI Guidelines (G4 Guidelines, 2013a, 2013b), to the guideline of KPIs for ESG 3.0 (ESG 3.0, 2010) which was published by the DVFA Society of Investment Professionals in

Germany in conjunction with the European Federation of Financial Analysts Societies (EFFAS). In this section, the last two mentioned frameworks which are the most suitable ones for breweries are shortly introduced. Then DEA model which is used for our sustainability assessment will be described.

2.1. Global Reporting Initiative

Nowadays, the GRI (G3.1 Guidelines, 2011; G4 Guidelines, 2013a, 2013b) is the most common non-profit organization that focuses its efforts on developing a comprehensive sustainability reporting framework that is widely used across the world. Its mission is to provide a credible and transparent framework for sustainability reporting that could be used in organizations regardless of their size, sector or location. The GRI framework enables all organizations to measure corporate performance and report it in four key areas of corporate sustainability (i.e., taking into consideration the companies' ESG and economic impacts). The GRI is a multi-stakeholder, network-based organization. Their vision is a sustainable global economy where organizations manage their ESG and economic performance impacts responsibly, and report transparently. To achieve these goals, they have developed a sustainability reporting standard practice by providing guidance and support to organizations.

The last version of this framework is the GRI G4 Guidelines (G4 Guidelines, 2013a, 2013b). The G3.1 Guidelines (G3.1 Guidelines, 2011) were a starting point of the G4 Guidelines, where some important changes were made to generalize sustainable reporting. The G4 Guidelines are presented in two parts: the Reporting Principles and the Standard Disclosures (G4 Guidelines, 2013a), and the Implementation Manual (G4 Guidelines, 2013b). The Reporting Principles and the Standard Disclosures guidance explain the reporting requirements of reporting against the framework, "what" must be reported. The Implementation Manual provides further guidance on "how" organizations can report against G4 Guidelines criteria. The improvement of the technical quality of the guidelines content was focused on the elimination of ambiguities and differing interpretations. Furthermore, this improvement was focused on the harmonization of guidelines with other internationally accepted standards, and on offering guidance related to linking the sustainability reporting process to the preparation of an Integrated Report (Hřebíček et al., 2014a; Kocmanová et al., 2013).

2.2. Key Performance Indicators for Environment, social and Governance Issues 3.0

The DVFA framework (ESG 3.0, 2010) is free-of-charge publically available reporting framework which was published by DVFA Society of Investment Professionals in Germany in conjunction with EFFAS. DVFA and EFFAS are periodically reviewing the accuracy of the framework and implement modifications wherever deemed necessary. The objective of KPIs for ESG 3.0 guidelines is to propose the basis for the integration of ESG indicators into corporate performance reporting. It provides a credible and transparent framework for sustainability reporting suitable for all entities regardless of size, scope and legal form it has been specifically designed for stock-listed companies and issuers of bonds.

In order to ensure high-quality reporting of ESG-KPIs, the company should follow the DVFA Principles. These principles are relating to relevance, transparency, continuity and recentness. The information, data, processes and assigned competencies required for

the preparation of ESG reports should be recorded, analyzed, documented and disclosed in such a way that they would stand up to an internal and external audit or review.

This framework consists of 114 subsectors (ESG 3.0, 2010) following the Dow Jones Industry Classification Benchmark (ICB) lists of KPIs. ICB is an instrument which is typically used for structuring industries into clusters with the aim of compiling peer groups or portfolios of companies. According to these lists, companies choose the most suitable subsector. The KPIs in this framework are presented according to the structure depicted in Figure 1.

KPI	Spez.-ID	Scope	Specification
Energy Efficiency	E01-01	I	Energy consumption, total

Figure 1: ESG 3.0 KPIs' structure (ESG 3.0, 2010).

Note that "KPI" refers to the name of the presented indicator. "Spez.-ID" indicates to the KPI identifier. The scope describes the level of disclosure of the mentioned KPI. The consecutive levels of ESG disclosure are classified into three levels; Entry Level (Scope I), Midlevel (Scope II) and High Level (Scope III). The last two levels are not available for some subsectors. Entry Level presents the minimum number of KPIs which should be disclosed by companies. Midlevel and High Level differ in terms of granularity and details of reporting. Both levels were modelled based on the observation that mainstream ESG disclosure often already exceeds the Entry Level.

In our case, we are dealing with Czech breweries. Therefore, table 1 which presents the KPIs of breweries subsector is taken into consideration.

Table 1: KPIs for breweries subsector (ESG 3.0, 2010).

KPI	Spez.-ID	Scope	Specification
Energy Efficiency	E01-01	I	Energy consumption, total.
GHG Emissions	E02-01	I	GHG emissions, total.
Staff turnover	S01-01	I	Percentage of FTE leaving p.a./total FTE.
Training&Qualification	S02-02	I	Average expenses on training per FTE p.a
Maturity of workforce	S03-01	I	Age structure/distribution.
Remuneration	S08-01	I	Total amount of bonuses.
	S08-02	I	Total number of FTEs who receive 90 % of total amount of bonuses.
	S08-03	I	Key Performance Narrative.
Litigation risks	V01-01	I	Expenses and fines related to anti-competitive.
Corruption	V02-01	I	Revenues in regions with Transparency International corruption below 6.0 [%].
Revenues from new products	V03-02	I	New products or modified products introduced less than 12 months ago [%].
Innovation	V04-01	I	Total R&D expenses.
	V04-012	I	Total investments in research on ESG.
	V04-013	I	Products or services [%]
Emissions to Air	E03-01	II	Total CO ² ,NO _x , SO _x , VOC emissions [mil.t]
Waste Scope I	E04-01	II	Total waste [t].
Waste Scope II	E05-01	II	Total waste which is recycled [%].
Packaging	E010-01	II	Total amount of packaging material [t].

	E010-02	II	Packaging material per [t] of output.
Gene Modified Organisms	E15-01	II	Share of products containing genetically modified organisms or ingredients containing genetically modified organisms in [%].
Water Consumption	E28-01	II	Water consumption in m ³ .
Sustainable, Organic & Fair Trade Products	E31-01	II	Total revenue from products with organic origin [%].
Certification of Facilities	S07-04	II	Total facilities certificated according to ISO 9001, SA 8000 or OHSAS18001 standards [%].
Customer Satisfaction	V06-01	II	Total customers surveyed comprising satisfied customers [t].
Utilization	V13-01	II	Capacity utilization as a percentage of total available facilities.
Brand Value	V24-01	II	Value of brand as measured by third-party or external consultancy.
Supply Chain	V28-01	II	Total number of suppliers.
	V28-02	II	Percentage of sourcing from 3 biggest external suppliers.
	V28-03	II	Turnover of suppliers [%].
Packaging	E10-03	III	Breakdown of packaging materials [t].
	E10-04	III	Total cost of packaging in \$, €.
	E10-05	III	Cost of packaging per revenue in percent
Water Consumption	E28-02	III	Water (m ³) used per product manufactured amount (t).
	E28-03	III	Groundwater consumption in m ³ .
Environmental Compatibility	E33-01	III	Number of sites with ISO 14001 certification.
Customer Retention	V05-03	III	Share of market by product, product line, segment, region or total.
Supply Chain	V28-04	III	KPN (max. 500 words) How do you ensure that your suppliers adhere to a standard of ESG compliance similar to that of your company?
	E28-05	III	KPN (max. 500 words) When assessing the performance of your procurement and purchasing functions: Do you incentivize your procurement management for the selection of ESG performing suppliers even if you might have to carry a premium over less expensive suppliers?

2.3. Data Envelopment Analysis Model

Data Envelopment Analysis (DEA) is a relatively new “data oriented” approach for evaluating the efficiency of number of producers. In DEA the producers are usually referred to as a Decision Making Units (DMUs) which convert multiple inputs into

multiple outputs. Relative efficiency is defined as the ratio of total weighted output to total weighted input. DEA can be used as a very powerful service management and benchmarking technique to evaluate nonprofit and public sector organizations (Charnes et al., 1978).

In the case of evaluation n number of DMUs $_j$ ($j = 1, \dots, n$). Each DMU consists of m inputs and s outputs with x_{ij} ($i=1, \dots, m$) and y_{rj} ($r = 1, \dots, s$) values, respectively. Assume that a particular factor is held by each DMU in the amount w_j , and this serves as both an input and output weight. Let us consider dual-role factors DEA model Cisneros et al (2011) in Equation 1.

$$\text{Max } \theta_k = \sum_{r=1}^s u_r y_{kr} + \gamma w_k - \beta w_k \quad (1)$$

Subject to

$$\sum_{i=1}^m v_i x_{ik} = 1 \quad (2)$$

$$\sum_{r=1}^s u_r y_{kr} + \gamma w_k - \beta w_k - \sum_{i=1}^m v_i x_{ij} \leq 0, j = 1, 2, \dots, n \quad (3)$$

$$u_r, v_i, \gamma, \beta \geq 0, \forall r, i$$

where u_r, v_i are the weight given to the output r and the input i , respectively. γ and β are the weights given to the dual-role factor. DMU $_k$ consumes x_{ik} ($i=1, \dots, m$), the amount of input i , to produce y_{rk} ($r = 1, \dots, s$), the amount of output r . Let us consider the cross-efficiency evaluation, each DMU determines a set of input and output weights individually, leading to n sets of weights for n DMUs. The n sets of weights are used to assess the efficiencies of the n DMUs, resulting in n efficiency values for every DMU. Then efficiency values for each DMU are finally averaged as an overall efficiency value of the DMU (Adler et al., 2002). Denote by u_r^* ($r = 1, \dots, s$) and v_i^* ($i=1, \dots, m$) the optimal solution of Equation 1. Then the dual-role efficiency of DMU $_k$ is computed according to:

$$\theta_k^* = \sum_{r=1}^s u_r^* y_{kr} + \gamma^* w_k - \beta^* w_k \quad (4)$$

which is the best relative efficiency that DMU $_k$ can achieve. Therefore a cross-efficiency value of DMU $_j$ which reflects the peer evaluation of DMU $_k$ to DMU $_j$ ($j = 1, \dots, n; j \neq k$) is calculated according to Equation 5.

$$\theta_j = \frac{\sum_{r=1}^s u_r^* y_{rj}}{\sum_{i=1}^m v_i^* x_{ij}} \quad (5)$$

Wang&Chin (2010) referred to DMU $_k$ as the target DMU. The above mentioned model is solved n times for each target DMU using Maple program. As a result, there will be n sets of input and output weights for n DMUs and each DMU will have one dual-role efficiency value and $(n-1)$ cross-efficiency values. The n efficiency values are then averaged as the overall performance of the DMU. Based on their average cross-efficiency values, then DMUs can be compared or ranked.

In order to solve this problem the Optimization Package (Maple Online Help 2014) in Maple program is used. In order to achieve good results, Optimization [LPSolve] for solving linear programming problems is chosen. We used this command for finding the optimum of various types of multivariable functions with various types of constraints. It solves a linear programming problem, which involves computing the minimum (or maximum) of a linear objective function subject to linear constraints.

Table 2: Core indicators.

Indicator	Description	Unit
EC1	Economic Value Added (EVA)	CZK
EC2	Cash flow	CZK
ENV1	The amount of hazardous waste	tonnes
ENV2	The amount of other waste	tonnes
SO1	The number of employees.	num
SO2	The average employees salary and bonus	CZK
GOV1	Percentage of women in supervising the company	%

3. Results and Discussion

The two previously described frameworks, i.e., GRI (G4 Guidelines, 2013a, 2013b) and DVFA (ESG 3.0, 2010), present a lot of indicators related to the economic, environmental, social, and governance pillars. Reporting on all these indicators is a big challenge, because collecting and managing data is a very difficult and expensive process. Due to this we try to determine the optimal set of these indicators by doing quantitative research about the most frequently used indicators in each pillar (dimension). These researches include a literature researches which determine the key performance indicators of manufacturing sector. In additional, 32 small and medium brewery companies in the Czech Republic have been tested in a survey. This paper concentrates on determining the weight of indicators on the sustainability assessment. We have drawn upon the available GRI and DVFA frameworks to achieve a set of suitable indicators of economic, social, and environmental dimensions, then chose the available ones. The taken KPIs are summarized in table 2.

Table 3: Core indicators of companies A, B, C, ..., N.

Company	EC1	EC2	ENV1	ENV2	SO1	SO2	GOV1
A	-783.1	362314	36.397	265.625	134	37286	100
B	-14524.78	246934	0.3	111.92	131	53681	0
C	192358.85	9635	0.95	1474.85	113	71230	0
D	-1974.2	-6086	1.21	35.72	12	2918	0
E	-3657	333159	0	26.88	47	20020	0
F	24351	3903753	0	89.83	140	71344	67
G	-25977.55	270751	1.55	33.63	58	22691	33
H	-75690.93	-1008306	2.19	137.03	65	31349	33
I	994.77	90193	0.85	71.17	32	5982	0
J	-27269.89	277075	1.18	108.74	89	28882	33
K	7959.8	1007815	0	73.44	150	72533	33
L	-3452.37	113280	0.22	154.69	58	12731	100
M	122.79	570883	0.26	99.22	81	34719	0
N	226103.5	-176006	0	64.58	51	17458	0

We consider KPIs; EC2, ENV2, SO1, SO2 and GOV1 as organizations' inputs. The organizations' output is EC1 indicator. In addition, a dual-role factor is considered as indicator ENV1. These core indicators are relating to ESG and economic activities in measurement. In terms of the model's outputs, one type of output data EC1, from the 14

Czech breweries selected organizations A, B, C, ..., N (Amadeus Database) has been used. For the input and output dataset from environmental, financial and sustainability reports were mainly used.

We applied the previous described model and computed efficiency score of selected organizations (DMUs) using the linear programming in Maple (Hřebíček et al., 2014b), where score and parameters are computed for the first company A.

Then the written program is modified for the other 13th organizations. Table 3 identifies the set of organizations as A, C, ..., N with the values of related KPIs.

According to table 4 we can distinguish between efficient and non-efficient companies. The set of organizations A, D, H and N are the most efficient companies with a relative efficiency scores approximately equal to 1. However, the less efficiency organizations are B, C, E, F, G, I, J, K, L and M with very low score of less than 0.5 are considered to be inefficient. Depending on our detailed results, we can conclude that company N is the most efficient organization with the best corporate performance.

Table 4: Score and parameters γ and β .

Company	Score
A	0.99
B	0.08
C	0.47
D	0.99
E	0
F	0.08
G	0.34
H	0.99
I	0.37
J	0.1
K	0.03
L	0.02
M	0.08
N	1

4. Conclusions

Corporate sustainability assessment should be a comprehensive process to achieve the best performance and determine the weak points of the studied organization. There are many barriers cause SMB of different organization in business sectors not to support sustainability reporting. These barriers are presented as an expensive data collecting and managing, difficulty of determining the appropriate sustainability indicators and capturing reliable data-information, business risk and difficulty in determining the sphere of influence of each organization. In order to minimize these barriers many steps should be followed.

In this paper, some important contributions about the sustainability assessment for Czech breweries are provided. First, the breweries may establish key criteria for sustainability management following GRI and DVFA frameworks in order to measure any progress towards sustainable performance development. Then, the DEA model for measuring breweries sustainability management and performance considered a dual-role factor and cross-efficiency technique simultaneously is implemented. This model

can be integrated into ICT tool and used by organization as a powerful technology for monitor its efficiency scores, which provide an indication of the levels of corporate performance. Applying this technology helps the organization in improving their sustainability in both short and long terms. Finally, the dual-role factors DEA model is implemented in this paper.

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Compatibility of the IFRS for SMEs and the new EU-Accounting Directive

Gerrit Kaufhold¹

¹*Oesterleystrasse 39, 22587 Hamburg, Germany, e-mail: g.kaufhold@dsp-kanzlei.de*

Abstract

The new EU-Accounting Directive of 26 June 2013 has the intention to harmonize the accounting and financial reporting of enterprises in the European Union. “Think small first” is the central principle in the new EU-Directive and the new regulations have to be adopted in the laws of European member states by 20 July 2015. The new EU-Accounting Directive does not provide the option for the member states to adopt the “IFRS for SMEs” as an accounting and reporting standard besides or instead their local accounting principles. The new EU-Accounting Directive may encourage entrepreneurship in Europe, but certainly not the use of IFRS for SMEs in Germany.

Keywords: EU-Accounting Directive, financial statements, IFRS for SMEs

1. Introduction

The European Union Accounting Directive (DIRECTIVE 2013/34/EU) was published on 26 June 2013. The new Accounting Directive (2013) covers both single and consolidated financial statements and replaces the 4th (single financial statements) and 7th (consolidated financial statements) Directives.

According to the preamble of the new Accounting Directive (2013) the development and publication of the new Accounting Directive was part of a wide program of the European Commission to boost entrepreneurship and smaller and middle sized enterprises in Europe (“think small first”) by reducing regulations and administrative burdens. The member states of the European Union have to transpose the Accounting Directive into their national legislation latest by 20 July 2015.

The International Financial Reporting Standard for Small and Medium-sized Entities (IFRS for SMEs) was published in 2009 by the International Accounting Standards Board (IASB), which is an independent body of the IFRS Foundation. The IASB intended to create simplified international financial reporting standards for the special needs of smaller and medium-sized enterprise. The development process of the IFRS for SMEs took more than five years and resulted in a stand-alone framework with about 230 pages compared to over 3,000 pages of the full IFRS. Up till now the European Union has refused the endorsement of the IFRS for SMEs.

In June 2013 the IASB issued a Guide for Micro-sized Entities Applying the IFRS for SMEs (2009) according to IFRS Foundation (2014) fact sheet to help micro entities the use of the IFRS for SMEs.

Since the IFRS for SMEs has been published in 2009 the Standard has been permitted or required by worldwide 63 jurisdictions according to the fact sheet by the IFRS Foundation (2014) last updated in August 2014. The empirical study by Kajüter, Saucke, Hebestreit and Schellhorn (2015) showed that the standard is relatively prevalent in Middle and South America as well as in Africa. Whereas several Asian countries intend to permit the use of the IFRS for SMEs by local firms in the nearer future, none of the jurisdictions of the European Union has adopted the IFRS for SMEs state Kajüter, Saucke, Hebestreit and Schellhorn (2015).

After practical experience with the Standard of about two years the IASB has undertaken an initial comprehensive review starting in June 2012 with a request for information seeking public views on whether there is a need to make any amendments to the IFRS for SMEs according to the IFRS Foundation (2014) fact sheet. The comment deadline was November 2012. The 89 participants of the request for information were government and accounting bodies, standard setters, audit firms and consultants. The author of this paper has also posted his recommendations of amendments to the IASB. In October 2013 the IFRS Foundation (2013) published the Exposure Draft of amendments to the IFRS for SMEs. The IFRS Foundation (2013) Exposure draft contains a variety of mostly minor proposals for modifications and practical improvements. According to Kirsch (2013) the IASB considered only “limited amendments”, since the practical experience with the IFRS for SMEs is still limited in many jurisdictions. Therefore the IFRS for SMEs 2009 is still a new standard for many jurisdictions and should therefore not be amended dramatically. The scope of the IFRS for SMEs according to the IFRS Foundation (2013) Exposure Draft remains basically the same, so the use of the IFRS for SMEs is limited to non-publicly accountable entities and also for not-for-profit entities. According to Beiersdorf and Schubert (2013) the IASB confirms its former decision not allow complex accounting policy options, since SMEs prioritize simplified accounting. They critically ask whether the permission of the use of the revaluation method would endanger the concept of the IFRS for SMEs, but generally appreciate that the IASB has assessed critically potential amendments and kept the complexity of the standard relatively low. Kirsch (2014) appreciates that the IASB has defined the principle “undue cost or effort” in the IFRS for SMEs framework, but points out that this principle could contain high subjectivity in the financial statements according IFRS for SMEs.

According to the fact sheet of the IFRS Foundation (2014) the IASB has deliberated the changes to the Exposure Draft by the end of 2014 and aims to publish the revised IFRS for SMEs in the first half of 2015. The effective date of the amendments should be 1 January 2017, earlier adoption permitted.

The new EU-Accounting directive (DIRECTIVE 2013/34/EU) provides the legal framework for single company and company accounts for undertakings based in the European Union according to the Federation of European Accountants (FEE, 2014). The new Accounting Directive (2013) replaces the 4th Directive for single company accounts and the 7th Directive for consolidated accounts. The amendments of the new EU-Accounting Directive (2013) have to be transposed into national law by the EU Member States latest by 20 July 2015.

According to Lanfermann (2013) many of the amendments proposed by the European Commission to reduce the options for the Member States in order to improve the comparability of the financial statements with the EU could not pass the European

Parliament and Council. Lanfermann (2013) and Kreipl (2013) point out that the “Materiality”- and “Substance over form”- approaches have to be anchored in the legislations of the Member States. FEE (2014) introduces another approach: “the bottom-up”- approach meaning that the new Accounting Directive starts with the requirements of small entities, following with the additional requirements for medium and larger undertakings. The thresholds whether an undertaking will be classified as small, medium or large have been adjusted by the new Accounting Directive (2013) as follows:

Table 1: Thresholds for single financial statements

Increase of the thresholds for single financial statements					
Category of undertakings	Balance sheet total (€)		Net turnover (€)		Ø Employees
	Old	New	old	new	
Micro-undertakings	0.35 m	0.35 m	0.7 m	0.7 m	10
Small undertakings	4.84 m	6.0 Mio.	9.68 m.	12.0 m	50
Medium-sized undertakings	19.25 m	20.0 m	38.5 m	40.0 m	250

According to the new Accounting Directive (2013) the Member States can exempt smaller and medium-sized undertakings from the preparation of consolidated financial statements. According to Müller (2013) the German legislation will choose the options to exempt smaller and medium-sized undertakings from the preparation of consolidated financial statements and will define following threshold in the German Commercial Code (HGB):

Table 2: Thresholds for consolidated financial statements

Increase of the thresholds for consolidated financial statements in Germany					
Thresholds according § 293 (1) Nr. 1 and 2 HGB	Balance sheet total (€)		Net turnover (€)		Ø Employees
	Old	New	Old	new	
Gross method	23.1 m	24.0 m	46.2 m	48.0 m	250
Net method	19.25 m	20.0 m	38.5 m	40.0 m	250

The increase of the thresholds, partially more than 20%, determines that the European Parliament and the Council intended first to deregulate the requirements of small and medium-sized undertakings.

2. Methodology and Data

The intention of the introductory part of this paper was to use literary research in order to describe and comment the potential amendments of the IFRS for SMEs and the new accounting and presentation requirements for European undertakings due to the new Accounting Directive (2013). The following part analyses the compatibility of the IFRS for SMEs and the new Accounting Directive (2013). The analysis tries to determine whether the IFRS for SMEs could play a more important role in the accounting of undertakings in Germany and in the European Union.

The method to collect the relevant data to determine the compatibility of the IFRS for SMEs and the requirements of the new EU Accounting Directive (2013) for the accounting and the presentation of financial statements of SMEs in Germany was the use

of results of third party studies and of own analysis. With respect to the compatibility of the IFRS for SMEs (2009) with the 4th and the 7th EU Accounting directives the most relevant third party study was carried out by the European Financial Reporting Advisory Group (EFRAG) in 2009 and 2010. The own analysis used the results of EFRAG (2010) and analyzed whether there are still incompatibilities between the new EU Accounting Directive (2013) and the IFRS for SMEs (2009) and its possible amendments due to the Exposure Draft to the proposed amendments to the IFRS for SMEs (2013). Furthermore, the analysis determines to what extent the German legislation has to be amended to be in line with the requirements of the new Accounting Directive (2013).

3. Results

The results of this analysis are presented in tables, in which the accounting requirements were analyzed with regard to its compatibility (shown as “compatible”), incompatibility (“incompatible”) to the IFRS for SMEs and the new EU-Accounting Directive (2013) and respectively the German Commercial Code (HGB). If the result of the analysis is marked as “depending” the field is either not assessed or an amendment in the IFRS for SMEs or in the German legislation has to be done to achieve compatibility.

3.1. Useful lives of goodwill and other intangibles

The determination of the useful lives of goodwill and other intangibles will be amended according to the Exposure draft of the proposed amendments to the IFRS for SMEs (2013) and according to the new Accounting Directive (2013).

Table 3: Compatibility of the useful lives of goodwill and other intangibles

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Maximum depreciation period of goodwill and other intangible assets if the entity is unable to make a reliable estimate of the useful life of the intangible asset	If an entity is unable to make a reliable estimate of the useful life of goodwill or another intangible assets, the useful life should be based on management's best estimate and not exceed ten years.	Depending	If an entity is unable to make a reliable estimate of the useful life of goodwill or another intangible assets, the useful life should be based on management's best estimate and should not be shorter than 5 years and not exceed ten years.	Depending

Depending on the entity not to choose an amortization period shorter than 5 years while preparing financial statements according to IFRS for SMEs the incompatibility will no longer exist. The new requirements of the amortization period of the goodwill and other

intangible assets due to the new Accounting Directive (2013) have to be transposed in the German legislation.

3.2. Revaluation model for property, plant and equipment

The necessity of the permission of the revaluation model in the IFRS for SMEs was intensively discussed during the Comprehensive Review by the IFRS Foundation (2013). In order to keep the accounting for SMEs less complex the IASB (2013) decided not to reconsider the permission of the revaluation model for property, plant and equipment. According to the new Accounting Directive (2013) Member States of the European Union can permit or require the revaluation model for certain assets or undertakings.

Table 4: Measurement of property, plant and equipment in the financial statements

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Property, plant and equipment	Property, plant and equipment are measured at cost less accumulated depreciation or amortization and impairment losses after initial recognition. The revaluation model is not permitted.	Depending	Items recognized in the financial statements shall be measured in accordance with the principle of purchase price or production cost. Member States may permit or require the measurement of fixed assets at revalued amounts.	Depending

Depending on the decision of the Member States to permit or require the revaluation model for assets others than financial instruments incompatibility between the IFRS for SMEs and European legislation could arise. The amendment of the legislation in Germany is not mandatory, since the current treatment is in line with the EU Accounting Directive (2013).

3.3. Deferred tax

The framework of the deferred tax in the IFRS for SMEs was based on the IASB's Exposure Draft 'Income tax' which was never finalized. The IASB (2013) decided to amend the IFRS for SMEs editorially to align them with IAS 12 (Income taxes).

Basically the IFRS for SMEs and the EU Accounting directive follow the same approach in the recognition of deferred tax liabilities and tax assets. Amendments will be made in the IFRS for SMEs and the German Commercial Code (HGB) to align with IAS 12 or respectively with the new Accounting Directive (2013).

Table 5: Recognition and measurement of deferred tax

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Deferred tax	Adoption of the principles of IAS 12 (Income taxes) in the IFRS for SMEs with disclosure reliefs due to the "undue cost or effort" exemptions	Depending	Additional requirement for medium-sized and large undertakings, where a provision for deferred tax is recognized in the balance sheet, the deferred tax balances at the end of the financial year, and the movement in those balances during the financial year in the notes	Depending

3.4. Unpaid subscribed share capital

An incompatibility exists in the treatment of unpaid subscribed share capital.

Table 6: Unpaid subscribed capital

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Disclosure of unpaid subscribed share capital	The unpaid subscribed share capital has to be offset against the equity.	Incompatible	The unpaid subscribed share capital has to be disclosed as an asset.	Compatible

The IFRS Foundation has not removed this incompatibility in the Exposure Draft (2013) and therefore likely no amendment will be made in the IFRS for SMEs to delete the incompatibility. The German legislation had already transposed the new requirement by the Accounting Directive (2013) in the German Commercial Code (HGB).

3.5. Revenue or net turnover

The new Accounting Directive (2013) redefines the net turnover in the profit and loss statement. The distinction of income between "typical" and "not typical" has been removed.

Table 7: Revenue or net turnover

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Revenue / net turnover	Revenue arises from the sale of goods, rendering services, construction contracts and the use by others of entities assets.	Compatible	As net turnover the income arises from the sale and rental of goods and services.	Depending

The former incompatibility between the IFRS for SMEs and the former Accounting directives has been reversed, since the new Accounting Directive (2013) reversed the distinction of income and expenses between “typical” and “not typical” business activities. The German legislation has to transpose the new requirement due to the new Accounting Directive (2013) in to the German Commercial Code (HGB).

3.6. Extraordinary items

According the IFRS for SMEs (2009) an entity shall not present or describe any items of income and expense as “extraordinary items” in the statement of (comprehensive) income and was therefore incompatible with the 4th Council Directive which required certain items of income and expenses as extraordinary items.

Table 8: Disclosure of extraordinary items

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Disclosure of extraordinary items in the presentation of the profit and loss account / statement of (comprehensive) income	An entity shall not present or describe any items of income and expense as "extraordinary items" in the statement of (comprehensive) income.	Compatible	The disclosure of extraordinary expenses or income in the profit and loss statement is reversed. The information of extraordinary items has now to be disclosed in the notes.	Depending

The former incompatibility between the IFRS for SMEs and the former Accounting directives has been reversed. The German legislation has to transpose the new requirement due to the new Accounting Directive (2013) in to the German Commercial Code (HGB).

3.7. Composition of the financial statements

Whereas according the IFRS for SMEs (2009) an entity shall present a complete set of financial statements including notes, a cash flow statement and a statement of changes in equity the presentation of a balance sheet, profit and loss account and selected notes to the financial statements is generally sufficient according to the new Accounting Directive (2013). Micro-undertakings may prepare only an abridged balance sheet and an abridged profit and loss account without notes depending on the legislation of the Member State. Besides the preparation of financial statements medium-sized and larger undertakings have to prepare management reports.

Table 9: Composition of the financial statements

Accounting or disclosure requirement	IFRS for SMEs	Compatibility	EU Accounting Directive (2013)	Compatibility
Complete set of financial statements generally consists of	Statement of financial position, (comprehensive) income, changes in equity, cash flow and notes	Depending	Balance sheet, profit and loss account, notes, management report	Depending

The incompatibility in the composition of the financial statements can be removed by the Member states since they have the option to require from medium-sized and larger undertakings the preparation of a cash flow statement and a statement of changes in equity besides the balance sheet, profit and loss account and the notes. The requirements of the new Accounting Directive (2013) for consolidated financial statements remain basically unchanged to the 7th Directive. Therefore consolidated financial statements still consist of a (group) balance sheet, profit and loss account, notes, a cash flow statement and a statement of changes in equity. Additionally, a management report has to be provided for the group. Small groups must be, medium-sized groups can be exempted from the preparation of consolidated financial statements according to the new Accounting Directive (2013).

4. Discussion and Conclusions

The new Accounting Directive (2013) was part of European Union program to stimulate the business of small and medium-sized undertakings by deregulating accounting requirements. The use of the IFRS for SMEs is not prohibited by the Accounting Directive (2013), but it is not intended by the European Parliament and the European Council to adopt the IFRS for SMEs via endorsement. According to FEE (2014) the endorsement of the IFRS for SMEs has been rejected because the IFRS for SMEs would not serve the simplification and the administrative burden for smaller and medium-sized undertakings. As a consequence, Member States of the European Union can transpose the IFRS for SMEs in their legislation, but obviously only if the IFRS for SMEs is in line with requirements of the new Accounting Directive (2013).

The analysis of the compatibility of the IFRS for SMEs and the Accounting Directive (2013) determined that most of the former incompatibilities between the IFRS for SMEs (2009) and the 4th and the 7th Directive could be removed by the proposed amendments by the Exposure Draft of the IFRS Foundation (2013). The analysis showed that the only real incompatibility between the Exposure Draft of the IFRS for SMEs (2013) and the Accounting Directive (2013) is the treatment of the unpaid subscribed capital, obviously not an important or frequent accounting issue for small and medium-sized undertakings. Other discovered incompatibilities could be reversed by the Member States of the European Union, if the respective accounting options provided by the IFRS for SMEs or the Accounting Directive (2013) are used correspondingly.

Even with the proposed amendments of the Exposure Draft (2013) the major obstacle for the use of the IFRS for SMEs in Europe is the remaining complexity compared to the requirements of the new Accounting Directive (2013). Especially for micro- and small undertakings the accounting and presentation of financial statements according to the Accounting Directive is much more simple compared to IFRS for SMEs. Furthermore, financial statements according to the German Commercial Code (HGB) are still the basis for taxation and dividend distribution. Consequently, the use of the IFRS for SMEs in Germany is currently no subject-matter.

The increasing worldwide relevance of the IFRS for SMEs will likely bring the adoption of the IFRS for SMEs on the agenda of European Parliament and Council. According to the authors view the European Union should carefully watch the implementation of the amendments of the Exposure draft (2013) in the IFRS for SMEs and should allow small and medium-sized entities the use of the revised IFRS for SMEs in Europe.

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Dividend behavior of Polish nonfinancial listed firms

Bogna Kaźmierska-Józwiak¹

¹*Department of Finance and Strategic Management, Faculty of Management, University of Lodz, Matejkistr. 22/26, 90-237 Lodz, Poland, e-mail: bognakaj@uni.lodz.pl*

Abstract

Corporate dividend policy is still one of the major puzzles in modern finance. The question, when and why do firms pay dividends, is still valid. Vast literature has examined the dividend policies of firms from developed countries, especially from U.S. Fama and French (2001) document that U.S. firms have become less likely to pay dividends. The question is whether this lower propensity to pay dividends is quite general? What is the situation on emerging markets? Do the firms paying dividends and nonpaying dividends differ in terms of profitability, liquidity, leverage? The purpose of this paper is to analyze the dividends behavior of Polish listed nonfinancial companies. Furthermore, the paper examines the characteristics of dividend payers and nonpayers listed on Warsaw Stock Exchange.

Keywords: dividend policy, listed companies, Poland

1. Introduction

Dividend policy is a very important issue in corporate finance. Although dividend policy has attracted the interest of researchers all over the world, a unique solution seems not to exist. It is still problematic to explain why some firms pay dividends and some do not. As Black (1976) said *“the harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just do not fit together”*.

Fama and French (2001) notice that the percent of firms publicly traded in the U.S. paying dividends declines. The authors document a large decline in the residual “propensity to pay dividends”. Fama and French (2001) argue that dividends have been disappearing since 1978.

The decline in the percent of firms paying dividends raises following questions:

- What is the incidence of dividend payers on the emerging market?
- What are the dividend behavior of companies from emerging market?
- Do dividends appear or disappear on the emerging market?

Using Thompson Reuters, the paper investigates the incidence of dividend payers of nonfinancial companies listed on Warsaw Stock Exchange in Poland during the 2001–2012 period and examines the characteristics of dividend payers and nonpayers.

The paper is organized as follows: section 2 presents the literature review, section 3 gives a short background of the nature of Polish Capital Market and facts about dividends in Poland. Section 4 presents the data, methodology and hypotheses. Section 5 gives the results of the study. Section 6 presents the conclusions.

2. Literature review

Modigliani and Miller (1958) argue that dividend policy is irrelevant for the corporate value (the irrelevance theory). The MM theory provides conditions under which a company's financial decisions do not affect its value. The authors argued that given the perfect market assumptions, value of the company is unrelated to its capital structure and dividend policy.

Lintner (1956) argues that firms of developed markets target their dividend payout ratio with the help of current earnings and past dividends. The author concludes that firms should have stable dividend policies. Lintner (1959, 1962) and Gordon (1963) were the primary supporters of the theory that corporation's value is not independent on the dividend policy. They argued that the investors valued dividends more than capital gains and the more money a company pays as dividend the more valuable it becomes, therefore the dividend policy is relevant. This theory, known as "bird in hand theory", states that the money paid to shareholders is more valuable than the money reinvested.

Litzenberger and Ramaswamy (1979) argued that investors are disadvantaged in receiving cash dividends. The researchers claim that investors prefer lower payout companies for tax reasons. The implication of Litzenberger and Ramaswamy's tax preference theory is that firms could increase their share prices by reducing dividends. Miller and Rock (1985) state that the changes in dividend policy convey news about future firms' financial situation. Due to the authors dividend increases convey good news, dividends decreases – bad news. Therefore, firms may indicate their future profitability by paying dividends.

Dividends are also considered as a useful tool to reduce agency conflicts and agency costs (Jensen and Meckling (1976), Rozeff (1982), La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000)). By paying dividends corporate earnings have been returned to investors and hence insiders are no longer capable of using them to benefit themselves. La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) say that: "dividends (*a bird in the hand*) are better than retained earnings (*a bird in the bush*) because the latter might never materialize as future dividends (can fly away)."

3. Polish capital market

Traditions of Polish capital market go back to 1379, when the first mercantile exchange were founded in Gdansk. The first totally state-organized Stock Exchange was founded in 1817. In spite of being in partition between Russia, Austria-Hungary and Germany, Warsaw Stock Exchange (WSE) grew rapidly throughout 19th century and was closed in 1915 during The First World War. Following the overthrow of Poland's former

communist regime in 1989, WSE was founded as a joint-stock company on April 12, 1991. WSE was created by the State Treasury pursuant to the Foundation Act for The Warsaw Stock Exchange Company. On the first day of trading, only five stocks were listed.

The Warsaw Stock Exchange conducts trading in financial instruments on three markets: the Main List (in operation since 16.04.1991), New Connect – an alternative trading system. It was designed for startups companies and developing companies, especially from new technologies sector (launch in 2007), Catalyst – a debt instruments market for municipal, corporate and mortgage bonds (founded in 2009).

In 1999, Poland reformed its pension system, which contributed to an increase in domestic institutional investment, in 2004 it joined the EU. These developments helped to boost trading volume in subsequent years. In recent years, WSE has become one of Europe's most dynamic IPO markets with 471 companies, including 51 foreign companies, listed on its Main Market, and 431 companies listed on New Connect as at February 28, 2015. In addition, WSE's derivatives trading platform has grown to become the largest in CEE. As at June 30, 2010 it was the largest national stock exchange in CEE and one of the fastest-growing exchanges in Europe among both regulated and exchange-regulated markets.

It is worth mentioning that together with the development of Polish capital market, changes in the tax system were observed. Since 1992 corporate tax rate declined more than 50% (from 40% to 19%). Gradually decrease in the amount of corporate tax rate was accompanied by the changes in the dividend tax as well as capital gains tax system. At the beginning of the Polish economy transformation dividends were taxed at 20%, while capital gains were tax free. In 2003 capital gains were still tax free, dividends were taxed at 15%, corporates at 27%. The tax treatment of dividends and capital gains in Poland underwent a major change in 2004, when Poland became a EU member (table 1). Since 2004 dividends and capital gains have been taxed at the corporate tax rate (19%).

Table 1: Dividend, capital gains and corporate tax rates in Poland in 1992–2014.

	Dividend tax rate	Capital gains tax rate	Corporate tax rate
1992–1996	20%	0%	40%
1997	20%	0%	38%
1998	20%	0%	36%
1999	20%	0%	34%
2000	20%	0%	30%
2001–2002	20%	0%	28%
2003	15%	0%	27%
Since 2004	19%	19%	19%

4. Methodology, data and hypotheses

The paper investigates the dividends behavior of nonfinancial companies listed on Warsaw Stock Exchange (WSE) in Poland. The financial data employed is derived from the Thompson Reuters database covered the period 2001–2012.

The following hypotheses will be tested in the study:

- H1: There is an increasing number of nonfinancial firms paying dividends in the 2001-2012 period.
- H2: Polish nonfinancial firms classified into two groups: dividend payers and nonpayers differ in term of their nature.

To test the first hypothesis, the number and the percent of nonfinancial firms listed on Warsaw Stock Exchange paying dividends in the period 2001–2012 will be analyzed.

To test the second hypothesis, the WSE nonfinancial firms will be classified into different dividend groups. Then, the characteristics of dividend payers and dividend nonpayers will be analyzed based on the summary statistics. A number of variables, potentially responsible for the determining company's dividend payout decisions have been discussed in the literature. In this study, the set of following explanatory variables has been chosen: profitability (measured by ROA as: net profit/total assets), liquidity (current ratio, measured as: current assets/currents liability) and leverage (leverage ratio, measured as: total debt/total assets). To examine whether there are significant differences between two group (dividend payers and dividend nonpayers) means in terms of ROA, LIQ, LEV) Z-test has been applied. The null hypothesis is following $H_0: \mu_1 = \mu_2$, against the alternative hypothesis $H_1: \mu_1 \neq \mu_2$. Z test is described as follow (Starzyńska, 2007):

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2 + \sigma_2^2}{n_1 + n_2}}}$$

Where: \bar{x}_1 – mean value in the first population (dividend payers),

\bar{x}_2 – mean value in the second population (dividend nonpayers),

n_1 – number of observations in the first population,

n_2 – number of observations in the second population,

S_1 – standard deviation for the first population,

S_2 – standard deviation for the second population.

For each significance level, the Z-test has a single critical value (for example, 1.96 for 5% two tailed).

5. Empirical results

Figure 1, which presents the percent of nonfinancial firms listed on Warsaw Stock Exchange paying dividends in the period 2001–2012, shows the upward trend in the percent of nonfinancial firms listed on WSE in 2001–2012, although at the beginning of analyzed period not many firms were interested in paying dividends. In 2001 less than 15% of nonfinancial firms paid dividends, following years this number decreases.

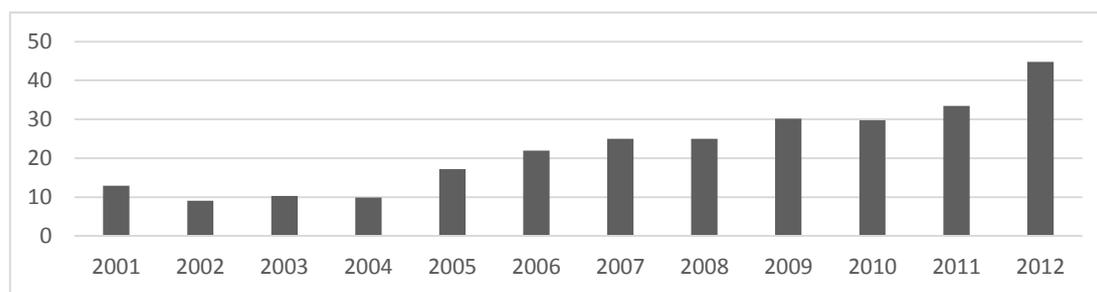


Figure 1: Percent of nonfinancial WSE firms paying dividends in the 2001–2012 period.

The proportion of firms paying dividends rises rapidly in 2005, probably as a consequence of the tax treatment from 2004. It continues to rise in the following years (except 2008 and 2010). In the whole period the percent of firms paying dividends rises more than 4 times, from 9.05% in 2002 to 44.83% in 2012.

Figure 2 presents the number of nonfinancial firms listed on WSE classified in different groups: payers, nonpayers, new payers, former payers.

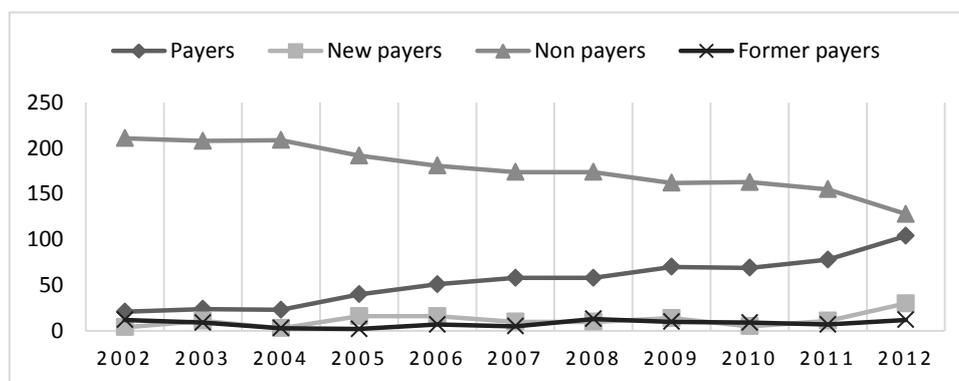


Figure 2: The number of WSE nonfinancial firms in different dividend groups.

Payers pay dividends in year t ; nonpayer do not pay; former payers do not pay dividend in year t , but did pay in year $(t-1)$, new payers start to pay dividends in year t , did not pay in any year before.

Figure 2 shows quite clear the trend in the number of dividend payers and nonpayers. The number of firms paying dividends rises from about 30 in 2001 to 104 in 2012. The number nonpayers declines from 202 in 2001 to 128 in 2012. The number of firms paying dividends rises sharply after 2004, similarly as the number of new payers, when a major change in the tax system was implemented. That change affected the relative attractiveness of dividends. The number of former payers – the firms which do not pay dividend in year t , but did pay in year $(t-1)$ is quite stable. It could be argued that dividend payers appears on the Warsaw Stock Exchange and nonpayer disappeared.

Following Fama and French (2001), the next step of the research is to analyze the characteristics of dividend payers and nonpayers. As explained in the previous section, the analysis focuses on profitability, liquidity, leverage (table 2).

Table 2: Characteristics of dividend payers and nonpayers.

		Dividend payers			Dividend nonpayers		
		ROA	LIQ	LEV	ROA	LIQ	LEV
2001	Mean	3.20	1.36	18.67	7.22	1.51	15.01
	Median	2.46	1.32	12.67	5.49	1.34	9.99
	Standard deviation	3.09	1.11	13.63	5.56	0.63	19.91
2002	Mean	0.10	1.85	17.93	1.82	1.29	24.07
	Median	2.71	1.38	15.02	4.00	1.19	24.85
	Standard deviation	13.33	1.34	18.91	8.31	0.82	18.47
2003	Mean	6.60	1.85	12.77	5.11	1.27	12.58
	Median	5.30	1.66	9.80	5.39	1.19	11.85
	Standard deviation	4.87	0.97	13.39	9.27	0.54	20.24
2004	Mean	9.26	1.86	10.73	8.88	1.45	20.14
	Median	8.04	1.73	10.35	8.05	1.32	17.31
	Standard deviation	6.40	0.84	9.94	11.17	0.66	18.36
2005	Mean	8.56	1.76	15.23	8.43	1.74	19.21
	Median	6.87	1.70	11.48	8.02	1.87	15.71
	Standard deviation	7.00	0.62	17.00	10.29	1.85	17.00
2006	Mean	8.80	1.80	14.29	9.43	2.04	17.52
	Median	6.61	1.67	12.72	8.60	1.42	13.82
	Standard deviation	9.56	0.80	13.36	11.38	2.12	15.34
2007	Mean	9.97	1.94	17.85	9.11	2.08	16.05
	Median	8.70	1.55	17.15	9.33	1.50	11.34
	Standard deviation	7.30	1.49	13.83	10.09	1.65	15.13
2008	Mean	7.43	2.04	17.74	4.06	1.85	18.80
	Median	6.71	1.46	16.30	4.89	1.42	15.21
	Standard deviation	8.31	1.73	15.00	10.33	2.43	16.12
2009	Mean	6.87	2.15	13.16	2.75	1.95	19.36
	Median	5.53	1.80	8.06	3.68	1.35	17.61
	Standard deviation	6.72	1.55	12.84	9.55	2.95	16.06
2010	Mean	6.73	1.95	12.55	5.07	1.82	18.42
	Median	5.51	1.64	6.84	4.59	1.32	17.38
	Standard deviation	6.45	1.05	12.86	12.26	1.70	14.69
2011	Mean	8.01	1.98	14.59	6.11	1.99	20.15
	Median	6.85	1.56	12.72	4.87	1.39	20.70
	Standard deviation	7.30	1.22	13.93	10.70	3.09	14.65
2012	Mean	6.54	1.93	14.31	2.43	1.53	21.29
	Median	5.60	1.57	11.84	3.28	1.23	20.94
	Standard deviation	6.78	1.08	13.55	6.90	1.56	13.60

In 2001 and 2002 the mean and the median of ROA for dividend payers were lower than for nonpayers. Moreover, it should be noticed that the profitability of both groups is quite low. Quite similar situation for both groups of firms can be observed in the 2004–2006 period. Since 2007 dividend payers have been more profitable than nonpayers. Figure 3 shows very clearly the gap between the profitability of payers and nonpayers, especially in the 2008–2012 period. Therefore, it could be conclude that Polish nonfinancial firms paying dividends tend to be more profitable.

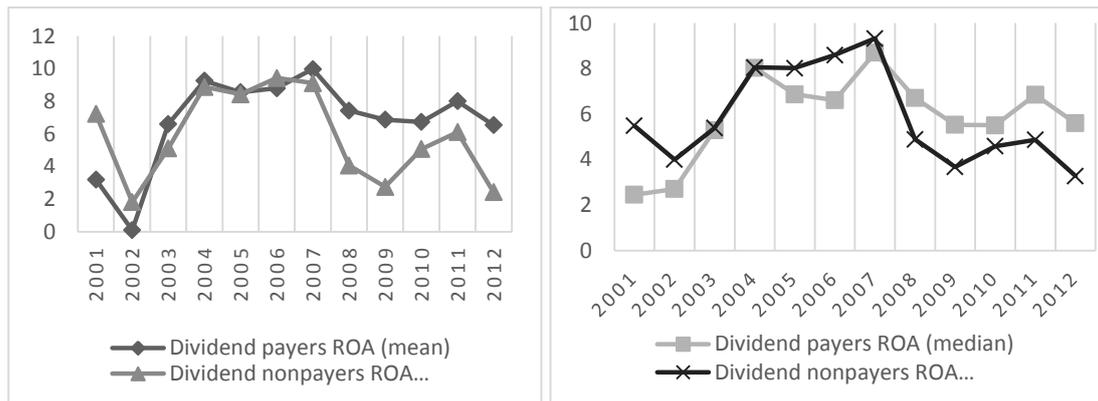


Figure 3: Mean and median value of ROA ratio for payers and nonpayers.

Regarding the leverage, the figure 4 shows that that except the 2007–2009 period (mean of LEV) and except only year 2007 (median), dividend payers are less leveraged than nonpayers. Therefore, the higher the level of leverage, the less likely the firm to pay dividend. It is consistent with Rozeff (1982), who argue that high leverage increase the transaction costs and the risk of the firm. Firms with high leverage ratio have high fixed payments and are less likely to pay dividends. It can be argued that Polish companies with high debt ratios pay lower dividends and are less able to pay dividends. The result is consistent with the agency cost theory of dividend policy.

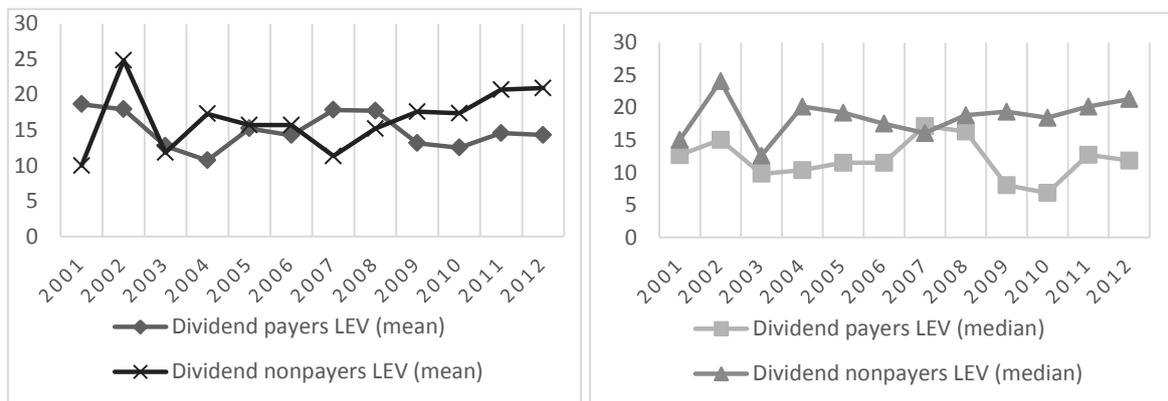


Figure 4: Mean and median value of LEV ratio for payers and nonpayers.

Liquidity, like leverage, differ across dividend groups. The figure 5 shows that firms paying dividends have higher level of liquidity (mean value – except 2001, 2005–2007 and 2011, median value – except 2001, 2007–2008 when the values are equal). Therefore, it could be argued that more liquid firms are more likely to pay dividends. These results are with line with the agency theory of dividend policy – liquid firms should use dividend policy a useful tool to reduce agency conflicts and so agency costs; see Rozeff (1982), Porta et al. (2000) and Lozano et al. (2005).

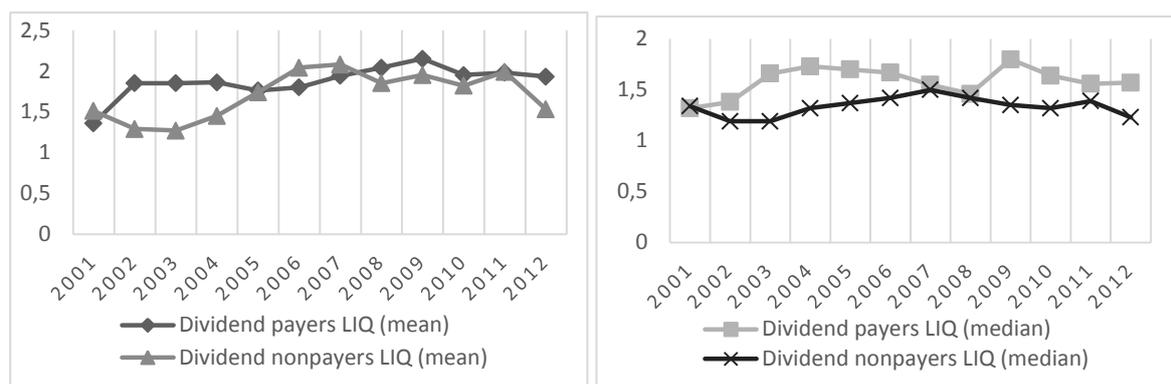


Figure 5: Mean and median value of LIQ ratio for payers and nonpayers.

To examine whether or not the dividend payers and nonpayers significantly differ in terms of profitability, liquidity and leverage, Z-test has been applied (table 3).

Table 3: The results of Z-test for two means of dividend payers and dividend nonpayers (ROA, LIQ, LEV)

		Dividend payers	Dividend nonpayers	Z
ROA	Mean	7.45	5.89	3.65*
	St. dev.	7.46	10.72	
	N	587	1323	
LIQ	Mean	1.93	1.77	2.24*
	St. dev.	1.22	2.037	
	N	599	1526	
LEV	Mean	14.57	19.30	-6.72*
	St. dev.	13.85	16.22	
	N	599	1512	

* – statistically significant differences at $\alpha = 0.05$.

Due to result of the analysis we should reject the hypothesis H0 in all the analyzed cases (ROA, LIQ, LEV). Therefore, it is confirmed that the differences between the means of ROA, LIQ, LEV for dividend payers and dividend nonpayers are statistically significant.

6. Discussion and Conclusions

The aim of this paper was to analyze the dividends behavior of Polish listed nonfinancial companies and to present the characteristics of dividend payers and nonpayers listed on Warsaw Stock Exchange. As it was mentioned, Polish capital market does not have as long history as more developed markets. The Main List of Warsaw Stock Exchange has been in operation since 16 April 1991. Since then the market developed gradually through privatization and IPOs of former state-owned firms. WSE, which is a medium-sized European stock exchange, is among the fastest-growing exchanges in Europe, with a capitalisation of more than 200 Eur million and 450 firms listed at the end of 2013.

Taking into the considerations the number of companies paying dividends, it could be argued that dividends are getting more important on the Polish market. In the whole analyzed period the percent of firms paying dividends rises more than 4 times, from 9.05% in 2002 to 44.83% in 2012. The number of firms paying dividends rises from about 30 in 2001 to 104 in 2012. The number nonpayers declines from 202 in 2001 to

128 in 2012. It should be pointed out that the number of firms paying dividends rises sharply after 2004, when a major change in the tax system was implemented. While in the U.S. dividends are disappearing, in Poland they are appearing. This may be a consequence of the economy development and as a consequence firms' development. The mature firms are better candidates to pay dividends than young firms, because they have higher profitability and mostly fewer attractive investment opportunities.

The results of the study show statistically significant differences between the means of ROA, LIQ, LEV for dividend payers and dividend nonpayers. Therefore it could be concluded that dividend payers and nonpayers differ in terms of profitability, liquidity, leverage. Moreover, the results indicate that Polish nonfinancial firms paying dividends tend to be more profitable, less leveraged and more liquid than firms nonpaying dividends to the shareholders.

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Geographical indications for non-agricultural products

Hana Kelblová¹ and Jana Mikušová²

*¹Department of Law and Social Sciences, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
kelblova@mendelu.cz*

*²Department of Law and Social Sciences, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
mikusova@mendelu.cz*

Abstract

The article deals with the intention of the European Commission to introduce legal regulation of unitary geographical indication protection for non-agricultural products at EU level. In present time, various national legal instruments apply to protection of the origin of non-agriculture products, resulting in different levels of legal protection in Europe that is inconsistent with the principle of the single market. The article focuses on potential benefits and risks of extending legal regulation of the geographical indication protection for non-agricultural products.

After experiencing the results of legal protection of geographical indications of agricultural products and foodstuffs, it is clear that strengthening legal protection of these designations brings benefits to producers, because their products have greater distinctiveness and the guarantee of quality and origin can boost sales.

The same values are beneficial for consumers, which can make informed and safe decision about purchase of goods, based on reliable information. Eventually, the selected region can benefit from the GI too, because the introduction of the protection of geographical indications can have a multiplying effect in terms of promotion of the region, encouraging tourism and subsequent creation of new job opportunities.

Keywords: Geographical indications, non-agricultural products, EU

1. Introduction

The European system of protection of geographical indication (further GI) for food and agriculture products has been introduced in Europe from 1992 and today it brings good results because the foodstuffs and agricultural products labelled Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Speciality Guaranteed (TSG) meet the demand of consumers for quality foodstuffs with clearly

declared geographical origin that is followed by their willingness to pay for this kind of foodstuff a price premium. This labelling contributes to the development of rural areas, provide producers with the right tools to better identify and promote their products, protects those producers against unfair practice, helps them in obtaining promotional grants and maintain local employment especially in poorer areas (European Commission, 2014).

The aim of this article is to evaluate the potential of introduction of the GI protection of non-agricultural products. The first part of the article will analyse the current legal environment of GIs protection for non-agricultural products in the Czech Republic because Czech Republic has a *sui generis* system of protection of non-agricultural products, followed by the considerations of authors about possible threats to the introduction of the same system of protection on EU level.

2. The international legal framework of the protection of GIs

The intention to introduce regulation of GIs for non-agricultural products reflects the effort of the EU to support the development of protection of GIs at Union level and to ensure their protection in third countries within the World Trade Organisation (WTO). The members of the EU are bounded by rules on protecting GIs under The agreement on trade related aspects of intellectual property rights (TRIPS). Articles 22¹ and 23 TRIPS state that GIs have to be protected to avoid misleading the public as to the origin of goods and to prevent unfair competition.

Currently, 15 EU Member States, including the Czech Republic, have *sui generis* legislation on GI protection for non-agricultural products, but this protection is neither on the same level nor the same range.

In present time, various national legal instruments apply to protection of the origin of non-agriculture products, resulting in different levels of legal protection in Europe that is inconsistent with the principle of the single market.

3. The Protection of GIs in the Czech Republic

The Czech producer of non-agriculture product, who's labelling contents GI, can use the protection of designation of these products by legal protection which is provided by several legal instruments:

- a) via a *sui generis* GI law,
- b) via a trade mark law,
- c) via a unfair competition law,
- d) via a consumer protection law.

To paragraph a), the “**sui generis**” system of the legal protection of the designation of origin of goods and GI has been in place for many years in the Czech Republic and, currently, it is on a very high level (Kelblová 2012). We can notice, that the first legal

¹ Geographical indications are, for the purposes of this Agreement, indications which identify a good as originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin.

protection of GIs in the Czech legal order was anchored in Act No. 5/1924 Coll., on appellation of origin of goods and Act No. 111/1927 Coll., on protection against unfair competition. The next legal regulation only for GIs was performed in Act No. 159/1973 Coll., on the protection of appellations of origin. At that time, this system was supplemented by several bilateral agreements: Agreement between Austria and CSSR on Indications of Source on Goods, Appellations of Origin of Products and other Marking Concerning the Origin of Agricultural and Industrial Product from 1981, Agreement between Government of Portugal and CSSR on Indications of Source on Goods, Appellations of Origin of Products and other Geographic Denomination from 1987, Agreement between Switzerland and CSSR on Indications of Source on Goods, Appellations of Origin of Products and other Geographic Denomination from 1976 (Horáček, Čada, Hajn 2005). The reciprocal protection and access to the market of goods protected by GI of the other party is mostly regulated in bilateral agreements and such agreements mean extending the protection of their GIs in the third countries for Czech holder of the GIs.

The Act No. 159/1973 Coll. was replaced by the Act No. 452/2001 Coll., on the Protection of Designations of Origin and Geographical Indications and this act covers the protection of agricultural products and non-agricultural products at present time on Czech national level.

Currently, Czech databases of protected designations entered in the Industrial Property Office registry contain not only foodstuffs and agricultural products that are also mostly registered on the community level (e.g., “Olomoucké tvarůžky”, “Hořické trubičky”, “Pohořelický kapr”) but also industrial products whose registration by the community law have not been allowed yet, but which are protected in the Czech Republic for a long time thanks to the industrial production tradition dating back to 19th century² (e.g., “České sklo”, “Železnobrodské sklo”, “Jablonecká bižuterie”, “Karlovarský porcelán”, “Český granát – Český granátový šperk”).

In contrast to the Act No. 159/1973 Coll., the Act No. 452/2001 Coll. requires essentials of application for registration that has to contain:

- a) wording of the designation of origin;
- b) name or, as appropriate, business name and seat, or first name, surname and permanent address of the applicant or, as appropriate, of his representative;
- c) geographical definition of the territory where production, processing and preparation of goods takes place;
- d) specification of the place of business where the goods provided with designation of origin is produced, processed and prepared at the locality whose geographical name creates a part of designation of origin;
- e) list of goods to which designation of origin should relate;
- f) description of characteristics or qualitative features of goods, which are given by special geographical environment.

To paragraph b), possibility of protection of the GIs by **Trademark law** is provided by Act. No. 441/2003 Coll. which contains legal regulation of registration of individual and collective trademarks in the Czech Republic. Especially via registration of the collective trademarks it is possible to protect GIs for group of producers. The application for trademark registration can be passed to the Industrial Property Office, which examines

² The list of designations of foodstuffs and agricultural products registered in the EU is available in the DOOR database at <http://ec.europa.eu/agriculture/quality/door/list.html>, the Czech national database of GI is available at the website of the Industrial Property Office: <http://www.upv.cz>.

whether the application has particulars e.g. whether it is not identical to already registered trademark, whether it is not a generic name or descriptive denomination, misleading or false indication and alike (European Commission, 2013).

To paragraph c), the protection of the GIs by **legal regulation of unfair competition** is possible by Act. No 89/2012 Coll., Civil Code, (section 2976–2990 of the Act). The previous legal regulation of unfair competition that was effective to 31st December 2013 was regulated by the provisions contained in the Commercial Code. For the purposes of the protection of GIs the most useful tool is the general clause of unfair competition or legal regulation of individual types of unfair competition such as misleading marking of goods and services, conduct contributing to mistaken identity, or parasitic use of the reputation of another competitor's enterprise, products or services.

To paragraph d) the **public law of consumer protection** in the Czech Republic is anchored in Act No. 634/1992 Coll., on consumer protection, and it offers legal protection of GIs too. This act regulates unfair commercial practices of traders against consumers, especially misleading marketing practices such as presentation of a product or service, including comparative advertisements and marketing, that leads to confusion with other products, services or distinguishing attributes of a different entrepreneur.³ According to this act, one of the deceptive trade practices also include the offer or sale of products or services which infringe certain intellectual property rights.

4. Intentions of the EU

At EU level, unitary GI protection is currently provided for wines, spirit drinks, and aromatised wines and for agricultural products and foodstuffs. There is currently no harmonisation or unitary GI protection in place for non-agricultural products at EU level. Instead, national legal instruments apply, resulting in varying levels of legal protection across Europe. Non-agricultural producers who wish to protect a GI throughout the EU need to ensure that they have separate protection in each Member State, which does not seem to be in line with the objectives of the internal market.

The Commission identified the issue in its 2011 Communication a single market for intellectual property rights and proposed a thorough analysis of the existing legal framework for GI protection of non-agricultural products in the Member States, and its implications for the internal market (European Commission, 2013). The Study on GIs shows that existing legal instruments available for producers at national and at European level are insufficient.

After the green paper on non-agricultural GI's (European Commission, 2014) was enacted on 15th July 2014 the European Commission have launched a consultation on possibly granting EU-wide protection to traditional non-agricultural products rooted in the cultural and historical heritage of particular geographical locations by extending to such products the benefits of GIs. The consultations were closed on 28.10.2014 leading to the 136 received contributions of which 6 were from non EU members. United Kingdom, France, Italy and Spain were contributing the most. Seven member states did not respond at all.⁴

³ Sec. 5 (1) (a) Act No. 634/1992 Coll., on consumer protection

⁴ The Czech Republic was represented by the official statement available at http://ec.europa.eu/internal_market/consultations/2014/geo-indications-non-agri/docs/contributions/public-authorities/official-contribution-czeck-republic_en.pdf. Countries that did not respond were Bulgaria, Romania, Croatia, Luxembourg, Malta, Slovenia and Latvia.

Most of the contributions were in favour of the creation of the common GI protection for non-agricultural products in the EU. The intent of the EU is to introduce the same tool that is now used only for agricultural products to the new area of all other products. The question is whether this positive spillover effects is possible and whether the benefits prevail the costs. Despite the optimistic views of the contributors to the green paper questions, there still exist negative effects which costs are hard to estimate but which should be taken into account.

The benefits of the common GI protection of non- agricultural products were estimated by the contributors as:

- Benefits for consumers: Consumers will gain more information about products, they will feel more secure and EU might become more attractive to third countries consumers or partners
- Benefits for business: Business persons will get better enforceability of their rights which will also decrease of losses stemming from counterfeiting. The GI protection will contribute towards providing the financial resources required for future investment, it may bring higher competitiveness and more consumers and market share
- Benefits for regions: regions may benefit from more tourism and cultural activities in the area. GI protection is a way for cultural heritage to generate value (vs. benefit from public subsidies), and it may also help to sustain local knowledge and jobs.

The negative impacts of newly introduced GI protection were seen by the contributors mainly in:

- Costs for consumers: Consumers might feel confused about new labelling and the possibility of increase prices
- Costs for business: Producers may feel compelled to apply for registration and prevented from moving their business, unlikely that SMEs (80%) will find the system worth investing (a GI does not create demand in itself), the system might lead to higher costs for producers.
- General costs: GIs might be burdensome and costly for MS, an overreach of GI protection could create obstacles to free competition (protectionism). There exist split views on benefits in the international field.

5. Discussion

The author's assumption is that EU will have to find the answers to the question whether to follow the same steps and protection that is granted to the GIs in agricultural sector, or to create a sui generis system of GIs protection for non-agricultural products; and how to treat generic terms in non-agricultural sector.

One of the benefits that will be brought by GI to consumers was identified as more information and thus more security to consumers. This is however connected with the requirements of the GI standardization. If there is a strict requirements imposed on the granting of GI, then it is assumed that it can guarantee high level of product reputation and recognisability among consumers but it may lead to exclusion of small producers and thus higher prices. Contrary the looser rules simplify implementation process of GI, allow many different products under the same GI, but threaten the product credibility and identity (Galtier, Belletti, and Marescotti, 2013).

The most important definition of the GI is the linkage to the territory and product that may distinguish products protected by GIs from others. The intent of the EU is to set the rules based on the principles presented in agricultural GIs. In this respect we can find the protected designations of origin (PDO) and protected geographical indications (PGI). The difference is based on the strength of the connection with the geographical area. For a PGI, one of the production steps, processing or preparation must take place in the area, while the raw material may come from another area. For a PDO, the entire production process must take place in the defined geographical area, and the raw materials must also come from the same area. (Grote, 2009). Apart from the GIs there exist another system of protection of traditional specialities (Traditional Speciality Guaranteed – TSG) that differs from PDO and PGI with no link to specific geographical area. To qualify for a TSG a food must be of specific character and either its raw materials, production method or processing must be traditional. The meaning of “specific character” is defined under Art. 3 of Regulation (EU) No 1151/2012 on quality schemes for agricultural products and foodstuffs as “the characteristic production attributes which distinguish a product clearly from other similar products of the same category”; the meaning of “traditional” is defined *ibidem* as “proven usage on the domestic market for a period that allows transmission between generations; this period is to be at least 30 years”.

Thus we can assume that only few products will reach for the PDO status⁵ as the production steps usually take place in different geographical area than is the place of the raw materials used (for example Murano glass raw materials come from the river bank Adige and Ticino and other important components from Egypt (Rasmussen 2008); Marmo di Carrara – only few companies processing carrara marble are situated in the region of Carrara, Jablonecká bijou is composed of many components, not just glass, and these components and raw materials come from different regions (Nový, 2008).

The other very important point is how the Commission and EU Courts will solve the question of generic terms. The famous “Feta cheese”⁶ may be used as the guideline for the decision of how strict the evaluation of generic terms would be. To establish whether or not a name has become generic, account shall be taken of all factors, in particular the existing situation in the Member State in which the name originates and in areas of consumption, the existing situation in other Member States, and the relevant national or Community laws. The situation in crafts might be more complicated than in the agricultural sector because of the different nature of it, as crafts are not inevitably connected to the territory and the overall knowledge and skills can easily cross the borders. Again the Commission together with the applicant will have to find strong connection to the certain territory and special state of art.

⁵ The situation in agricultural sector is different. According to the Database of Origin and Registration the numbers of registered PDO and PGI are nearly the same. Out of the GIs, 47% were PDO, 49% PGI, and 4% TSG. Available at (<http://ec.europa.eu/agriculture/quality/door/list.html>). The difference is due to the very nature of production, where agricultural products are linked to natural conditions on certain territory. Farmers then were more tied to the territory and therefore the production of agricultural products remained tied to a specific location. In contrast, Craftsmen’s products were processed where there was demand and not in place of origin of the raw materials needed for production.

⁶ Joined cases C-465/02 and C-466/02 Germany vs Commission

6. Conclusion

The EU system of GI protection for agricultural products is considered as successful (European Commission, 2013) and intention of European Commission to spread protection to non agriculture products by via the same system as for foodstuff and agricultural products can be considered as potentially beneficial for producers in the Czech Republic especially in area of various traditional craft products. In our opinion, community labelling Protected Designation of Origin and Protected Geographical Indication in comparison with regional or quality labelling are more effective than regional marks or domestic quality marks because this labelling is understandable to the majority of consumers in EU. It also enables the producers to spend their means on promotion of one type of labelling only and they can export their products directly into all EU countries. The labelling is understandable to consumers in all EU member states. (Kelblová, 2014).

European Commission will have to consider whether to implement the same system of protection which works in agricultural sector or to find out a new appropriate system for non-agricultural products. The connections between agricultural products and the territory is visibly stronger than the connections of other products. The first possibility may result in very few products that will be eligible for the registration of GI, the other possibility means that the consumers will be confused about different quality labelling and that may lead to deterioration in distinctiveness of GIs of agricultural products.

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On policy autonomy, coordination, harmonization and centralization in integrating Europe

Luděk Kouba¹, Michal Mádr², Danuše Nerudová³ and Petr Rozmahel⁴

¹*Department of Economics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: kouba@mendelu.cz*

²*Department of Economics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xmadr@mendelu.cz*

³*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic,
e-mail: danuse.nerudova@mendelu.cz*

⁴*Department of Economics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: rozi@mendelu.cz*

Abstract

The article discusses the question of whether policies in the integrating European Union should head towards autonomy, coordination or harmonization. Taking the path dependence effect into consideration, in our opinion, Europe has gone too far in its integration process to be able to continue with policies being fully under the competences of individual member countries. In addition, the establishment of the common currency in the EU as a result of deep harmonization in the monetary policy area is an unambiguous precedent with many consequences. Within this context, should fiscal policy be harmonized to a comparable level as monetary policy? We argue it should not. We employ the arguments from the theory of fiscal federalism, which recommends strengthening of stabilization function of the public finance; typically in form of rules and surveillance institutions (e.g., Fiscal Compact, the Six-Pack, European Semester). On the contrary, these authors usually refuse intensification of redistribution function also because of the fact that intergovernmental transfers in contemporary Europe are highly unpopular. Furthermore, Europe is still too heterogeneous as regards, in particular, informal institutions, different regimes of welfare state and different tax systems. For these reasons, a directed top-down harmonization and centralization path towards a full fiscal union is neither politically, nor economically rational. On the contrary, it is desirable to delimit moral hazard and free ride and strengthen joint responsibility in the area of public finances in nowadays EU.

Keywords: autonomy, coordination, harmonization, centralization, European Union, fiscal policy, heterogeneity

1. Introduction

Should nowadays' European Union head towards more autonomous or more unified policies? From the EU governance perspective, we discuss whether the governance structure with central authority with centralized functions resulting from the harmonization process such as in the monetary area (EMU) is the best way of further economic integration. Regarding fiscal policy, such a harmonization and centralization process would probably result in formation of fiscal union with centralized fiscal functions. Besides, we can see two other alternative scenarios: the largely autonomous policies and the process of policy coordination leading to government structure with implemented co-ordination mechanisms.

Considering the future of fiscal policy in the EU, even critiques of the European integration process should take the concept of path dependence into consideration. Path dependence, one of the most widely used concepts in contemporary social science (Rixen, Viola, 2009), explains how the decisions faced for any given circumstance are limited by the decisions made in the past, even though past circumstances may no longer be relevant. North (1990) imported the concept of path dependence into the area of economic institutions, while Pierson (2004) into political science. Increasing returns are typical for political institutions since they significantly affect actors' expectations, therefore, decrease the transaction costs associated with coordinating behaviour. In addition to that, the establishment process of institutions is usually related to high costs; institutions create incentives for maintenance, have learning effects, etc., therefore, the system evolves along a particular path that has been "locked in" (Arthur, 1989).

Therefore, we consider the European integration process to be a characteristic example of an institutional "lock-in", which makes an essential reverse almost impossible or highly unlikely. Furthermore, this generally "locked-in" integration process is further embodied into vast monetary unification. Till now, around 270 billion € have been paid by the European Financial Stability Facility, European Central Bank and International Monetary Fund only to Greece (Financial Times, 2015). Not talking about the extent of financial help to the other affected Eurozone countries, it is obvious that European politicians have been determined to save the Eurozone under all circumstances. In the case of the European policies, evidently, Path dependence matters. Therefore, in our opinion, a reverse to fully autonomous economic policies in Europe is not realistic.

Nevertheless, the level of heterogeneity in the EU has increased as a consequence of the EU enlargement by post-socialist economies. For more details, see Rozmahel, Kouba, Grochova and Najman (2013) and Rozmahel, Grochova and Litzman (2014). This article builds on the final thesis of the paper by Rozmahel, et al. (2013): *"Instead of harmonization, we call for better coordination and joint responsibility in the fiscal area, and more generally in terms of policies and institutions in the European Union."* This statement implies that we distinguish between coordination of less or more autonomous national policies on the one hand and comprehensive harmonization towards unified EU policies on the other. Naturally, establishment of the common currency in the EU as a result of deep harmonization in the monetary policy area is an unambiguous precedent with many consequences. First of all, the habitual question still arises in literature. Does fiscal policy need to be harmonized to a comparable level as these two policies, necessarily, to complement each other? On one hand, there are voices for creating a fiscal union as an inevitable complement to the common monetary union.

Part 2 introduces our understanding of the key terms, such as centralization, harmonization, coordination, and autonomy. Part 3 supports our line of reasoning against deep harmonization and centralization of fiscal policy in the EU by arguments from the theory of fiscal federalism. Part 4 summarizes the main ideas.

2. Coordination vs. harmonization

One can distinguish between autonomous policies, which can be accompanied (but not necessarily) by direct competition among individual countries, on the one hand and full unification, which in certain areas is called harmonization, on the other. Nonetheless, because of the achieved level of integration in Europe, the article labels rigorously autonomous policies at a national level as being highly unlikely. Therefore, one should ask about the relationship between the terms coordination and harmonization. Analysing current literature, we can identify two views of the relation between harmonization and the coordination of particular policies.

The first view understands both terms as being close contemporary processes or directly as synonyms, it means, as opposites to the principles of subsidiarity, autonomy policies and competition among countries, e.g., in the tax area. This kind of argumentation for coordination-harmonization in the EU (EMU) is stated, e.g., in Clement-Wilz (2014), Gabrisch (2011), Giurescu and Vasilescu (2006), Köhler-Töglhofer (2011), Mortensen (2013), Roman and Bilan (2008). Starting with the papers dealing with coordination of economic policies in a broader context, Roman and Bilan (2008, p. 509) emphasize the importance of broad coordination for successful development in the EU: *“Realizing an efficient coordination of economic policies represents a necessary condition for achieving a stable and durable economic growth within the Union and it implies increasing the credibility of the authorities, transparency of the economic policies and, last but not least, increasing cooperation (dialogue) between authorities.”* Giurescu and Vasilescu (2006) consider the insufficient coordination of the economic policies as a macroeconomic risk factor for European integration. According to them, the risk factor *“consists in the heterogeneity of member states’ economies, the taxation strategies and the insufficient coordination between the budget policies and the monetary policy.”* Gabrisch (2011, p. 69), who derives the necessity for coordination from current account imbalances, speaks also about the macroeconomic coordination, which *“needs a clear identification of union-wide employment goals, and the establishment of a high level institution (High Representative for Economic Policy) responsible for coordination following these objectives.”* According to Clement-Wilz (2014, p. 99), current anti-crisis measures in the EU strengthen (and coordinate) fiscal discipline and the coordination of other economic policies as well. Moreover, he adds two preconditions for effective coordination in the EU (EMU): *“the first is based on flexible multilateral surveillance between States overseen by the Council, and the second based on a more rigid supervision on the part of the Commission.”*

Whereas the previous papers deal with the coordination of economic policies in general, other authors are more specific talking about labour market policy (Rantala, 2003; Stockhammer, 2008), environmental policy (Straume, 2003) or harmonization of criminal law (Calderoni, 2010). Concerning the term harmonization itself, it is most frequently used in the areas of tax policy and accounting. In addition, harmonization is typically discussed as the opposite to tax competition. While Benassy-Quere, Tranov and Wolff (2014), Fernandez-de-Cordoba and Torres (2012), Garcia, Pabsdorf and Mihi-

Ramirez (2013) and Gullo (2013) argue for tax harmonization, Oates (2001) and Schäfer (2006) support the principle of tax subsidiarity. In our opinion, in present-day Europe, tax competition still prevails in comparison to tax harmonization. On the other hand, the introduction of united accounting standards (e.g., International Financial Reporting Standards – IFRS) is an example of the implementation of meaningful and successful harmonization. In this sense, Samuels and Piper (1985, pp. 56-57) define international harmonization of accounting as *“the attempt to bring together different systems. It is the process of blending and combining various practices into an orderly structure, which produces a synergistic result”*.

The second view distinguishes coordination from harmonization using the example of the tax area, for instance, Faria (1995), O’Shea (2007), Pirvu (2012) and Shikwati (2012). Faria (1995, p. 228) explains the difference in the following way: *“tax harmonization implies a high level of intergovernmental cooperation, that may materialize through regional economics agreements based on factors, that are common to the signatory states, while tax coordination includes measures through which the taxation system of a state adapts to the taxation system of another state, but respective measures will not lead to uniformity of taxes applied by public authorities”*. Our understanding to the difference between coordination and harmonization is very close to Shikwati (2012) who, among others, points out the question of realism: *“we need to pursue “tax coordination” rather than “tax harmonization” as “harmonization” is mostly focused on achieving same tax rates, which is not realistic even in a common market. “Tax coordination” is focused on application of common rules and principles”*. While Shikwati’s recommendations are focused on African integration processes (ECOWAS), O’Shea (2007, p. 814) comes to a similar conclusion when discussing the context of EU countries: *“the member states (EU) will continue to try to find solutions that meet their national interests and will comply with their EC Treaty obligations, but it is unlikely that such solutions will be found at the Community level”*.

In addition, the matter of subsidiarity is another important point within the discussion on the future of the EU policies, e.g. Bird and Ebel (2007), Eichel (2002), Lighian (2012) and Sinn (1994). Schäfer (2006, p. 249) argues that *“The key vision should not be a Europe of harmonised equalness, but a Europe of subsidiarity, of plurality in differentiation”*. From our point of view, the principle of subsidiarity lies somewhere between autonomy and coordination on the related scale (see Figure 1), in other words, it is compatible with both of these approaches to economic policies in integrating groupings.

3. Coordination and harmonization in the theory of fiscal federalism

Our approach, where we distinguish between policy coordination and harmonization, can be supported also through the use of arguments from the theory of fiscal federalism. Section 3.1 summarizes the functions of public finance within the theory of fiscal federalism. Section 3.2 deals with the links between the theory of fiscal federalism and the current situation in the European Union.

3.1. Fiscal federalism and the public finance functions

In the 1950s, thus, in the high era of interventionism, Musgrave (1959) introduced his famous three economic functions of the public sector: stabilisation, distribution and allocation – solely with single-level governance. Later, Oates (1968, 1972) tried to apply Musgrave's typology of public finance roles in a multi-level governance model, so called, fiscal federalism. This seeks the best level of governance to perform public finance functions in an economy, i.e., provide public goods and collect budget revenues. Oates simplified it into a two-level public administration model: centre vs. regions, e.g., the German federal government vs. *länder*, the US federal government vs. federal states, or, in this paper's case, the EU vs. member states.

Regarding the stabilization function, it should be kept at a central level. Regions are often not able to react efficiently to economic decline, e.g., regional government cannot perform currency devaluation. Moreover, fiscal policy instruments have a limited impact compared to their implementation at the central level due to the openness of current economies. As Oates points out (1968, p. 44), such policies can be successful but only within a particular region, not within the whole country (economic union): a result can be the relocation of investors from a neighbouring region within the same country (economic union). Similarly, Oates recommends centralisation in the case of the redistribution function. If the regional government in a prosperous region seeks to intensify a redistribution function through progressive taxation and social transfers, it is probable that people will start to migrate to a region without progressive taxes. However, under assumption, that production factors are mobile. On the contrary, high social transfers will cause an inflow of low-income population groups (the current EU). Finally, the allocation function should be decentralised. Oates considers the preferences of public service users to be non-homogenous. It is assumed that lower levels of governance have a better understanding of people's preferences since these are in closer contact with their citizens and have a better knowledge of local conditions (conditions of transportation, environment, etc.). This Oates' approach, in fact, meant a turnover in the understanding of government roles.

The nowadays' literature usually distinguishes two evolutionary stages of fiscal federalism: first generation and second generation. The most characteristic difference of the second generation lies in its focus on the growth effects of fiscal decentralization instead of equity effects, which are typical for the first generation. For instance, Weingast (2009, p. 280) says that models belonging to the first generation of fiscal federalism stress the importance of intergovernmental transfers in order to balance regional disparities. On the contrary, the models of the second generation emphasize the role of tax incentives. Regional and local governments are motivated to the efficient allocation of resources and providing market-enhancing public goods when they get a higher share of tax revenues. Considering contemporary EU policies, Tanzi (2008) points out two omitted aspects. Firstly, he sees a need to anchor fiscal federalism theories in historic time (see the concept of path dependence in the Introduction). Secondly, he emphasizes the fact that strong supranational institutions exist in the globalized world of the 21st century. Moreover, these global institutions also play a significant role in the area of public finance. Tanzi even concludes (2008, p. 711): "there is need for theories that deal with the role and the form of "global governments".

3.2. Is fiscal federalism a relevant concept within the context of current EU policies?

In particular, one has to take into consideration two specific tenets of the EU budget. Firstly, the budget is exceptionally small; secondly, the structure of expenditures is extraordinarily specific. The size of the EU budget is only about 1% of GDP, moreover, 57% of expenditures are related to the allocation function and about 40% to the redistribution function. It implies that macroeconomic stabilization function is entirely marginal in the current EU. Therefore, the contrast between such a marginal role of joint fiscal policy and the centralised monetary policy represented by the European central bank is more than apparent. In addition to that, the financial, economic and debt crisis intensified the discussion on the necessity of a strengthening role of EU fiscal policy.

We will now take a look at the part of this discussion using arguments from the theory of fiscal federalism where, in our opinion, one can identify two lines of argument. A (minor) group of authors propose reforms aiming at a full fiscal union in the EU, whereas another (major) group of authors suggest only a partial strengthening of the role of the EU budget.

The proponents of the first group, Bordo, Jonung and Markiewicz (2013), Vallee (2014), support harmonization and centralization towards a full fiscal union. Bordo, Jonung and Markiewicz (2013, p. 482–483) identify five conditions for an efficient fiscal union, which can prevent risks of divergent fiscal policies: a credible commitment to a no-bailout rule, a degree of revenue and expenditure independence reflecting the preferences of the voters, a well-functioning European system of transfers in times of distress, the creation of a euro bond market serviced by taxes collected by the EU government, the ability to learn from and adapt to changing economic and political circumstances. The conclusions are based on the fiscal history of five federal states Argentina, Brazil, Canada, Germany, and the USA.

The proponents of the second group, Bargain (2013), Begg (2009), Csürös (2013), Dabrowski (2013) and Hinarejos (2013), question both the sense and enforceability of a fiscal union in Europe. Similarly to this paper, Hinarejos (2013) distinguishes between two models of fiscal federalism, the “surveillance model” and the “classic fiscal federalism model”. Concerning the former, Member States continue to have full fiscal competence (tax revenues and allocation of sources) and the competence to conduct a general economic policy as well. The mainly corrective EU role is, in particular, to enforce fiscal discipline and prevent structural asymmetries and asymmetric shocks. On the contrary, the latter assumes a much deeper centralization in the form of an independent sphere of fiscal authority. Both the Member States and the EU have the competence to raise revenues and to provide different kinds of public goods. This model typically includes a version of a “transfer union” as well. Hinarejos considers the surveillance model to be a natural progression of the status quo in the EU.

4. Conclusions

The article deals with the question of whether EU policies should head towards autonomy, coordination or harmonization and centralization. In our opinion, Europe has gone too far in its integration process to be able to continue with policies being fully under the competences of individual member countries (path dependence effect). A reverse in trends would incur extremely high costs. Moreover, the high level of

monetary unification, having already been accomplished, in fact, considerably excludes fully autonomous fiscal policies. On the other hand, Europe is still too heterogeneous and it will also be so in the future – people in Finland, Spain and Slovakia have distinct culture, mentalities, traditions and ways of thinking. Therefore, a goal-directed top-down harmonization and centralization path towards full unification could even be contradictory, since it could increase people’s antipathies towards the European integration process itself.

The article discusses, in particular, two approaches to the policies within an integration process: harmonization (with centralization) and coordination. In this article, we apply the second mentioned view – a differentiation between the approach of coordination and harmonization. While coordination is a process maintaining certain levels of autonomy, harmonization tends to lead to a full unification or centralization of particular policies. The differences are summarised in the following figure.

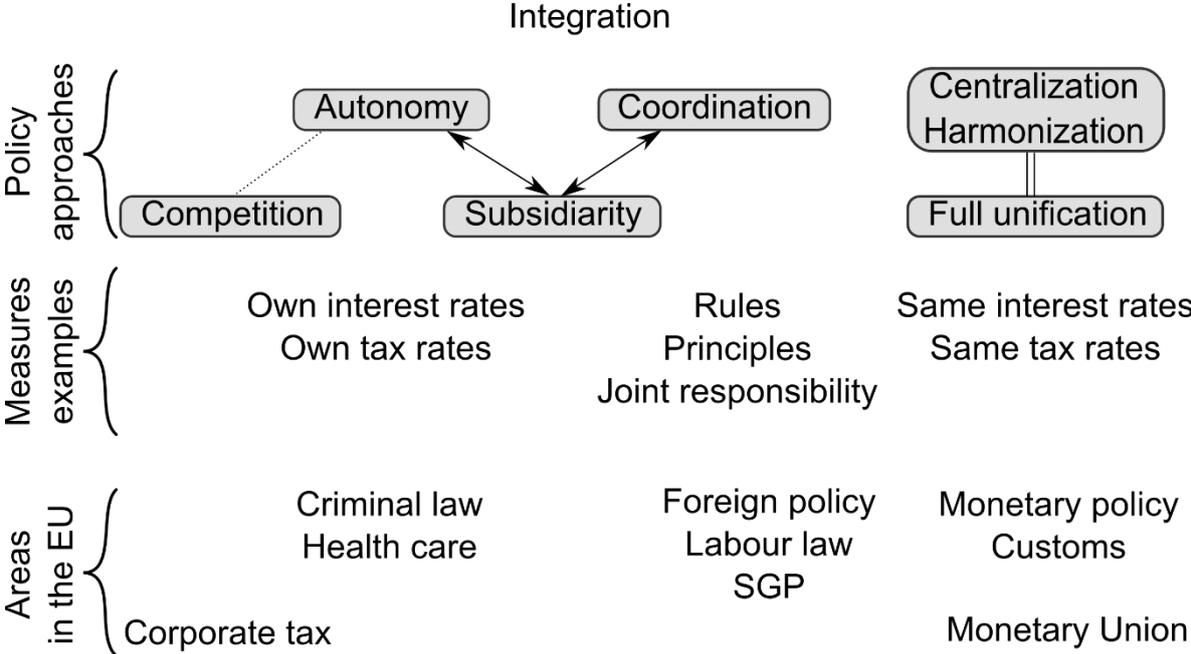


Figure 1: The scale of the policy approaches in the integration groupings. Source: Authors.

To sum up the discussion on the EU budget based on arguments from the theory of fiscal federalism, most of the authors recommend strengthening the stabilization function of public finance, usually in the form of rules and surveillance institutions (e.g., Fiscal Compact, the Six-Pack, European Semester). The other authors (Bargain, 2013; Begg, 2009; Csürös, 2013) refuse an intensification of the redistribution function, as intergovernmental transfers in contemporary Europe are highly unpopular. A full fiscal union in contemporary Europe is, therefore, considered to be politically unenforceable. As a consequence, we suggest that the European Union should officially declare: within the European integration process, there is not any goal to achieve an absolute harmonization in all areas; an adequate level of coordination in each particular policy area should be sufficient. On the other hand, in order to maintain European integration process viable, it is necessary to reduce behaviour with features of moral hazard and free ride and strengthen joint responsibility for fiscal development of public finances in the EU. In our future research, we intend to focus on a few case studies dealing

especially with the matter of heterogeneity in contemporary Europe and with the area of tax policy.

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Heterogeneous distribution of money in the regions of Russian Federation

Zlata Kovtun¹

¹Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: zlata_kovtun@mail.ru

Abstract

Differences between Russian regions are determined by economic conditions: the structure of the regional industry, concentration of financial institutions, bank controls, the level of income and inflation. All this suggests pass-through market interest rates. This leads to the need to develop a set of measures concerning not only the unification of instruments of monetary control for different regions, as the definition of its position, aimed at achieving the same outcome indicators of economic development for the economically diversified area. In this paper the author improves the existence of the heterogeneous character of the banking system in Russian Federation, examines the heterogeneous reactions of commercial banks on monetary policy and diversity of economic growth in Russian regions.

Keywords: heterogeneity, monetary policy, transmission mechanism, interest rates.

1. Introduction

Taking into account the sizes of the Russian Federation and economic features of the Russian regions, there is a problem of using a single rate for the qualitatively different economic subjects.

A similar question was studied by Eijffinger and de Haan (2000). The traditional debates about the transmission mechanisms for both real and monetary shocks had already begun immediately after the introduction of the common currency. Supporters say the unprecedented switch to a single currency will benefit business and consumers alike.

The subject of heterogeneity in Russian economy is a rare topic and a very small number of authors chose this subject for research. This was served as a motivation for my thesis. Danilova (2014) wrote that Russian Federation has a complex territorial structure and very high heterogeneity of economic space. That is why the stabilization measures of the federal center can cause very different consequences. The traditional direction of stabilization policies aimed at cushioning the adverse economic “shocks” at the level of the territories of Russian Federation can lead to unplanned changes, such as the decrease of the multiplier impact of regulatory instruments and increase of regional differentiation. The negative effects of stabilization policy in some regions can exceed the benefits of progress that was made in others. That explains the poor performance of regulatory measures.

Monetary policy, conducted by the Russian Central Bank, affects on the real sector of the region not directly, but through financial intermediaries in the face of credit institutions. The action of monetary instruments primarily reflects on credit institutions by changing their financial capacity, affecting on the costs of funds. For the significant influence of monetary policy on the real economy, it is necessary to follow such conditions as: real sector should actively use banking products and depend on financial services provided by credit institutions. (Volkov, 2012) Therefore, the effect on the region's economy through measures of monetary policy will be stronger in regions with high investment potential, developed credit and banking system, largely satisfying requirements of companies in financial resources.

In contrast to Russia, the question of heterogeneity of the monetary transmission mechanism is very popular in Europe and it is supported by a large body of empirical evidence. The main directions of the literature devoted to this subject explains cross-country heterogeneity of the effects of monetary policy shocks by a lack of convergence in fiscal, financial or production structures, that affect the interest rate elasticity and the functioning of transmission mechanisms. Such analyses are usually done at the aggregate level of the domestic economies.

Leeper and Roush (2003) proved that money plays an important role in the transmission mechanism. When monetary policy generates significant joint movements in money and the interest rate, real and inflation impacts of policy are larger than when money's response is small. Ferrero, Nobili and Passiglia (2007) identified significant increase of deposits in Germany, France and Spain. At the same time, in Italy the decrease of total financial assets caused the decrease of total deposits.

The integration in the euro area implies a unique monetary policy. Spulbăr and Gherghinescu (Spulbăr et.al, 2009) underline the heterogeneity of the monetary policy transmission mechanism within the European Union. In default of a sustainable and efficient economic model, the adoption of the single currency can create major dysfunctions. Thus, European countries will not be able to stimulate the economy through the interest rate or through the exchange rate, policies frequently utilized at present.

Heller (2003) wrote that introduction of a single European currency means that the participation countries will no longer be able to pursue independent monetary and fiscal policies. Monetary policy for the EU will be under control of the Central Bank. One of the concerns about the success of the monetary union is whether this central bank will be able to maintain an independent policy of maintaining a low inflation target. While each country has some control over its own fiscal policy, the ability to engage in deficit spending is limited since the monetary union shares a common interest rate. Higher levels of government borrowing in one country raise interest rates in all participating countries.

The paper supports the interest in different economic situation in Russian regions and heterogeneous reaction of regions on the single monetary policy. In this paper, I suggest that money supply of the Russian Central Bank is distributed heterogeneously across the regions. I follow the money endogeneity hypothesis and the thesis that national banking systems create credit money and significantly contribute to the money stock. This contribution is determined by money demand which varies across Russian regions.

The paper consists of five parts. The first part is introductory part, the second part characterizes the economic conditions in different regions, the third part describes methodology, the fourth part includes results and the last part consists of some conclusions and offers recommendations how to reduce heterogeneity in Russia.

2. Heterogeneity in Russian regions

Differences between Russian regions are determined by economic conditions: the level of inflation (*Fig.1*), the structure of the regional industry, concentration of financial institutions in the region and their capabilities, the development of agricultural and commodity sector, the level of transport costs, the level of income. All this suggests a difference in levels of market interest rates. (Volkov, 2012) This leads to the need to develop a set of measures concerning not only the unification of instruments of monetary control for different regions, as the definition of its position, aimed at achieving the same outcome indicators of economic development for the economically diversified area. For example, in regions with high rates of inflation, monetary policy has a much smaller effect on aggregate demand, compared with regions with low inflation.

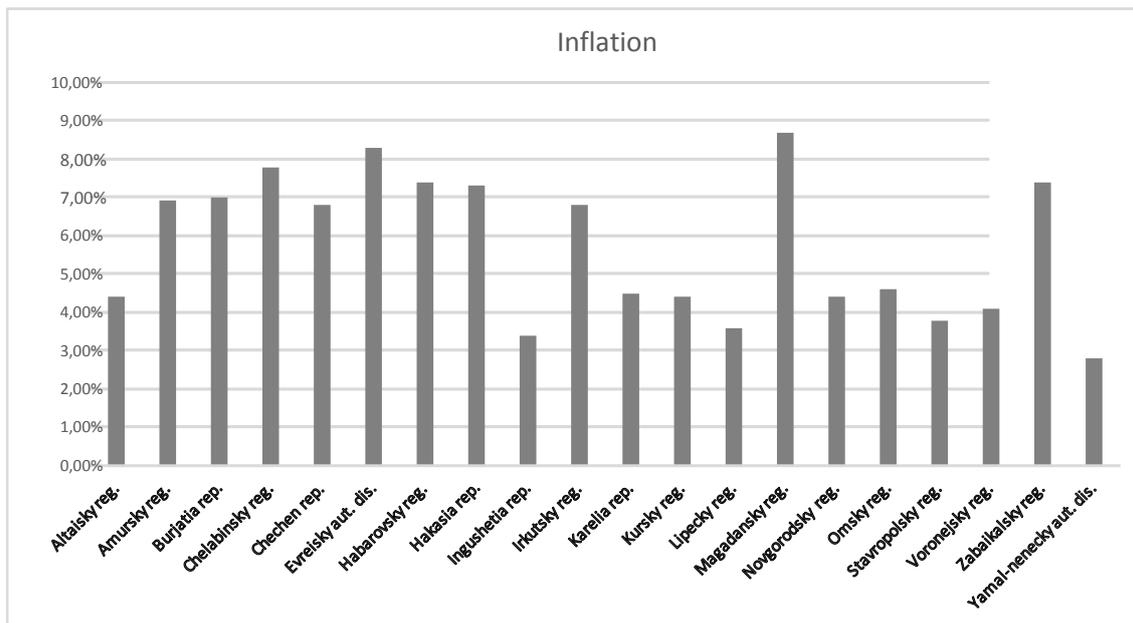


Figure 1: Inflation in Regions of Russian Federation (2014).

Source: The data was collected by author with the help of examining the regional statistics (2014).

Economic growth in Russian regions, measured with different indicators, continues to develop very unevenly. Differences between federal districts and between regions did not decrease considerably, and even within and between regions there are significant differences at the local administration level.

Since different regions vary greatly in levels of development of the banking sector in regions and banking segment, the impact of the regional aspect will not also be the same for these components of the banking system. In the process of implementation of the regional aspect the central bank needs to use the resources of its territorial divisions, in contradistinction to implementation of the federal aspect of monetary policy. In this case it is enough to use the tools at the disposal of the federal government. (Kachan, 2010)

The regional aspect is a set of measures to create conditions for the stable functioning of the regional economy by providing it with credit resources (refinancing), control over the implementation of mandatory standards set by the Central Bank. This control serves as a regulator of the monetary sphere and at the same time as an instrument of monetary control its state (required reserve ratio). The regional aspect of the implementation of monetary policy in addition to traditional tools includes a relatively young branch of the Bank of Russia – information management tools of monetary policy, known as monitoring

companies. Currently, monitoring of enterprises at the regional level consists of two blocks and conducting a study of economic processes in five areas. “Classic” unit analyzes the state of the economic situation on the regional market, the investment component in the enterprise development strategy and the financial situation of enterprises. Block “The demand for banking services,” respectively examines the state of the market of banking products in two areas – the study of the demand for banking services, and the study of banking services offers. (Nikitin, 2004)

Russian Central Bank conducts monetary policy by using the tools, which can be divided into two groups. The first group of such instruments includes: open market operations, foreign exchange intervention setting targets for growth of the money supply, direct quantitative restrictions, the issue of bonds by the Bank of Russia on its own behalf. The second group of tools includes: the regulation of rates on operations of Central Bank, the formation of the obligatory reserve fund and refinancing. (Korishenko, 2011) The hallmark of the second group of tools is the presence of potential for varying the degree and direction of their impact on the economy of the region, depending on its specific features. Using the diversification of interest rates it is possible to adjust the effect of monetary policy on different regions. For the maximum effect from the realized monetary policy there is need in reliable and operational information about the state of real and financial sectors and the monetary sphere.

3. Methodology and Data

A consequential research requires an adequate and reliable data of all the variables. The data for this paper consists of quarterly observations for 12 Russian regions, 33 banks, such indicators as loans, deposits, assets, interest income, interest rates of Central Bank, inflation level during the period before and after financial crisis (2005-2014). The data set for variables have been taken from regional statistics, balance sheets of each bank and it was estimated by the author manually. The data was seasonally adjusted and further transformed into logarithmic time series, so that time series are consistent with economic theory.

The presence of unit root in time series data was checked by applying Dicky-Fuller Test (ADF-1979). For testing the presence of a unit root, by Enders (W. Enders, 2010), there is a regression equation:

$$\Delta y_t = \gamma y_{t-1} + \varepsilon_t \quad (1.1)$$

$$\Delta y_t = a_0 + \gamma y_{t-1} + \varepsilon_t \quad (1.2)$$

$$\Delta y_t = a_0 + \gamma y_{t-1} + a_{2t} + \varepsilon_t \quad (1.3)$$

The difference between these regressions is in deterministic elements a_0 and a_{2t} . In the case when hypothesis $\gamma = 0$, the first equation represents a pure random walk model, in the second equation it is contained the tiered constant a_0 , and the third equation also contains a_0 and linear time trend a_{2t} .

To obtain values and respective standard deviation, the author estimates equations (1.1), (1.2) and (1.3) using OLS.

Testing the null hypothesis $\gamma = 0$ against the alternative hypothesis $\gamma < 0$, the author compares the results of t-statistics with the corresponding value of the Dickey-Fuller tables and makes a decision about the acceptance or rejection of the null hypothesis.

The information panel may have a group effects, time effects, or both. These effects are either fixed effects or random effects. The model assumes a fixed effect differences captured in the group or time period, while the random effect model deals with the differences in the error value. Unidirectional model contains only one set of fictitious variables (eg. Company), while two-way model considers two sets of fictitious variables (eg., Firm and year).

For allowing the imprecise relationships between economic variables it is rationally to change the function of a deterministic consumption (2. 1.) as follows:

$$Y = \beta_1 + \beta_2 X + u \quad (2.1),$$

where, (u) is disturbance or error term, random (stochastic) variable, which has a well-defined probabilistic properties. Failure term (u) represents all those factors that have an impact on consumption, but not taken into account explicitly.

Function of econometric consumption hypothesis underlines that the dependent variable Y (consumption) is directly proportional to the explanatory variable X (income), but the relationship between them is not accurate; subject to individual variation. Thus, the statistical method of regression analysis is the main tool for obtaining estimates. (Gujarati, 2004)

After that, the author built the linear regression and the matrix of correlation coefficients to show what factors in each region influence on credits and deposits.

4. Results

The presence of unit root in time series data was checked by applying Dicky-Fuller Test (ADF-1979). The results showed that the datasets are stationary. Thus, I could not do cointegration, but classical regression without any other transformation. Therefore, I've made the transformation of time series using the natural logarithm, except percentages of the interest rates.

I used an alternative way of structuring data. I left all measures related to each bank in one record (widescreen). Panel equation predicts interest rates on loans, deposits, interest income and assets. Firstly, I've analyzed the influence of assets, interest income and interest rates of Central bank on loans. So, I've used loans as dependent variable and others as independent variables.

Table 1: Linear regression of Central region.

Loans	Coef.	Std. Err.	t	P>t
Assets	.0904556	.0454772	1.99	0.050**
Income	-.0027413	.0049582	-0.55	0.582
IRCB	.209101	.1892794	1.10	0.272
_cons	-.0036881	.0044792	-0.82	0.412

Table 2: Linear regression of Altaisky region.

Loans	Coef.	Std. Err.	t	P>t
Assets	-.0238161	.0243553	-0.98	0.331
Income	-.0026743	.0063666	-0.42	0.675
IRCB	.3392465	.1290555	2.63	0.010***
_cons	.0002426	.0031897	0.08	0.940

Table 3: Linear regression of Habarovsky region.

Loans	Coef.	Std. Err.	t	P>t
Assets	.0000539	.0024136	0.02	0.982
Income	-.0545464	.0307292	-1.78	0.079*
IRCB	.0440073	.1048868	0.42	0.676
_cons	.0020886	.0024856	0.84	0.403

Table 4: Linear regression of Krasnodarsky region.

Loans	Coef.	Std. Err.	t	P>t
Assets	-.0111498	.0372946	-0.30	0.766
Income	-.0120896	.0078657	-1.54	0.131
IRCB	.5430468	.1980825	2.74	0.008***
_cons	-.0001193	.0053547	-0.02	0.982

Source: own calculation

Note: Statistically significant at a 1% (***), 5% (**), 10% (*)

By results of the linear regression I chose indicators that have a relationship with credits. For example in Centralny region assets produce the greatest impact on loans. In Altaisky region interest rate of Central Bank produces the impact on loans. In Habarovsky interest income produces the greatest impact on loans.

Secondly, I've used deposits as dependent variable and others as independent variables.

Table 5: Linear regression of Centralny region

Deposits	Coef.	Std. Err.	t	P>t
Assets	-.011136	.0131521	-0.85	0.399
Income	-.0043893	.0014339	-3.06	0.003***
IRCB	-.0521408	.0547401	-0.95	0.343
_cons	.001369	.0012954	1.06	0.293

Table 6: Linear regression of Altaisky region

Deposits	Coef.	Std. Err.	t	P>t
Assets	-.0186726	.0108401	-1.72	0.088*
Income	-.0026667	.0028336	-0.94	0.349
IRCB	.0419809	.0574404	0.73	0.467
_cons	.0012503	.0014197	0.88	0.381

Table 7: Linear regression of Habarovsky region

Deposits	Coef.	Std. Err.	t	P>t
Assets	.0002441	.0010184	0.24	0.811
Income	-.0090639	.0129667	-0.70	0.486
IRCB	-.1600127	.0442589	-3.62	0.001***
_cons	.0007779	.0010488	0.74	0.460

Table 8: Linear regression for Mordovia region

Deposits	Coef.	Std. Err.	t	P>t
Assets	-.0034845	.002596	-1.34	0.183
Income	-.0105142	.0036285	-2.90	0.005***
IRCB	-.0080654	.0373587	-0.22	0.830
_cons	.0002228	.0008659	0.26	0.798

Source: own calculation

Note: Statistically significant at a 1% (***), 5% (**), 10% (*), NA – not available observations

In Centralny region interest income influences on deposits more than other variables, in Altaisky assets, in Habarovskiy region interest rates of Central bank and in Mordovia interest income.

The more there are independent credit institutions in the region, the higher will be the frequency and the wider will be the range of operations, which they perform with the Bank of Russia. Therefore the effect of such a tool as interest rates on operations of the Bank of Russia will be higher. In the regions, where the banking sector is formed by the banking segment of other regions, the interest rate on operations of the CB has more significant influence.

I've built the matrix of correlation firstly for loans and then for deposits.

The results underline the existence of high heterogeneity in Russian regions. Observing the changes in dynamics of individual groups of indicators it is possible to evaluate the response of the regional economy on the application of the measures and instruments of monetary regulation. For example, a change in the refinancing rate affects the dynamics of the following indicators: production activity, the current demand, production capacity, inflationary fluctuations, the credit activity, the impact of credit conditions, credit activity. Change of reserve ratio affects the money supply indicator, economic stability, business risks and credit conditions.

Table 9: Loans correlation within the Russian regions.

Region	Assets	Interest Income	IR of CB	Sample size
Centralny	-0,30278**	NA	NA	101
Altaisky	NA	NA	0,494537***	107
Habarovskiy	NA	0,734542*	NA	101
Krasnodarskiy	NA	NA	0,329725***	86
Mordovia	-0,13936***	NA	0,290034***	108
Primorskiy	NA	NA	NA	NA
Privolzhskiy	NA	NA	NA	NA
Severo-Kavkazskiy	NA	NA	NA	NA
Severo-Zapadny	-0,11141*	NA	NA	99
Sibirskiy	0,198704*	0,233738***	NA	108
Stavropolskiy	NA	0,350269*	NA	72
Uralskiy	NA	-0,03745***	NA	66

Source: own calculation

Note: Statistically significant at a 1% (***), 5% (**), 10% (*), NA – not available observations

Table 10: Deposits correlation within the Russian regions.

Region	Assets	Interest Income	IR of CB	Sample size
Centralny	NA	-0,31321***	NA	101
Altaisky	-0,17022*	NA	NA	107
Habarovskiy	NA	NA	-0,47901***	101
Krasnodarskiy	NA	NA	NA	NA
Mordovia	NA	-0,29705***	NA	108
Primorskiy	0,032782*	NA	NA	89
Privolzhskiy	-0,41415*	-0,03142***	NA	108
Severo-Kavkazskiy	NA	NA	NA	NA
Severo-Zapadny	0,272765**	NA	NA	99
Sibirskiy	NA	-0,15663***	NA	108
Stavropolskiy	NA	-0,3103**	NA	72
Uralskiy	NA	-0,22233***	NA	66

Source: own calculation

Note: Statistically significant at a 1% (***), 5% (**), 10% (*), NA – not available observations

5. Conclusions

In conclusion I can underline that the level of heterogeneity is very high across the regions of Russian Federation. As recommendations for reducing the level of heterogeneity I can distinguish the passive role to the central bank. In the Russian economy, the main objective of monetary policy of the Central Bank is to ensure stability of the national currency on the domestic market (the maintenance of a stable purchasing power) and external (to maintain a stable exchange rate).

Test results on the Granger causality for Russia suggest that credits to state enterprises are actually defined with respect to monetary aggregates. This means that the Bank of Russia in the development of monetary policy should pay special attention to this factor. (A. Ignatenko, 2011)

Results of the last three years of development of Russian economy showed progress in the field of the national monetary policy, largely because of the stable rate of ruble and gradually reducing inflation (Ilias, 2014). At the same time, the problem of interaction of the banking sector and the sector of non-financial corporations is still actual nowadays.

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Selected Empirical Results on Portfolio Optimization

Aleš Kresta¹

¹Department of Finance, Faculty of Economics, VŠB–TU Ostrava, Sokolská tř. 33, 702 00 Ostrava, Czech Republic, e-mail: ales.kresta@vsb.cz

Abstract

The development in the portfolio theory goes hand in hand with the increase of computer's computational power, which allows to apply more complex performance ratios and obtain the results in the reasonable time. The most known performance ratio is Sharpe ratio formulated in 1966 by William F. Sharpe in order to measure the performance of mutual funds. Since then, many new performance ratios were proposed. In the paper we focus on mean absolute deviation (MAD) ratio and Rachev ratio. Although these ratios were proposed to improve the portfolio allocation, we empirically demonstrate that this need not be necessarily true. On the historical dataset of DJIA components we empirically show that both Sharpe ratio and MAD ratio outperform the Rachev ratio. In the paper we assume two datasets – composition of DJIA as of the beginning of analyzed period (the correct dataset) and as of the end of analyzed period (incorrect dataset) and quantify the influence of a survivorship bias.

Keywords: portfolio optimization, Sharpe ratio, Rachev ratio

1. Introduction

The portfolio optimization represents a classical financial problem in which practitioners and theorists search for the answer to the question how to choose the best portfolio composition. The process of portfolio selection may be divided into two stages. In the first stage the historical performance of available assets is studied and the future performance is predicted based on available data. In the second stage the choice of optimal portfolio is made based on the predicted future development. As both stages represent a challenging task we discuss them in greater depth.

Contemporary state of the art of financial time series modelling is connected to the Efficient Market Hypothesis (henceforth EMH) according to which “prices fully reflect all available information” and hence future evolutions are unforecastable, see e.g. Samuelson (1965). In simple terms, EMH states that by predicting the future development we are not able to achieve the profits superior to the profits of the market index when these are adjusted for the risk and transactions costs are deducted. Under

this hypothesis, the investors can achieve higher profits only by taking higher risks – under EMH the return and the risk of the investments (stocks) can be modelled. However, when modelling the asset returns, even in efficient markets there exists empirical properties such as fat-tailed distribution, volatility clustering, gain/loss asymmetry, leverage effect and dependence in tails, which make modelling of return time series and subsequent estimation of future performance a challenging task, see e.g. Cont (2001). On the other hand, there are works such as Lo and MacKinlay (2011) and Lo et al. (2000) providing evidence that markets are not efficient. In these works, however, the strategies (or technical trading rules) are demonstrated to provide the extra performance in short term only and then the extra performance vanishes. Thus in our paper, we assume the returns to follow autoregressive model with stochastic volatility modelled by GARCH model. The autoregressive part of the model allows the predictability of the future returns to a certain extent, but this does not necessarily mean the violation of EMH as the higher expected return can be compensated by the increased risk (represented by volatility).

However even when we form our beliefs about future evolution, the task to choose optimal portfolio is not easy. The cornerstone in this field was a pioneer work of Markowitz (1952). In his work, Markowitz considered expected return a desirable thing and variance of returns an undesirable thing. His choice of variance was purposely because of its computational simplicity. However, nowadays we can argue that the choice of semi-variance would better reflect the risk of the portfolio. Nevertheless, based on Markowitz mean-variance framework, Sharpe (1966) introduced a well-known Sharpe ratio, by which different portfolios can be ranked based on the ratio of expected excess return and its standard deviation. The drawback of the Sharpe ratio as well as Markowitz mean-variance framework is that they do not consider higher moments of return probability distributions. In order to overcome this imperfection there were introduced many other performance ratios which differs in applied measures or risk and reward. The examples are Gini ratio (Shalit and Yitzhaki, 1984), mean absolute deviation ratio (Konno and Yamazaki, 1991), mini-max ratio (Young, 1998), Rachev ratio (Biglova et al., 2004) and others, for the summary see e.g. Farinelli et al. (2008).

The aim of the paper is to back-test these ratios and compare the obtained results. The dataset which is applied in the performed analysis consist of stocks incorporated in Dow Jones Industrial Average. Moreover, we assume two different datasets – the composition of the index as of April 8, 2004 (the beginning of the analyzed period) and October 6, 2014 (the end of analyzed period). As we analyze the performance during the period between April 8, 2004 and December 31, 2014, the second database contains the information which was not known in this period. This phenomena is usually addressed as the survivorship bias, see e.g. Chan (2008). The results obtained when assuming these two datasets are also compared in the paper so that we quantify the effect of the survivorship bias.

The paper is structured as follow. In the next section we describe the GARCH-copula model, which takes into account the empirical facts of returns distribution and can be applied in the first stage of portfolio optimization. Then, in the section three we define the second stage of portfolio optimization problem as well as we describe particular performance ratios. In the section four and five the applied data are described and empirical results are presented. In the last section the results are discussed.

2. Financial Assets Returns Modelling

Evolution of financial asset returns over time is specific in the following ways, for further details see e.g. Cont (2001). Empirical volatility of returns is not constant over time, but is rather clustered. Thus, for the same asset, the periods of high volatility (high gains/losses) can be seen as well as the periods in which volatility is low (the gains/losses are low). This issue can be tackled by the volatility modelling, in the paper we particularly apply GARCH model (Bollerslev, 1986). Even after the correction of returns for volatility clustering, the residual time series still exhibit heavy tails. The conditional distribution, however, is less heavy-tailed than unconditional distribution. In our paper we utilize joint Student distribution for residuals. Due to the estimation and simulation requirements, this joint distribution is decomposed into Student marginal distributions and Student copula function in line with Sklar's theorem (Sklar, 1973). We address obtained model as GARCH-copula model, which was already successfully applied in risk management with the application for portfolio of indices discussed by Huang et al. (2009) and for foreign exchange sensitive portfolio by Wang et al. (2010).

Assume that we want to model the future returns of n assets. For each asset we assume AR(1)-GARCH(1,1) process, i.e. i -th asset returns can be modelled as follows,

$$R_{i,t} = \mu_{i,0} + \mu_{i,1} \cdot r_{i,t-1} + \sigma_{i,t} \cdot \tilde{\varepsilon}_{i,t}, \quad (1)$$

$$\tilde{\varepsilon}_{i,t} \sim t_v(0,1), \quad (2)$$

where μ_0 and μ_i are parameters of autoregressive model, $\sigma_{i,t}$ is standard deviation (volatility) modelled by the GARCH model and $\tilde{\varepsilon}_{i,t}$ is a random number from Student probability distribution (henceforth filtered residual). The Student distribution is applied for its ability to model the fat tails (higher kurtosis) of probability distribution, which are usually present in return time series. The volatility is modelled by means of GARCH model (Bollerslev, 1986), an extension of ARCH model (Engle, 1982). The applied model takes the following form,

$$\sigma_{i,t}^2 = \alpha_{i,0} + \alpha_{i,1} \cdot \sigma_{i,t-1}^2 + \beta_{i,1} \cdot (\sigma_{i,t-1} \cdot \varepsilon_{i,t-1})^2, \quad (3)$$

where $\alpha_{i,0}$, $\alpha_{i,1}$ and $\beta_{i,1}$ are the parameters needed to be estimated. The positive variance is assured if all the parameters are equal or greater than zero. Model is stationary if $\alpha_{i,1} + \beta_{i,1} < 1$.

In order to preserve the mutual dependence among the assets' returns, the filtered residuals are joined together applying copula function modelling. Copula functions are projections of the dependency among particular distribution functions,

$$C: [0,1]^n \rightarrow [0,1] \text{ on } R^n, n \in \{2,3,\dots\}. \quad (4)$$

Basic reference for the theory of copula functions is Nelsen (2006), while Rank (2007) and Cherubini et al. (2004, 2011) target mainly on the application issues in finance. Actually, any copula function can be regarded as a multidimensional distribution function with marginals in the form of standardized uniform distribution. Following the Sklar's theorem (Sklar, 1959), any joint distribution function, in our case the joint distribution function of filtered residuals $F_{\tilde{\varepsilon}_1, \dots, \tilde{\varepsilon}_n}(x_1, \dots, x_n)$, can be decomposed into marginal distributions and selected copula function,

$$F_{\tilde{\varepsilon}_1, \dots, \tilde{\varepsilon}_n}(x_1, \dots, x_n) = C(F_{\tilde{\varepsilon}_1}(x_1), \dots, F_{\tilde{\varepsilon}_n}(x_n)) = C(u_1, \dots, u_n). \quad (5)$$

The formulation above should be understood such that the copula function C specifies the dependency, nothing less, nothing more. In the paper we apply Student copula function, which belongs to the family of elliptical copula functions,

$$C_{\nu, \mathbf{Q}}^t(u_1, \dots, u_n) = \frac{\Gamma\left(\frac{\nu+n}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right)\sqrt{(\nu\pi)^n |\mathbf{Q}|}} \int_{-\infty}^{t_v^{-1}(u_1)} \cdots \int_{-\infty}^{t_v^{-1}(u_n)} \left(1 + \frac{\mathbf{z}'\mathbf{Q}\mathbf{z}}{\nu}\right)^{-\frac{\nu+n}{2}} dz, \quad (6)$$

where Γ is gamma function, ν stands for degrees of freedom both in marginals and Student copula function and \mathbf{Q} is a correlation matrix. Note that by accompanying Student copula function with Student marginals we obtain the joint-Student distribution.

3. Portfolio Optimization Problem

In this paper we assume the investor who is maximizing selected performance ratio, i.e. solving following portfolio optimization problem,

$$\begin{cases} \max_{\mathbf{x}} PR(\tilde{\mathbf{R}} \times \mathbf{x}) \\ \sum_{i=1}^N x_i = 1 \\ x_i \geq 0, \quad i = 1, \dots, N \\ x_i \leq 0.25, \quad i = 1, \dots, N \end{cases} \quad (7)$$

in which \mathbf{x} represents the vector of weights (portfolio composition) and $\tilde{\mathbf{R}}$ is the matrix of random realizations of returns (rows represent realizations with equal probability and columns represent particular assets the investor can include in the portfolio). The matrix $\tilde{\mathbf{R}}$ contains the random realizations of future returns, and thus is not directly observable but must be simulated. In order to simulate future returns we apply GARCH-copula model described in the previous section. Furthermore, the constraints of the optimization problem bound the weight of each asset between 0% (short selling is not allowed) and 25% (the portfolio is composed of at least four assets).

The portfolio optimization problem (7) is applied on moving window basis, i.e. for each day the portfolio composition is calculated from the previous data. Under such set-up we can compute the ex-post wealth path W_t ,

$$W_{t+1} = W_t \cdot \left(\sum_{i=1}^n R_{i,t} \cdot w_{i,t} \right), \quad (8)$$

where $R_{i,t}$ are ex-post observed returns and $w_{i,t}$ is weight of i -th asset at time t (portfolio composition). These weights were obtained by means of maximizing selected performance ratio, see problem (7).

3.1. Performance Ratios

The most know performance ratio is Sharpe ratio which is closely related to Markowitz mean-variance framework as it focuses only on the first two moments of probability distribution. However, as it is known, the empirical distribution of financial asset returns is characteristic by heavy-tails and skewness. Thus, many researchers proposed their own ratios, which take into account also the kurtosis and skewness of the

probability distribution. Among others, see for instance Gini ratio (Shalit and Yitzhaki, 1984), mean absolute deviation ratio (Konno and Yamazaki, 1991), mini-max ratio (Young, 1998), Rachev ratio (Biglova et al., 2004) and others. For the summary see e.g. Farinelli et al. (2008).

3.1.1. Sharpe Ratio

Sharpe (1966) continued in the framework established by Markowitz and proposed the well-known Sharpe ratio (Sharpe index, the Sharpe measure or the reward-to-variability ratio) which he first defined as the ratio between the excess expected return (i.e. the expected return minus risk-free rate, also known as risk premium) and its volatility,

$$SR(\tilde{R}) = \frac{E(\tilde{R} - R_{RF})}{\sigma_{\tilde{R} - R_{RF}}} = \frac{E(\tilde{R}) - R_{RF}}{\sigma_{\tilde{R}}} \quad (9)$$

where \tilde{R} is observed (or predicted) distribution of returns or equiprobable realizations of this distribution and R_{RF} is risk-free rate. The original ratio was revised by Sharpe (1994) substituting the risk-free rate by an applicable benchmark \tilde{R}_B , which can change in time,

$$SR(\tilde{R}) = \frac{E(\tilde{R} - \tilde{R}_B)}{\sigma_{\tilde{R} - \tilde{R}_B}} \quad (10)$$

Further in this paper we assume the original version of Sharpe ratio (9), which in fact is a special case of the revised version (10) in which $\tilde{R}_B = R_{RF}$. The Sharpe ratio defines the profile of an investor who prefers titles with higher expected excess returns for unity of volatility (standard deviation). When comparing two assets versus a common benchmark (in our case risk-free rate), the one with a higher Sharpe ratio provides better return for the same risk (or, equivalently, the same return for lower risk).

3.1.2. Mean Absolute Deviation Ratio

Mean absolute deviation ratio (henceforth MAD) considers expected return as a desirable thing and mean absolute deviation from the expected return as an undesirable thing,

$$MAD(\tilde{R}) = \frac{E(\tilde{R}) - R_{RF}}{E\left[|\tilde{R} - E(\tilde{R})|\right]} \quad (11)$$

The ratio still does not take the higher moments of probability distribution into account. Thus, it can be considered as the different version of Sharpe ratio.

3.1.3. Rachev Ratio

The Rachev ratio (Biglova et al., 2004) of a portfolio returns \tilde{R} is defined as follows:

$$RR_{\alpha, \beta}(\tilde{R}) = \frac{CVaR_{\beta}(-\tilde{R} + \tilde{R}_B)}{CVaR_{\alpha}(\tilde{R} - \tilde{R}_B)}, \quad (12)$$

where \tilde{R}_B is a benchmark return which we assume to be equal to R_{RF} ,

$$CVaR_{\beta}(X) = \frac{1}{\beta} \int_0^{\beta} VaR_u(X) du \quad (13)$$

is the Conditional Value at Risk of random variable X and $VaR_u(X) = -F_x^{-1}(u) = -\inf\{w | P(X \leq w) \geq u\}$ is the Value at Risk of the random variable X .

The conditional value at risk $CVaR_\beta(\tilde{R})$ is a coherent risk measure (see Artzner et al., 1999 and Rockafellar and Uryasev, 2002) and it is the opposite of the mean of the return portfolio losses below the percentile of its distribution. Rachev ratio allows to optimize the trade-off between maximum gains and minimum losses.

4. Methodology and Data

The utilized dataset consists solely of the stocks incorporated in one of the American stock market indices – Dow Jones Industrial Average (henceforth DJIA). In order to avoid survivorship bias, we assumed all the components of the index as of April 8, 2004. We also assumed the dataset of the stock incorporated in DJIA as of October 6, 2014. The reason for the second datasets was to compare the results.

Historical data of the stocks included in the dataset were obtained from Yahoo Finance website over the period January 2, 2003 until December 31, 2014 (3,020 daily observations for each stock). However, we estimated the parameters from 250 observations, which must have been left for initial parameters estimation. The back-testing were performed in the period from April 8, 2004 (the date from which the composition of the DJIA index was taken) until December 31, 2014 (2,700 daily observations).

The evolution of DJIA index in the analysed period (2003-2014) is depicted in Figure 1. The index took the value of 8,607.52 on January 2, 2003 and 17,983.07 on December 31, 2014. Thus the average annual return (to be more specific the average return of 250 trading days) in the analysed period was 6.29% whereas the maximum drawdown over the analysed period was 53.78%.

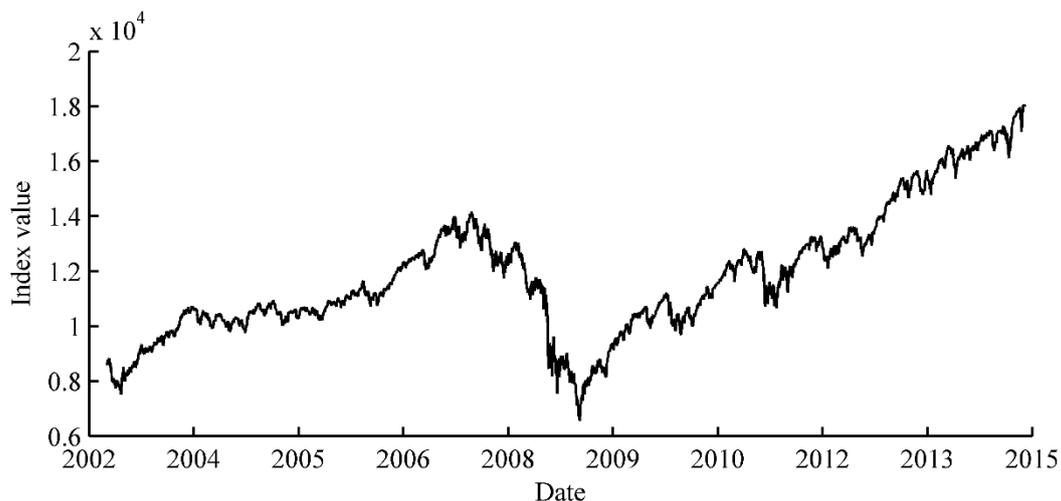


Figure 1: Evolution of DJIA index in the analyzed period

In the paper we verify the proposed portfolio optimization procedure and compare the results obtained by means of application of selected performance ratios. We proceeded as follows. The portfolio optimization is performed on rolling window basis over the analyzed period, i.e. for each day we consider preceding 250 observations.

Portfolio optimization is divided into two stages. The first stage is estimation-simulation phase and it is common for all applied performance ratios. In this stage we apply GARCH-copula model, see equations (1), (3), (6), by which we simulate 25,000 random one-day-ahead future returns. In the second stage we solve for each day the portfolio optimization problem (7) taking into account the randomly simulated returns from the previous stage and maximizing particular performance ratios. Applied risk-free rate is 0% in all performance ratios and parameters α, β in Rachev ratio are 5% (the value was taken in accordance with the previously published researches). At the end we compute the wealth path evolution according to (8) setting the wealth at the beginning to 1.

5. Results

The empirical results of the portfolio optimization back-testing are depicted in Figure 2. In the figure the wealth paths obtained by maximizing particular performance ratios are compared to each other and to the investment into the DJIA index. As can be seen from the figure the active portfolio management following proposed portfolio optimization procedure outperforms the passive investment into DJIA index. Moreover, we can see that there are not significant differences in wealth paths obtained considering different performance ratios.

In Table 1 we summarize the obtained final wealth and maximum drawdown of different strategies (applying different performance ratios). See that, while by investing into DJIA index the investor would multiply his wealth by 1.7 (annual return of 5%), following proposed active strategies the wealth would quadrupled (annual return of 14%). However, the transaction costs are not subtracted. The reason is twofold. Firstly, they differ significantly – although they would represent high fraction of the gains for small private investors, for large institutional investors they would be of smaller values. Secondly, also the considered investments into DJIA index is connected with the trading costs which are caused by the changes in stock prices (and thus also changes in relative weights and the need to rebalance portfolio).

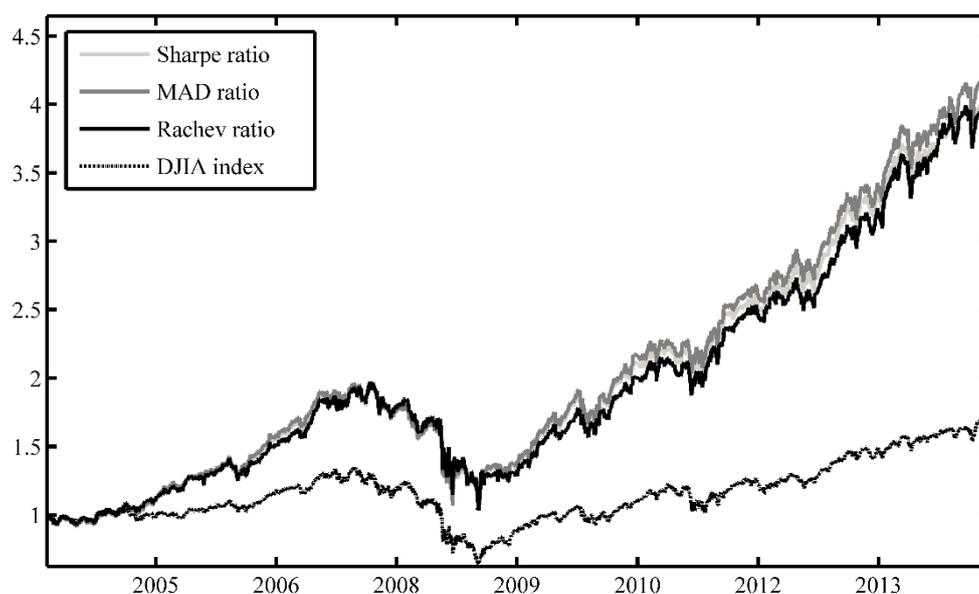


Figure 2: Wealth paths obtained by means of maximizing particular performance ratios

Table 1: Final wealth and maximum drawdown of particular wealth paths

	Sharpe ratio	MAD ratio	Rachev ratio	DJIA
Final wealth	4.059	4.228	3.980	1.716
Annual return	13.85%	14.28%	13.64%	5.12%
Maximum drawdown	45.63%	45.60%	47.67%	53.78%

The next factor the investor is concerned about is the risk of the strategy. In Table 1 we also recorded the maximum drawdown of particular strategies in analyzed period. It shows up that not only the proposed active strategies outperformed the index in terms of final wealth but also the maximum drawdown decreased. While the index lost almost 54% of its value during the financial crisis in 2008-2009, the maximum drawdown of the active strategies was around 46%.

When comparing particular performance ratios, we can see two things. The differences are small and the results obtained by means of Rachev ratio maximization are worse than applying simpler performance ratios. However, different values of parameters α, β may produce better results and thus the further research is needed.

Moreover, we also tried to quantify the survivorship bias. In Table 2 we summarize the results of Sharpe ratio strategy for two different datasets – survivorship-free dataset (further addressed as the correct one) and the dataset with the survivorship bias (further addressed as incorrect one). The problem of the incorrect dataset is the leakage of information.¹ As can be seen from the table the utilization of incorrect dataset would improve the results so that they look impressively compared to DJIA investment. However these results are not valid as they are contaminated by survivorship bias.

Table 2: Comparison of results from correct dataset and incorrect dataset

	Correct dataset	Incorrect dataset
Final wealth	4.059	4.636
Annual return	13.85%	15.25%
Maximum drawdown	45.63%	33.19%

6. Discussion and Conclusions

The cornerstone of modern portfolio theory was set by Markowitz in 1952 and the portfolio optimization problem is in the constant focus of both academics and practitioners. The development in computer's computational power allowed to apply more complex performance ratios, which takes into account also higher moments of return probability distribution. Although these ratios were proposed to improve the portfolio allocation, we empirically demonstrated in our paper that this need not necessarily be true. On the historical dataset of DJIA components we empirically showed that both Sharpe ratio and MAD ratio outperformed the Rachev ratio. However, for

¹ We can illustrate it on the case of General motors company. The stocks of General motors company are included in the correct dataset (the composition of the DJIA index as of the beginning of the analyzed period) but are not included in the incorrect dataset (composition of index as of the end of analyzed period) due to the fact that the company faced financial problems and the value of their stocks declined to the point in which it was bailed out by US government. The stocks of the company were also excluded from the index. However this knowledge was not known to the investor before exclusion so he would consider it as an investment opportunity during analyzed period.

Rachev ratio we assumed only one level of parameters value. Different set-ups of parameters may provide different results and thus further analysis is certainly required.

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The influence of allocation formula on generation of profit in different economy sectors

Kateřina Krchnivá¹, Danuše Nerudová²,

¹Department of Accounting and Taxation, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xkrchniv@node.mendelu.cz

²Department of Accounting and Taxation, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: d.nerudova@seznam.cz

Abstract

The mechanism for the distribution of the Common Consolidated Corporate Tax Base will be based on three macroeconomic factors which are considered to be the main indicators of generated profit/loss. The paper analyzes the explanatory power of the proposed allocation formula with respect to the sector of economic activity from the perspective of the Czech independent enterprises. The research is based on the comparison of the coefficients determination indicating the proportion of explained variability of proposed multiple regression models. The paper concludes that the proportion of explained profitability by the allocation formula factors as defined by the CCCTB Draft Directive may differ up to 34% with regard to the sector of economic activity classified by NACE classification.

Keywords: Allocation formula, Tax harmonization, Common Consolidated Corporate Tax Base.

1. Introduction

The Common Consolidated Corporate Tax Base (CCCTB) should constitute the general and unambiguous rules for the determination of corporate tax base with the main goal to simplify tax systems of the EU Member States and to ensure their greater transparency.

In the terms of the strategy Europe 2020 is the main objective of the CCCTB system to remove the needs for transfer pricing rules, to eliminate the possibilities for double taxation due to incurred tax liabilities in the different EU Member States and also to reduce tax compliance costs (Spengel et al., 2012).

As the main contribution of the CCCTB system is considered the completion of the Single Internal Market, improvement of the economic growth and the employment as well as the strengthening of the competitiveness of the European enterprises in the line with the revised Lisbon strategy. The arguments against the CCCTB system are mainly associated with the increasing of business uncertainty and its costly implementation. According to Mintz (2007), the implementation of the CCCTB system may cause new types of distortions of the tax systems, therefore is the system sometimes called as white elephant.

The mechanism for the distribution of the Common Consolidated Corporate Tax Base, i.e. formula apportionment (FA), will be based on the computation of the share of a respective member of a company group on the overall volume of three macroeconomics factors, i.e. volume of tangible fixed assets, labour compensation (indicated by payroll costs accompanied with number of employees) and volume of sales revenues. These factors are considered to have the largest impact on the generated profit of a company and therefore are able to explain the highest proportion of its variability.

The paper analyses the power of allocation formula factors to explain variability in generation of profit/loss of single enterprises from the perspective of the Czech Republic with focusing on the explanation ability of allocation formula on generation of profit of companies operating in different economic sectors classified by NACE classification of the European industrial activity¹.

2. Theoretical background

The CCCTB system considers a tool for harmonization of tax base and does not assume the harmonization of tax rates. Although, based on the proposed amendment of the European Parliament on the proposal for a CCCTB Directive from 12 April 2012 is impossible to achieve the equality in corporate taxation without introduction of the minimum level of corporate tax rates. The CCCTB system will do not distort the national accounting principles of the EU Member States, despite to the fact that the allover implementation of the International Financial Reporting Standards (IFRS) was initially considered as the possible starting point for the introduction of the CCCTB system.

The proposal for the CCCTB Directive, as the result of more than 7 years long extensive work of the European Commission Working Group (WG), was published on 16 March 2011. The CCCTB Draft Directive introduces the mechanism for the determination and computation of tax base, its consolidation and subsequent distribution among single members of a group of companies.

The CCCTB system will be addressed to a group of companies operating on the territory of the EU with high degree of economic dependence. These groups of companies have to also fulfill the criterion of ownership with a threshold of >75% share on capital, criterion of control with requirement of >50% proportion on voting right and >75% share on rights giving the entitlement to profit. Based on the voting of the European Parliament from 19 April 2012 will be the CCCTB system after five years long transition period compulsory for all group of companies fulfilling the above mentioned criterions with the exception of small and medium size enterprises.

¹ Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008) available on Eurostat website

The mechanism for the distribution of the CCCTB, i.e. formula apportionment, is stated by article 86 of the CCCTB Draft Directive. The formula apportionment should be based on three factors: volume of tangible fixed assets, volume of sales revenues and labour compensation. As eligible tangible fixed asset is considered assets with valuation of more than 1,000 EUR participating on the revenues generation of a respective company for the period longer of 1 year. The tangible fixed assets will be attributed to its economic owner; the leased assets will be assign to both of lessor and lessee. The labour compensation factor is constituted as a combination of payroll costs and number of employees working for a respective company. The definition of employee will be based on the national legislation of a Member State on which territory a respective employee performs her/his activity. Payroll costs will include all payments that are deductible as expense, including employees' benefits and social contributions. The sales factor will include revenues from sales of goods and services decreased by warranty claims and rebates, where the revenues will be attributed to the state of dispatch or transport of goods, i.e. destination principle, in case of services to the state on which territory the services are carried out.

The introduction of the CCCTB system as the main objective of European Commission in the tax harmonization process also initiated extensive scientific work of many researchers. In addition to the group of literature analyzing the impact of the introduction of the CCCTB system on the volume of tax revenues (Fuest et al., 2007, Devereux and Loretz, 2007, study of Ernest & Young, 2010, van der Horst, 2007 or Bettendorf, 2009), there is also group of papers researching the introduction of the CCCTB system from a different perspective; Devereux and Loretz (2008) analyzed the impact of the CCCTB system on the market efficiency, Becker and Runkel (2012) examined the influence of the CCCTB on the company decision about possible acquisition or merger with other existing company, while Schindler and Schjelderup (2007) considered the stability of cartel agreements in the situation of tax harmonization.

At present, some researches are focusing on the evaluation of the mechanism for the distribution of the consolidated tax base and the examination of the ability of allocation formula factors to explain statistically significant proportion of variability in generation of profit/loss. Rogemann et al. (2012) empirically analyzed the design of an EU apportionment formula with regard to profit generation. Based on the data from Amadeus database for the single enterprises operating in manufacturing and service sector² they concluded that the best performing formula is the three formula incorporating sales, tangible assets and labour costs. These three factors are able to significantly explain 28% of the variation in profit of considered companies. Pethig and Wagener (2003) compared the different design of formula apportionment with respect to their allocative features and strategic incentives. They concluded that in terms of equilibrium tax rates, the tax competition tends to be most relaxed under formula apportionment with sales as a single formula factor. Hines (2008) estimated the ability of formula factors (i.e. volume of sales, property, plant and equipment, labor compensation and employment) to predict variation in corporate income on the data of the large American corporations. His results suggested that an equally weighted free-factor formula may be considered as a reasonable predictor of market capitalization.

More recent study of Cobham and Loretz (2014) researched the impact on the distribution of the corporate tax base based on a number of different apportionment

² Manufacturing sector NACE codes: 15-36 and services sector NACE codes 50-74 and 92.

factors on the volume of tax revenues. They concluded that the distribution of the overall tax base according to number of employees dramatically redistribute tax revenues to lower income countries, while using costs of employee will do the opposite. They also concluded that the identification of the main winners and losers from the implementation of the CCCTB system mainly depends on exact definition of the apportionment factors.

3. Data and Methodology

The paper researches the ability of allocation formula factors to explain the variability in generation of profit/loss from the perspective of the Czech Republic with the objective to verify whether the allocation formula with three-equally weighted factors as is designed by the CCCTB Draft Directive is able to explain statistically significant proportion in variability in profit of a respective company. The equations indicates the structure of the allocation formula for the distribution of the CCCTB as is stated in Art 86 of the CCCTB Draft Directive:

$$ShareX = \left(\frac{1}{3} \frac{Sales^X}{Sales^{group}} + \frac{1}{3} \left(\frac{1}{2} \frac{Payroll^X}{Payroll^{group}} + \frac{1}{2} \frac{No_of_employees^X}{No_of_empolyees^{group}} \right) + \frac{1}{3} \frac{Assets^X}{Assets^{group}} \right) * Con'd_Tax_Base \quad (1)$$

where a share of group company member X on the common consolidated corporate tax base is computed as its share on the overall volume of sales, tangible fixed assets and labour compensation constituted as a combination of payroll costs and number of employees.

The paper employed the firm-level data of active unconsolidated companies registered in the Czech Republic with published value of profit/loss before taxation for taxable year 2012 from Amadeus database³. For the research were collected information about volume of tangible fixed assets (TFA), operating turnover (OPT), number of employees (NoE) and payroll costs (CoE) and profit/loss before taxation (PL). With regard to the objective to analyze the ability of allocation formula to explain variation in profit in different economy sectors, also the information about NACE codes were collected. The operating turnover is considered as a proxy of sales formula factor, since based on its definition comprises the total output from economic activity carried out in a respective period, usually measured by the overall volume of revenues on sales of goods and services reduced by rebates and warranty claims.

The initially collected sample of data for 111,295 unconsolidated companies was adjusted for the further research. All companies with missing information about NACE code as well as with negative value of tangible fixed assets or payroll costs were excluded from the sample. Also all companies with extreme value of any variable below 1st percentile and above 99th percentile were eliminated. The final data sample covers 65,376 companies.

Table 1 provides the descriptive statistics of all variables in the year 2012, table 2 presents correlation matrix which indicates that all observed variables are correlated in positive significant way at significance level of 5%.

³ Amadeus update number 234, date of updated 13.03.2014

Table 1: Descriptive statistics, all variables in thousands EUR, except for number of employees, active unconsolidated companies in Czech Republic with published value of profit/loss before tax for 2012

Name of variable	Abbreviation	Mean value	Standard Deviation	Min. value	Max. value
Sales	OPT	1,579.74	4,402.00	0.00	63,844.42
Profit/loss before taxes	PL	53.69	225.44	-526.90	3,015.65
Tangible fixed assets	TFA	417.25	1,373.47	0.00	19,351.05
Number of employees	NoE	18	41	3	357
Cost of employees	CoE	226.56	569.05	1.27	7,282.04

Table 2: Correlation matrix for adjusted sample of companies, n=65,376; 5% both sides critical value 0.0077

PL	OPT	NoE	CoE	TFA	
1.0000	0.5395	0.4209	0.5196	0.3811	PL
	1.0000	0.6113	0.6938	0.4565	OPT
		1.0000	0.8873	0.4997	NoE
				0.5056	CoE
				1.0000	TFA

The analysis of explanation power of formula factors is based on the examination of coefficients of determination of multiple regression models analyzed by Ordinary Least Squares method. As was already mentioned the paper researches the ability of allocation formula to explain the variation in profit/loss generation with focusing on different sectors of economic activity classified by NACE codes, therefore the data sample was divided into subsamples according to NACE codes. The positive linear links between dependent and independent variables were considered. The proposed regression model was as follows:

$$PL_n = \beta_0 + \beta_1 CoE_n + \beta_2 NoE_n + \beta_3 TFA_n + \beta_4 OPT_n \quad (2)$$

where the PL_n considers profit/loss before taxes as the dependent variable which is explained by four independent variables, i.e. payroll costs (CoE), volume of tangible fixed assets (TFA) and operating turnover (OPT) or number of employees (NoE).

The parameters of proposed regression models were determined by unrestricted as well as restricted regression where the parameters are considered to be equal.

4. Results and discussion

The main objective of the paper is to analyze the ability of the allocation formula to explain statistically significant proportion of variability in generation of profit/loss with focusing on the sector of economic activity in which a particular company operates.

The dependent variable profit/loss before taxation (PL) is supposed to be statistically significantly explained by four independent variables: number of employees (NoE), payrolls (CoE), operating turnover (OPT) and tangible fixed assets (TFA). These four independent variables are those which are involved in the allocation mechanism for the distribution of the CCCTB. The Ordinary Least Square method is used for the estimation of the parameters of proposed multiple regression models. There positive linear links between dependent and independent variables are assumed.

In addition to the unrestricted regression models also the restricted regression models were design for the analysis. The parameters of the restricted regression model are supposed to be equally-weighted, therefore this model is considered to have better explanation ability on generation of profit/loss with regard to the structure of allocation mechanism for the CCCTB.

Table 3: Explanation power of proposed allocation formula factors on profit/loss generation in different sectors of economic activity indicated by NACE codes. Dependent variable Profit/loss before taxes⁴.

	Number of observation	Unrestricted regression			Restricted regression		
		R2	adj R2	F-statistics	R2	adj R2	F-statistics
All NACES	65,376	0.3490***	0.3489***	8,759.61***	0.3254***	0.3254***	3,1531.28***
A	2,316	0.3883***	0.3872***	366.72***	0.3703***	0.3700***	1,360.76***
B	88	0.3911***	0.3617**	13.33***	0.3202***	0.3123***	40.50***
C	10,471	0.4248***	0.4246***	1,932.60***	0.4052***	0.4052***	7,132.30***
D	448	0.3496***	0.3437***	59.54***	0.2861***	0.2845***	178.70***
E	661	0.4299***	0.4264***	123.65***	0.4064***	0.4055***	451.12***
F	7,007	0.3740***	0.3736***	1,045.73***	0.3671***	0.3670***	4,062.30***
G	17,968	0.3035***	0.3033***	1,956.64***	0.2634***	0.2633***	6,423.71***
H	2,216	0.3412***	0.3400***	286.27***	0.3297***	0.3294***	1,088.89***
I	2,803	0.1339***	0.1327***	108.15***	0.0767***	0.0763***	232.56***
J	2,268	0.3828***	0.3817***	350.86***	0.3781***	0.3778***	1,377.51***
K	100	0.1431***	0.1070***	3.97***	0.1198***	0.1108***	13.34***
L	5,720	0.1861***	0.1855***	326.59***	0.1223***	0.1221***	796.54***
M	7,944	0.3928***	0.3925***	1,284.01***	0.3858***	0.3857***	4,988.73***
N	1,827	0.3337***	0.3323***	228.15***	0.3210***	0.3206***	862.62***
O	7						
P	692	0.1613***	0.1564***	33.03***	0.1145***	0.1132***	89.20***
Q	1,747	0.4264***	0.4251***	323.73***	0.3771***	0.3767***	1,056.23***
R	564	0.2906***	0.2856***	57.26***	0.1547***	0.1532***	102.87***
S	529	0.0910***	0.0841***	13.12***	0.0810***	0.0792***	46.44***
T	0						
U	0						

The analysis is based on the comparison of the values of coefficient of determination indicating the proportion of explained variability of the model. The Table 3 presents the results of the analysis for both of unrestricted and restricted regression models. The obtained values of adjusted coefficient of determination were analyzed by statistical significance test for the coefficients of determination. Furthermore, all proposed regression models were verified by the statistical significance test for the regression model, i.e. F-test, checking out if the variables in the model are correctly chosen. The below stated table reports the values of unadjusted as well as adjusted coefficients of determination. However that the proposed multiple regression models are supposed to be explained by the same number of independent variables, the further comments are reported to the values of adjusted coefficient of determination, which is able to eliminate possible distortion caused by the different number of independent variables. As was

⁴ ***, **, * indicates statistical significance level at the 1, 5 and 10% level respectively.

already mentioned, the paper researched the ability of the allocation formula to explain variability in profit/loss generation in different economy sectors, the results are reported for single economy sector indicated by NACE code. For the detailed description of NACE codes see *Appendix 1*. From the above stated table is obvious that the NACE sectors T and U as well as O were excluded from further analysis due to missing or low volume of observation. The table shows that the volume of explained variability in generation of profit/loss differs with regard to sector of economic activity indicated by NACE codes. The proportion of explained variability for the Czech independent enterprises operating in all industry sectors is 34.89%, respectively 32.54% in case of restricted model. While the proportion of explained variability in profit/loss is even by almost 8% higher for companies operating in Human health and social work activities (NACE code Q) and in Water supply and waste management activities (E NACE code) in case of unrestricted model and also almost by 8% for companies operating in Manufacturing sector (C NACE code) in case of restricted model.

These four allocation formula factors (CoE, NoE, TFA and OPT) are able to explain the highest proportion of variability in C, E, Q and M NACE sectors, whereas the lowest volume of variability is explained for I, K and S NACE sectors in case of unrestricted regression models as well as in case of restricted regression models.

The formula factors incorporated in the allocation mechanism for the distribution of the CCCTB based on the Art 86 of the CCCTB Draft Directive are able to statistically significantly explain the variability for companies operating in Financial and Insurance activities and Other services activities (K and S NACE sectors) based on the results of analysis of unrestricted regression models, however the proportion of explained variability in profit is very low. The results for the restricted regression models indicate that allocation formula with four independent variables is able to explain even lower of variability in profit in case of Other service activities sector (S NACE sector), i.e. 7.92%, as well as for Financial and Insurance activities (K NACE sector) where the proportion of explained variability reaches up to 11.08%.

With regard to the results obtained for unrestricted and restricted regression model has to be mentioned that the results may differ up to 13%; in general it can be concluded that the proportion of explained variability is lower for the unrestricted regression models.

In the line with the study of Anand and Sansing (2000), who concluded that the choice of allocation formula factors will be influenced by the principal industry sector in a respective country, can be generalized that the proportion of explained variability by the allocation formula for the companies operating on the territory of the Czech Republic reaches up to 30.33%, respectively up to 26.33%. With regard to Rogemann et al. (2012) study it is possible to conclude that the average proportion of explained variability in profit generation for the Czech unconsolidated companies operating in manufacturing and services sector reach up to 30.20%, respectively up to 26.51%.

The question for the further research may be considering of the explanatory ability of allocation formula factors in the variety of their combination with focusing on the comparison of the allocation formulas which are commonly used in United States or in Canada, or the considering of possible different definition of allocation formula factors for that types of economic sectors where the allocation formula as is defined by the Art 86 of the CCCTB Draft Directive is able to explain very low proportion of variability in generation of profit/loss.

5. Conclusions

The paper analyzed the ability of allocation formula factors to statistically significantly explain the variability in generation of profit/loss of the Czech unconsolidated enterprises with focusing on the proportion of explained variability for companies operating in different sectors of economic activity.

The research was based on the estimation of unrestricted as well as restricted regression models via Ordinary Least Squares method and subsequent evaluation of the values of coefficients of determination indicating the proportion of explained variability by the proposed independent variables.

The obtained results in the paper indicates that the allocation formula factors are able to statistically significantly explain the variability in the generation of profit/loss for companies operating in all of 18 considered NACE sectors, however the proportion of explained variability may differ up to 34% with regard to sector of economic activity classified by NACE codes.

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Appendix 1 – List of NACE codes

NACE code	Description	Details (first two digits)
A	AGRICULTURE, FORESTRY AND FISHING	01-03
B	MINING AND QUARRYING	05-09
C	MANUFACTURING	10-33
D	ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY	35
E	WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES	36-39
F	CONSTRUCTION	41-43
G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	45-47
H	TRANSPORTATION AND STORAGE	49-53
I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES	55-56
J	INFORMATION AND COMMUNICATION	58-63
K	FINANCIAL AND INSURANCE ACTIVITIES	64-66
L	REAL ESTATE ACTIVITIES	68
M	PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	69-75
N	ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES	77-82
O	PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY	84
P	EDUCATION	85
Q	HUMAN HEALTH AND SOCIAL WORK ACTIVITIES	86-88
R	ARTS, ENTERTAINMENT AND RECREATION	90-93
S	OTHER SERVICE ACTIVITIES	94-96
T	ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS; UNDIFFERENTIATED GOODS- AND SERVICES-PRODUCING ACTIVITIES OF HOUSEHOLDS FOR OWN USE	97-98
U	ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES	99

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Hayek’s Theory of Evolution of Religions: 1980s Articles Compared to The Fatal Conceit

Tomáš Křištofóry¹

¹Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: tomas.kristofory@pef.mendelu.cz

Abstract

Hayek’s 1980s articles, neglected and hardly attainable to the public, contain more fully developed theory of evolution of religions than the Fatal Conceit. Hume’s methodological presupposition that morals are not the conclusions of our reason served Hayek as the basis for the theory that morals are conclusions of selected religions. A religion can improve its evolutionary status by the so-called immanent criticism, i.e. analysis of the consistence of the parts of its teaching with the capitalist order. Hayek’s examples of immanent criticism are presented. Hayek’s prediction is displayed that either (1) religious liberty in the USA will help religions develop institutions of family and several property in coming 200 years in a way that overcomes threats of decay to our civilization by ruling out of maladapted religions and quasi-religions of socialism and social justice and by adapting of the others or (2) constructivist morals deprives believers of their belief and our civilization will fall.

Keywords: F. A. Hayek, religious evolution, cultural evolution, Fatal Conceit.

JEL codes: B31, B 40, B52, Z12.

1. Introduction

The main subject of Hayek’s The Fatal Conceit is the evolutionary theory of morals, that he saw as hitherto neglected: “I suggest that we need not only an evolutionary epistemology but also an evolutionary account of moral traditions, and one of a character rather different than hitherto available. Of course the traditional rules of human intercourse, after language, law, markets and money, were the fields in which evolutionary thinking originated. Ethics is the last fortress in which human pride must now bow in recognition of its origins” (Hayek 1988a: 24). To understand, that our morals are not a creation of our reason, “both economics and religion come into play, the first helping to explain how moral orders evolve and how they can assist us where

reason falters; the second, as an aid in upholding some systems of morality against the premature assaults of reason” (Hayek 1988b). What is the stance, after almost 30 years, of distinctly Hayekian research programme in spontaneous theory of morals as compared to the origins of law, language, markets and money?

Whereas in the former areas a substantial progress has been achieved since Hayek, in morals, only modest ones (Gaus 2007, Gaus 2013). From the two halves in the theory of spontaneous order of morals: economics and religion, the economics part, that explains why several or private property prevailed, is much more developed than religions (Benson 1989, Benson 1995, Pipes 1999, Mulligan 2004). Even in economics part, progress has been hindered by utilitarian interpretations of Hayek despite late Hayek’s frequent denouncement of utilitarianism. Nothing comparable to economics part of the evolution of morals exists in the religious part of the theory of spontaneous order of morals. There is beginning to grow a distinctly Hayekian tradition of spontaneous evolution of morals, but it remains unrelated to the hayekian evolution of religions (Andersson 2010, Gaus 2007, Gaus 2013, Horwitz 2005, Horwitz 2008, Wilson 2002). Why does the evolution of religions remain so neglected? This article argues that it is mainly so not because the theory was proven wrong, but because its most mature form has not been considered at all. We have the hope, that by presenting the theory in more coherent form it reawakens new interest in the distinctly Hayekian evolutionary theory of morals. Section two presents the historical setting of the newly found Hayek’s articles. Section three compares 1980s articles with the *Fatal Conceit*. Section four concludes.

2. Historical Problem and Its Relevance

Hayek’s theory of evolution of religions remains unknown in its most mature form. Here one must first take a stance to the problem of the authorship of Hayek’s last book, the *Fatal Conceit* published in 1988 by Hayek and edited by W. W. Bartley III. There exists a literature on authorship, with conclusions ranging from J. Friedman (1997), who claimed basically, that it is not a Hayek’s book through Buchanan (1988), who believed Hayek (or Bartley) made substantial progress from the first draft discussed in 1982 to a conclusion of Vanberg and Gick and Runst’s, based on the comparison of the 1982 article “Overstated Reason” to the *Fatal Conceit*, that it is basically Hayek’s book, although precise formulations do not sound like Hayek (Vanberg 2011, Gick and Runst 2013). From our study it follows a conclusion only on part of religious evolution, that the *Fatal Conceit* basically is Hayek’s book, and that editorship was made almost perfectly, with some disclaimers. In the book, the most of duplicities were deleted and the most of the original argument contained, on most points in the form of autoplagiarism of Hayek. There is hardly any news to 1980s articles in the *Fatal Conceit*. On the other hand, some of the 1980s material was neglected in the *Fatal Conceit*. We don’t make any conclusions about why is that, since we hitherto couldn’t consult Hoover Institution Hayek Archives. While we consider religious evolution in *Fatal Conceit* as Hayek’s idea, theory presented in the *Fatal Conceit* is incomplete.

Hayek developed this theory mostly in articles produced in the span of years 1978–1985, in the same time as he worked on the book *Fatal Conceit*, where the evolution of religions played important role (Vanberg 2013). In 1978 Hayek did not yet have this evolutionary theory of religions, because he believed that “after all, we had a great classical civilization in which religion in that sense was really very unimportant. In

Greece, at the height of its period, they had some traditional beliefs, but they didn't take them very seriously. I don't think their morals were determined by religion" (Hayek and Craver 1983: 240). In 1982 he participated at the conference "Evolution and the view of man", organized by the catholic cardinal König in Kleßheim. He spoke of the evolution of religions in his "Overstated Reason" paper in the conference proceedings and then participated in the discussion recorded in the conference proceedings (Riedl and Kreuzer 1983). He worked on the theory till in 1985 he went so ill, that he couldn't continue with systematic work (Shearmur 2014). The completion of the Fatal Conceit was handed over to the editor Bartley.

Hayek's papers and interviews from 1978–1985 contain the theory in a scattered form and must be reconstructed only retrospectively. What is puzzling with these articles is that they are highly repetitive. Yet, Hayek frequently told audiences in this period that he was "making an experiment on them", "was trying some new ideas" with them, and he was really doing it. The core of the argument of cultural evolution was the same, and thus repetitive, but always a new aspect of the problem was introduced. One can see this only when reading at least couple of these articles at once, perhaps concentrating on this aspect of the problem. No one has as yet accomplished this, and partly because the opinion is widespread that these articles do not contain anything substantial, that is not covered in Hayek's late books. (Caldwell, personal communication)

Part of the problem rests in that these articles have as yet not been published like the *Studies* (1967), *Freiburger Studien* (1969) and *New Studies* (1978), as a by-product of his main endeavour. Hayek's articles after the 1974 Nobel Prize were published by institutes and all over the world, because Hayek was travelling the globe to lecture. Some of these institutes and magazines do not exist now and only a small portion of this material has been put on the Internet. It is only recently, that surviving institutes and Magazines started to dig these articles and videos from archives and present them on the web. Still, most of these materials remain hardly attainable to the public. This is the first paper where considerable portion of these texts are examined as a whole. Hennecke's Complete bibliography of Hayek, (Hennecke 2000) that is however incomplete, covers 120 texts in the span 1977–1996 and we managed to collect more than 70% of them and much more than 80% of the text. We also examined some more articles that we found beyond Hennecke's Complete Bibliography. One more note is needed on historical sources of autobiographical material, (Hayek 1983, Hayek 1994) which we also use, and that received much criticism because Hayek's memory often failed him in dating of his theoretical advances. This problem doesn't touch our paper, since we concentrate on theories Hayek was working on in the time of the autobiographical interviews, about which he was so willing to speak, that interviewers often had problems directing the discussion to Hayek's younger periods (Buchanan 1992).

All of the existing secondary literature reflects only parts of the theory. It is therefore not surprising, that it was put aside and actually, misinterpreted. That is, however, not our concern here.

3. Comparison of the 1980s articles with The Fatal Conceit

When an economist is to say anything of morality, he should be aware of the value freedom presupposition. Hayek was aware of that in 1978, he wanted to discipline economists to become free from value judgments: “It is indeed necessary in this connection to be very careful, and even pedantic, with regard to the expressions one chooses, because there exists a real danger of inadvertently slipping value judgments on an illegitimate manner into a scientific discussion, and also because those defending their socialist ideals are now mostly trained to use ‘freedom from value judgments’ as a sort of paradoxical defence mechanism for their creed, and are constantly on the lookout to catch their critics out in some incautious formulations” (Hayek 1978: 297). From Hume’s known is-ought problem and Max Weber’s forbid of value judgments Hayek drew one important question: If it is right, as Hume maintained, that the rules of morality are not the conclusions of human reason, thence where do they originate from? In 1983 and 1984 Hayek wrote a couple of articles, where he made clear, that Hume didn’t give an answer to this question and that it was Adam Smith, who did it. Hayek sees the Smith’s answer as the “selective evolution” of religions that sanctioned market morality better (Hayek 1983c, Hayek 1984b, Hayek 1984c, Hayek 1987). Here we come to our theme. Evolution of morals is a scientific problem that avoids the trap of value judgments, one that was hitherto not solved satisfactorily and one, where we cannot go on without religions. How much of that story is preserved in the Fatal Conceit?

The problem of value judgment or is-ought problem is not even mentioned. Hume’s sentence is cited more times, most importantly, (Hayek 1988a: 9) but the Smith’s answer to it is not preserved in the Fatal Conceit. Smith is cited as a motto for chapter 9 on religion, (Hayek 1988a: 135) but it is not clear from it, that one should read it as an answer to Hume’s question on whence come morals. The answer The Fatal Conceit gives to Hume’s question, concentrates only on economics, not on economics and religion, as was supposed in 1985: “The answer to this question, sketched in the first three chapters, is built upon the old insight, well known to economics, that our values and institutions are determined not simply by preceding causes but as part of a process of unconscious self-organisation of a structure or pattern” (Hayek 1988: 9). The course of the argument of the spontaneous evolution of morals as being the result both of economics and religion would be enriched with the use of the additional 1980’s materials.

The second argument, that The Fatal Conceit is missing is that the spontaneous evolution of morals is the result of both economics and religion: “Our morals, like many other aspects of our culture, developed concurrently with our reason, not as its product. To understand this, both economics and religion come into play, the first helping to explain how moral orders evolve and how they can assist us where reason falters; the second, as an aid in upholding some systems of morality against the premature assaults of reason” (Hayek 1988b). The role of religion in the Fatal Conceit is reduced to “a few remarks about the role of religion in the development of our moral traditions” (Hayek 1988a: 9, compare p. 135). Why is that, is not clear from the published material hitherto available to us.

The Fatal Conceit concentrates on other aspects of religion than 1980s articles, some critical some not, all of that having the source in 1980s articles. Striking is that one doesn’t get the idea from The Fatal Conceit, how could one push further the individual religion in defending the ‘right’ values. The concept of immanent criticism, that is described as a tool to accomplish that, is introduced, and illustrated in economics of

property rights, but nobody knows from the Fatal Conceit, how can one use it in religion. That is naturally a presupposition if we want to influence positively the spontaneous development of morals in future.

Hayek dealt with the concept of immanent criticism of our traditions before the Fatal Conceit (Hayek 1984b). He did apply it not only on the problem of the evolution of the value of several property (Kreuzer and Hayek and Dahrendorf 1983), but also on some of our religious traditions. What he wrote of the “theology of liberation”, a distinct marxian teaching within catholic theology in the Fatal Conceit, (Hayek 1988a: 51) he did also earlier, in 1985, (Hayek 1988b) and, more revealing, he said of protestant teaching, that there is one maladaptive aspect in it: the teaching, that if one tries hard, he will be remunerated on this earth. Hayek stressed that it is also a question of luck and that if protestants really believe, they have to be remunerated for their earthly endeavour, it may enhance other than market morality (Hayek 1985c).

There has been amassed a good amount of historical evidence in earlier articles on “the undoubted historical connection between religion and the values that have shaped and furthered our civilisation”, (Hayek 1988a: 137) that is however in the Fatal Conceit only postulated, not even illustrated. We will mention just the most important. Contra the conservative interpretations, Hayek held, that Judaism and Christianity were established in the only part of the world, where the institution of several property was sanctioned by the older polytheist religions more than 2000 thousand years ago (Hayek 1983c). Generally, Hayek had in mind a story of the rise and fall of nations as based on changed morals, that was no more adapted to the respective civilization (Hayek 1980: 46–47). Hayek thought that Gibbon was partly right, that ancient Rome fell due to changed morals, that of Christians, which was incapable of maintaining Roman civilization (Hayek 1983b). From some other of Hayek’s articles it flows, that Justinian’s civil code settled from the 6th century the basics of the rule of law, that was developing very slowly, but steadily until the end of Middle Ages (Hayek 1978). Many heretic religions appeared, Manicheans, bogomils etc., that disapproved of family and several property, that however didn’t last longer than roughly 100 years (Hayek 1988b). This passage is entirely plagiarized in Fatal Conceit (Hayek 1988a: 51). In the early modern age, those protestant religions maintained themselves, that sanctioned the values of family and several property (Hayek 1985a).

Quasi-religions of socialism or social justice are the last ones of false religions that will probably not survive their hundredth year. For the future, Hayek outlined two possible courses of evolution: if constructivist rationalism with its constructivist morals succeeds in lowering substantially levels of religiosity, there exists a danger of the fall of our civilization (Hayek 1985b). The second, more optimistic possibility is, that the future religious evolution of our civilization will be driven mainly by the new religious ideas flowing from the USA in the next 100 or 200 years (Hayek 1985c). Hayek held the opinion, that we will need new religious ideas to cultivate our sense of justice so, that it won’t be that incompatible with the morals of the extended order of human cooperation, (Hayek 1985c) perhaps even to remedy some drawbacks of present religions, namely their anthropomorphism (Hayek 1984a, Hayek 1988a: 56–57) and help them come nearer to understanding the extent of the transcendence of order and of God for believers (Hayek 1984a, Hayek 1988a: 72).

Here it is noticeable, that Hayek encouraged the further evolution of a religion of Unitarianism, for which he prepared the conference lecture “Presumption of Reason”. (Hayek 1988b) He spoke of religious evolution and its prevalence over scientific

delusion with the pope John Paul II in 1980, (Ebenstein 2001) participated on the conference on evolution and the vision of man, organized by cardinal König, (Riedl and Kreuzer 1983) and maintained a correspondence with that cardinal.

From this course of evolution of religions only heretics, quasi-religion of socialism and the possible decay of our civilization if most people cease to believe in supernatural beliefs are mentioned in the *Fatal Conceit*. It is clear, that Hayek was thinking of including the course of religious evolution in the chapters 2 and 3 of the *Fatal Conceit*, where he spoke of the evolution of the institution of several property and its interrelationship to the emergence of markets and civilization (Hayek 1983a). Why he dropped the religious evolution from these chapters cannot be decided from the published material.

Until now, we didn't find any distinctly new idea in this theory in the *Fatal Conceit*.

4. Conclusion

There exist some traditions of the evolution of morals nowadays. Hayek's one may grow into a respected one, but has not yet grown into it. In this paper we concentrated on religious evolution that was Hayek actively developing in the period 1978–1985. The theory of evolution of religions and their role in emergence of morals is not known in its most mature version, reached in 1985. It is dispersed in 1980s articles, published by institutes all over the world, some of which do not exist now. It is only recently, that surviving institutes start putting these Hayek's articles on the web, but still, majority of these papers remain hardly attainable for the public. Substantial omissions from the 1980s texts exist in the *Fatal Conceit* concerning evolution of religions. The *Fatal Conceit* is the book by Hayek that Bartley finally edited and published in 1988. The differences are accounted for in this paper.

First is the methodological presupposition of economist's study of morals, that is, the value freedom assumption. Hayek used the Hume's version, that the rules of morality are never the conclusions of reason, that you can never derive morals from reason. For Hayek, a question followed from this Hume's stance: where does moral rules come from? In Hayek's view, Adam Smith gave the correct answer. It was that religions sanctioned moral rules before reason, and that the depth of the division of labour depended on the number of members of the society. Hayek sees here a prevision of his own argument of the cultural evolution based on the group selection principle. Religion played a significant part in this for Hayek. Indeed, there are two halves of Hayek's evolutionary theory of morals: economics and religion. The role of religion part is lessened in the *Fatal Conceit*, reduced to "few remarks". From the *Fatal Conceit*, it is unclear, that the concept of immanent criticism is applicable here as well, and that it is needed for making adjustments for the future cultural evolution. We provide examples of such immanent criticism, such as incompatibility of the claim of Protestantism that promises the earthly rewards for a hard work. Hayek says contra it, that in market also luck plays a role, so that not every hard work has to be rewarded. Hayek would like to see Protestantism get rid of that teaching. The same applies to the relationship of catholic theology to the 'theology of liberation'.

Moreover, historical course of evolution of religions was omitted from the *Fatal Conceit*. We provided some orientation points in this evolution like the religious reasons behind the rise and fall of the ancient Greece and Rome, and then the rise of European

civilization. However, in this history, the predictions of the future religious evolution are most interesting. Either constructivist rationalism in morals deprives believers of their belief and our civilization will fall or a new religious energy springs from the USA, where the religious freedom is the highest and the number of new religious ideas is the richest. They will provide us with the adaptations our moral order needs if it is further to extend.

We don't speculate on why these omissions were made in the Fatal Conceit. Rational arguments on this may be developed only with the help of the Hoover Institution Hayek Archives. A good part of the arguments from 1980s articles were maintained in the Fatal Conceit, so we can assert the belief, that the Fatal Conceit is really Hayek's book.

Secondary literature cited either one-two of the earlier texts, or, after the publication of the Fatal Conceit, only this book. However, the theory is dispersed in many of the earlier articles, so that most, if not all, commentators missed the true extent of the theory. Interpretations of secondary literature made hardly any room for the development of Hayekian evolutionary theory of morals in its part on religion. We bring remedy to these misinterpretations. Our study furthermore provides a critique of the utilitarian interpretations of Hayek. Only after such interpretations are denied will it be possible, for the distinctly Hayekian theory of the spontaneous order of morals, to grow faster.

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Globalisation trends of the new economy and the competitiveness of small and medium-sized enterprises

Růžena Krninská¹, Markéta Adamová²

¹*Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: krninska@ef.jcu.cz*

²*Department of Management, Faculty of Economics, University of South Bohemia in České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: marketadamova@gmail.com*

Abstract

Globalisation trends of the contemporary world indicate beginning a “new economy” or knowledge economy. Its desirable state can be defined in a progressive manner with using cultural dimensions of G. Hofstede. In a globalized world the maintaining of competitiveness can be based on innovative approaches associated with desirable cultural dimensions: small power, collectivism, acceptance of globalization changes and long-term orientation.

The aim of the paper is application the new method (based on the cultural dimensions of G. Hofstede) for the finding out state of the transformation towards knowledge-based economy in enterprises.

The current state of cultural dimensions in small and medium-sized enterprises in South Bohemian Region indicates the functionality of the “small power distance” and “femininity”, which are desirable cultural dimensions in the knowledge economy. Desirable cultural dimensions of collectivism and long-term orientation are then supported only the values and perceptions of managers. Last desired dimension “adoption changes” is blocked the shift to a knowledge-based economy in enterprises.

Keywords: cultural dimensions, knowledge economy, small and medium-sized enterprises

1. Introduction

Every modern organization must be able to face changes – especially social, economic and technological changes. However the new is a permanence, dynamics, increasing frequency, complexity and the globalization of changes in an increasingly tougher conditions, expanding and growing competition. The modern market economy is – whether we like it or not – the economy of turbulence. There is nothing unchanging, permanent, the status quo belongs to the past (Barták, 2007).

Gibson (2007) states that the world is entering a “new economy” – “the knowledge economy” – associated with the use of human and intellectual capital, which emphasizes the ability to put knowledge into a new context, together with understanding and skills as the driving forces of changes, innovation and competitiveness. According to Kislingerová (2011) in recent years there have been many adjectives, which are assigned to the term of economics. They probably emphasize changes, which have occurred. The term “new” economy is only one possible connection. In addition to the adjective “new” even more is used the phrase “knowledge economy”. The knowledge economy has the ambition to indicate the status of social cooperation, where the formation of product depends on capital and labor, in addition to capital, labor and natural resources (technical progress) on other factors like education, which is often confused with innovation abilities in this context. The basic competitive advantage of economics (within the meaning of the national economy) is becoming “an innovation potential”. That is the ability of the economic system continuously comes with such modifications of social cooperation that bring the product more marketable, than the product of other countries (enterprises, communities, regions).

Corporate culture and its management in today’s society is becoming a global trend, which helps maintain the competitiveness not only in the local market, but in the global environment. Desirable corporate culture is a crucial factor in the successful development of the enterprise according to Krninská (2002). Corporate culture will be a primary element of modern management for the future knowledge society, contributing to control and motivating employees to the process of self-knowledge, self-development and self-realization. By this developmental stage the individuals spontaneously enter into the process of lifelong learning (both professional and personal), developing their creative skills necessary for the knowledge society.

Kotter in Gibson (2007) states that we know that it is possible to have a culture that does not hinder the forward progress, but it helps to adapt. Thus, if we count with several other decades of rapid changes, we will have to learn how the organizational culture does something that will not be a brake. But what will be support instead of the brake to adapt companies.

According to Hofstede and Hofstede (2005) we perceive values as a general trend to differ some facts from other states, and thus it is possible to define the heart of the culture. Values are associated with feelings that have a specific direction, a positive or negative aspect, and indicate what surrounds a human in the categories of “good or bad, true or false, beautiful or ugly, rational or irrational,...”; they provide the possibility of orientation in the world by the fact that the social reality is structured in terms of importance and corresponding hierarchy. Cultural dimensions according to Hofstede (1999), Hofstede and Hofstede (2005), based on similar contradictions, will be described in detail in this study.

For an easier understanding of the different indexes and cultural dimensions that are included in these indexes, the authors present a simple overview, taking the bold

dimensions, which are, according to the authors, desirable for corporate culture in the knowledge economy.

Table 1: Overview of the indexes of contrasting cultural dimensions with relevant values

Name of index	Value of dimension	
	Lower than 50	Higher than 50
Power distance (PDI)	Small distance	Big distance
Individualism vs. Collectivism (IDV)	Collectivism	Individualism
Masculinity vs. Femininity (MAS)	Femininity	Masculinity
Uncertainty avoidance (UAI)	Acceptance of risk	Uncertainty avoidance
Long-term vs. Short-term orientation (LOT)	Short-term orientation	Long-term orientation

Resource: Krninská and Duspivová (2013, p. 143)

1.1. Power distance (PDI)

With large power distances (the value of the index is close to 100), superiors and subordinates consider one another as existentially unequal. It is felt that the hierarchy of power is based on this existential inequality. Enterprises centralize power as much as possible and in the smallest number of hands (Hofstede and Hofstede, 2006).

In a situation of small power distance (index value = 0), the subordinates and superiors are viewed as existentially equal. The hierarchical system just means inequality of created roles, because it is necessary. These roles may change, so the person who was a subordinate yesterday may be the boss tomorrow (Hofstede and Hofstede, 2005).

The small power distance is desirable cultural dimension on the way towards the knowledge economy. It can express cohesion between subordinates and superiors and enables the development of the human capital in the direction of the process of self-realization. It generally allows contributing ideas to the development of the company and working with an innovative potential of the company to all employees. It also supports the transfer of information (Krninská, 2014).

1.2. Individualism versus Collectivism (IDV)

The employees in individualistic society (the index value for strong individualism = 100) are assumed that they are acting in accordance with their own interest, and that the work should be organized so that their interest and the interest of the employer match.

In collectivist culture (value of index IDV = 0) the employer never accepts only the individual, but a person belonging to a certain group of “we”. The employee shall act in accordance with the interests of this group, and they may not always agree with his (her) individual interests: self-denial is normally expected in this society (Hofstede and Hofstede, 2006).

Collectivism is the desirable cultural dimension of corporate culture in the knowledge economy, which is opening the way to cooperation and teamwork. Since the individual is encouraged to give their unique individual abilities for the benefit of the society (Krninská and Duspivová, 2014). The teamwork opens new ways to working together

not only with explicit but especially with tacit knowledge, and therefore with the development of human potential in a new way (Krninská, 2014).

1.3. Masculinity versus Femininity (MAS)

Enterprises in masculine societies (the value of index MAS = 100) emphasize results and try to reward fairly, i.e., to each employee according to his or her results. Organizations in feminine societies prefer to reward people on the basis of equality, i.e., to each person according to his or her needs (Hofstede and Hofstede, 2006). In a masculine society men are socialized in the direction of assertiveness, ambition and competition. When they grow up, it is expected that they will seek to advance a career. Women in a masculine society are divided into those who want a career, and the majority who do not want this (Hofstede and Hofstede, 2005).

In a feminine society (value of index MAS = 0) gender roles overlap and from both men and women are expected moderation, solidarity, concern and care for the quality of environment and of life generally (Nový, 1996).

Feminity is the desirable cultural dimension of the organizational culture in knowledge economy, opening the care of mutual interpersonal relationships, guaranteeing an openness and trust as a precondition for self-knowledge and self-development processes. It is therefore an essential precondition for the development of the human capital. An atmosphere of openness and trust are the strongest factors that ensure continuity and transfer of knowledge. And thus they have influence on the performance of the organization (Krninská, 2014).

1.4. Uncertainty avoidance (UAI)

In an environment in which people avoid uncertainty (value of index UAI = 100) there are a number of formal laws and informal conventions that determine the rights and obligations of employers and employees (Hofstede and Hofstede, 2006).

Having small uncertainty avoidance (value of index UAI = 0), the enterprises are more likely to cope with the opposite of that, the horror of the formal rules. The rules are implemented only in cases of absolute necessity. Small fear of the uncertain, acceptance of changes and risk is a desirable state of the knowledge economy, as it allows for easier dealing with the discontinuous changes of global society (Nový, 1996).

The small uncertainty avoidance, change management and risk are a desirable state of the cultural dimension of the knowledge economy, allowing easier dealing with discontinuous changes in a global society (Krninská, 2014).

1.5. Long-term versus Short-term orientation (LOT)

In the short-term orientation (LTO = 0), if exaggerated, the personal peace and stability can discourage from initiative, risk-taking and willingness to change, which rapidly changing market conditions require upon the businessman (Hofstede and Hofstede, 2006).

In an environment with a long-term orientation the family and the work are not separated. The values of the LTO pole (LTO = 100) support business activity. Endurance and reliability in monitoring any targets are significant advantages (Hofstede and Hofstede, 2006).

Considering short-term orientation (LTO = 0), extreme personal peace and stability can discourage from initiative, exploration risk and willingness to change, which requires from the entrepreneur to rapidly change market conditions (Hofstede and Hofstede, 2005).

Long-term orientation is the desirable cultural dimension of corporate culture for the knowledge economy, fulfilling the principles of sustainability (replacement of immediate profit by optimal profit) and related with objectives and long-term perspective of business, which is based primarily on invest in the human capital development and its potential (Krninská, 2014).

2. Methodology

The aim of this paper is the application of the new method (based on cultural dimensions of G. Hofstede) for finding out the state of transformation of enterprises into the knowledge economy.

The paper is based on data acquired through questionnaires within the Grant Agency of University of South Bohemia in České Budějovice GAJU 039/2013/S “Human resources management in small and medium-sized enterprises”, which is focused on human resources management and its detailed aspects, including corporate culture. And also from data, which was gained from cooperation with students and their thesis, which include questionnaire VSM 94 (Hofstede, 1994).

A structured questionnaire „Human resources management in small and medium-sized enterprises” (hereinafter referred to as the questionnaire) was filled in both employees and managers of small and medium-sized enterprises. The questionnaire included identification of the business, such as company name, identification number, sales area of products and services, participation in a chain store, foreign connections, outsourcing, etc. It included questions on human resources management, for example whether a company creates a strategy in the field of management of human resources, whether it has a spokesman, how many employees it has (including the number of managers or the number of women employed in the business). Enterprises also had to evaluate the process of human resource management compared to other processes (e.g. marketing, sales, production, quality control, etc.). In the questionnaire there were also questions about financial and non-financial benefits, internal and external communication, strengths and weaknesses and problematic areas of human resource management and, last but not least, the questionnaire included questions on the corporate culture. In these matters, it was checked how important for managers are building the corporate culture, comments of ordinary employees concerning management and business operations, employee relationships based on trust and openness, and employee satisfaction.

The structured VSM 94 questionnaire (hereinafter referred to as VSM 94) was filled both in executives and employees of the same small and medium-sized enterprises. VSM 94 was evaluated according to the methodology for data processing of VSM 94 (Hofstede, 1994). According to this methodology, individual indices of the dimensions take values from 0 to 100, but it is not an exception that it takes lower or higher values. Individual indices imply two contradictory cultural dimensions; the first one is achieved when the results range from 0 to 50 and the second dimension is achieved when the results range from 50 to 100, see Table 1. According to the authors the middle values (about 50) are in a grey zone, also called the transition zone, where it is not clear which

dimension the company adheres to. For this reason, the intervals of evaluation are distributed as follows: $(-\infty, 40)$ for the first cultural dimension, $(41, 60)$ for the so-called grey or transition zone and $(61, \infty)$ for the second, opposite cultural dimension. The above mentioned questionnaires were completed by 105 small and medium-sized enterprises of the South Bohemian Region.

Next, the managers had to choose one of the two words that would express their conception of corporate culture. These terms have been selected according to the opposing cultural dimensions of G. Hofstede (Hofstede, 1994) and will be specified in the following sections of this paper

The entire sample of businesses was composed of 32% of micro-enterprises (enterprises with 1–9 employees), 40% of small businesses (businesses with 10–49 employees) and 28% of medium-sized enterprises (enterprises with 50–249 employees). (These categories of enterprise sizes defined by the number of employees were determined by Commission Regulation No. 800/2008). 14% of businesses have been operating in the market for one year to five years, 16% of enterprises were established six to ten years ago, 46% of the businesses have been operating in the market for eleven to twenty years, and 24% have operated there for more than twenty-one years. The surveyed SMEs had a wide variety of business forms, mostly limited liability companies (64%), tradesmen (16%) and joint stock companies (13%). The remaining 7% were cooperatives, limited partnerships and public companies.

3. Results and discussion

As mentioned above, two questionnaires were filled in 105 small and medium sized enterprises (SMEs).

Table 2: Percentage distribution of SMEs in assigning importance

Verdict	Answers				
	The most important	Very important	Slightly important	A little important	Not important
Building a corporate culture is for our company...	14%	41%	34%	9%	2%
Comments of ordinary employees to management and running of the company are...	10%	51%	29%	8%	2%
Relationships between employees based on trust and openness are ...	30%	59%	9%	1%	1%
We consider employee satisfaction...	30%	59%	9%	1%	1%

As can be seen from Table 2, for the majority of enterprises the questions concerning corporate culture are significant. Building a corporate culture is the most important and very important for 55% of corporations, while a little important and unimportant for 11% of corporations. 61 % of companies consider the comments of ordinary employees

relating to management and company operation to be the most important and very important, suggesting a small power distance. 89% of executives of surveyed small and medium-sized enterprises find relationships between employees based on trust and openness important, which suggests a tendency to the desired cultural dimension of femininity, while it is considered a little important or not important only by 2% of them. The same number of companies considers employee satisfaction to be important as in the previous issue.

The surveyed SMEs were supposed to tick one of the two options, which would characterize their opinion about what the corporate culture in their company should be like. These options were carefully chosen, while one of the options expressed a desirable cultural dimension and the other one the opposite. For the power distance were chosen “coherence” for the small power distance and “respect” for the large power distance. Next, it was a “sense of teamwork” for collectivism and “responsibility of individuals” for individualism. The other desirable dimension includes femininity, for which the term “understanding” was chosen and its opposite was “success”. For the desired dimension of weak certainty avoidance the term “acceptance of changes” was chosen and for the strong certainty avoidance the term “need for certainty” was chosen. For the important long-term orientation the word “investment” and the word “immediate profit” was chosen for the short-term orientation.

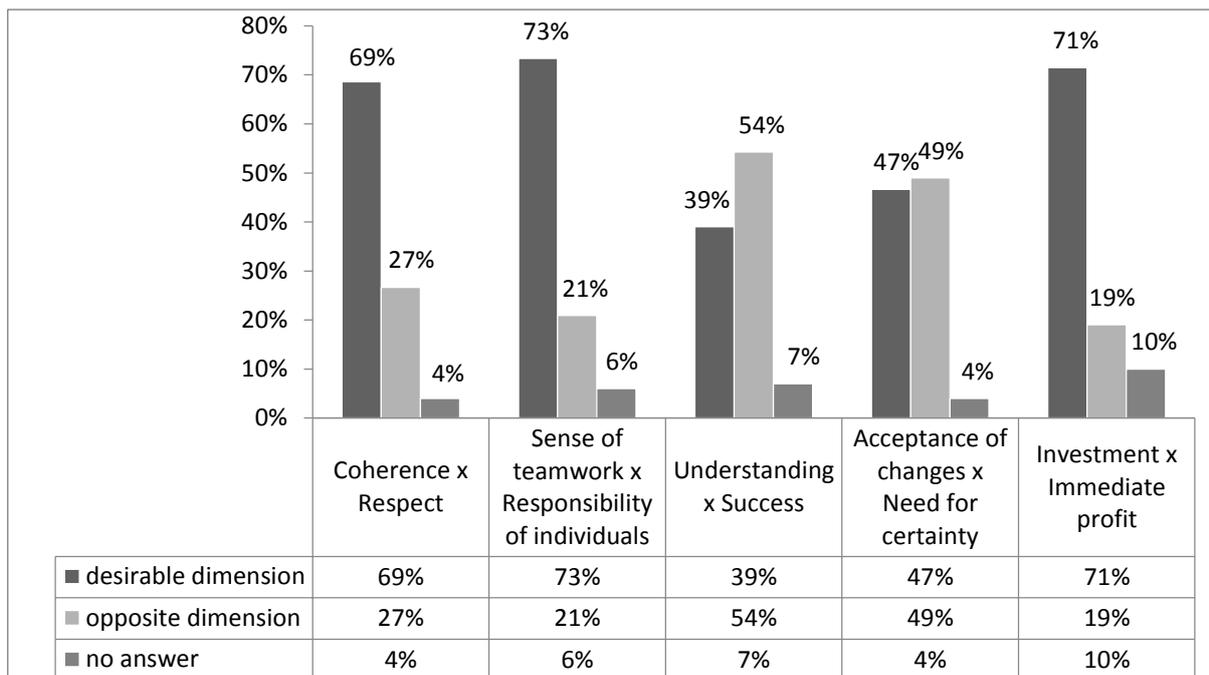


Figure 1: Percentage distribution of SMEs within the selected terms

As can be seen from Figure 1, 4–10% of surveyed SMEs weren't able to choose from the list of possible answers. Having to decide to which extreme to incline to, these businesses were not able to choose in one case of the five (out of five pairs of opposite terms they didn't tick one answer of the two presented in a pair, but they ticked the other four), therefore it is possible that the company representatives weren't able to choose one of two characteristics of the corporate culture, as both the meanings were significant for them. For this reason such businesses could be classified in the transition (grey) zone, in between the cultural dimensions.

The results also show that the majority of surveyed SMEs prefer the coherence to respect, the teamwork to responsibility of individuals, the investments to immediate profit. These preferred terms may be considered as the desirable cultural dimensions of shifting to the knowledge economy. As regards the other two cases, most businesses prefer the terms included in the opposite cultural dimensions, specifically they prefer success to the understanding and certainty to the acceptance of changes. Here the differences are not as striking as in the previous cases.

The selection of these statements does not exactly reflect the cultural dimensions appearing in firms since there exist many aspects of cultural dimensions and within this research it was possible to choose only one, so these results are considered only as a kind of probe into the attitudes and preferred values of business representatives and a future direction of possible extension of this research.

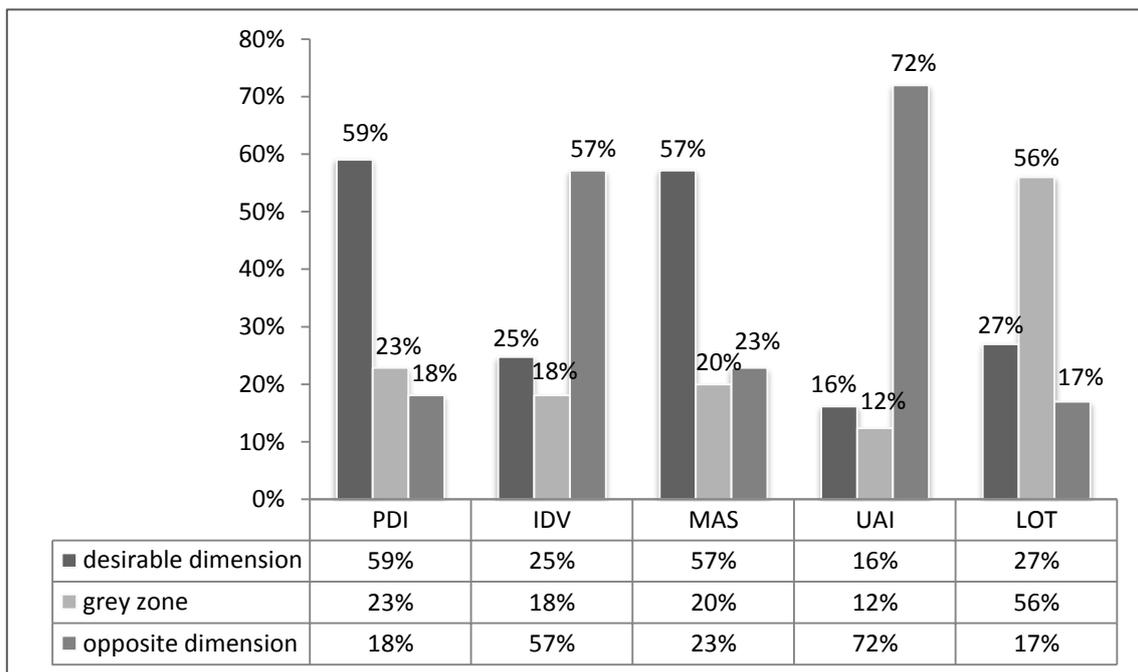


Figure 2: Percentage distribution of SMEs in particular cultural dimensions and their interval

Figure 2 shows the results obtained using the VSM 94, which show the current condition of small and medium-sized enterprises. Here it is noticeable that in this research sample clearly prevails the cultural dimension of small power distance (59%), femininity (57%) and long-term orientation (27%). Within the power distance and preference of long-term orientation it comes to consensus between attitudes of leaders of the small and medium-sized enterprises and the real situation in the company. In contrast, companies more incline to individualism (57%), although the question of whether the company inclines to collaboration was responded positively by 85% of them. Absolutely clear is the inclination to the cultural dimension of uncertainty avoidance, to which 72% of surveyed small and medium-sized enterprises incline and which is related to problems with adapting to changes of the globalized society, avoiding the uncertainty and fear of risk-taking, but also blocking the path to the knowledge economy.

4. Conclusions

The competitiveness of enterprises plays an important role in the global contemporary community. Enterprises can be different from others primarily its innovative approaches, which emphasis is being placed in the knowledge society. State of the transformation is not easy to diagnose in the knowledge society. It can use the method of state cultural dimensions. These dimensions are embodied in the corporate culture and the managers can use them for the right direction management for the business transformation into the knowledge society. These desirable cultural dimensions are small power distance, femininity, collectivism, accepting changes and taking the risks, and long-term orientation. The surveyed small and medium-sized enterprises tend to the desired cultural dimensions only partially, this affiliation never being perfect.

The strongest inclination evidently belongs to the cultural dimension of small power distance, where the absolute majority (59%) of all economic activities tend to this desired dimension. Furthermore, all economic activities incline more to the desirable femininity (57%) than the opposite masculinity (23%). The other preferences include the long-term orientation. Unfortunately only a small percentage of all businesses of the surveyed economic activities tend to it (27%), most of them are situated in the transition (grey) zone (56%) and do not clearly prefer neither the short term (17%) nor the long-term orientation. However, a possibility appears, looming in the minds and values of responsible executives, how to step on the path of investing rather than prioritizing the profit and thus switch to the knowledge economy.

The cultural dimension of collectivism is acknowledged by exactly one quarter of the surveyed companies, and more than a double incline to the individualism (57%). One could say that, although in ascertaining the real state of corporate culture the majority of enterprises tend to individualism. However managers are already aware of the positive effects of teamwork and 73% of executives in the imagination prefers teamwork over the duty of the individual. Assuming that the old cultural Czech traditions are associated with the collective spirit should occur relatively quickly directing this dimension to the knowledge economy (Krninská, 2002).

The longest path of enterprises to the knowledge economy is determined by the cultural dimension of accepting changes and risk perception. Only a small number of surveyed enterprises (16%) are willing to accept the changes with all the risks that these changes bring along. The need for certainty is nowadays absolutely prevalent. It may be due to recent and to some extent ongoing crisis in the economy. But it is more than obvious that in today's global, turbulent society full of rapid changes, companies must orientate themselves in these changes. And if these changes are easy to take, they will gain a major advantage over the others on the market.

It can be concluded that in most cases the companies incline to two desirable cultural dimensions (small power distance and femininity). The executives tend to prefer them in their perceptions and values. The two desirable cultural dimensions are primarily supported by values and perceptions of managers, while the current condition is not yet corresponding to these values (long-term orientation and collectivism). As regards the last desirable cultural dimension, a stronger preference has been found (acceptance of changes and risk perception) neither in the current state of the corporate culture in the companies nor in the perception of values and ideas of responsible executives in the surveyed small and medium-sized enterprises. The state of cultural dimensions determines the transfer of enterprises into the new (knowledge) economy and reflects of the state of competitiveness of SMEs.

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Banking and Shadow Banking Sector and Credit Lending Standards in the Euro Area

Zuzana Kučerová¹

¹Department of Economic Policy, Faculty of Economics, VŠB-Technical University of Ostrava, Sokolská tř. 33, 721 01 Ostrava, Czech Republic, e-mail: zuzana.kucerova@vsb.cz

Abstract

Shadow banking sector gained a great influence in the world financial markets over the past decade. Shadow banking can be regarded as one of the causes of potential financial instability because these activities are realised outside the regulated banking sector. Therefore, it is necessary to monitor and measure the interconnectedness of banking and shadow banking activities. The aim of the paper is to measure the national distribution of banking and shadow banking activities in the Euro Area countries and assess the relationship between these activities and credit lending standards imposed by banking institutions. When measuring the shadow banking activity at national level, the shadow banking activities are most extensive in Austria, Belgium, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. We conclude that banking institutions of the analysed countries originated less loans in reaction to tighter lending standards imposed by these banking institutions on their loans. However, the expected positive impact of tighter lending standards on loans provided by shadow banking institutions is confirmed only in some countries.

Keywords: banking sector, shadow banking sector, lending standards, long-term loans, securitization.

1. Introduction

Generally, the financial sector comprises many types of institution, among others shadow banking institutions. Shadow banking sector gained great attention particularly after the financial crisis. It can be considered as a part of the market-based financial system where firms prefer financing through capital markets (by the issuance of shares or bonds) than via the banking system (by the acceptance of a bank credit). In the bank-based financial systems the situation is opposite; banks intermediate credit between savers and borrowers. Shadow banking institutions take part in the securitisation process and use sophisticated securitisation techniques in order to intermediate credit. As a result, they produce structured financial products, e.g. asset-backed commercial

papers (ABCP), asset-backed securities (ABS), mortgage-backed securities (MBS), collateralised debt obligations (CDO), etc.

Shadow banking can be regarded as an important source of potential financial instability because these activities are realised outside the regulated banking sector and as such they are an important source of potential financial instability. Moreover, integrated financial markets increase the probability of a severe financial contagion. Therefore, it is necessary to monitor and measure these activities and the interconnectedness between banking (regulated) and shadow banking (unregulated) sector. The Financial Stability Board (FSB) recommends national authorities to enhance their monitoring framework in order to unveil potential risks hidden in the shadow banking sector by means of the application of a stylised monitoring process (see FSB, 2013).

The aim of the paper is to measure the national distribution of banking and shadow banking activities in the Euro Area countries and assess the relationship between these activities and credit lending standards imposed by banking institutions. The data concerning the banking and shadow banking activities are drawn from the European Central Bank (ECB) online database. The analysis based on data from the ECB Bank Lending Survey is conducted only for nine Euro Area countries: Austria, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Spain, and Portugal. We use the method of statistical description and comparison and the method of correlation analysis.

The structure of the paper is as follows. The second section mentions various definitions of the shadow banking. Section three describes data, countries and methods used in our paper. In the fourth section, we present our results. Section five discusses our results and brings conclusion.

2. Definition of the Shadow Banking

Various definitions of the shadow banking are available in the literature. According to Bakk-Simon *et al.* (2012, p. 8), shadow banking “...refers to activities related to credit intermediation, liquidity and maturity transformation that take place outside the regulated banking system”. This definition comprises these financial institutions: finance companies, money market funds, some hedge funds, special purpose vehicles and other vehicles involved in various activities related to securitisation.

Deloitte (2012) presents another definition of the shadow banking activities. This definition encompasses the following characteristics: “*Credit intermediation, raising short-term funds from financial markets to deploy elsewhere, including maturity and/or liquidity transformation. Shadow banking relies on financial markets, not bank deposits, as the source of funds. Funds raised are not guaranteed, in that there is no explicit government insurance for their safe return to investors in the event of an organizational entity failure. No access to a central bank in the event of a liquidity/funding problem.*”

However, Claessens *et al.* (2012) restrict the definition of shadow banking to “...those activities that are economically most bank-like: involve risk transformation and a focus on reducing counterparty risks”. They focus on two shadow banking activities: securitisation and collateral intermediation.

The FSB (2013, p. 5) broadly describes the shadow banking system “...as the system of credit intermediation that involves entities and activities fully or partially outside the regular banking system, or non-bank credit intermediation in short”. Moreover, FSB (2013) distinguishes between an entity-based approach and an activity-based approach

to measuring the shadow banking sector. The entity-based approach focuses on measuring the activities of non-bank entities. However, this approach may omit some banking activities which are undertaken by banks that may also produce systemic risk. The activity-based approach measures the bank-like intermediation activities realised originally through markets.

In our paper, we stick to the definition of FSB (2013), i.e. we focus on such activities which are realised fully or partially outside the regulated banking system.

3. Data, Countries and Methods

3.1. Data and Countries

It is not easy to measure the size of shadow banking in the Euro Area. Unlike the United States, the European flow-of-funds data do not provide sufficient data to describe and analyse the shadow banking in the Euro Area. One possible way how to quantify these activities is to combine data from two ECB online databases – monetary statistics and euro area accounts (EEA) – and construct a proxy which enables us to roughly measure shadow banking activities (Bakk-Simon et al., 2012).

The EEA data are divided into the following sectors: financial corporations, non-financial corporations, general government, and households (including non-profit institutions). Financial corporations comprise monetary financial institutions (MFIs), other financial intermediaries (OFIs) and insurance corporations and pension funds (ICPFs). MFIs cover the regulated banking system and include central banks, credit institutions and money markets funds. The OFIs are regarded as a part of the sector of the shadow banking activities in our paper and therefore, we focus particularly on this sector as a representative of the shadow banking sector.

In the second step, we use data from the ECB Bank Lending Survey (BLS) which are available since 2003:Q1. The dataset used in our paper works with the answers from this survey for selected Euro Area countries; banks in these countries provided quarterly information on credit standards for approving loans and credit terms and conditions (i.e. information from the supply side).

The analysis is performed particularly for nine Euro Area (EA9) countries mostly involved in the shadow banking activities in the Euro Area (Austria, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain). In case of Belgium, data concerning credit lending standards are not available.

3.2. Methods and Indicators

Several categories of financial indicators can be used as a proxy for measuring the size of the shadow banking sector.¹ In our paper, we measure the activities of the banking and shadow banking sector by using the level of long-term loans provided by the relevant sector.

As far as the BLS is concerned, ECB uses two measures based on the responses to questions concerning lending standards (see ECB, 2015b): (1) net percentage difference between the share of banks reporting lending standards and (2) the diffusion index, i.e. the weighted difference between the share of banks reporting that lending standards

¹ See e.g. Bakk-Simon et al. (2012) or Kučerová (2014).

have been tightened and the share of banks reporting that they have been eased (banks who have answered “considerably” are given score 1 and banks that answered “somewhat” are given score 0.5). We use the second measure, i.e. the diffusion index.

In order to achieve the aim of this paper, we use the method of statistical description and comparison and the method of correlation analysis in our paper.

4. Results

4.1. Shadow Banking Sector in the Euro Area

As already mentioned above, we use only one measure of the shadow banking sector activity, i.e. we focus on the level of long-term loans provided by banking and shadow banking institutions in the Euro Area countries. Figure 1 illustrates the percentage share of long-term loans of both MFIs and OFIs in individual Euro Area countries in total long-term loans of MFIs or OFIs in the whole Euro Area in 2013. As far as MFIs are concerned, the highest share of intermediation through the MFIs in 2013 was measured in Germany (28%), France (21%) but also in Spain (14%), Italy (13%) and in the Netherlands (9%). The highest share of non-bank intermediation (i.e. through OFIs) was in Luxembourg (35%), in the Netherlands (21%) and in Ireland (14%). In Italy and France, OFIs also had a relatively noticeable position (7%, respectively 6%). OFIs in the rest of the Euro Area produced some 5% of total long-term loans.

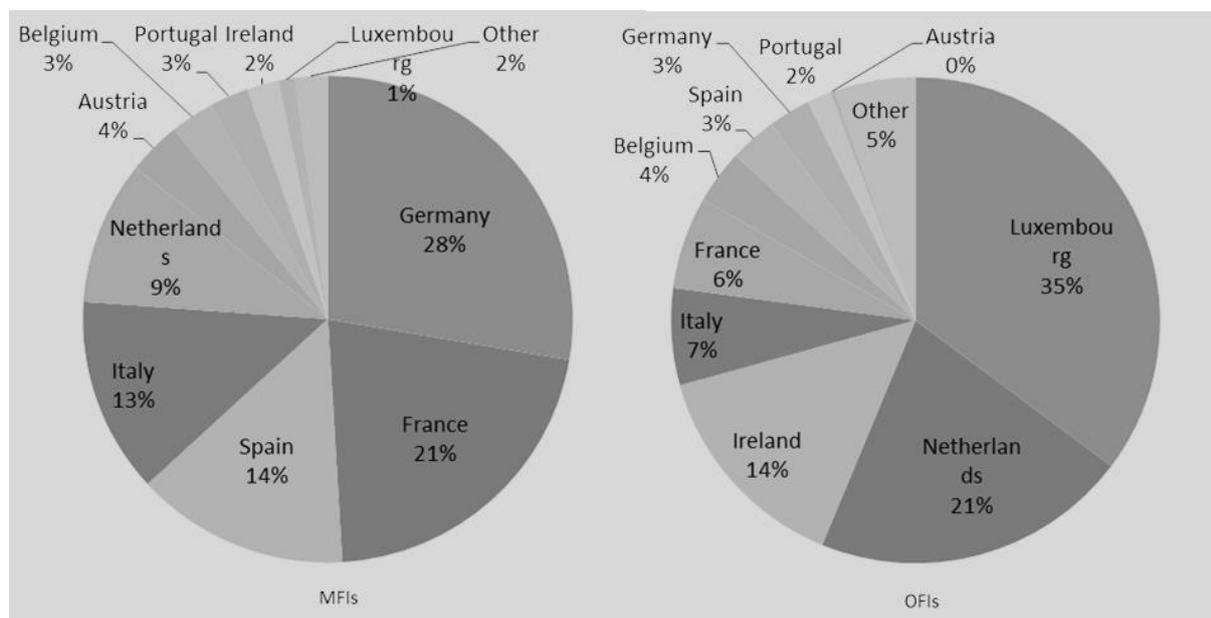


Figure 1: Share of long-term loans of MFIs/OFIs in individual countries in total long-term loans of MFIs/OFIs in the Euro Area, 2013, in % (Source: ECB (2015a))

We conclude that the highest activity of both MFIs (banking institutions) and OFIs (shadow banking institutions) is apparent in these nine Euro Area countries: Austria, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. Therefore, we focus only on these countries (except for Belgium where the data about lending standards are not available) in the following analysis.

4.2. Long-term Loans and Lending Standards

In order to assess the relationship between the activities of the banking and shadow banking sector and credit lending standards it is necessary to describe the data used in the analysis first. Data concerning differences of the outstanding amounts of total long-term loans (i.e. new loans) provided by both MFIs and OFIs in the EA9 countries from 2003:Q1 to 2013:Q4 are presented in Figure 2. It can be stated that MFIs originated more long-term loans than OFIs till 2011:Q3, except for 2007:Q1, 2009:Q1, 2009:Q3 and 2009:Q4. However, OFIs originated more long-term loans than MFIs from 2011:Q4 till the end of the analysed period.

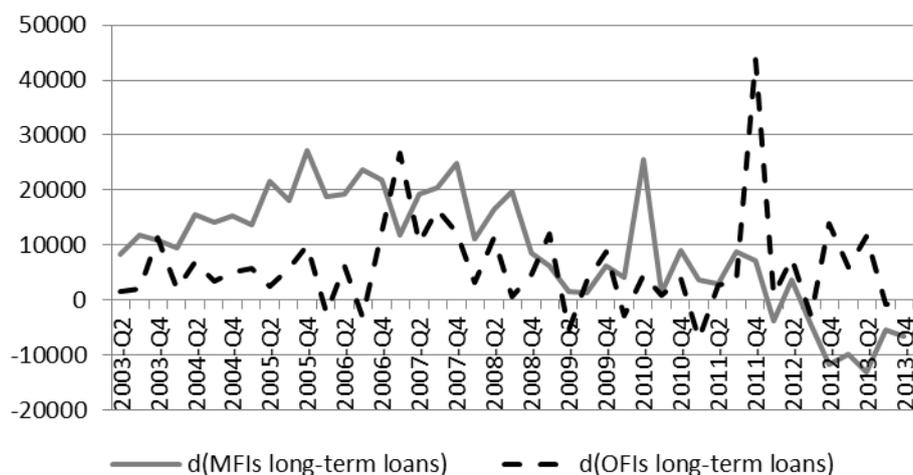


Figure 2: New long-term loans provided by MFIs/OFIs in the EA9 countries, 2003–2013, (Millions of Euro) (Source: ECB (2015a))

Then, we focus on the credit lending standards for approving loans and credit terms and conditions (i.e. the supply of credit) of the Euro Area banks. Lending standards are measured using the diffusion index (see Section 3.2.). Positive values of the diffusion index indicate that a larger proportion of banks have tightened lending standards and *vice versa*. Figure 3 depicts the lending standards in the EA9 countries from 2003:Q1 to 2013:Q4 both for the long-term loans for house purchases (i.e. loans to households) and for long-term loans to enterprises. It is apparent that banks in the Euro Area tightened their lending standards particularly from 2007:Q4 to 2008:Q4, i.e. during the financial crises. Since then, banks eased their lending policy till 2010:Q4 (or till 2011:Q2 in case of loans to enterprises), then tightened it again till 2012:Q1. Since 2012:Q2, the conditions were eased till the end of the analysed period.

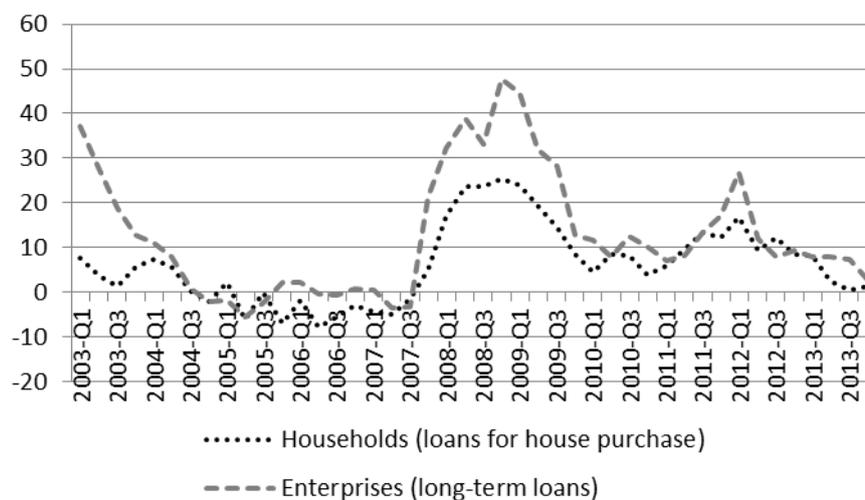


Figure 3: Lending standards applied to loans to households and enterprises in the EA9 countries, diffusion index, 2003–2013 (Source: ECB (2015b))

4.3. Empirical Analysis

In this section, we present our results concerning the relationship between the credit lending standards and the long-term loans provided by both MFIs and OFIs to households and enterprises using the method of correlation analysis.

In case of loans originated by MFIs, a negative relationship between lending standards and new long-term loans is expected, i.e. higher lending standards imposed by MFIs on their loans would lead to a decrease in the level of new loans originated by these institutions in the following period and *vice versa*. However, it is also expected that some clients (either households or enterprises) would move from the banking sector (represented by MFIs) to the shadow banking sector (represented by OFIs) in the following period in order to ask for a new loan and that OFIs would satisfy this demand, i.e. they would increase the supply of new loans. Therefore, this effect would emerge as an increase in the level of loans originated by OFIs, i.e. a positive relationship between lending standards (imposed by MFIs on their loans) and new long-term loans (originated by OFIs) is expected. Because of the fact that clients (households and enterprises) need some time to move from the banking sector to the shadow banking sector and that OFIs need some time to follow the increased demand, we correlate the values of new long-term loans of the current quarter with the values of lending standards of the previous quarter.

Figure 4 plots lending standards and new long-term loans provided by both MFIs and OFIs in the EA9 countries from 2003 to 2013 to households (Panel A and Panel B) and to enterprises (Panel C and Panel D). The plots on the left side include data for MFIs and on the right side for OFIs. In case of MFIs, the expected negative relationship is confirmed in the EA9 countries, i.e. banks in the analysed countries originated less loans in reaction to tighter lending standards (the only exception is Portugal and partially Spain, see Table 1). However, the expected positive relationship in case of OFIs is not confirmed at the level of the EU9. In other words, OFIs did not increase the supply of loans in reaction to tighter lending standards in the banking sector (represented by MFIs). Nevertheless, there are differences in individual countries; the expected positive relationship is measured in Austria, France, Germany, Ireland, and Italy in case of both households and

enterprises, then in Luxembourg in case of households and in Italy and Spain in case of enterprises (see Table 1).

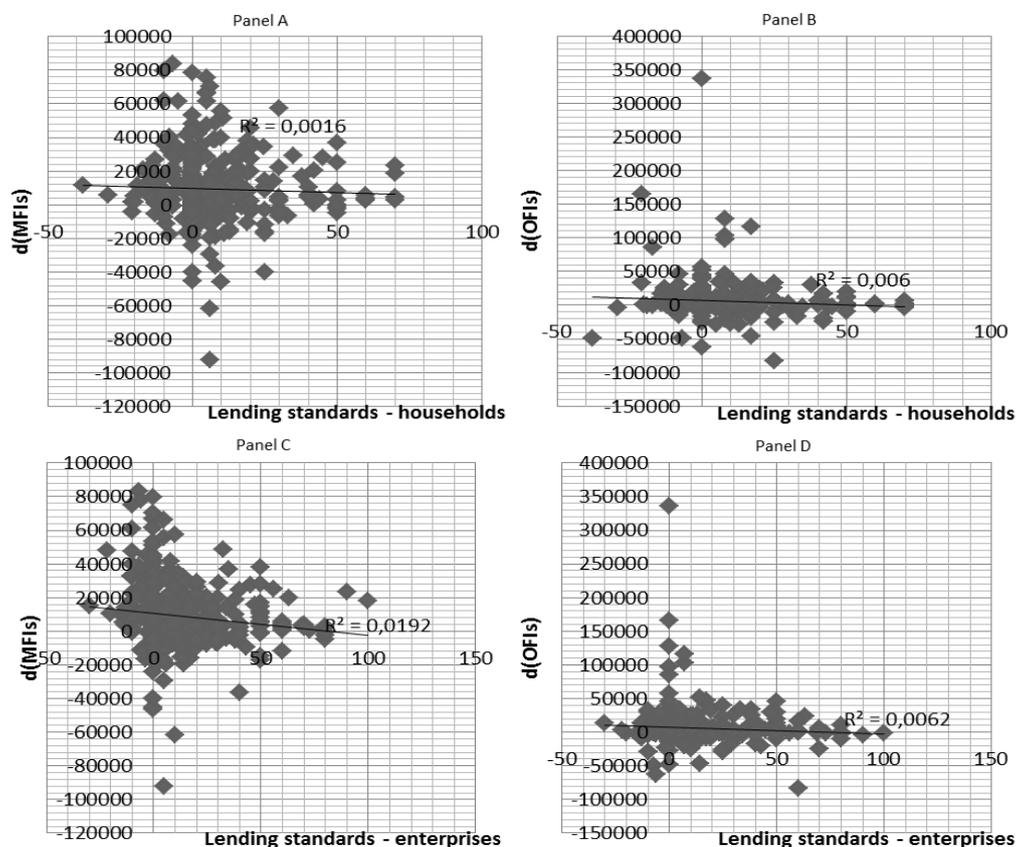


Figure 4: Lending standards and new long-term loans provided by MFIs/OFIs in the EA9 countries, 2003–2013 (Source: author's calculations based on ECB (2015a), ECB (2015b))

A summary of the results for the individual EU9 countries is presented in Table 1.

Table 1: Relation between lending standards and long-term loans provided by MFIs/OFIs in the individual EA9 countries, 2003–2013

	MFIs		OFIs	
	Households	Enterprises	Households	Enterprises
Austria	–	–	+	+
France	–	–	+	+
Germany	–	–	+	+
Ireland	–	–	+	+
Italy	–	–	–	+
Luxembourg	–	–	+	–
Netherlands	–	–	–	–
Portugal	+	+	–	–
Spain	+	–	–	+

Note: Shaded areas denote situations with an estimated relationship opposite to the expected relationship. Source: author's calculations based on ECB (2015a), ECB (2015b)

5. Discussion and Conclusions

The paper was focused on the problem of interconnectedness of the banking sector and the shadow banking sector with a view to credit standards and the supply of loans. The aim of the paper was to measure the national distribution of banking and shadow banking activities in the Euro Area countries and assess the relationship between these activities and credit lending standards imposed by banking institutions.

When measuring the shadow banking activity using the indicator of long-term loans in the Euro Area, the shadow banking activities were most extensive in Austria, Belgium, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. However, data concerning credit lending standards were not available for Belgium so the country has been excluded from the sample of countries. We conclude that banking institutions (i.e. MFIs) in the analysed countries originated less loans in reaction to tighter lending standards imposed by these banking institutions on their loans; this finding is consistent with findings of Demiroglu *et al.* (2012). However, the expected positive impact of tighter lending standards (concerning bank loans) on loans provided by shadow banking institutions (i.e. OFIs) was confirmed only in some countries.

In our future research, we are going to focus on the demand for loans too (see e.g. Bassett *et al.*, 2014). We also plan to incorporate the monetary policy stance into our analysis (see e.g. Maddaloni and Peydró, 2011) and extend this approach to other regions (e.g. the United States and some Asian countries).

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Testing market efficiency of the emerging capital markets in countries of the Central and Eastern Europe

Oleksandra Lemeshko¹

¹Department of Finance, Faculty of Economics and Administration, Masaryk University, Lipová 41a, 602 00 Brno-Pisárky, Czech Republic, e-mail: lemeshko@mail.muni.cz

Abstract

Incorporation of all relevant information by stock prices in combination with investors' rational expectations and utility maximization is the one of the fundamentals that the modern portfolio theory is based upon. This brings long-term equilibrium and ensures that no one can persistently beat the market. However, as it is mentioned, this is the state of things in the long-term horizon, which, as numerous evidence suggest, may not hold for short-term horizon. Additionally, violation of any one of the fundamentals, such as presence of investors' herding behavior or information asymmetry makes the movement of stock prices to deviate from random walk pattern, thus providing a room for short-term outperformance. Up to date no absolutely efficient markets are known for world academic and investment community. The best know long-term approximation is represented by mature capital markets. As for emerging markets, so there is a long-term debate about their efficiency. Generally, emerging markets due to underdeveloped local economies, loose securities regulation, poor investors' rights protection, political instability and high exposure to external shocks are considered as inefficient. In this context the role of capital markets of the Central and Eastern Europe is quite ambiguous: on one hand having among themselves high-income economies with stable political systems and being closely located to developed economies they are considered as remote types of mature capital markets with corresponding high-level efficiency, while, on the other hand, having among themselves middle-income economies, some of which are even not members of the European Union, thus being characterized as less developed economies with low level of political stability and low quality governance, they are characterized as emerging capital markets with corresponding low-level efficiency. In the light of stated above the paper aims to test market efficiency of the emerging capital markets in 11 high- and middle-income economies from the Central and Easter Europe (here and after CEE) for the time span from 2000 to 2015. Following established practice a set of standardized efficiency test will be employed and data from Bloomberg terminal will be used.

Keywords: market efficiency, random walk, EMH, CEE

1. Introduction

Since publication by Louis Bachelier in 1900 his work *Théorie de la speculation*, in fact an effort to adopt Brownian motion to movement of stock options, and its reconsideration in light of randomness of stock market prices by David George Kendall and Eugene Fama half a century after, efficient market hypothesis is being the one of the most frequently discussed and controversial issues in the classic and modern portfolio theory. According to it, stock prices follow a random walk, that is, no one can beat the market, at least, in the long run. However, as it is mentioned, this is the state of things in the long-term horizon, which, as numerous evidence suggest, may not hold in the short run (Chan, 2003). Up to date no absolutely efficient market is known for world academic and investment community. The best know long-term approximation is represented by mature capital markets (Urquhart and Hudson, 2013). As for emerging markets, so there is a long-term debate about their efficiency. Generally, emerging markets due to underdeveloped local economies, loose securities regulation, poor investors' rights protection, political instability and high exposure to external shocks are considered as inefficient (Hull and McGroarty, 2014). In this context the role of capital markets of the Central and Eastern Europe is quite ambiguous: on one hand having among themselves high-income economies with stable political systems and being closely located to developed economies they are considered as remote types of mature capital markets with corresponding high-level efficiency, while, on the other hand, having among themselves middle-income economies, some of which are even not members of the European Union, thus being characterized as less developed economies with low level of political stability and low quality governance, they are characterized as emerging capital markets with corresponding low-level efficiency.

In the light of stated above the paper aims to test market efficiency of the emerging capital markets in 11 high- and middle-income CEE economies for the time span from 01/01/2000 to 02/02/2015. Following established practice for testing capital markets efficiency a set of standardized test was used, such as tests for normality of distribution of returns, tests for presence of a unit root and stationarity/non-stationarity of time-series tests. Although the chosen research does not cover as large number of individual series as previous studies, it provides a useful insight into CEE capital markets efficiency, documenting important country and regional characteristics.

This paper proceeds as follows: Section 2 briefly describes development and current state of chosen CEE capital markets; Section 3 reports data and methodology used; Section 4 presents obtained results and discussion; and Section 4 concludes.

2. Capital markets of the Central and Eastern Europe

In the modern economic literature the collective term “capital markets of the Central and Eastern Europe” stands for a group of rapidly developing capital markets of the former socialist economies, whom it took less than 15 years to transfer from planned to market economic model. Due to numerous structural changes and reforms undertaken by local governments, companies and societies today capital markets of CEE by the level of their liquidity and turnover are approaching quickly the state of their developed counterparts from the Western Europe. Such rapid development and growth could not stay unnoticed by world financial community and it found its reflection in FTSE global equity index series country classification – currently three out of eleven emerging

capital markets of CEE are classified as advanced and the speed at which they scale up their grade is impressive – on average, it takes them less than 4 years to jump to higher category. As for individual subgroups of CEE capital markets, so the largest and the most fast growing subgroup is secondary emerging market, represented by Russian capital market – 53% of cap to GDP ratio with 37% liquidity and 82% turnover ratios, growing on the average annual rates of 33%, 78% and 30% respectively (see Table 1 and Table 2). The second largest subgroup is represented by advanced emerging capital markets – 25% of cap to GDP ratio with 15% liquidity and 67% turnover ratios growing on the average annual rates of 12%, 17% and 9% respectively. Within this subgroup the largest market cap belongs to capital market from Poland – it is nearly by 1,2 times larger than its counterparts from the Czech Republic and Hungary – however, the highest liquidity and trading activity is present at the capital market of Hungary – nearly by 1.6 times higher than those ones in the Czech Republic and Poland. The ultimate subgroup of CEE capital markets is represented by frontier emerging markets with average cap to GDP ratio of 11%, 2% liquidity and 23% turnover ratios, which are growing on the average annual rates of 16%, 22% and 1% respectively. Although capital market from this last group have nearly by 2 times smaller market cap and trading activity and by nearly 4 times lower liquidity than their advanced and secondary emerging CEE counterparts, these markets have growth rates which are higher than those of the advanced emerging CEE capital markets, but lower than those of Russia. This indicates at their high prospects to upgrade their subcategory in the most foreseeable future. If we take a closer look inside this last subgroup we can notice the leading position of capital markets from Estonia and Slovenia both in terms of cap to GDP and liquidity ratios *per se* and in terms of their annual growth rates. Contrary, the lagging positions are occupied

Table 1: Growth dynamics of CEE capital markets

	2000– 2003	2004– 2007	2008– 2011	2012– 2013	Aver.	Aver. growth rate, %
Panel A. Advanced emerging CEE capital markets						
Cap/GDP, %	18.39	30.48	25.18	26.75	25.20	12
Liquidity, %	9.35	17.37	16.43	15.83	14.74	17
Turnover, %	45.22	66.01	62.40	67.49	60.28	9
N of listed companies per 10k	663	499	646	1012	705	8
N of IPO	2	15	8	1	8	304
Panel B. Secondary emerging CEE capital markets						
Cap/GDP, %	27.16	70.32	55.65	56.79	52.48	33
Liquidity, %	8.29	30.49	47.74	60.56	36.77	78
Turnover, %	40.31	52.40	94.02	141.81	82.13	30
N of listed companies per 10k	154	201	222	264	210	10
N of IPO	1	20	8	6	9	466
Panel C. Frontier emerging CEE capital markets						
Cap/GDP, %	11.28	21.68	14.08	12.59	14.91	16
Liquidity, %	2.08	3.29	1.59	0.85	1.95	22
Turnover, %	23.41	15.52	6.87	7.99	13.45	1
N of listed companies per 10k	6278	4593	3138	3259	4317	6
N of IPO	2	4	2	4	3	31

Source: Author's own computations on the basis of data from WDI database.

Table 2: Development of the CEE capital markets

	Cap/GDP, %		Liquidity, %		Turnover, %		N of listed companies per 10k		N of IPO	
	M	SD	M	SD	M	SD	M	SD	M	SD
Panel A. Advanced emerging CEE capital markets										
CR	23.68	5.69	13.08	6.95	54.49	22.26	428	350	1	1
Hungary	23.29	5.68	19.09	6.63	80.01	22.47	490	73	1	2
Poland	27.97	9.91	11.60	5.95	43.25	14.71	1066	651	27	19
Panel B. Secondary emerging CEE capital markets										
Russia	51.86	22.38	33.37	20.84	73.61	39.84	203	44	10	10
Panel C. Frontier emerging CEE capital markets										
Bulgaria	15.39	10.28	2.31	2.61	14.93	11.06	5101	691	3	1
Estonia	23.32	11.05	4.87	3.29	19.25	10.51	1212	181	8	4
Lithuania	16.85	7.14	1.78	1.26	9.86	5.03	1297	142	5	3
Latvia	7.97	2.84	0.75	0.72	10.51	13.08	1947	461	3	1
Romania	13.88	6.59	1.61	1.03	14.04	5.92	9364	909	3	1
Slovakia	5.79	1.17	0.93	1.08	19.29	26.97	4044	755	0	0
Slovenia	23.48	10.11	2.52	1.14	11.71	7.16	4027	658	1	1

Source: Author's own computations on the basis of data from WDI database.

by capital markets from Latvia and Slovakia. If we consider the most and the least favorable periods of CEE capital markets development and growth, so local capital markets prosper the most during 2004–2007, that is, the year of their accession into EU and three subsequent years, and they experienced the most drastic dry out during 2012–2013, that is, recession years.

3. Data and Methodology

The paper aims to test market efficiency of the emerging capital markets using time-series data on weekly equity indices returns from 11 high- (Poland, Czech Republic, Slovak Republic, Hungary and Estonia) and middle-income CEE economies (Latvia, Lithuania, Romania, Bulgaria, Russia and Ukraine) for the time span from 01/01/2000 to 02/02/2015. For research purposes capital markets from the chosen sample of CEE high- and middle-income economies was reclassified in accordance with FTSE global equity index series country classification approach into three subsamples – advanced emerging CEE capital markets represented by the Czech Republic, Hungary and Poland, secondary emerging CEE capital market represented by Russia, and frontier emerging CEE capital markets represented by Bulgaria, Estonia, Lithuania, Latvia, Romania, Slovakia and Slovenia. For time-series there have been used weekly compound returns of the local equity indices (782 weekly observations) denominated in local currencies (see Table 3). Raw data on weekly compound returns was collected from Bloomberg terminal, data on size and development of local capital markets was collected from the World Bank Development Indicators (here and after WDI) database.

Following established practice for testing capital markets efficiency a set of standardized test was used, such as tests for normality of distribution of returns, tests for presence of a unit root and stationarity/non-stationarity of time-series tests. In particular normality tests comprised calculation and evaluation of mean, standard deviation, skewness and excess kurtosis of time-series of equity index returns. Further for better precision and robustness of the obtained results Jarque-Bera test (Jarque and

Bera, 1980) has been conducted with significance level at 1% and 5%. Test statistic for Jarque-Bera test is computed as:

$$\xi_{LM} = N \left[\frac{1}{6} \left(\frac{1}{N} \sum_{i=1}^N \hat{\varepsilon}_i^3 / \hat{\sigma}^3 \right)^2 + \frac{1}{24} \left(\frac{1}{N} \sum_{i=1}^N \hat{\varepsilon}_i^4 / \hat{\sigma}^4 - 3 \right)^2 \right] \quad (1)$$

which is the weighted average of the squared sample moments corresponding to skewness and excess kurtosis respectively. Null hypothesis is rejected when there are too low p-values suggesting about non-normal distribution of residuals.

A unit root tests represented by Augmented Augmented Dickey–Fuller test (Dickey and Fuller, 1979; here and after ADF) and Kwiatkowski–Phillips–Schmidt–Shin test (Kwiatkowski, Phillips, Schmidt and Shin, 1992; here and after KPSS) have been conducted in order to reveal presence or absence of a random walk in the movement of equity index returns, thus providing evidence in favour or against efficiency of local capital markets. A random walk is present when there is non-stationarity of the analyzed time-series, that is, when mean, variance and covariance of returns changes over time. ADF test sets $H_0: \theta = 1$ against $H_1: \theta < 1$, where θ corresponds to a unit root. ADF test is conducted with significance level at 1% and 5%. Test statistic is computed from:

$$(1 - \phi_1 L)(1 - \phi_2 L)(Y_t - \mu) = \varepsilon_t \quad (2)$$

The stationarity condition requires that ϕ_1 and ϕ_2 are both less than one in absolute value, but if $\phi_1 = 1$ and $|\phi_2| < 1$, we have a single unit root, $\theta_1 + \theta_2 = 1$ and $\theta_2 = -\phi_2$.

KPSS test sets null hypothesis of no unit root ($Y_t - \beta t$ is stationary), against $H_1: Y_t - \beta t \sim I(1)$ and test statistic is given by:

$$KPSS = T^{-2} \sum_{t=1}^T S_t^2 / \hat{\sigma}^2 \quad (3)$$

where $\hat{\sigma}^2$ is an estimator for the error variance. Critical values come from Monte Carlo simulation.

Another way how to detect non-stationarity is provided by variance ratio tests (here and after VR tests), based on the property that the variance of increments of a random walk, X_t , is linear in its data interval. The most popular versions of this test are Lo-Mackinlay test (Lo and Mackinlay, 1988) and Chow-Denning test (Chow and Denning, 1993). Lo-Mackinlay test assumes that if a series follows the random walk property, then the variance of q-difference equals to the variance of the first-order difference multiplied by q (the null hypothesis). VR is computed as follows:

$$VR(q) = \frac{\sigma^2(q)}{\sigma^2(1)} \quad (4)$$

where $\sigma^2(q)$ is $1/q$ times the variance of $(X_t - X_{t-q})$ and $\sigma^2(1)$ is the variance of $(X_t - X_{t-1})$. The null hypothesis is that $VR(q)$ is not statistically different from 1. The standard normal test statistic used to test the null hypothesis of random walk under assumption of homoscedasticity is $Z(q)$ and it is calculated as:

$$Z(q) = \frac{VR(q) - 1}{\sqrt{\theta(q)}} \sim N(0,1) \quad (5)$$

$$\text{where } \theta(q) = \frac{2(2q-1)(q-1)}{3q(nq)} \quad (6)$$

Test statistic under assumption of heteroskedasticity is $Z^*(q)$ and it is calculated as:

$$Z^*(q) = \frac{(VR(q)-1)}{\sqrt{\theta^*(q)}} \sim N(0,1) \quad (7)$$

$$\text{where } \theta^*(q) = \sum_{j=1}^{q-1} \left[\frac{2(q-j)}{q} \right]^2 \hat{\delta}(j) \quad \text{and} \quad \hat{\delta}(j) = \frac{\sum_{t=j+1}^{nq} (X_t - X_{t-1} - \hat{\mu})^2 (X_{t-j} - X_{t-j-1} - \hat{\mu})^2}{\left[\sum_{t=1}^{nq} (X_t - X_{t-1} - \hat{\mu})^2 \right]^2} \quad (8),(9)$$

Chow-Denning test is designed to control the test size for variance ratio, which is failed by Lo-Mackinlay test and may result in large Type I errors. To control the test size and reduce the Type I errors, Chow-Denning test extends Chow-Denning test's conventional variance ratio test methodology and form a simple multiple variance ratio test, under which $Z_1(q)$ and $Z_2(q)$ are computed as:

$$Z_1(q) = \underset{1 \leq i \leq L}{\text{Max}} |Z(q_i)| \quad \text{and} \quad Z_2(q) = \underset{1 \leq i \leq L}{\text{Max}} |Z^*(q_i)| \quad (10), (11)$$

where $Z(q_i)$ and $Z^*(q_i)$ are defined in equations (5) and (7).

In both tests – Lo-Mackinlay test and Chow-Denning test – the decision about whether to reject the null hypothesis is based on the maximum absolute value of individual variance ratio test statistics.

4. Results and Discussion

4.1. Basic normality tests

The basic analysis of CEE equity index returns for being normally distributed indicates at relatively high level of non-normality of their distribution – on average, sample mean and standard deviation depart from normal distribution by 4.9 and 0.153 base points respectively (see Table 3). The observed distribution is highly asymmetric – left-skewed and leptokurtic, that is, with major mass of the distribution concentrated on right from the mean. Strong evidence against normality is given by Jarque-Bera test – too low p-values suggest about non-normal distribution of residuals. In general, all such evidence testifies against efficient market hypothesis for local capital markets.

If we take a closer look inside subsamples, that is advanced, secondary and frontier emerging CEE capital markets we will notice that returns of equity indices from the most developed markets of Czech Republic, Hungary and Poland exhibit such distribution, which is the closest to normality in comparison with equity index returns from other two subsamples – average subsample mean is “only” by 4.5 base points higher than that one from the normal distribution and average subsample standard deviation is almost 1, which is a the one characteristic for normal distribution. As for the shape subsample

Table 3: Normality of distribution of the CEE local equity indices returns

Country	Representative index	Mean	St. dev.	Skewness	Kurtosis	Jarque-Bera test
CZ	PX Index	4.74	1.08	-2.71	10.32	3755.93
Hungary	BUX Index	4.47	0.98	-2.52	8.35	2458.62
Poland	WIG Index	4.40	1.00	-1.84	3.68	706.24
Russia	MICEX Index	6.01	1.30	-1.25	0.65	217.15
Bulgaria	SOFIX Index	5.66	1.17	-2.31	9.33	3076.89
Estonia	TALSE Index	5.11	1.49	-1.99	3.97	984.78
Lithuania	VILSE Index	5.26	0.99	-3.41	14.67	6800.12
Latvia	RIGSE Index	5.25	0.93	-1.85	4.53	1117.66
Romania	BET Index	6.28	1.44	-1.51	1.21	348.08
Slovakia	SKSM IN Equity	2.74	1.18	-1.62	1.75	6.81
Slovenia	SVSM Index	4.67	1.08	-2.46	9.27	3344.91

Notes: Jarque–Bera test uses log returns. Advanced emerging markets are shown in bold italics.

returns distribution, so it is heavily left-skewed and leptokurtic with zero p-value from Jarque-Bera test. This suggests about high possibility to earn positive returns at these capital markets. In general, on the basis of obtained results it is possible to conclude that the highest efficiency within the chosen subsample is observed at capital market of Poland and the lowest efficiency is observed on the capital market of the Czech Republic.

As for subsample of frontier emerging capital markets of CEE, so returns of local equity indices have mean and standard deviation which nearly by 5 times and 2 times exceed the ones for normal distribution. Distribution of local returns is left-skewed and leptokurtic, but less than that for returns from advanced subsample. The same evidence contain results of Jarque-Bera test – zero p-value testifies against normality. In general, on the basis of obtained results it is possible to conclude that the highest efficiency within the chosen subsample is observed at capital market of Estonia, Latvia and Slovakia, the lowest – at capital markets of Bulgaria and Lithuania. Mixed evidence is from capital markets of Romania and Slovenia.

It is difficult to derive reliable conclusions about capital market efficiency of secondary emerging markets of CEE because the whole subsample is represented by only one economy – Russian – which often suffers numerous outliers. In general, MICEX exhibits excess positive returns with mesokurtic left-sided distribution. Likewise in case of other two subsamples results of Jarque-Bera test suggest about non-normality of returns distribution.

4.2. Unit root tests

Following world accepted approach the basic analysis of CEE equity index returns is further extended by performing Augmented Augmented Dickey–Fuller (here and after ADF) and Kwiatkowski–Phillips–Schmidt–Shin (here and after KPSS) tests for non-stationarity, that is, the presence of random walk of returns. Both tests were run in two versions – with level of variable, that is, log returns of local equity indices, and with the first difference of the level variable. This was done in order to insure the better reliability of obtained results, nevertheless, they remain to be mixed. In general, the obtained results for ADF test with lever of variable suggest about stationarity of times series of equity index returns across the whole sample – the obtained test statistic is

lower than critical values for both time series with a constant and time series with a constant and a trend (see Table 4). As for obtained results for KPSS test with level of variable, so they suggest about non-stationarity of times series of equity index returns across the whole sample – the obtained test statistic is larger than critical values for both time series with a constant and time series with a constant and a trend. In order to avoid a unit root problem, occurred in the case of KPSS test, the input data of log returns was transformed by using first differences. Despite the applied transformation the obtained results from both test continue to provide mixed evidence: (1) test statistics of ADF test with first difference is, on general, higher than critical values suggesting about acceptance of null hypothesis; and (2) test statistics of KPSS test with first difference is, on general, lower than critical values suggesting about acceptance of null hypothesis. If we take a closer look at individual country evidence, we can notice that the earlier mentioned stationarity under KPSS with level of variable is not homogeneous across the whole sample – there are two cases, which are exceptions to the general results obtained under these two tests. They are Bulgaria and Latvia. However, it is need to be mentioned

Table 4: A unit root tests for stationarity of the CEE local equity indices returns

	With level of variable		With first difference of level of variable	
	Constant	Constant & Trend	Constant	Constant & Trend
Panel A. ADF test				
CZ	-1.293	-2.077	-8.975	-8.973
Hungary	-0.910	-1.331	-41.977	-41.950
Poland	-0.678	-1.853	-10.017	-10.019
Russia	-1.823	-2.113	-12.446	-12.469
Bulgaria	-3.718	-4.260	-5.727	-5.824
Estonia	-1.744	-2.446	-12.772	-12.764
Lithuania	-1.202	-1.400	-7.028	-7.010
Latvia	-4.262	-3.638	-10.045	-12.749
Romania	-2.329	-1.551	-10.243	-10.455
Slovakia	-1.546	-2.181	-4.427	-4.439
Slovenia	-3.475	-2.451	-11.233	-11.573
Panel A. KPSS test				
CZ	3.834	0.798	0.085	0.056
Hungary	4.565	1.167	0.160	0.152
Poland	5.248	1.175	0.120	0.123
Russia	5.407	1.271	0.119	0.022
Bulgaria	0.594	0.309	0.427	0.239
Estonia	4.164	1.091	0.072	0.021
Lithuania	4.597	1.361	0.205	0.115
Latvia	3.200	1.208	0.672	0.149
Romania	4.508	1.424	0.400	0.068
Slovakia	5.446	0.501	0.192	0.169
Slovenia	2.744	1.345	0.320	0.059

Notes: 1% and 5% critical values are -3.43 and -2.86 for ADF test with a constant, and -3.96 and -3.41 for ADF test with a constant and a trend. 1% and 5% critical values are 0.742 and 0.462 for KPSS test with a constant, and 0.217 and 0.148 for KPSS test with a constant and a trend. Advanced emerging markets are shown in bold italics.

that after applied transformation, that is, after using of the first differences the results obtained under both tests became totally homogeneous across the whole sample.

4.3. Variance ratio tests

In strive to find additional evidence in favor or against a random walk of equity index returns from CEE capital markets we conducted two basic variance ratio tests – Lo-Mackinlay test and Chow-Denning test, both of which have null hypothesis of presence of a unit root, that is, non-stationarity. Although the results obtained under these two variance ratio tests are more precise than those obtained under ADF and KPSS tests, nevertheless they still remain to be mixed and not final – more observations are required. So under Lo-Mackinlay test with homoskedastic standard errors, $Z(q)$, there is a unit root for a half of the chosen sample – the Czech Republic, Russia, Bulgaria, Latvia, Rumania and Slovenia – and there is no unit root for another half of the sample – Hungary, Poland, Estonia, Lithuania and Slovakia (see Table 4). Under more robust version of this tests, that is, Lo-Mackinlay test with heteroskedastic errors, $Z^*(q)$, there is a unit root for the whole sample except only Slovakia. Thus on the basis of robust evidence provided by Lo-Mackinlay test it is possible to conclude about prevalence of non-stationarity, that is, a random walk across equity index returns of CEE capital markets.

Under Chow-Denning test with homostedastic standard errors presence of a unit root is rejected for the whole sample except for Latvia and Romania, while under its version with heteroskedastic standard errors a unit root is present in half of the sample – the Czech Republic, Poland, Russia, Bulgaria, Latvia and Romania – and in the another half of the sample there is no unit root – Hungary, Estonia, Lithuania and Slovenia. For the case of Slovakia there is not enough of observations available. On the basis of robust evidence it is possible to conclude about a random walk followed by CEE equity index returns.

Table 5. Variance ratio tests for stationarity of the CEE local equity indices returns

	Lo-Mackinlay test		Chow-Denning test	
	$Z(q)$	$Z^*(q)$	$Z(q)$	$Z^*(q)$
CZ	0.549	0.207	21.329	4.042
Hungary	-6.563	-0.885	28.227	8.122
Poland	-5.456	-1.172	19.701	4.337
Russia	-1.933	-0.529	30.069	4.353
Bulgaria	-0.662	-0.118	23.631	4.136
Estonia	3.770	1.726	25.070	12.597
Lithuania	4.435	0.968	29.277	9.183
Latvia	0.002	0.000	4.325	1.330
Romania	-0.390	-0.159	2.488	1.035
Slovakia	23.967	5.690	N/A	N/A
Slovenia	-3.684	-0.654	33.449	9.426

Notes: 1%, 5% and 10% critical values are 2.58, 1.96 and 1.65 for Lo-Mackinlay test. 1%, 5% and 10% critical values are 5.397, 3.619 and 2.965 for Chow-Denning test. $q = 4$ for both tests.

5. Conclusion

Since efficient market hypothesis was introduced, testing of its robustness under various conditions including conditions of underdeveloped capital markets of emerging economies has been one of the most debated and controversial among academicians and practitioners issues from the classic and modern portfolio theory. In this context the role of capital markets of the Central and Eastern Europe is quite ambiguous: there are both advanced and frontier emerging capital markets and a question about their efficiency remains without a defined answer. The obtained results provide mixed evidence. On the one hand there is strong evidence of non-normality of distribution of local equity indices returns, which is an argument against market efficiency. On the hand variance ratio tests do not provide statistically significant evidence against non-stationarity of local equity indices returns. Application of classic unit root tests did not give any result – two tests, which are designed as reinforcing each another, provided opposite evidence, which preserved even after the applied transformation of input data. For more definitive conclusions further non-parametric tests and longer time-series are required.

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Consumption preferences and location effects: A hedonic analysis of the housing market in Cracow, Poland

Magdalena Ligus¹, Piotr Peternek²

¹Department of Corporate Finance and Value Based Management, Faculty of Management, Computer Science and Finance, Wrocław University of Economics, Komandorska 118/120, 53-345 Wrocław, Poland, e-mail: magdalena.ligus@ue.wroc.pl

²Department of Operation Research, Faculty of Management, Computer Science and Finance, Wrocław University of Economics, Komandorska 118/120, 53-345 Wrocław, Poland, e-mail: piotr.peternek@ue.wroc.pl

Abstract

This study aimed to investigate the dwelling-buyers' preferences; assess marginal values of improvements in structural, neighborhood and location characteristics and test the applicability of hedonic pricing method (HPM) in Poland. The econometric hedonic housing price model is developed and estimated for the Cracow urban area. Many forms of the hedonic price function can be used to describe the relationships between price and housing characteristics. To select the most appropriate model the goodness of fit test was performed. The Analysis and Monitoring of Real Estate Market Transactions (AMRON) database of Polish Banks Association containing data regarding mainly structural characteristics and transaction prices of real estate is used with observations between 2013 and 2014 years. The GIS technique is applied for implementation to the database neighborhood and location attributes. In the logarithmic model there are five significant variables: distance to the city center, distance to shopping center, total floor area, age of the building and garage or parking place. The findings are comparable with other studies and suggest that, as expected, the distance to the city center and to the shopping center is negatively correlated with housing price. Households are willing to pay more for apartments with garage or parking place, with larger floor area and situated in the building of younger age. Interestingly, however, whether surrounding area is potentially threatened by the flood or not is not a significant attribute. The findings could help to fine tune the developing housing market to match supply with demand in quality terms.

Keywords: hedonic pricing method, location effects, neighborhood effects

1. Introduction

Cracow is located in the southern region of Poland. It's Poland's second largest city and covers both banks of the Vistula river. The metropolitan area has 756,000 inhabitants, more than 1.4 million inhabitants if you include the surrounding communities. Although Cracow is officially divided into eighteen districts, each with a considerable degree of autonomy within the municipal government, this division is relatively recent and prior to March 1991, the city had been divided into just the four quarters of Podgórze, Nowa Huta, Krowodrza and Śródmieście (see figure 1). The city dates back to at least six hundred years after the birth of Christ and this long history has made it one of the leading hubs of Polish administrative, academic, cultural, touristic and economic life.

Therefore housing prices in Cracow are one of the highest in Poland. Higher prices are observed only in the capital city Warsaw. In 2014 year, according to Home Broker and Open Finance (2014), median housing prices were as high as 6955 zł/m² in Warsaw and 6002 zł/m² in Cracow, while only 3587 zł/m² in Lodz – the third largest city in Poland in terms of population. Housing prices also vary greatly across the city of Cracow. In less prestigious districts like Nowa Huta the housing prices are even lower than 5000 zł/m², while in ancient town center housing prices are as high as 10000 zł/m². What gives rise to such big property price differentials for the city? “Location, location and location” is well-known notion of property value. But the relationship between house price and location is more complicated than as said before. Housing is a multi-attribute commodity comprising diverse, heterogeneous characteristics. To understand the relationships between house price and its characteristics many attempts had been made (see literature review in Hui et al, 2007). Traditional location theory offered primary, diverse views.

This paper discusses the results of a study which aimed to (1) investigate home-buyers' preferences in relation to structural, location and neighborhood characteristics of a residential property; (2) assess actual marginal monetary values attributed to separate characteristics by a hedonic pricing analysis; and (3) test the applicability of the hedonic pricing method in Poland as developing country, since the limitation in applicability of the method is developed private housing market requirement.

The paper is to investigate the location-specific effects in a large, densely populated setting. It specifically examines the structural, location and neighborhood characteristics of a residential property on its market value using a hedonic model. Using GIS techniques, the paper analyzes a more precise determined set of attributes than is common for other studies. The study would also fill the knowledge gap for the relationships between house prices and structural, location and neighborhood characteristics for Poland where almost none analysis like this have been done before. In this study structural characteristics are defined as housing attributes such as total floor area of the apartment, number of rooms, age of the building, garage, floor level. Location and neighborhood characteristics are defined as attributes such as distance to the city center, distance to the shopping center, flood area.

This section has provided an introduction. The following will elaborate on the methodology and data used in this study. Section 3 will report the results. The discussion and concluding remarks are given in Section 4.

2. Methodology and data

2.1. Study area and data collection

In this study, 495 transaction records in Cracow City between 2013 and 2014 years were selected from the Polish Banks Association property transaction database, containing data regarding mainly structural characteristics and transaction prices of properties. The database is currently considered the best for property information mining and analysis in Poland. Figure 1 presents the location of records together with the division into the four city districts of Podgórze, Nowa Huta, Krowodrza and Śródmieście.

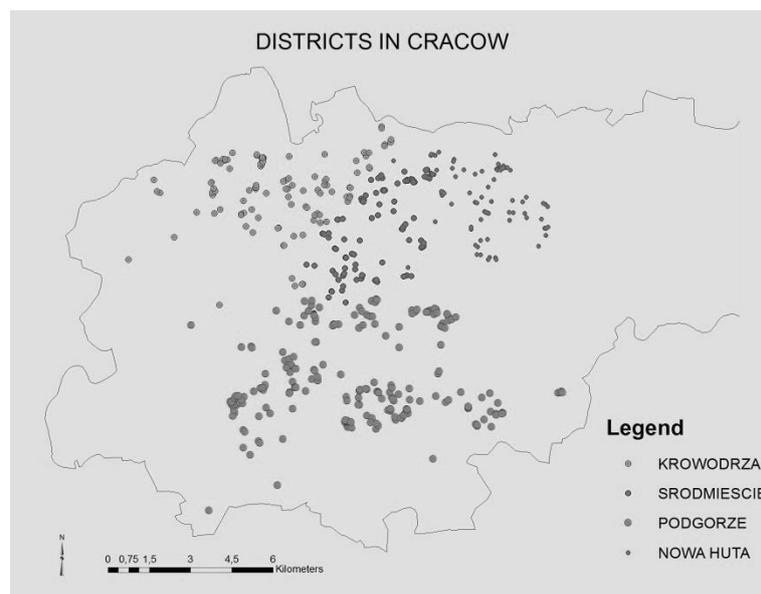


Figure 1: Districts in Cracow.

Spatial data were obtained from the Department of Geodesy, Cartography and Cadastre in Cracow – registry of buildings with addresses and from Regional Water Management Office in Cracow – flood area. Spatial analysis of attributes were conducted with using ARC GIS 10.2.2. Distances from buildings to city center and shopping centers were calculated using distance matrix option with QGIS 2.6.

2.2. Hedonic pricing method and regression model

In this study, the Hedonic Pricing Method (HPM) is our core analysis tool. The basic premise of the method is that the price of marketed goods is related to its constituent characteristics. Rosen (1974) is the first to present a theory of hedonic pricing (preceded by Lancaster's (1966) seminal paper presenting groundbreaking theory of hedonic utility). Rosen argues that an item can be valued as the sum of its utility generating characteristics; that is, an item's total price should be the sum of the individual prices of its characteristics. This implies that an item's price can be regressed on the characteristics to determine the way in which each characteristic uniquely contributes to the price.

The method has been commonly applied to assess variations in housing prices in relation to the value of inherent and external attributes (Freeman, 2003). The relation is presented with the functional form as follows:

$$\mathbf{P} = f(\mathbf{S}, \mathbf{N}, \mathbf{L}) + \boldsymbol{\varepsilon} \quad (1)$$

where

\mathbf{P} is an $(n \times 1)$ vector of housing prices,

\mathbf{S} is an $(n \times m)$ matrix of structural characteristics,

\mathbf{N} is an $(n \times k)$ matrix of neighborhood characteristics,

\mathbf{L} is an $(n \times l)$ matrix of location variables,

$\boldsymbol{\varepsilon}$ is an $(n \times 1)$ vector of random error terms.

f is adequacy relation

Structural attributes (S) are related to inherent characteristics of the property like total floor area, number of rooms, age of the building. Neighborhood attributes (N) include security, social status of the area, educational or cultural quality. Location (L) attributes consider distance to public services, shopping or green areas.

Table 1 gives details for the attributes enlisted in the study for Cracow.

Table 1: Variables and their definitions enlisted in the hedonic pricing study of residential properties in Cracow

Variable	Definition	Unit or coding	Expected sign ^a
<i>Housing price variable</i>			
P	Transaction price of the apartment	PLN	n.a.
<i>Housing structural attributes</i>			
s_1	Total floor area of the apartment	m ²	+
s_2	Age of the building	years	-
s_3	Garage	1 if yes, 0 if no	+
s_4	Number of rooms:	count	+
s_5	Floor level	count	?
<i>Housing location and neighborhood attributes</i>			
l_1	Distance to the city center	m	-
n_1	Distance to nearest shopping center	m	-
l_2	Flood area	1 if yes, 0 if no	-

^a "+" sign denotes augmenting; "-" suppressing effect on apartment price; "?" indicates an inherently indeterminate effect.

Given that this study involves data describing the land features—location and distances, this information should be more efficiently captured, processed and analyzed using geoinformation technology. Manually interpretation from personal observations or paper maps can be subjective and abstract. That is why the study uses GIS. In our study, the crucial set of land information in question is a sample of estate buildings. The analysis of distances include distance to the city center and to nearest shopping center. City center was defined as market square which is central business district. Distance from city center to each building was calculated using matrix distance option (QGIS).

$$p^{l_i} = \frac{\partial P}{\partial l_i} \quad i = 1, \dots, l$$

$$p^{n_i} = \frac{\partial P}{\partial n_i} \quad i = 1, \dots, k$$

The selection and estimation of hedonic price equations f is one of the major steps of the method. There is not enough guidance from economic theory about the relationship between house price and its attributes (Cropper et al., 1988). Thus many forms can be used to describe the functional relationship between house price and its attributes. There are considered linear, logarithmic, Box-Cox transformation and quadratic forms in the literature, (Habb and McConnell, 2002). To avoid the problem of spatial autocorrelation spatial autoregression model (SAR) and spatial error model (SEM) could be used (Hui et al. 2007, Kim, et al. 2003).

In data analysis inclusion of relevant factors and proper relationships between attributes and housing prices will improve the accuracy. Unfortunately in practical applications attributes selection is limited by the availability of data. In presented analysis two kinds of functional relations were considered: classical linear model and semi-log model. Logarithmic model is probably mostly used relationship in hedonic prices technique (Bockstael, 1996; Bolitzer and Netusil, 2000; Geoghegan, 2002, Jim and Chen 2007) and linear model was to confirm and compare the dependence. Construction of hedonic price model was started by analysis of correlation matrix between variables in liner model and between variables and their logarithms in log model. These analysis concerned on finding attributes without significant influence on housing prices. The findings of the correlation analysis were confirmed by classical t-test for regression coefficients (see tables 2 and 3).

Table 2: Results of regression analysis of the linear hedonic pricing model for Cracow

Variable	coefficients	T stats	p-value
constant	102974,447	6,853(s)	0,000
s1(floor_area)	6982,134	31,950(s)	0,000
s2 (age)	-16,982	-0,491	0,624
s3 (garage)	12052,573	1,192	0,234
s4 (nu_rooms)	-22757,397	-5,871(s)	0,000
s5 (nu_floor)	1757,173	1,166	0,244
n1 (dist_shop)	-2,047	-0,545	0,586
l1 (dist_cent)	-20,558	-9,269(s)	0,000
l2 (flood)	-12381,120	-1,374	0,170

(s) statistical significance at the 5% level.

Table 3: Results of regression analysis of the semi-log hedonic pricing model for Cracow

Variable	coefficients	T stats	p-value
constant	10,435	57,143(s)	0,000
s4 (nu_rooms)	-0,037	-4,028(s)	0,000
s5 (nu_floor)	0,001	0,397	0,692
s3 (garage)	0,060	2,517(s)	0,012
l2 (flood)	-0,030	-1,419	0,157

lnn1 (Indist_shop)	-0,036	-2,86(s)	0,022
lnl1 (Indist_cent)	-0,200	-12,232(s)	0,000
lns1(lnfloor_area)	1,017	33,272(s)	0,000
lns2 (lnage)	-0,016	-3,926(s)	0,000

(s) statistical significance at the 5% level.

Non-significant variables were eliminated from the models. Next step investigated into collinearity (too much dependence between variables). In both models there was found collinearity between number of rooms and total floor area. It was decided to eliminate variable “number of rooms” from the models.

Next step concerned on potential problem with residuals in hedonic price models. Analysis of a few classical figures of residuals investigated some problems with homogeneity of variance (see fig 4).

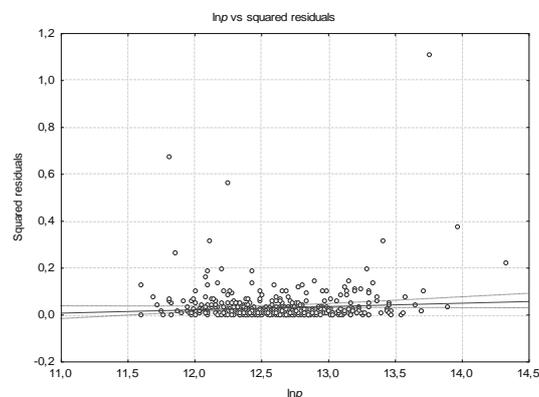


Figure 4: Squared residuals versus logarithms of prices

These problems have no impact on coefficient value but do impact on standard error. It was decided to make a White correction (White, 1980). Results for logarithmic model with correction are given in table 4.

Table 4: Estimation of logarithmic hedonic price model with White correction.

Variable	coefficients	New t stats	p-value
constant	10.859	55.519	0.000
lnn1 (Indist_shop)	-0.196	-10.547	0.000
lnl1 (Indist_cent)	-0.038	-3.336	0.001
lns1(lnfloor_area)	0.938	33.172	0.000
lns2 (lnage)	-0.018	-4.369	0.000
s3 (garage)	0.054	2.648	0.008

Multiple R-squared: 0.8105 Adjusted R-squared: 0.8085

F-statistic: 418,215 on 5 and 489 DF, p-value: < 1.2e-16

At final we selected two significant models to explore the relationship between housing price and housing attributes :

- Linear with multiple R-squared: 0.7582 (Adjusted R-squared: 0.7572; F-statistic: 771.3 on 2 and 492 DF, p-value: < 2.2e-16) given with equation:

$$P = 87895,45 - 20,87dist_cent + 6253,53floor_area + \varepsilon \quad (2)$$

- Logarithmic with multiple R-squared 0.81047 (Adjusted R-squared: 0.8085; F-statistic: 418,215 on 5 and 489 DF, p-value: < 1.2e-17) given with equation:

$$\ln P = 10,859 - 0,196 \ln dist_cent - 0,038 \ln dist_shop + 0,938 \ln floor_area - 0,018 \ln age + 0,054 garage + \varepsilon \quad (3)$$

3. Results

Results of the hedonic regression analysis for both models give quite good explanatory power. The linear model has adjusted coefficient of determination as high as 0.7572 and semi-log model has adjusted R square as high as 0.8085. This analysis confirms that logarithmic transformation gives better fitted hedonic price model.

Linear model generally confirms all expected signs of influence of attributes on prices (excluding number of rooms). Positive impact on price gives larger floor area and garage, increase in the distance from the city center and shopping center, older building and flood area reduce the price. It is surprising that number of rooms has negative impact on price but the reason for this could be quite strong correlation with “total floor area” variable because number of rooms usually is determined by floor area.

There are only two significant variables in linear model: total floor area and distance to the city center, where the floor area has major impact on price. Generally speaking one meter increase in floor area increases the apartment price on average by 6253 zł. Increase in the distance from the city center reduces the apartment price on average by 21 zł with every meter. In semi-log model expected signs of attributes and problems with numbers of rooms were repeated (like in linear model). However more variables are significant. There are 4 significant logarithmized variables: distance to the city center, distance to shopping center, total floor area and age of the building and one binary variable which concern garage or parking place. Major attribute influencing the apartment price is floor area again. A smaller apartment would have lower price than a bigger one, on average 0.938% growth in the price would be observed if the apartment floor area would increase by 1%. Sale price would increase by 5.4% if the house has a garage, and would drop by 0.018% if the building would be of older age by 1%.

When one analyze the location and neighborhood attributes it appears to surprise that whether the surrounding area is potentially threatened by the flood or not has no impact on apartment price, while significant impact on price has the distance to the city center and to the nearest shopping center. Increasing the distance by 1% reduces the apartment price by 0.196% and 0.038% respectively.

4. Discussion and Conclusions

This study focuses on the structural, location and neighborhood characteristics of a residential property on its market value in Cracow, Poland. Our study uses a GIS technique as a more advanced computational tool.

The current research is adequately sophisticated and has contributed to a better understanding of the important theoretical question of how much a household is willing to spend on various structural, location and neighborhood attributes of an apartment.

Two significant models were selected to explore the relationship between housing price and housing attributes: linear and logarithmic. Results of the hedonic regression analysis for both models give quite good explanatory power. The linear model has adjusted coefficient of determination as high as 0.7572 and semi-log model has adjusted R square as high as 0.8085. This analysis confirms that logarithmic transformation gives better fitted hedonic price model.

In the logarithmic model there are five significant variables: distance to the city center, distance to shopping center, total floor area, age of the building and garage or parking place. Major attribute influencing apartment price is floor area. The findings are comparable with other studies and suggest that, as expected, the distance to the city center and to the shopping center is negatively correlated with housing price. Households are willing to pay more for apartments with garage or parking place, with larger floor area and situated in the building of younger age. Interestingly, however, whether the surrounding area is potentially threatened by the flood or not is not a significant attribute.

To conclude, this research help improve our understanding on housing price determination in Poland. It also confirms the applicability of the hedonic housing prices in Poland as developing country. The findings could help to fine tune the developing housing market to match supply with demand in quality terms.

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The investigation of relationship between insider trading activities and stock returns of German blue chips

Dagmar Linnertová¹, Oleg Deev²

¹*Department of Finance, Faculty of Economics and Administration, Masaryk University, Lipová 41a, 602 00 Brno, Czech Republic, e-mail: Dagmar.Linnertova@mail.muni.cz*

²*Department of Finance, Faculty of Economics and Administration, Masaryk University, Lipová 41a, 602 00 Brno, Czech Republic, e-mail: oleg@econ.muni.cz*

Abstract

The aim of this paper is to investigate the causality between stock returns and insider open market transactions. The Dumitrescu-Hurlin (2012) heterogeneous approach to Granger causality is chosen to examine the relationship. The investigation was conducted on 30 most traded German blue chips during the period 2006-2014. The strong causality is revealed in the short term period. Thus, stock returns may be used to predict future insider activity. The strong causality between stock returns and future insider buying and selling transactions is further confirmed with three out of four employed insider trading indices. The reverse relationship is weak and valid only for longer time horizon of twelve months.

Keywords: insider trading, Granger causality, DAX

1. Introduction

In the classic financial literature, the insider trading activities are considered to have a significant impact on the pricing of stocks due to their morally hazardous behavior of using private corporate information. Penman (1982) suggests that insider earns abnormal returns not only from their trading activities but also by sharing private corporate information with other interested parties. Seyhun (1988) reveals that corporate insiders were able to predict 60 percent of variation in one-year ahead aggregate stock returns of their own firms. Karpoff & Lee (1991) discover that insiders sell their firm's common stocks at least for several months prior the announcement of the issue of new common stock and convertible debt. These findings are consistent with the hypothesis that managers have prior information that is conveyed to market. Lamba & Khan (1999) find that insiders act on their private information before stock exchange listings (purchasing or postponing the sale of stock) or delistings (selling stocks before

listing). As a logical result of such findings, Rozeff and Zaman (1988) show that outsiders can earn abnormal returns by using publicly available insider trading data.

Further studies of insider trading activities focus on the analysis of whether abnormal returns also propel insiders to sell or buy their company's stocks. Chowdhury et al. (1993), Iqbal & Shetty (2002) and Brio et al. (2009) employ Granger causality to investigate relationship between aggregate insider transactions and stock market returns. Chowdhury et al. (1993) find that stock market returns cause insider transactions. They also suggest that the degree of mispricing observed by insider is small partly because of unanticipated macroeconomics factors. Iqbal & Shetty (2002) demonstrate the large impact of stock returns on subsequent insider transactions at the aggregate and firm level. This impact according to their findings is negative. Thus, insiders buy after stock price decreases and sell after price increases. They also establish weak relationship between insider transactions and future stock returns. The same investigation but for the banking industry was applied by Brio et al. (2009). They reveal causality relationships between insider transactions and future stock movements only at the firm level.

Since the majority of studies on insider trading activities which explore US stock market, we tried to examine the validation of insider trading – stock returns causality on the biggest European stock market – German stock market. The aim of this paper is to investigate whether insider transactions and stock returns have causality relationships.

2. Data and Methodology

Thirty biggest German blue chip stocks were chosen for the purposes of our investigation. All stocks were traded on the Frankfurt Stock Exchange in the period January 2006 to December 2014. The data on insider activities are collected on monthly basis and obtained from Bloomberg. Insider transactions include open market transaction (net sell and buy in shares) of 12 kinds of insiders. Following Lamba & Khan (1999) and Iqbal & Shetty (2002) we only consider transactions of 100 shares or more because these transactions could be likely considered to be information motivated.

Stock returns are calculated as logarithm of price differences:

$$y_i = \log \frac{P_i}{P_{i-1}}$$

where P_i is monthly stock price at the time i .

Table 1 provides descriptive statistics of the comprised dataset.

Table 1: Descriptive statistics of the 30 DAX firms in the sample

	Return	Number of buy transactions	Number of sell transactions	Number of shares sold	Number of shares bought
Mean	0.002	0.227	0.109	13,208	17,513
Median	0.008	0.000	0.000	0.000	0.000
Maximum	0.656	11.000	7.000	9,177,100	14,352,210
Std. Dev.	0.095	0.758	0.486	253,443.7	333,446.1
Observations	3,209	3,209	3,209	3,209	3,209

Table 2 summarizes annual stock returns and insider transactions in years 2006–2014. The returns are generally positive with exceptions of two crisis years of 2008 (–0,039) and 2011 (–0,014). In year 2014 the number of shares bought by insiders has

reached its maximum with 45.986 shares at the average. The minimum was reached in 2009 with 1.489 shares. The number of shares sold has achieved its maximum in 2009 with 61.582 shares and its minimum in 2010.

Table 2: Stock Returns & Insider Transactions (mean value across firms)

Year	Return	Number of transactions		Number of shares	
		Buying	Selling	Bought	Sold
2006	0.012	0.111	0.183	13,266	18,519
2007	0.014	0.217	0.197	23,230	8,460
2008	-0.039	0.483	0.078	43,903	15,614
2009	0.011	0.114	0.103	1,489	61,582
2010	0.007	0.147	0.078	5,531	1,333
2011	-0.014	0.314	0.075	8,064	3,047
2012	0.016	0.161	0.097	13,151	2,290
2013	0.013	0.147	0.161	1,554	4,812
2014	0.000	0.225	0.078	45,986	2,232

Figure 1 depicts the performance of stock returns across firms in the period of 2006–2014. The minimum was reached in October 2008 (-20.4%). The maximum was achieved in April 2009 with the value of 10.2%.

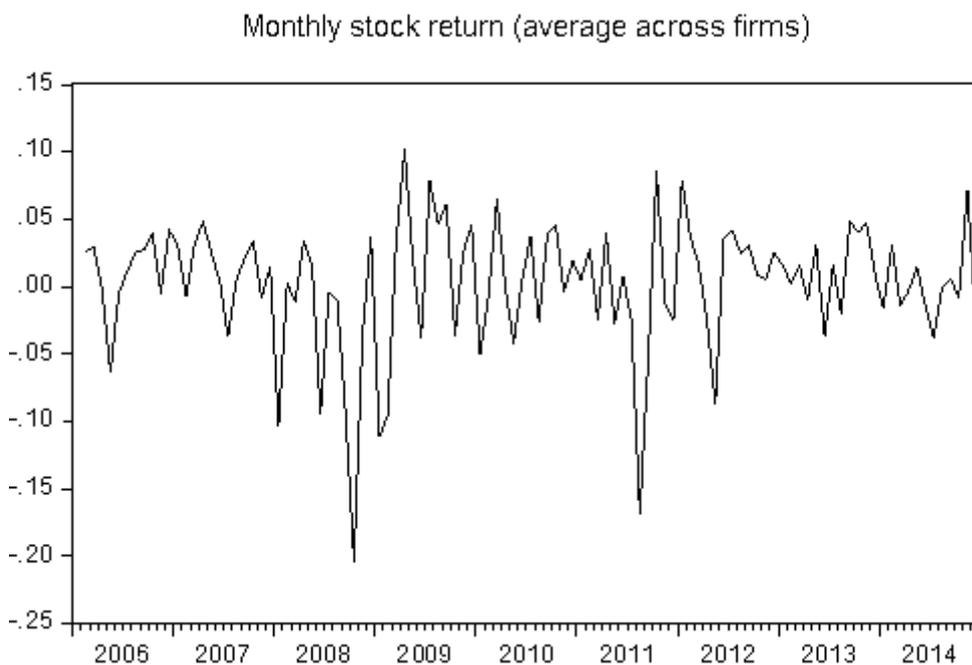


Figure 1: Average stock return across firms

To measure of the degree of insider transactions we used four activity indices. The first index suggested by John & Lang (1991) and later employed by Yur-Austin (1998), Iqbal & Shetty (2002) and Brio et al. (2008) is the net number index NNI. This index is defined as:

$$\text{NNI} = \frac{(P-S)}{(P+S)} \quad (1)$$

where P represents aggregate number of insider buy transactions and S is aggregate number of insider sale transactions. This index evaluates insider trading activity due to positive or negative news reports, when positive new report leads to increase of buying transactions and decrease of selling transactions and vice versa.

Similarly, the volume of transactions is measured with the net share index (NSI):

$$NSI = \frac{(PV-SV)}{(PV+SV)} \quad (2)$$

where PV and SV represent aggregate number of shares bought and sold by insiders in a particular month, respectively.

The remaining two indices characterize insider buying and selling separately. According to Chowdhury, et al. (1993), insider buying transactions have more information content than sell transactions. Same findings are reported in studies of Sayhun (1990, 1992). The insider buying index PNI is denoted as:

$$PNI = \frac{P}{(P+S)} \quad (3)$$

while insider selling index SNI is defined as:

$$SNI = \frac{S}{(P+S)} \quad (4)$$

Table 3: Insider Transaction Indices (mean value across firms)

Year	NNI	NSI	PNI	SNI
2006	0.036	0.026	0.100	0.000
2007	-0.002	-0.019	0.120	0.000
2008	0.204	0.188	0.242	0.000
2009	0.050	0.050	0.100	0.000
2010	0.037	0.039	0.894	0.000
2011	0.112	0.117	0.173	0.000
2012	0.054	0.055	0.122	0.000
2013	0.003	-0.002	0.097	0.000
2014	0.075	0.069	0.125	0.000

Table 3 summarizes the values of insider transaction indices. The number of insider selling transactions was higher than number of insider buying transaction only in 2007. In the same year, the aggregate number of shares sold by insider exceeded the aggregate number of shares bought by insider. The value of insider selling index SNI is very close to zero in all of analyzed periods.

Table 4: Correlation between monthly returns and insider transactions represented by activity indices

	Return	SNI	PNI	NSI	NNI
Return	1.000				
SNI	0.027	1.000			
PNI	-0.132	-0.031	1.000		
NSI	-0.138	-0.209	0.784	1.000	
NNI	-0.128	-0.213	0.827	0.962	1.000

Table 4 reports correlation coefficients between stock returns and insider trading indices. The positive correlation is found between stock returns and insider selling transactions (SNI), while negative correlation is apparent between stock returns and insider buying transactions (PNI). These findings resemble those of Iqbal & Shetty (2002).

To analyze time-series relationships between stock returns and insider trading indicators, we used Granger causality procedure. We first check whether stock returns and insider trading activity indices are stationary series by the Dickey-Fuller and Phillips-Perron unit root tests. Application of these tests is a priori requirement for the application of Granger causality tests. Granger causality is computed by running bivariate regression that in a panel data context take the following form:

$$y_{i,t} = \alpha_{0,i} + \alpha_{1,i}y_{i,t-1} + \dots + \alpha_{l,i}y_{i,t-l} + \beta_{1,i}x_{i,t-1} + \dots + \beta_{l,i}x_{i,t-l} + \epsilon_{i,t} \quad (5)$$

$$x_{i,t} = \alpha_{0,i} + \alpha_{1,i}x_{i,t-1} + \dots + \alpha_{l,i}x_{i,t-l} + \beta_{1,i}y_{i,t-1} + \dots + \beta_{l,i}y_{i,t-l} + \epsilon_{i,t} \quad (6)$$

where t determines the time period dimensions of the panel and i denotes the cross-sectional dimensions. Dumitrescu-Hurlin (2012) approach was chosen to allow all coefficients to be different across cross-sections:

$$\alpha_{0,i} \neq \alpha_{0,j}, \alpha_{1,i} \neq \alpha_{1,j}, \dots, \alpha_{l,i} \neq \alpha_{l,j}, \forall i, j \quad (7)$$

$$\beta_{1,i} \neq \beta_{1,j}, \dots, \beta_{l,i} \neq \beta_{l,j}, \forall i, j \quad (8)$$

In the heterogeneous panel model, we also test the homogenous non-causality (HNC) hypothesis:

$$H_0: \beta_i = 0, \forall i = 1, \dots, N \quad (9)$$

Under the alternative hypothesis, there is a causality relationship from $x_{i,t}$ to $y_{i,t}$. The causality tests are conducted for constant lag (K) periods of 1, 3 and 12 months.

3. Results

We first test the causality from the index NNI to stock returns and vice versa. Then we test the same causality relationships with the other indices NSI, PNI and SNI, respectively. For each pair, Wald statistic and standardized Z-bar test statistics were computed. These statistics are computed for one, three and twelve lags. The results from are reported in Tables 5–8.

Table 5 presents the results for the causality between the index NNI and stock returns and stock returns and the NNI index, respectively. The homogeneous non causality between stock returns and index NNI is rejected at 1% level for lag one and three. It means that the past stock returns may be useful for the forecasting of the standardized volume of net purchases in the period of one and three months, respectively.

Table 5: Causality relationship – stock returns and NNI index

Lag order	K = 1	K = 3	K = 12
<u>Index NNI to Return</u>			
W-Stat	0,847	2,539	12,789
Zbar-Stat.	-0,645	-1,119	0,420
Lag order	K = 1	K = 3	K = 12
<u>Return to Index NNI</u>			
W-Stat	2,720	5,004	12,631
Zbar-Stat.	6,363***	4,141***	0,274

Note: *, **, *** denote significance at the 10%, 5% and 1% respectively.

Results of testing causality between the stock returns and index NSI that represents the volume of insider transactions are reported in Table 6. In that relationship, the non-causality between stock returns and volume of insider transactions is rejected at 1% level for lag one and 5% level for lag three. Thus, the past stock returns influence the volume of insider activities in the time horizon of the one and three months.

Table 6: Causality relationship – stock returns and NSI index

Lag order	K = 1	K = 3	K = 12
<u>Index NSI to Return</u>			
W-Stat	0,906	5,847	13,368
Zbar-Stat.	-0,424	-0,424	1,001
Lag order	K = 1	K = 3	K = 12
<u>Return to Index NSI</u>			
W-Stat	2,771	8,171	12,978
Zbar-Stat.	-0,425***	3,000**	0,614

Note: *, **, *** denote significance at the 10%, 5% and 1% respectively.

Results of the relationship between stock returns and index PNI that measures the share of insider buying transactions to the insider transactions as a whole are presented in Table 7. The results suggest that in the horizon of one and three months the past stock returns may be employed to predict number of insider purchasing activities. In the horizon of twelve months, the situation is different and the past number of buying transaction has an impact on future stock returns.

Table 7: Causality relationship – stock returns and PNI index

Lag order	K = 1	K = 3	K = 12
<u>Index PNI to Return</u>			
W-Stat	1,090	3,278	14,816
Zbar-Stat.	0,261	0,459	2,430**
Lag order	K = 1	K = 3	K = 12
<u>Return to Index PNI</u>			
W-Stat	1,977	3,980	11,781
Zbar-Stat.	3,583***	1,957*	0,572

Note: *, **, *** denote significance at the 10%, 5% and 1% respectively.

Table 8 demonstrates the results of the causality testing between index SNI that measures the share of insider selling transactions to the number of insider transactions

as a whole and stock returns. The homogeneous non causality hypothesis is not rejected in any tested situation. Thus, there is no evidence of the causality between these two variables.

Table 8: Causality relationship – stock returns and SNI index

Lag order	K = 1	K = 3	K = 12
<i>Index SNI to Return</i>			
W-Stat	1,452	6,526	19,758
Zbar-Stat.	0,625	0,876	1,752
Lag order	K = 1	K = 3	K = 12
<i>Return to Index SNI</i>			
W-Stat	1,863	7,256	16,785
Zbar-Stat.	0,364	0,459	1,456

Note: *, **, *** denote significance at the 10%, 5% and 1% respectively.

4. Conclusion

In this paper, we analyzed the causality relationships between stock returns and insider transactions using aggregate monthly panel data of German blue chip stocks from 2006 to 2014. The examination is based on heterogeneous Granger causality of Dumitrescu-Hurlin (2012). Our findings show strong relationship between stock return and future insider trading activities in the time period of one and three months. These results were confirmed with employment of the three out of four insider trading activity indices. This effect diminishes in the longer time horizon. The reverse relationship or causality between insider transactions and subsequent stock returns is weak and exists only in the longer time horizon of 12 months. These findings are consistent with the findings of Chowdhury et al. (1993) and Iqbal & Shetty (2002).

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Business ethics and CSR in pharmaceutical industry?

Markéta Lőrinczy¹ and Sylvie Formánková²

¹Department of Management, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: marketa.lorinczy@mendelu.cz

²Department of Management, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00, Czech Republic, e-mail: sylvie.formankova@mendelu.cz

Abstract

How do business ethics and CSR form part of pharmaceutical business in the Czech Republic and Hungary? The question was analyzed through empirical studies where surveys were the main tool. The research investigated business ethics, CSR, ethical code, ethical involvement of employees as factors that might be important to achieve ethical behavior in the pharmaceutical industry. Results showed that Czech and Hungarian original companies are more towards ethical behavior and the employees know more about the organization they work for.

Keywords: business ethics, CSR, pharmaceutical industry

1. Introduction

Since the late 20th century there have been reports of unethical activities by members of the organizations in many industries. A survey from year 2000 showed that 48% of respondents stated that they were unethical at work. (Mathis, et al., 2010) Another survey done in South Africa in the IT sector showed that 65% of respondents believed that by being ethical a company can increase the profit in long term. (Charlesworth, et al., 2004) The examples of unethical behaviour are: false information, gifts, cooperation for money, unfair settlement, higher margin, description of tenders for one specific company, etc. (Lőrinczy, et al., 2015) The response for such behaviour was implementation of ethical conduct.

According to Crane and Matten (2010), business ethics concentrates on “grey areas” of business or where values are in conflict. There are several reasons why business ethics is important. It is possible to mention at least 3 of them: the power and influence of a business in the society, the potential of business to provide major contributions to the society (producing the products and services that we want, employment, paying taxes, and acting as an engine for economic development), and business malpractices have the potential to inflict enormous harm on individuals, communities and on the environment.

A survey of over 1,000 UK employees working in public and private sectors found that one in three workers did not consider their employer to be fair. (Goodcorporation, 2013) Another survey of nearly 2,000 Hong Kong executives revealed that more than 40% of those with operations in China had encountered fraud. (KPMG, 2015) The situation in pharmaceutical industry is even more important to be observed. The fact, that pharmaceutical industry is a good business, cannot be refuted – at least on the stock market. According to Formánek (2014) even American Food and Drug Association approved a drug with only 10% efficiency if it was safe. The majority of the governments intervene in the pharmaceutical industry to assure the quality, safety and efficacy of medicine. (Davidova, et al., 2008)

It is legal but is it ethical? To keep a good position on the market, companies would do whatever it takes – some of them including unethical behaviour, such as:

- Industry-funded ghost writing (The practice whereby drug companies pay medical writers to write drafts or final versions of research articles and then seek for academics to become the identified authors.)
- Publication bias (Drug companies are under no obligation to publish the results of research they have funded. A recent analysis found that a third of antidepressant trials conducted for FDA approval were never published, and most of these were negative.)
- Prescription data mining (Drug companies purchase information from pharmacies about doctors' prescribing habits.)
- Gifts to doctors (Drug companies have traditionally given doctors gifts, ranging from pens and sandwiches to trips to Caribbean resorts.) (Carlat, 2015)

The organizations who try to have global competitive advantage would often get harmed by their own employees who need to behave unethically at work. Ethics in transitional economies is still more illusion than the reality therefore the ethical behaviour is becoming important part for companies who want to compete globally. (Fülöp, et al., 2000) Organisations wish to improve profitability to reach their decision-making strategies and this is why incorporate ethics into them is important. (Kay, et al., 1998)

The relevance of the ethical organization in transitional economies has been emphasized. Bigger significance can be observed in the pharmaceutical industry that has direct impact on human beings. In the Czech Republic and Hungary production of medicines is an industry with long-term perspective. Not only because of the increase in population but also because of the increase in medicine consumption. (fond, 2015) This is not the only similarity between the Czech and Hungarian pharmaceutical industry. Others are: market size, FDI income, code of ethics, substitution law, etc. (Lőrinczy, 2013)

Ethical behaviour of pharmaceutical companies is the main subject of this paper. The main goal of the paper is to analyse and compare the ethical level of the pharmaceutical companies in the Czech Republic and Hungary. The main focus is on the difference of ethical behaviour in generic and original companies.

2. Methodology and Data

The empirical study through surveys was done between 2013 and 2014. In these 2 years were contacted original and generic pharmaceutical companies in the Czech Republic and Hungary. In total 110 questionnaires were filled however only 100 were replied

completely. The number of respondents was the same in the Czech Republic and in Hungary. Each participant had a questionnaire to fill in. A mailing list of participants was compiled and questionnaires were sent via e-mail. Research assistants contacted non-respondents via phone and email to encourage them to return completed questionnaire. After data collection, were rejected questionnaires which were not completely filled in. For data comparison was used nonparametric statistical analysis based on Mann-Whitney-Wilcoxon U test.

3. Results

The questionnaire was designed and developed with assistance of 4 universities from the V4 countries. The survey consisted of the following parts: Ethical institutions where the answer options were “Yes”, “No” and “I do not know”, About myself, About stakeholders of my company, About my company where the questions were based on different levels of the scale assigned the numerical values 1–5. The level of measurement is an interval scale which allows for statistical analysis based on Mann-Whitney-Wilcoxon U test (nonparametric test) compare two samples in our case original and generic companies. The third part consisted of 2 open questions and the last part was used to obtain demographical information of the respondent. To ensure that the survey measures the concept it was supposed to, it was subjected quick interviews with representatives of few companies. Feedback was used to improve the survey and check the importance of the topic.

One hundred and forty questionnaires were distributed in the Czech Republic and Hungary amongst 120 organizations. In average, one questionnaire was sent to each organization. The scholars used their private contacts or it was sent to human resources email. A total of 100 completely filled questionnaires indicate a 69.4% response rate.

The last section requested respondents to provide general demographical and biographical information. These were used to highlight different groups and based on that the comparison was done. The replies were compared on the basis of company type (original or generic).

Organizations of all sizes within the pharmaceutical cluster in the Czech Republic and Hungary were represented in the responses which were gathered. The original pharmaceutical companies represented 50% and the same number for generic companies.

The main research question for this study can be formulated as follows: Do generic companies behave more ethically than original ones?

Based on the above surveys the following hypotheses were tested:

Hypothesis 1: The pharmaceutical companies behave ethically.

Hypothesis 2: All individuals in the companies know about ethical politics.

Statistical hypothesis testing was used where the significance level was set to 5%. There were 18 test questions where the replies were set by 5-point ordinal scales. As mentioned before, the different levels of the scales were assigned by values 1–5. The results of the analyses are summarised in the Tables below.

Table 1: It happened before that I behaved in an unethical way during my work (even in minor issues).

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
534.5000	-4.92908	0.000001	-5.06465	0.000000	50	50	0.000000

Table 2: I am aware of what company documents (e.g. code of conduct) states about unethical behavior.

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
678.5000	3.93637	0.000083	4.103241	0.000041	50	50	0.000058

Table 3: It is always clear for me what the ethical behaviour means in my job.

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
458.0000	5.45646	0.000000	5.72795	0.000000	50	50	0.000000

Table 4: My company regularly takes into account ethical principles in marketing and advertising field.

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
151.0000	7.57286	0.000000	7.89881	0.000000	50	50	0.000000

Table 5: My company supports/sponsors activities in its local community.

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
768.0000	3.31937	0.000902	3.470514	0.000520	50	50	0.000773

Table 6: Unethical behaviour is quite common in my company.

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
81.00000	-8.05543	0.000000	-8.34958	0.000000	50	50	0.000000

Table 7: It is almost impossible to work in a completely ethical way in every aspects of our business.

U	Z	p-value.	Z (corrected)	p-value.	N valid. (pharmaceutical - original)	N valid. (pharmaceutical - generic)	p
951.5000	-1.98542	0.047099	-2.04492	0.040864	50	50	0.046394

Hypothesis testing gave the following results:

The hypotheses in questions 1–7 were rejected. The pharmaceutical companies do not behave ethically therefore not all individuals know about ethical politics in their company. The main question of the research was also rejected. The test clearly shows that generic companies do not behave more ethically than the original ones.

The same result was obtained from the questions “Yes”, “No”, “I do not know”. The majority of the respondents from generic companies replied “No” or “I do not know” to the questions such as: Did your company indicate a person responsible for ethical behavior and/or CSR?; Does your company have clear procedures when unethical behaviour occurs? or Does your company have exact rules and procedures of anticorruption policy?

Very small percentages of respondents indicate that their organizations would have clear procedures of all ethical and CSR activities. In many companies is not even person who would dedicate time to these activities. The open question showed that the employees are many times misled in their work. The respondents indicated namely the unethical practices that are used in their company. 70% of respondents were from generic companies.

4. Discussion and Conclusions

As Du Ning-ning (2014) says in the article Study on the realization of enterprise social responsibility “it is generally believed in this field that the social responsibility of pharmaceutical enterprises has been given particular meaning because of its particularity, namely, they have to undertake the social responsibilities for the government, ecological environment, shareholders, consumers and employees when seeking reasonable profits, among which, guaranteeing the products quality safety is the primary social responsibility. It is due to such particularity that we have higher anticipations on pharmaceutical enterprise’s social responsibility than that of other enterprises, especially in recent years, this industry has occurred many phytotoxicity accidents and commercial bribes, which contributes to people’s requirements and expectation for strengthening the constraint and undertaking social responsibilities to break through the theoretical study and become a kind of realistic demand.” The influence of the pharmaceutical industry could be performed in numbers. The world pharmaceutical market was worth an estimated \$855,500 million at ex-factory prices in 2011. The pharmaceutical industry’s reputation has come under fire concerning the lack of transparency around its relationships with governments and the health community. (Valverde, 2012) Since focusing on this problem it is necessary to regularly control and evaluate the current situation.

This research highlights certain characteristics of ethical/unethical pharmaceutical companies. Respondents were asked to respond to the questions which should show whether the pharmaceutical companies behave ethically or not, if they implement more strict ethical procedures and if they use CSR practices in daily bases. There were 3 types of questions: first type was “Yes”/ “No” / “I do not know” questions, second type were a 5-point Likert scale questions ranging from “strongly agree” (5) to “strongly disagree” (1), the third type were open questions.

The first type of questions indicated that the generic type of pharmaceutical companies behave less ethically. Therefore the second types of questions were tested to confirm this initial statement. From the tables 1–7 certain deductions can be made such as:

- Ethical behaviour at work;
- Awareness of company documents;
- Ethical principals;
- Ethical job;
- Sponsors activities.

From analysis it can be stated that in general pharmaceutical companies do not have clearly set procedures for ethical and CSR activities. The original ones started to implement more and more ethical issues due to pressure from associations. The generic

pharmaceutical companies still do not have strict rules which would help the employees not to be misled in their work. The majority of generic companies do have Code of Ethics but nobody really cares about its indications. Question number 6 indicates that unethical behaviour or practices is common mainly in generic companies ($p > 0.05$). On the other hand generic companies do support more all sponsor activities.

As far as the p-values are concerned, all the values from the questions are smaller than 0.05, indicating that there is significant difference. However, to support the result, other 2 types of questions were used.

The research examined also the comparison between Hungarian pharmaceutical industry and Czech pharmaceutical industry. The result was that the companies in these countries behave in a very similar way which we had assumed before survey. There was only one disparity in the question "Ethical concerns were crucial reasons why I started to work for my company". In this particular question the respondents from the Czech Republic were more in agreement with this statement. The majority of Hungarian responses were strong disagreement.

In the past decade the concept of business ethics and CSR was common topic in the news. There is big pressure on pharmaceutical companies to implement strong ethical rules to the company's strategy. From the governments point of view there is higher control on the pharmaceutical business and from the people's one there is higher transparency.

The purpose of this article was to present the situation of business ethics and CSR in pharmaceutical industry in the Czech Republic and Hungary. Moreover, data from an empirical study were analysed and interpreted where the ethical and CSR situation in generic pharmaceutical companies and original ones in these two countries were compared. The key findings of the empirical research can be summarized as follows: The majority of generic pharmaceutical companies do not behave more ethically than the original pharmaceutical companies and the individuals do not know all ethical and CSR rules in their company. In spite of that, the majority of respondents believe that the implementation of these rules would help their work and moreover foster the success. They believe that ethical behaviour would be beneficial for the organization.

A possible limitation of the research was the will to reply from the respondent's side and the truthfulness of responses, as well. Not all pharmaceutical companies wanted to cooperate in this particular research due to sensitive information. The study could have been extended to further countries and this in turn could have resulted in higher response rate. However, we believe that these 2 particular countries have a lot in common that is why we decided to compare only these countries.

The importance of this study is to give general overview of the ethical situation in the pharmaceutical business in two CEE countries. We believe that it will have impact on the future of the concerned business itself. There is already by now a big tendency to increase transparency in this particular industry and in the future the companies will slowly change to the responsible ethical organization. But as Leisinger (2005) writes in his article: Social issues and development gaps are and will remain formidable challenges for billions of people now trapped in poverty. If a pharmaceutical corporation wants to go on record as a visible part of sustainable solutions, it must define its corporate social responsibility in a comprehensive and inspired way and therefore must transcend the "must do" dimension to apply ambitious "good corporate citizenship."

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The political instability as a determinant of inflows of foreign direct investment in emerging and transition countries

Michal Mádr¹, Luděk Kouba²

¹*Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xmadr@mendelu.cz*

²*Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: kouba@mendelu.cz*

Abstract

The purpose of this article is to quantify the influence of the political instability on the inflows of foreign direct investment in emerging and transition countries. Emerging markets are identified with Middle Income Countries according to the evaluation of the World Bank, it means, with a sample of 78 states. Furthermore, the article distinguishes between two types of political instability, elite (non-violent forms, e.g., minority governments, holding of elections) and non-elite (violent forms, e.g., civil wars, coups, ethnic and religious riots). The article uses panel data regression analysis, fixed effects model with a cluster option. According to the results, the political instability affect foreign investment in emerging countries, moreover, both types (elite and non-elite) are statistical significant except for the proxy Political Terror Scale. Finally, non-elite forms have more considerable effects on international investments than government stability.

Keywords: Political instability, foreign direct investment, emerging markets, transition countries, Middle Income countries, concept Elite/non-elite of political instability

1. Introduction

Nowadays, foreign direct investment (FDI) is a crucial determinant of economic growth. In particular, in transition countries and emerging markets, where the influx of foreign capital reached circa 11% GDP in 2012. The impacts of FDI on this group of countries are analysed in empirical literature, e.g., Aizenman, Jinjark and Park (2012), Moran, Graham and Blömstrom (2005) and Sun (2014). Emerging and transition countries have undergone significant changes in the area of political arrangement over the last thirty years, e.g., a relative reduction of political instability (Latin America), political regime changes during the “Colour Revolutions” (Georgia, Lebanon, Kyrgyzstan, Ukraine, Yugoslavia – Serbia) and the “Arab Spring” (Algeria, Egypt, Morocco, Tunisia), a large

number of armed conflicts (Armenia, Azerbaijan, Georgia, Sudan, Yugoslavia) and some countries are still highly unstable (Columbia, Mexico, Nigeria, Pakistan, Philippines, Ukraine). As a consequence, one can identify a group of successful economies (new EU member states – Croatia, Hungary, Latvia, Lithuania; newly industrialized countries – Brazil, China, Russia, Turkey; and the others, e.g., Equatorial Guinea, Uruguay, Trinidad and Tobago) and a group of failed (Cameroon, Djibouti, Kyrgyzstan, Laos, Pakistan, Sudan, Zambia) economies.

The purpose of this article is to quantify the influence of the political instability on the inflows of foreign direct investment in emerging and transition countries. The first section includes a literature survey, the method of regression analysis, data sources, used proxies and a sample of observed countries. The main second section includes a panel data regression analysis. The conclusion summarizes the major findings.

2. Methodology and data

The article is based on the new political economy, more precisely, the new institutional economy. The topic of the political instability is an important theme of the economic approaches. One can consider the main contributions on the theme, Aisen and Veiga (2013), Alesina, Özler and Roubini (1996), Fosu (1992), Jong-A-Pin (2009), Olson (2000), Przeworski and Limogni (1993).¹ The existing empirical literature says that there is no unambiguous relationship between the political instability and the inflow of FDI. The paper distinguishes between two types of political instability omitted in thematic literature, elite (non-violent instability; minority governments, tension related to holding elections) and non-elite (violent forms of instability; civil wars, coups, ethnic and religious riots).²

According to Qian and Baek (2011), government instability, religious and ethnic tensions have a major impact on developing countries. Busse and Hefeker (2007) and Meon and Sekkat (2004) also mention statistical significance, in the first case ethnic tension and internal conflict and in the second case the political risk, in general. Nevertheless, according to Demirham and Masca (2008), the effect is not significant, similarly, Dutta and Roy (2011) claim that there is no unequivocal causality. The other contributions (Asiedu, 2002 and 2006; Williams, 2010) focus on different violent forms of political instability (e.g. number of assassinations, revolutions and coups). Asiedu (2002) and Williams (2010) state that this violent forms are insignificant in developing countries, on the other hand, there is significant influence in African economies (Asiedu, 2006) and Latin American countries (Williams, 2010). The ambiguity of empirical results remains even if alternative indicators are used; see Mádr and Kouba (2014).

Regarding panel data regression analysis, there are two basic methods in panel data, fixed and random effects. We chose the Hausman test for the determination of a suitable method (random effects are preferred under null hypothesis while preference for fixed effects is an alternative hypothesis). Econometric verification is verified by testing the occurrence of the unit root (Levin-Lin-Chu and Im-Pesaran-Shin test), homoscedasticity (Wald test) and serial autocorrelation (Wooldridge test). Drukker (2003) and Wooldridge (2002) selected the tests. The reference period focused on the period of 1996–2012 due to data availability.

¹ For a definition of the new political economy in more detail, see Kouba (2010).

² For more detail, Grochová and Kouba (2011).

Regression model tests the influence of the individual proxies of the political environment, which are comprise four selected economic factors of international investment. As the dependent variable in the following regressions, *FDI* (foreign direct investment net inflows, current \$; UNCTAD, 2013) is employed. According to empirical literature, market seeking is the main factor of inflows of foreign investment. This factor is represented by the variables *GDP* (constant 2005 prices \$) and *Economic growth* (annual percentage growth rate of GDP per capita, constant 2005 prices \$). The model contains also two additional proxies, *Trade* and *Inflation*. *Trade* (the sum of merchandise exports and imports divided by the value of GDP) shows the integration of a country into international trade. One can suppose that a higher participation in international trade leads to lower transaction costs for foreign investors. *Inflation* (the annual change in the consumer price index) is a variable for macroeconomic stability. The model is constructed according to Globerman, Shapiro and Tang (2006) and Wernick, Haar and Singh (2009).³ Also the selected proxies are frequently occurred in the referred empirical literature.

The database of the World Bank (Worldwide Development Indicators; World Bank, 2014b) is a source for economic factors. One can assume all variables, with the exception of Inflation, are positively associated with FDI inflow. The logarithmic form is used for proxies *FDI* and *GDP*. Political proxies are single added-to benchmark regression in order to avoid the problem of multicollinearity. The regression model is the following:

Model 1:

$$\log FDI_{it} = \alpha + \beta_1 \log GDP_{it} + \beta_2 Growth_{it} + \beta_3 Trade_{it} + \beta_4 Inf_{it} + \beta_5 Political_{it} + \varepsilon_{it} \quad (1)$$

As the basic indicator of the political instability, the article uses index the Political Stability and Absence of Violence (GM2) of the concept Governance Matters⁴ of the World Bank because it ranks among the most frequently used indicators. Proxy GM2 measures “*perception of the likelihood of political instability and/or political motivated violence, including terrorism*” (The World Bank, 2014c), which means the proxy also represents non-elite forms of political instability. The expression of non-elite is supplemented by two alternative indicators, the State Fragility Index (*SFI*)⁵ and the Political Terror Scale (*PTS*)⁶. Elite, the second type of the political instability, is also represented by three proxies, Majority (*Maj*; the fraction of seats held by the

³Compared to Globerman et al. (2006) we substitute proxy of Market capitalization for proxy Inflation due availability of data and preference for macroeconomic stability. Compared to Wernick et al. (2009) we replace proxy GDP per capita with variable Economic Growth.

⁴The GM concept has been published since 1996 and annually since 2002. It consists of several hundred individual indicators, which are provided by 32 international organizations, and evaluates 215 states and dependencies. There are six parts (Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption), which range from -2.5 (the worst quality) to +2.5 (the best). (The World Bank, 2014c).

⁵The State Fragility Index scores each country on both Effectiveness (from 0 to 13) and Legitimacy (from 0 to 12) in four performance dimensions, Security, Political, Economic, and Social. The resulting score is in a range from 0 (no fragility) to 25 (extreme fragility). (Marshall and Cole, 2014).

⁶The Political Terror Scale measures levels of political violence and terror that a country experiences in a particular year based on a 5-level “terror scale”, from 0 (rule of law, no political murders or political prisoners) to 5 (terror expended to the whole population – murders, disappearances and torture are a common part of life). The resulting score is the arithmetic mean of outputs from Amnesty International and the US State Department (Wood and Gibney, 2010).

government in the Lower House, as a percentage), the Herfindahl Index Government (*HerfG*; the sum of the squared seat shares of all parties in the government, as a percentage) and *Elections* (legislative and presidential)⁷, for more detail, Keefer (2013).

Three modifications of the input data are made for the purposes of a balanced panel data. The first adjustment is related to the logarithmic functional form, which requires a positive value of basic observations; therefore, the values of negative inflow of FDI are replaced with a three-year arithmetic mean.⁸ The second modification, values for the years 1997, 1999 and 2001 are added to the proxy *GM2* as the arithmetic mean of neighbouring values. Thirdly, a higher index value of *SFI* and *PTS* means worse quality, therefore, the sign is changed to correspond with the proxy *GM2*, thus, an increase in the index is associated with higher quality.

We understand emerging and transition markets as Middle Income Countries (MIC) according to the evaluation of the World Bank.⁹ MIC is a group of economies having a gross national income per capita from \$1045 to \$12746. In 2014, MIC contained 105 countries, 50 “Lower MIC” (from \$1045 to \$4125) and 55 “Upper MIC” (from \$4126 to \$12746). We added seven economies of “Upper Income, non OECD” (GNI pc from \$12747 to \$15000) to MIC. 78 economies we chosen according to two requirements, the availability of data and a population higher than 500 thousand inhabitants due to the elimination of small, mainly island countries that have a specific status in the area of international capital flows. A sample of countries consists of five geographical regions, *European and Central Asian transition economies* (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Romania, Russia, Serbia Turkmenistan, Ukraine and Uzbekistan), *Latin America* (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela), the *Middle East and North Africa* (Algeria, Djibouti, Egypt, Iran, Jordan, Lebanon, Morocco, Sudan, Tunisia and Turkey), *South and East Asia* (Bhutan, China, India, Laos, Malaysia, Mongolia, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam) and *Sub-Saharan Africa* (Botswana, Cameroon, Cote d’Ivoire, Equatorial Guinea, Ghana, Lesotho, Mauritania, Mauritius, Namibia, Nigeria, the Republic of Congo, Senegal, South Africa, Swaziland and Zambia).

3. Results

The regression model contains 78 cross-sectional units and 17 time series units, the sum is 1 326 observations. Firstly, the cointegration of unit roots was verified by the Levin-

⁷Dummy variable (0 – no elections in the year; 1 – legislative or presidential elections in the year; 2 – both types of elections).

⁸24 from 1 326 observations were substituted (1.8%).

⁹The World Bank Atlas Method evaluates countries by gross national income (GNI) in \$ and uses the Atlas conversion factor, which reduces the impact of exchange rate fluctuations in the cross-country comparison. The Atlas conversion factor is the mean of a country’s exchange rate for the year and for the two preceding years adjusted to international inflation (the weight mean of the GDP deflators of the euro area, Japan, the UK, and the USA, the amount of each currency in one SDR unit are weights). (The World Bank, 2014a).

Lin-Chu test and the Im-Pesaran-Shin test.¹⁰ Fixed effects methods are chosen according to the result of the Hausman test.¹¹ The model of fixed effects incorporates heteroskedasticity (Wald test) and serial autocorrelation (Wooldridge test).¹² If cross-sectional units are more than time series units, then a cluster option is a suitable instrument, see Hoechle (2007). The estimated regression coefficients remain the same and heteroskedasticity and serial autocorrelation also persist in the model, but standard errors are calculated to be robust. Then one can consider the estimated regression coefficients for the efficient. The individual cross-sectional units (countries) are used for the cluster option.

All economic variables are significant within the model and the proxy GDP has the main effect. Regarding the political instability, only proxy the Political Terror Scale has not statistically significant influence, which means that restriction on the political rights is not any important factor for international investors. Indicator *GM2* (perception of likelihood of destabilization of government by violent forms) has the main effect, which is related to statistical significance of government stability (proxies *Maj* and *HG*). On the other hand, influence of the government stability is minimal, because stable majority government is often related to an authoritative style of governance in these countries, which may lead to riots during elections (negative effect of the proxy *Elections*) or destabilization in the long run (e.g. revolutions, coups, guerrilla fighters). One can interpret the regression coefficients that an increase in the *GDP* of one per cent leads to an increased inflow of foreign investment of up to 2.5%, whereas the political environment is less than one per cent. On the other hand political instability has the same effect like the other economic indicators.

Table 1: Results of the regression model (fixed effects, cluster option)

log FDI	Constant	log GDP	Growth	Trade	Inflation	Political	R ²
Base	-38.18*** (-5.08)	2.53*** (7.64)	0.01*** (3.25)	0.01* (1.78)	-0.001* (-1.9)	x	0.84
GM2	-35.5*** (-4.99)	2.5*** (7.56)	0.01*** (3.38)	0.01* (1.93)	-0.001* (-1.93)	0.38** (1.98)	0.81
SFI	-31.09*** (-3.53)	2.17*** (5.98)	0.01*** (3.26)	0.01* (1.48)	-0.001* (-1.85)	0.08** (2.25)	0.81
PTS	-38.19*** (-5.08)	2.44*** (7.68)	0.01*** (3.28)	0.01* (1.73)	-0.001* (-1.9)	0.06 (0.71)	0.81
Maj	-36.44*** (-4.91)	2.35*** (7.49)	0.01*** (3.31)	0.01* (1.27)	-0.001* (-1.96)	0.001*** (4.07)	0.82
HG	-36.8*** (-4.87)	2.368*** (7.36)	0.01*** (3.11)	0.01* (1.68)	-0.001* (-1.98)	0.0002** (2.31)	0.81
Elections	-38.14*** (-5.06)	2.43*** (7.61)	0.01*** (3.26)	0.01* (1.77)	-0.001* (-1.91)	-0.09* (-1.82)	0.81

Source: Author's calculation.

Notes: (.) denotes t statistic, */**/** means a significance level at 10%/5%/1% and R² means an adjusted R-squared.

Previous results are supplemented with a graphical analysis that shows the relationship between the inflow of FDI and several explanatory variables. Values are the arithmetic

¹⁰Both tests have a null hypothesis that all the panels contain a unit root. Based on the results, we can reject the null hypothesis and consider a panel data for stationary. Tests include the time trend and lags structure (1). See Appendix.

¹¹We reject a null hypothesis about the preference of random effects in favour of an alternative hypothesis about the preference of fixed effects. A Chi-square is 178.82 (p-value 0.00).

¹²The results of both tests are included in the Appendix.

mean for 1996 to 2012. The graphs compare the effect of the motive of market seeking (GDP), economic development ($GNIpc$; gross national income per capita) and the political stability ($GM2$ according to the World Bank). FDI has two expressions, general inflow (FDI) in the first three mini graphs and the inflow per capita ($FDIpc$) in the fourth. The second expression is used because it allows a better comparison of the small and medium-sized economies that predominate in our sample of countries. All the selected variables, excluding $GM2$, are in logarithmic functional forms owing to the clarity of the graph.

One can see the high dependence between GDP , $GNIpc$ and FDI (regression coefficient 0.79 and 0.8) while the impact of the political stability is minimal (coefficient -0.4). There is a dominant influence of the motive of market seeking, which may be demonstrated by the example of countries with the largest influx of foreign capital (Argentina, Brazil, China, India, Mexico, Russia and Turkey). For these countries, there are typically large markets (population size, GDP or natural resources) and simultaneously this countries are higher political unstable in general. The situation is different in the case of FDI per capita. The article can unambiguously identify successful (Botswana, Bulgaria, Costa Rica, Croatia, Mongolia, Namibia, Uruguay, Trinidad and Tobago) and unsuccessful (Algeria, Cote d'Ivoire, Iran, Pakistan, Philippines, Sudan) states both in the case of foreign investment and the quality of the political environment. Nevertheless, most of the countries are allocated between these groups and, therefore, the unequivocal causality cannot be determinate.

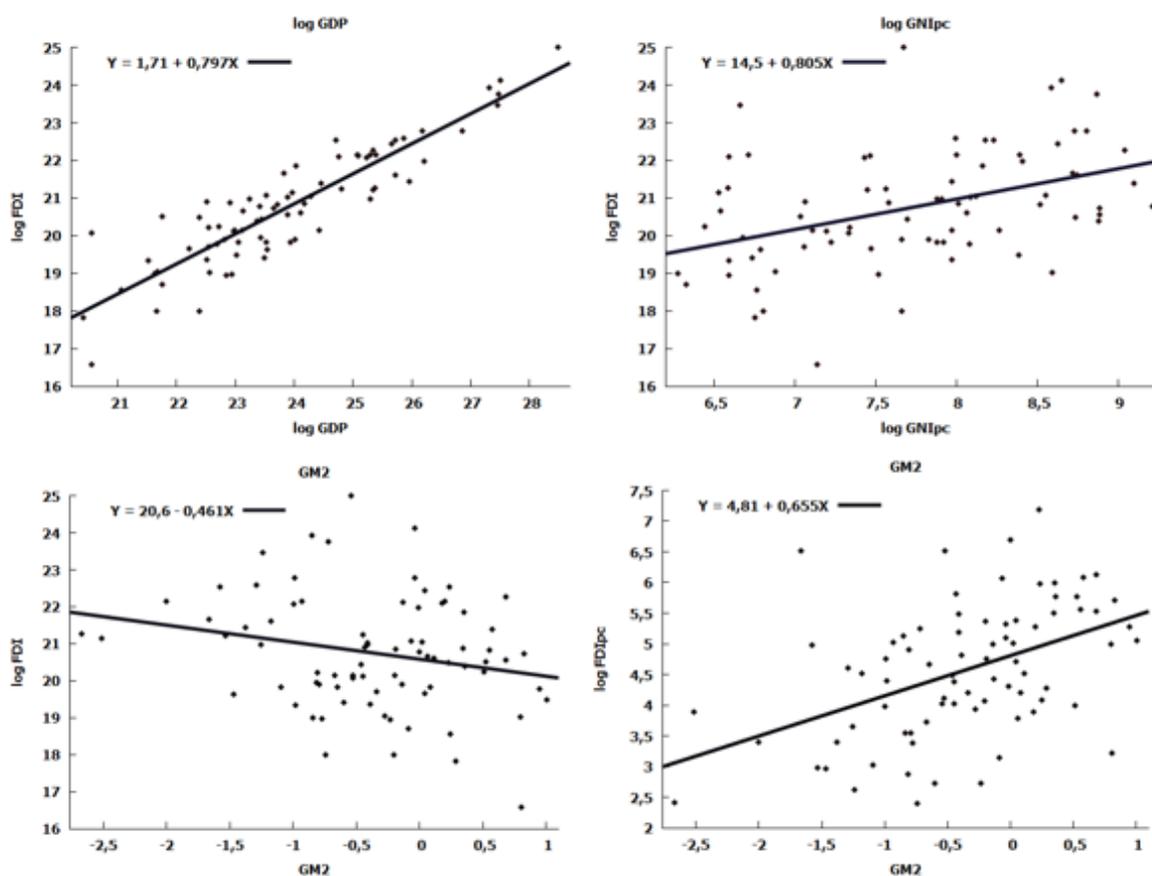


Figure 1: FDI and the selected variables 1996–2012. Source: Author's calculations.

4. Conclusions

Foreign direct investment significantly impacts on economic growth in emerging and transition countries. The inflow of FDI has increased on average eleven times for the last 10 years. The panel data regression analysis was used for the purpose of and quantification of the influence of the political instability on FDI. In the regression model, the fixed effect method was supplemented with the cluster option. The article distinguishes between two types of political instability, elite (non-violent) and non-elite (violent forms). Furthermore, the article combines indicators frequently occurring in empirical literature (the Political stability and Absence of Violence of Governance Matters) with alternative proxies (the Herfindahl Index Government, the Political Terror Scale, the State Fragility Index).

According to the results, one can argue that the political instability affects foreign investment in emerging countries and its both types (elite and non-elite political instability) are statistical significant except for the Political Terror Scale. Non-elite forms have more considerable effects on international investments than government stability. In comparison with the other economic indicators, political instability has the same effect like integration to international trade or macroeconomic stability, but, in accord with the empirical literature, market seeking motive is the main factor. One can also interpret results that an improvement in the individual political indicators leads to a potential increase in the inflow of FDI by up to 1%, whereas an increase in the case of market seeking motive (GDP) is about 2.5%. The recommendation for policy-makers focuses on small and medium-sized emerging and transition countries. If the country cannot offer large markets, then an improvement of the political stability can support an increase in the attractiveness for international investors.

As a possible extension, we propose the inclusion of the other dimensions of the political institutions (e.g., quality of democracy or level of corruption) with an addition of the other alternative indicators. Simultaneously, we should include some economic motives, e.g., investment incentives.

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Appendix

Table 2: Results of econometric tests

	Base	GM2	SFI	PTS	Maj	HG	Elections
LLC	0.00 (-5.05)	0.00 (-4.81)	0.00 (-4.88)	0.00 (-5.17)	0.00 (-5.59)	0.00 (-5.2)	0.00 (-5.16)
IPS	0.055 (-1.6)	0.06 (-1.52)	0.05 (-1.66)	0.05 (-1.61)	0.01 (-2.35)	0.05 (-1.62)	0.07 (-1.49)
Wald	0.00 (7526.35)	0.00 (6955.57)	0.00 (4910.3)	0.00 (6716.8)	0.00 (6490.45)	0.00 (7296.64)	0.00 (7034.26)
Wooldridge	0.00 (37.27)	0.00 (36.89)	0.00 (38.87)	0.00 (36.98)	0.00 (35.73)	0.00 (37.3)	0.00 (36.88)

Source: Author's calculation.

Notes: LLC – Levin-Lin-Chu test, p-value (t statistic); IPS – Im-Pesaran-Shin, p-value (t statistic); Wald test, p-value (Chi square); Wooldridge test, p-value (F statistic).

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Customer Perception of Marketing Communication tools

Klára MargarISOVÁ¹, Václav Kala², Jan Huml³, Jiří Čerkasov⁴, Pavel Kulfánek⁵

¹*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: margarISOVA@pef.czu.cz*

²*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: kala@pef.czu.cz*

³*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: huml@pef.czu.cz*

⁴*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: cerkasov@pef.czu.cz*

⁵*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague, Czech Republic, e-mail: kulfanek@pef.czu.cz*

Abstract

The article is oriented on the issue of non-direct distribution of publicity material that is still more commonly used by both commercial chains as well as companies having their selling place located only in one region. As customers' mail boxes are very often flooded with advertising leaflets and other printed periodicals retailers are forced to seek new options how to differentiate their advertisement so that it would attract customer attention. More efficient means of addressing the customer have potential to improve cost-benefit ratio of advertisement, brand awareness and last but not least sales. There are several way how to increase conversion ratio of advertisement such as responsible distribution of printed materials or enclosing, i.e. putting several periodicals together. The article presents results of marketing research focused on general perception and customer response on non address printed advertisement distributed by retailers in Czech Republic.

Keywords: marketing, marketing communication, distribution, publicity, non-direct printed matter, marketing research.

1. Introduction

Nowadays, majority of managers of large and small companies is searching for appropriate way of gaining customer attention for their products and/or services. There is a great variety of promotion media such as the printed or electronic ones that focus both on mass customers and individuals. Space for improvement customer perception of one's own promotion material is varied and finding new ways is still desirable.

In the area of promotion, it is always necessary to take into account its economic effects which are not, however, easily measurable in practice with regard to the number of influences that have an effect on customers whose decision eventually determines the range of sales returns. Personnel that communicates with customer as well as its management, sales procedural aspect, character of demand, width and depth of assortment offered to customers and price level adjustment represent only some factors which have an impact on resulting customer behaviour. Market research that is focused on specific customer groups and that allows for the detection of customer perception of promotion material which they have encountered so far serves as an effective instrument in terms of monitoring the perception of these factors. The degree of effectiveness in relation to publicity periodical reflects the degree of customer perception. These findings obtained by means of market research are supplied with subsequent research whose aim is to reveal what part of publicity periodical arouses more or less attention. The reasons for the existing situation are as well identified. Publicity periodical creation and distribution is inevitably linked with the necessity to address the largest segment of prospective customers from the target group that is usually limited as for its size. Perception of publicity periodicals by the given target group may be predicative as for the future increase in sales returns (Vollmuth, 1998; William, 1989; Trend Marketing, 2009; Suchá, 2009).

This article deals with non-direct distribution of publicity printed matters that represent one of possible forms of promotion. To be specific, it concerns the distribution of leaflets, newspapers and other printed matters to household letter boxes of particular customers. Prospective customer may gradually concentrate his attention only to some publicity periodicals which is derived from the large number of periodicals accessible to him. Customers most commonly focus on those periodicals relating to their regular needs, interests and/or their decision process during their choice and purchase of a product. At this moment, his perception of external impulses becomes intensified. However, the aim of publicity message is to address even those customers who do not, for various reasons, actively search for information and thus at least to allow them to consider the assortment offer. The article deals with marketing representing science that focuses on perception, comprehension, stimulation and satisfaction of needs of specifically oriented target markets – customers. Effective use of company resources is taken into consideration. Marketing aim is to enable continuous improvement of interaction process between company resources on the one hand and target market on the other hand. One of marketing disciplines comprises assessment of future development (Payne, 1996).

In order to be able to approach practical part, it is necessary to characterize the notion of “non-directed distribution”. Non-directed distribution represents special kind of promotion which may include printed publicity in the form of magazines, prospectus and leaflets. However, non-direct distribution of printed matters may be as well ranked within sales promotion. According to Kotler, sales promotion may be characterized as a short-term incentive stimulating the purchase or sale of product or service (Kotler, 1992).

It may be therefore stated that non-direct distribution advertising includes publicity leaflet that is used for short-term incentives similar to campaigns on the grounds of which product may be chosen and subsequently purchased.

The significance of this topic is confirmed by the research carried out by research agencies ppm factum and Česká marketingová společnost: Czechs and advertising 2013 (Vysekalová, 2013). Consumers rather affects the advertisement that they can

thoroughly explore. Many people (38%) when buying are influenced by leaflets. In second place is then television advertising (34%) and advertising at point of sale (31%).

2. Methodology and Data

The aim of this article is to provide, within a narrow practical scope, the characteristics related to the question of market research as well as the identification of methods enabling the measurement of customer perception of publicity message. The objective was to determine the measurability of data obtained in the carried out research and the suggestion of more effective way of publicity periodical distribution.

The introductory part puts emphasis on term definition in the field of marketing research and on the formulation of theoretical basis allowing further practical research.

Second part concentrates on practical application of theoretical findings within the frame of which selection of appropriate methods for the measurement of customer perception of publicity materials will be carried out. It will as well include sample identification and description of criteria necessary for research and deduction of conclusions.

Practical research will be divided into three successive stages:

- Preparatory stage before research initiation. This stage consisted in objective specification and provision of research conditions. It was necessary to address distribution company for testing and measuring success rate of particular periodicals. It was then essential to choose the areas where publicity periodicals will be distributed. Periodicals were distributed by means of enclosing the smaller and generally less perceived periodical (advertising on windows replacement) into the “pivotal” periodical (offer of alimentary products). After that, it was necessary to choose appropriate methods (observation and interrogation) and to prepare the forms into which research results were entered.
- The stage of the realization of research activities. Research was also carried out in two separate steps. First, it was detected through observation whether the printed matter was physically present in house (customer letter box). In practice, much greater number of houses, and descriptive numbers in particular, was visited so that research result would not be influenced by mistake on the part of distributor. For the reasons of result comparison, interrogation stage was divided into two parallel sets of interrogation. Each week and in each city where the research took place, several distribution areas were chosen (2-4) where:
 - periodicals were distributed in advance in the form of “enclosed” (product of technical character) into the “pivotal” (alimentary products).
 - second interrogation proceeded in areas where the “pivotal” and “enclosed” periodicals were distributed separately. This allowed for obtaining data intended to compare perception of periodicals. Regional homogeneity of inhabitants was taken into account and kind of build-up area was comparable, too.

Random household selection was then carried out. In households, people were put the question whether they received “pivotal periodical” and “enclosed periodical” and their answer YES (received), NO (did not receive).

“No” answer was accompanied by the question concerning the suggestion of possible reasons for such situation. The interviewee was always provided with physical copy of the printed matter being under research so that mistaken change on the part of customer would be avoided.

- The last stage involved evaluation of research results, identification of appropriate generalizing factors.

Observation represents one of the fundamental methods related to primary data gathering. In most cases, observer and the one being observed do not come in touch. It is employed when observer is interested in data which concern sensually perceivable facts or actions. The advantage of this method lies in the fact that data are not biased by the subject being under research. The risk is nevertheless embodied in the person of observer who is bound to cope with demanding claim as for the interpretation of detected data. It is suitable to combine this method with other methods related to primary data gathering, for instance with the method of observation or experiment (Kozel, 2006; Tomek, 2007).

Observation which was used for the purpose of the research may be characterized as observation in natural conditions since it involved monitoring of regularly repeating process. The method applied was demonstrative observation. Since the research results were recorded immediately into prepared forms, it was as well structural observation. Considering the fact that observation was meant to monitor in person the consequence of an activity, it may also be classified as non-direct and personal observation without usage of technical instruments (Kozel, 2006; Tomek, 2007).

Interrogation concerns once again one of the methods related to primary data gathering. For the purpose of this research, the method of personal (face to face) interrogation was employed. Its main advantage consists in direct interaction between the inquirer and respondent as well as in high rate of answer return. Interrogation is bound to complete the monitored data with customer perspective in relation to the issue being the subject of examination as well as to find out his opinion (Kozel, 2006; Tomek, 2007).

As for interrogation method, personal questioning was employed for practical reasons since it completes observation with respondent's opinion. Written, telephone or electronic method of interrogation was therefore excluded (Kozel, 2006; Tomek, 2007).

3. Results

Really effective process of the distribution of publicity printed matters should go beyond mere reaction on geographic, demographic or socially economic criteria that may be obtained from customer research usually carried out by means of interrogation in the sales place. Factor that is of ultimate importance involves as well the way the process of distribution is adjusted in practice or the way it should be adjusted. Customer perception of periodicals depends on his interest. Periodicals which constantly gain more attention include the issues such as food, dry goods and hobby. Less attention is paid to those that are not distributed with such a frequency or those which promotes a product with longer expiration time, loan services etc. The research presented hereafter aims to determine the number of readers in case that the “enclosed” medium is put mechanically or manually into the “pivotal” one in comparison with the case when the “enclosed” medium is distributed separately. This will enable to indicate how the

number of readers will rise, which will consequently apply to the probability of purchase realization, too.

Quantitative market research focused on the exploration of preconditions which make customer take note of non-direct periodical more often was launched. Research location included the cities of Znojmo, Olomouc, Vsetín, Zábřeh, Zlín and Český Těšín. In total, 820 respondents were addressed in the course of the whole temporal frame whereas each interrogation included 410 respondents. Interrogation in the areas where enclosed periodicals were distributed, 380 respondents noticed this fact and 30 did not. In the areas where the periodicals were distributed separately, 338 respondents took note of the advertising on technical product and 72 did not take note of this media. The choice of locations was done with respect to approximate comparability in the number of distributed material so that identical number of questionnaires put to respondents would be achieved.

Numbers of questions were carried out within the following categories respecting the number of items:

- 0–200 distributed items – 15 questionnaires,
- 200–400 distributed items – 20 questionnaires,
- 400 and more distributed items – 30 questionnaires.

All surveyed locations where periodicals were “enclosed” into the “pivotal” periodical, 7 247 items were distributed. In the areas where they were distributed separately, 7 293 items were distributed in total.

As far as the comparison of particular cities is concerned, it is possible to detect irregularities as for customer taking note of the periodical depending upon the fact whether it is enclosed or distributed separately.

Success rate with respect to customer taking note of periodical is in majority of cases higher with the distribution by enclosing, only one case records comparable values.

With regard to particular cities, the results are as follows:

Znojmo (enclosed periodicals):

In total, 100 respondents were addressed in four areas. Ninety-two respondents received the enclosed leaflet, out of which eight did not take notice of the enclosed leaflet. Success rate therefore amounts to 92%.

Znojmo (separately distributed periodical):

In total, 100 respondents were addressed in four areas. Eighty-five respondents received the enclosed leaflet, out of which fifteen did not take notice of the enclosed leaflet. Success rate therefore amounts 85%.

In sum, it may be stated that the difference as for taking note of the periodical on the part of customer amounts to 7% in this city. Enclosing the periodical records better results.

Olomouc (enclosed periodicals):

In total, 60 respondents were addressed in three areas. Fifty-five respondents received the enclosed leaflet, out of which five did not take notice of the enclosed leaflet. Success rate therefore amounts to 91%.

Olomouc (separately distributed periodical):

In total, 60 respondents were addressed in two areas. Fifty-one respondents received the enclosed leaflet, out of which nine did not take notice of the enclosed leaflet. Success rate therefore amounts to 85%.

In sum, it may be stated that the difference as for taking note of the periodical on the part of customer amounts to 6% in this city. Enclosing the periodical records better results.

Vsetín (enclosed periodicals):

In total, 80 respondents were addressed in four areas. Seventy-seven respondents received the enclosed leaflet, out of which three did not take notice of the enclosed leaflet. Success rate therefore amounts to 96%.

Vsetín (separately distributed periodical):

In total, 80 respondents were addressed in four areas. Sixty-one respondents received the enclosed leaflet, out of which nineteen did not take notice of the enclosed leaflet. Success rate therefore amounts to 76%.

In sum, it may be stated that the difference as for taking note of the periodical on the part of customer amounts to 20% in this city. Enclosing the periodical records better results.

Zábřeh (enclosed periodicals):

In total, 40 respondents were addressed in two areas. Thirty-seven respondents received the enclosed leaflet, out of which three did not take notice of the enclosed leaflet. Success rate therefore amounts to 93%.

Zábřeh (separately distributed periodical):

In total, 40 respondents were addressed in two areas. Thirty-two respondents received the enclosed leaflet, out of which eight did not take notice of the enclosed leaflet. Success rate therefore amounts to 80%.

In sum, it may be stated that the difference as for taking note of the periodical on the part of customer amounts to 13% in this city. Enclosing the periodical records better results.

Zlín (enclosed periodicals):

In total, 65 respondents were addressed in three areas. Fifty-nine respondents received the enclosed leaflet, out of which six did not take notice of the enclosed leaflet. Success rate therefore amounts to 98%.

Zlín (separately distributed periodical):

In total, 65 respondents were addressed in three areas. Fifty-six respondents received the enclosed leaflet, out of which nine did not take notice of the enclosed leaflet. Success rate therefore amounts to 82%.

In sum, it may be stated that the difference as for taking note of the periodical on the part of customer amounts to 16% in this city. Enclosing the periodical records better results.

Český Těšín (enclosed periodicals):

In total, 65 respondents were addressed in four areas. Sixty respondents received the enclosed leaflet, out of which five did not take notice of the enclosed leaflet. Success rate therefore amounts to 91%.

Český Těšín (separately distributed periodical):

In total, 65 respondents were addressed in four areas. Fifty-three respondents received the enclosed leaflet, out of which twelve did not take notice of the enclosed leaflet. Success rate therefore amounts to 79%.

In sum, it may be stated that the difference as for taking note of the periodical on the part of customer amounts to 12% in this city. Enclosing the periodical records better results.

4. Discussion and Conclusions

Non-direct distribution of publicity printed material represents a highly used instrument employed by the majority of commercial chains on Czech market. Its quality (percentage of the delivered material) within the Czech Republic depends primarily on the quality of chosen distributors, i.e. people who ensure physical distribution. In terms of sales returns and their increase, however, it is equally important to consider the percentual rate related to customer's ability to take note of the given periodical. The above stated research focused on the quantification of this percentual value.

Research results show the difference between the periodical that is enclosed and the one that is distributed separately.

Out of 410 respondents who were questioned in the areas where the periodical was enclosed, 380 respondents took note of such a periodical and they were thus able to make further use of it (decide about purchase) and 30 respondents did not take note of such a periodical at all.

Out of 410 respondents who were questioned in the areas where the periodical was distributed separately, 338 respondents took note of such a periodical and 72 respondents did not take note of such a periodical at all.

The difference as for taking note of the periodical on the part of customer therefore amounts to 11% in case of employing different ways of distribution.

What is more, research results enable us to reveal even more important fact. When focusing on the number of distributed items that was intentionally chosen so that it would be approximately the same, it is also possible to figure out "lost periodicals", i.e. the periodicals which customers did not have chance to encounter, which they did not read and were thus not able to make decision as to their prospective purchase of products offered in these periodicals.

This particular research detected the fact that in case of enclosed periodicals, 580 did not reach the customer at all (8% out of the total number of 7 247 distributed items).

In case of separate distribution, this number is even higher and amounts to 19% out of the total distributed quantity. In this case, 1 386 items did not reach the customer.

In each company it is possible to find out the volume of the carried out purchases and it is as well possible to figure out the number of the printed copies of publicity periodical. This consequently allows for the detection of the amount reflecting company's average loss resulting from separate distribution. It also enables us to find out how much more the company could have earned if it would join a partner, not mentioning considerable savings of financial means in case of joint distribution.

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Convertible debt financing during the financial crisis – an American case

Jakub Marszalek¹

¹*Department of Finance & Strategic Management, University of Lodz, ul. Matejki 22/26, 90-237 Lodz, Poland, e-mail: jakmarszalek@gmail.pl*

Abstract

Convertible debt may be a useful source of capital for the company in the time of troubled traditional financing. Conventional debt widened by the conversion to equity option gives wide range of financing variety. It may help the company to collect the lowered interest debt or issue shares during lower valuation time. Possibility of conversion seems to be the most important factor determining the convertible debt structure. In this article the some important parameters of convertible bond were analyzed before the time of financial crisis (2008) and after. Data, obtained from Bloomberg database, cover issuances from 2002 to 2011. Using some tests for statistical significant differences it has been shown that the economic crisis had a considerable impact on the convertible bonds issued by the American nonfinancial companies. Average time to maturity, time to conversion and conversion premium decreased after 2008. Higher conversion ratio and lower interest paid has been also observed. General conclusions refer to theoretical expectations. Convertible debt and its flexible features allow financing of the company during unfavorable time.

Keywords: convertible debt, financing, financial crisis

1. Introduction

Convertible bonds may become a valid financing option although they do not belong to the most frequently used sources of capital. The primary reason is their complex structure. Combining a classic bond with American stock options raises many valuation and investment risk estimation problems. Hence, when these instruments are used, questions about the reasons are immediately raised. Why does the issuer avail himself of such a complex way of raising capital instead of issuing stock or ordinary bonds? It may suggest that he wishes to hide away some information about the company from the investors increasing the risk as perceived by them. That may be especially important in the times of economic downturn when the prices of stock in the market are low and lower demand prevents from achieving operating results that would suffice to cover

financial costs. Lowering interest rates on offered bonds might then be an attractive option for the issuer.

The purpose of this article is to assess the changes in the structure of the convertible bond issued in deteriorating of economic conditions. Therefore, a comparison of bonds offered in the US market before the crisis 2008 and later was conducted. Changes in the structure of the instruments can test whether they are attractive way of funding the company during the economic downturn. The study assumes that negative changes in the business environment may determine companies to convertible bonds with higher conversion price or lower coupon. Offered instruments should also have a higher probability of conversion by the extended conversion period and buyback period.

The paper is structured in five sections: The second section discusses critical premises of convertible bond issuance. Section three commences the empirical analysis by describing data sets and methodology. The fourth section discusses the empirical results. Section five presents the discussion and concludes.

2. Critical premises of convertible bond issuance

Theoretical achievements devoted to reasons behind issuing convertible bonds start with a series of concepts, which explain the issue of hybrid debt instruments with information asymmetry. In accordance with this concept, members of the Board and shareholders will always differently assess development prospects of a company. Convertible bonds are issued when a business faces problems with raising capital from simpler instruments. There may be excess risk of bankruptcy implied by the issuing of ordinary bonds or fear of too much watered stock if the company decided to issue stock (Myers, Majluf, 1984). In such cases issuing convertible bonds sends a negative signal to the market as it means the Board are trying to hide problems with traditional financing with the hybrid nature of convertibles (Constantinides, Grundy, 1998). Conversion ratio may be the measure of potential difficulties. As evidenced by studies by Yong O. Kim (1990), the higher the parameter the lower profits should be expected for the issuer. However, it is worth referring to M. Brennan and E. Schwartz's idea pointing to positive aspects of the problem. Both authors in their work highlight that characteristics of straight debt and the upside potential associated with the underlying common stock are natural merits of convertible bonds which make them richer and more useful instruments. It is thanks to them that a company may issue bonds with lower interest rate or "sell" the stock above their current market price.

The assets substitution hypothesis assumes that if a company investment is financed with debt, shareholders will be more willing to increase the debt due to asymmetric distribution of investment benefits and risk (Jensen, Meckling, 1976). If a project is successful, they will receive higher rate of return from creditors. When an investment is a failure, they will lose as a result of potential stock price drops while creditors risk all of their invested capital. The assets substitution hypothesis assumes that a company may issue hybrid debt to moderate conflict between the owners and creditors (Green, 1984). If the value of stock is high, which makes bond conversion likely, shareholders will not want to undertake additional risk to avoid losing benefits from increased value of the company. High valuation „protects“ creditors against excessive risk. It means issuing hybrid debt is particularly justified when company's valuation is low in particular at the times of economic downturn.

Premises for using hybrid capital are differently explained by the back door equity financing hypothesis. In accordance with this concept, reasons for using convertible debt instruments should be derived from equity financing as debt conversion results in increased equity and its higher share in issuer's capital structure. Thus it is believed that hybrid financing is de facto equity financing deferred in time. Companies use convertible instruments as issuing ordinary debt is too costly (Stein, 1992). Debt element in a hybrid instrument allows managing financing in difficult times. By offering coupon payments and lower investment risk of a bond the issuer reduces the risk of possible acquisition of shares by investors. That facilitates equity increases under unfavourable circumstances, e.g., during economic downturn.¹

J. Zwiebel (1996) draws our attention to strategic aspects of issuing convertible bonds. He notices that when delivering risky investment projects a company is exposed to the risk of reduced market value which might lead to a takeover. Financing the same project with external capital may, in turn, stimulate the risk of bankruptcy. Company's Board may fear both forms of financing. Convertible bonds may reduce the above risk as the conversion of bonds will potentially improve issuer's liquidity and it will take place at higher stock prices minimising the risk of acquisition. Arguments used in this concept hold water also with reference to financing when company's valuation is low.

Additional aspects of issuing convertible bonds are also worth mentioning. These securities offer the possibility of benefiting from tax advantages as a result of extended time of conversion. Conversion period may be imposed by the issuer, hence it may be agreed with investors and the company will benefit from the tax shield and be free from the burden connected with bonds redemption (Jalan, Barone-Adesi, 1995). We should note that tax arguments in favour of the issue are strengthened by poor performance of the stock exchange.

Thus we may observe that issuing convertible bonds may be very profitable for an operator in conditions of undervaluation of the market price of his stock and difficulties in debt servicing. In both cases hybrid capital helps partly solve these problems. Issuing convertible bonds in the period of low market valuation, a company may decide on a relatively high conversion value, practically meaning issuing stock at a price above the one in the capital market. Thus the instrument may be extremely useful in the times of stock market downturn.

3. Methodology and Data

3.1. Sample description

The survey examined convertible bonds issued by US companies. Because of financial specificity the sample excluded banks, investment funds and other companies from the financial sector. The survey examined issuances before the financial crisis outbreak in 2008 and those that were realized after 2008. The beginning of the crisis the collapse of Lehman Brothers in September 2008 was assumed. 2008 was a time when bull market ended and the crisis began. For this reason, issuances in 2008 were excluded from the sample. The period before the crisis included 264 issuances realised in 2002–2007. The

¹ We should note, however, that works on this subject have evidenced that a public offer of debt convertible instruments leads to higher stock price reductions than issuing ordinary bonds, which may refrain companies with low valuation not to provoke the risk of a hostile takeover. See: Dann, Mikkelson (1984); Ammann, Seiz (2006); Elbadraoui, Lilti, M'Zali (2010); Zeidlera, Mietznerb, Schiereck (2012).

crisis period covers 296 issuances 2009–2011. The basic parameters of issued convertible bonds (buyback period, conversion conditions, conversion price and coupon) were analysed. The data was obtained from Bloomberg database. Buyback period set the maturity of the bonds. Conversion conditions were specified by the period from the date of issue until the first day of allowed conversion, the period from the date of issue until the last day of allowed conversion, the period from the first to the last day of possible conversion. Additionally, the effective time of debt maturity i.e. time taking into account the option of early redemption from the issuer's request (call option) was used. Terms of conversion were determined by the conversion ratio and the conversion premium at the issuance day. Conversion premium is defined as the conversion price excess over issuer's share price at the issuance day. Finally, information about the coupon was presented as a difference between the nominal interest rate offered to investors and the issuer's WACC of debt, obtained from Bloomberg database. From the same source WACC net debt, which takes into account the tax shield was also obtained. This data allowed calculating the difference of the cost of new net debt capital.

3.2. Methodology

To evaluate the differences between the parameters of the bonds issued prior to and during the 2008 crisis the statistical analysis based on statistical significance tests was used. T-test for independent samples and the Mann-Whitney test were used. T-test for independent samples was used to assess the significance of differences between the expected value of a quantitative variable in two independent populations. The null hypothesis is: $H_0: \mu_1 = \mu_2$ against the alternative hypothesis $H_1: \mu_1 \neq \mu_2$. The test is the t statistic test as (Starzynska, 2007):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{n_1 S_1^2 + n_2 S_2^2}{n_1 + n_2 - 2} \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (1)$$

where: \bar{x}_1, \bar{x}_2 – the arithmetic mean of the dependent variable for the population before and during the crisis, S_1^2, S_2^2 – variance of the dependent variable for the population before and during the crisis. This statistic has a t-distribution with degrees of freedom $df = n_1 + n_2 - 1$.

When the assumption of the homogeneity of variance cannot be complied strong version of the t-test (resistant to heterogeneous variances) was used. The formula of the test for such test is (Ruszkiewicz, 2011):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1 - 1} + \frac{S_2^2}{n_2 - 1}}}, \quad (2)$$

This statistic has a t-distribution with degrees of freedom $df = \frac{\left(\frac{S_1^2}{n_1 - 1} + \frac{S_2^2}{n_2 - 1}\right)^2}{\frac{S_1^4}{(n_1 - 1)^3} + \frac{S_2^4}{(n_2 - 1)^3}}$.

Differences between populations (specifically, between the expected values of the dependent variable in the compared populations) were considered as statistically significant if the probability of a t-test was lower than the level of significance α .

As an alternative to the t-test for independent samples when the assumption of normal variable distribution cannot be complied the Mann-Whitney's test was used. This test requires at least ordinal level of the dependent variable measurement. The null hypothesis is: $H_0: F_1 = F_2$ against $H_1: \sim H_0$, where F_1 and F_2 are the cumulative distribution functions of probability distributions of the dependent variable in the compared populations. If there are no linked ranks in the sample, the test is a statistic test (Szymczak, 2010):

$$Z = \frac{U - \frac{1}{2} \cdot n_1 \cdot n_2}{\sqrt{\frac{1}{12} \cdot n_1 \cdot n_2 \cdot (n_1 + n_2 + 1)}}, \quad (3)$$

where: $U = n_1 \cdot n_2 + \frac{n_1 \cdot (n_1 + 1)}{2} - R_1$.

If there are linked ranks in the sample, the test is a statistic test:

$$Z = \frac{U - \frac{1}{2} \cdot n_1 \cdot n_2}{\sqrt{\frac{n_1 \cdot n_2}{n \cdot (n-1)} \cdot \left[\frac{n^3 - n}{12} - \sum_{12} \frac{t_i^3 - t_i}{12} \right]}}, \quad (4)$$

where: $n = n_1 + n_2$, t – number of observations linked to particular rank.

In both cases, the statistic Z is approximately normally distributed with parameters 0 and 1. Since the null hypothesis assumes that two independent samples come from populations with the same distribution, the differences between populations are considered to be statistically significant if the probability for the Mann-Whitney's test is lower than the level of significance α .

4. Results

It turns out that the economic crisis started in 2008 has had a considerable impact on the issued convertible bonds. Slightly (by approx. 12 days) shortened the time from issuance to start conversion, while the median has not changed, and even mean differences are not statistically significant. Meanwhile, the other parameters of the issued bond were statistically significant changed. The mean of the time from the issuance moment to the end of conversion period decreased approx. twice and the median – even more. Before the crisis, the time from issuance to conversion emissions did not exceed 7292.5 days for the half of observations, while after 2008 it was only 2192 days. Similar differences relate to the time from the start to the end of conversion. Also, the time from issuance to the maturity of debt changed significantly – before the crisis it reached an average of approx. 3600 days, and after 2008 – approx. 2300 days. Effective time of the debt maturity increased as well. Before the crisis half of the observations did not exceed 1.65 years, after 2008 it was 1.86 years (mean of this parameter is significantly higher, with high standard deviation).

Table 1: Parameters of convertible bonds issued in the United States before and during the crisis of 2008.

Parameter	Moment of issuance	n	Mean	Standard deviation	Median	p
Period from issuance to conversion's beginning	before 2008	202	85.120	578.814	0.000	0.238
	after 2008	258	62.810	226.958	0.000	
Period from issuance to conversion's end	before 2008	263	6221.510	3124.982	7292.500	<0.001*
	after 2008	280	3177.290	2766.177	2192.000	
Conversion period	before 2008	263	6197.860	3132.474	7288.500	<0.001*
	after 2008	280	3152.610	2803.018	2191.000	
Buyback period	before 2008	260	3619.665	1985.216	3320.500	<0.001*
	after 2008	279	2257.384	1521.192	2202.000	
Effective buyback period (years)	before 2008	260	2.795	5.126	1.652	<0.001*
	after 2008	279	3.168	4.254	1.859	
Conversion ratio	before 2008	259	70.275	414.761	33.994	<0.001*
	after 2008	273	476.804	2013.009	46.847	
Conversion premium (%)	before 2008	242	31.870	15.887	32.226	0.155
	after 2008	215	28.965	10.311	27.500	
Interest premium (%)	before 2008	263	-0.230	1.986	-0.943	<0.001*
	after 2008	281	-2.625	3.040	-1.635	
Interest premium after taxes (%)	before 2008	123	0.601	1.866	-0.101	<0.001*
	after 2008	141	-1.368	2.415	-0.333	

The significance of differences was assessed using Mann-Whitney's or t test.

* – statistically significant differences at $\alpha = 0.05$.

Source: own studies based on Bloomberg.

Conversion premiums at the day of issuance decreased (although much less – the differences were not statistically significant). But conversion ratios increased significantly – half of them did not exceed approx. 34 before 2008. After 2008 they were higher than approx. 47. The crisis also forced significant changes in the offered interest rate. The difference compared to WACC of debt before 2008 for half of the sample did not exceed -0.943. After 2008 it was not lower than -1.635. When the differences are adjusted by taxes the direction of changes is similar. It is worth noting that the arithmetic mean is, even in both compared periods, has opposite character (before the crisis it was an average of 0.601, after 2008 -1.368).

5. Discussion and Conclusions

The study did not allow for a clear concluding. First of all, it has been shown that the rapid downturn significantly reduced the buyback period of offered instruments. Primarily conversion time was shortened. This observation contradicts the assumption made at the beginning of the article. Shorter period of conversion and buyback period reduces the probability of conversion. Specific advantages of the convertible bond are

strongly reduced then. The value of bonds due to the lower value of the conversion option is also decreased. At the same time, however, it was observed that convertible bonds offered a lower premium conversion. This means that the potential conversion was planned at a lower level of issuer's share price valuation. It reduces the attractiveness of hybrid financing too. Finally, the conversion ratio of issued bonds after the crisis was significantly higher and highly diversified. This caused greater dilution of equity. Thus it is another indication against the use of hybrid financing. Why, then, the outbreak of the crisis in 2008 did cause an increase of convertible bonds issuances among US companies? The reasons for this should be sought in changes in offered coupon. A marked reduction in the value of interest paid related to the debt held was observed. Therefore it can be assumed that crisis in 2008 affected mainly the cost of capital of the surveyed companies. The issue of hybrid debt de facto restructured their capital structure. The uncertainty in the stock market prevented to obtain equity capital in attractive way, but the hybrid nature of convertible bonds allowed favourable debt financing. Paradoxically, this marks the biggest advantage of hybrid financing – the possibility of exchange between the attractive issuance of shares and bonds. The study indicates that crisis in 2008 steered this exchange toward the debt. It doesn't mean that convertible bonds issued during the crisis are not beneficial for the company. It is worth remembering that in 2008 there was a paralysis of the US banking system. Terms of debt financing obtained by issued convertible bonds might be significantly more attractive than other alternatives. They also might be the only source of financing.

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Environmental taxes in Czech and Slovak Republic

Lenka Martínková¹

*¹Department of Public Finance, Faculty of Finance and Accounting, University of
Economics, Prague, W. Churchilla 4, 130 67 Praha 3, Czech Republic, e-mail:
L-Martinkova@seznam.cz*

Abstract

Importance of ecology is increasing at this time. A. C. Pigou was already discussing about environment. He tried to influence the behaviour of economic actors by introducing taxes and subsidies. His idea was not be success. Today the term “environmental taxes” is popularly known term. This paper discusses the development of environmental taxes in the Czech and Slovak Republic. This paper evaluates their development in individual years and compares both states. The importance of these taxes is assessed according to the share of environmental taxes on total tax revenues. In the next part is also explored the structure of these taxes in Czech and Slovak Republic. Energy taxes and their payers are analysed in the next part.

Keywords: environmental, energy taxes, transport taxes, taxes on pollution, taxes on resources, implicit tax rates, electricity tax rates, Slovakia, Czech republic, EU 27, comparison.

1. Introduction

Meaning of environmental grows in the last years. The negative impacts of human activity have the main role on detriment of society. The reason is growing up of population, their consumption and increasing pace of technical and technological development (OECD, 2011). It is possible to mention Environmental Kuznets Curve (D. Stern, (2004). The curve represents dependence of income per Capita on pollution of environment. A load on environment is evident in dependence on agricultural and industrial production. The advanced economy has other preferences from the specific moment. The consumers demand products environmentally friendly. Protection of environment is more significant for consumers and for all advanced economic state. It was published book on this theme called The Closing Circle in 1972. The author Barry Commoner researched post-war situation from point of view pollution of environment in USA. She pointed to dependence of pollution on growing of technology and dependence of pollution on growing population and their consumption. The growing of

technology is from point of view pollution more significant than growing population. This book was criticized from the reason of neglecting of growing population by Paul Ehrlich and John Holder. Because of that arose original equation IPAT.

A lot of authors research the theme of environmental taxes. Energy taxes analysed Zimmermanová the rates of the states are depicted in EC 2014. Taxes in the EU (EU 15 and EU12) researched Vitek. Šťasný elaborated scenarios reflecting various gas emission etc. Fuchsová proposed E3 sectors. Environmental taxes by paying economic activity are described in EC 2011.

The instruments, which should to prevent next pollution of environment, are e.g. environmental taxes. Environmental taxes meant double/triple dividend – improvement quality of environment, decreasing distortion taxes – this situation could be, reduction of labour tax, this theme analysed Goulder, and decreasing costs on protection of environment.

The aim of this paper is to compare the environmental tax revenues in Czech Republic and Slovakia, analyses the structure of environmental taxes and researches energy taxes. The values are presented in percentage environmental taxes to GDP and total tax and social contribution revenues. The values are in millions euro too.

The first part presents environmental taxes from the general sight in Slovakia, Czech Republic and EU 27. The second part includes tax rates, special electricity rate and compares them for each other. The third part presents the structure of environmental taxes and compares them and analyses energy taxes. The next part includes who pays energy taxes and compares implicit tax rates (ITR) on energy.

2. Methodology and Data

The tax revenues are analysing according to the date from the European Commission and from statistics of OECD. Eurostat divide environmental taxes into the following groups: Energy taxes (including CO₂ taxes), transport taxes and taxes on pollution/resources. The most important parts from energy taxes are electricity, coal and natural gas taxes. Ownership and using of motor vehicles are the main part of transport taxes. Taxes or fees linked to the extraction or to the use of natural resources integrate into taxes on resources. Taxes on pollution include emissions to air and water, noise and solid waste.

Environmental taxes are compared according to percentage these taxes to GDP and percentage to TSC in Czech and Slovak Republic. Data for energy tax rates are used from publication of European Commission “Excise duty table – Energy products and Electricity”. Environmental tax revenues according to economic activities are analysed for energy taxes in Czech and Slovak republic, Denmark and Germany. These data are collected from Eurostat.

3. Results

3.1. Environmental taxes in Slovakia and Czech Republic

The total environmental taxes increased by 2392 million euro in Czech Republic in 2012 in compare with 1995 and environmental taxes increased by 895 million euro in Slovakia. Denmark has the biggest environmental tax revenues from all states of EU. Denmark belongs to first states, which implemented environmental taxes.

Fiscal significant of environmental taxes is not great in these years. A share of environmental taxes to GDP was 2.35% in Czech Republic in 2012. A share of environmental taxes to total revenue from taxes and social contributions was 6.72% in Czech Republic in 2012. This share is 1.75% of GDP and 6.18% of TSC in Slovakia. Environmental taxes in EU 27 are 2.40% of GDP and 6.05% of the total taxes and social security contribution revenues. This situation is illustrated on figure 1 and 2.

Share of environmental taxes to GDP is lower in Slovakia than EU 27. The difference between EU 27 and Slovakia is about 0.65% in 2012. The share of environmental taxes to GDP is very similar in Czech Republic and EU 27. This share is only about 0.05% higher in EU 27 than in Czech Republic. The share to GDP is decreasing in Slovakia since 2004. The reason is that the environmental tax revenues were increased about 30% and GDP was increased about 37%.

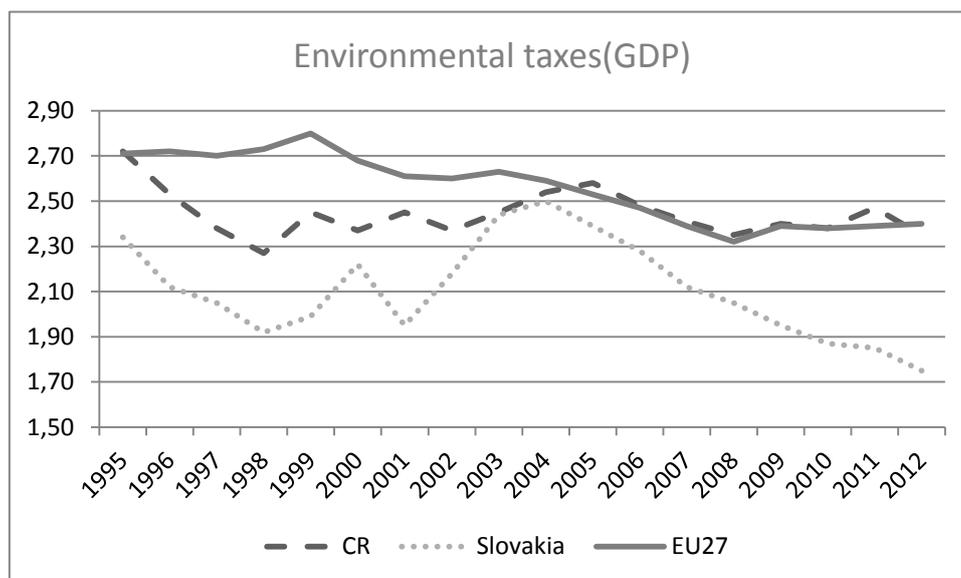


Figure 1: Percentage environmental taxes to GDP

The share of environmental taxes to total taxes and social security contribution revenues has unstable trend in Slovakia. These shares exceed Czech Republic since 2002. This share decreases under values of Czech Republic in 2009. The share of TSC is about 0.54% higher in Czech Republic than in Slovakia in 2012. The difference between EU 27 and Slovakia is only 0.13% in 2012. The values decreased about 1.76% between the years 2004 and 2012 in Slovakia. Figure 2 shows the reason of this decrease. Environmental taxes have the similar trend like TSC. TSC and environmental taxes increased since 2001. Trend of environmental taxes was changed since 2004. Environmental tax revenues increased lower than TSC. This trend has higher values of environmental tax revenues since 2007. Czech Republic has share of environmental

taxes on TSC higher than EU 27. The reason is that the values for EU 27 are for more states. It is average from 27 states of EU. The values of environmental tax revenues and TSC are closer each other in EU 27 than these values in Czech Republic.

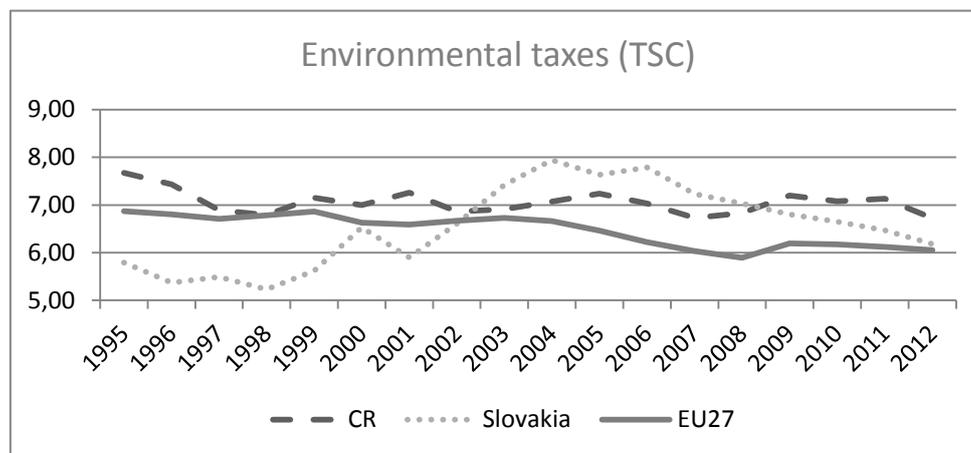


Figure 2: Percentage environmental taxes to total taxes and social security contribution

3.2. Energy taxes

EU implemented minimum rates of environmental taxation and some states had exception to impose the environmental taxes. Czech Republic and Slovakia apply this exception and these states had lower rates until 2010. Table 1 illustrates tax rates.

The tax rate is very different in these states. Electricity tax rate of selected states is below mentioned, as seen in figure 3. The selected states are Denmark, Germany, Slovakia and Czech Republic. Denmark is one of first states with environmental taxes. First environmental tax was energy tax in this state. Germany has fast growing economic. Germany achieves the biggest environmental tax revenues (58 004 millions euro) in 2012. When these tax revenues are compared with GDP, Germany is situated in the bottom third. Electricity tax rate is specific with them that a lot of states have two difference rates. These rates are determined for business a non-business. Figure 4 shows this situation. Non-business has higher rates than business. Denmark has the highest rate of these states. Denmark belongs to the states with the biggest environmental tax revenues (9 503 Millions euro, 3.87% environmental taxes to GDP). Electricity taxes (non-business) achieve the biggest revenues from all environmental taxes.

Table 1: Energy tax rates in Czech Republic and in Slovakia

	CR		SR
	Tax rate (CZK)	Tax rate - Euro	Tax rate - Euro
Electricity tax	28.30	1.09 € per MWh	1.32 € per MWh.
Natural gas	30.60	1.18 € per MWh	1.32 € per MWh.
Coal and coke	8.50	0.33 € per GJ	10.62 € per tonne

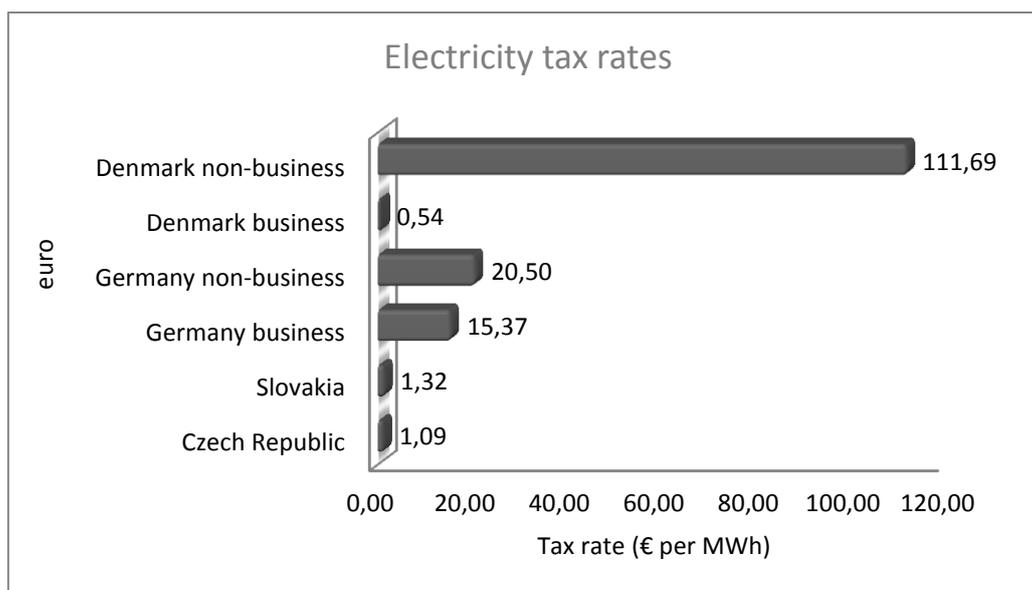


Figure 3: Electricity tax rates in selected states

3.3. Structure of environmental taxes

Figure 4 shows a distribution of environmental taxes. The distribution is from the point of view of energy taxes, transport taxes and taxes on pollution/resources. Energy taxes have the main part of environmental taxes in Czech Republic and too in Slovakia. These taxes are the most significant in the all EU. The transport taxes are more significant in Slovakia than in Czech Republic, as seen in figure 4. E.g. transport taxes included 11.11% of environmental taxes in Slovakia and 5.8% in Czech Republic in 2012.

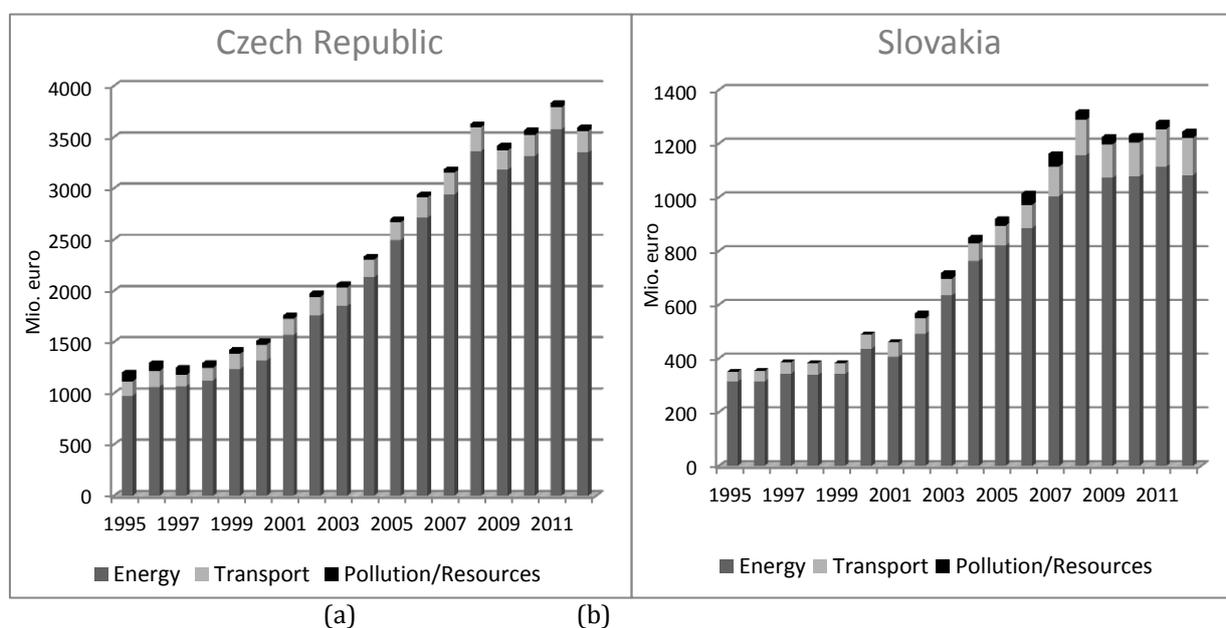


Figure 4: Structure of environmental taxes in millions euro: (a) Structure of energy taxes, transport taxes and taxes on pollution/resources in Czech Republic, (b) Structure of energy taxes, transport taxes and taxes on pollution/resources in Slovakia

Table 2: Structure of environmental taxes to total environmental taxes, GDP and TSC in Slovakia and Czech Republic in 2012

environmental taxes	millions euro		% of total environmental taxes		% to GDP		% to TSC	
	CR	SR	CR	SR	CR	SR	CR	SR
total	3595.61	1244.81	100	100	2.35	1.75	6.72	6.18
energy	3349	1082.75	93.14	86.98	2.19	1.52	6.26	5.38
transport	208.56	138.31	5.80	11.11	0.14	0.19	0.39	0.69
pollution/resources	38.05	23.75	1.06	1.91	0.02	0.03	0.07	0.12

Table 2 shows structure of environmental taxes in Slovakia and Czech Republic in 2012. These taxes are evaluated according to different indicators. Czech Republic has more revenues from total environmental taxes. When environmental taxes are compared in millions euro in these states, it is seen: Energy taxes in Czech Republic are about 68% higher than in Slovakia. The transport taxes are about 34% higher than in Slovakia. And taxes on pollution/resources are about 38% higher than in Slovakia.

In the next columns it is seen that energy taxes in all indicators are in Czech Republic higher than Slovakia. But the difference is in taxes on pollution/resources and transport taxes. There are tax revenues higher in Slovakia. Transport taxes: percentage to GDP is about 0.05% higher in Slovakia than in Czech Republic. Percentage of total revenues from TSC is about 0.03% higher in Slovakia than in Czech Republic.

Taxes on pollution/resources are about 0.01% (to GDP) and 0.05% (of total revenues from TSC) higher in Slovakia than in Czech Republic. But, when we give all taxes together, is clear that environmental tax revenues are higher in Czech Republic. Because of energy taxes have a big significance – about 0.67% (to GDP) higher in Czech Republic than in Slovakia.

Figure 5 shows development of percentage energy taxes to GDP. The values of Slovakia have decreased trend in 2004–2012. Development of Czech Republic has rather increasing trend other side. This percentage is higher than the EU 27 since 2000. Since 2004, the energy tax revenues increased by 30% in Slovakia. GDP increased by 37%.

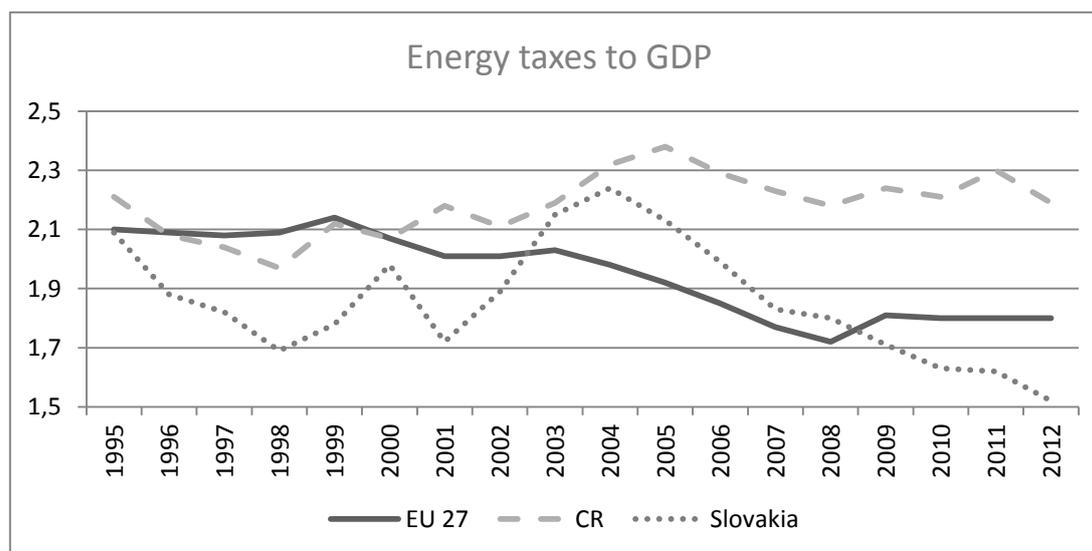


Figure 5: Percentage energy taxes to GDP

Figure 6 illustrate development of transport taxes. The transport taxes are higher in the EU 27 than in Slovakia and Czech Republic. Since 2004, Czech Republic has the lowest share of these taxes to GDP. The value of revenues between the years 2004–2012 increased about 17% and the value to GDP increased about 24%. The difference between the EU 27, Slovakia and Czech Republic is higher about 0.31% in the EU 27 than in Slovakia and about 0.36% higher than Czech Republic in 2012.

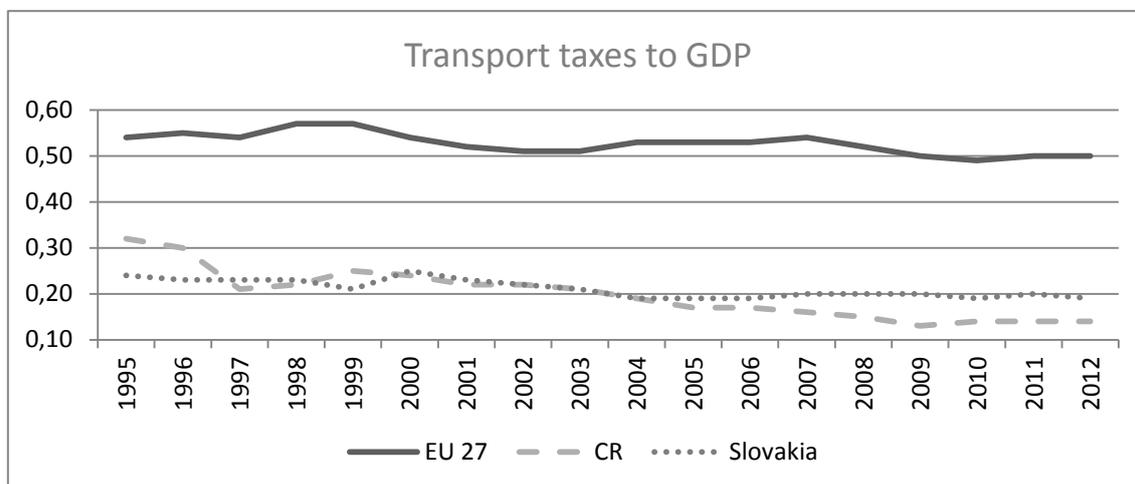


Figure 6: Percentage transport taxes to GDP

Figure 7 shows taxes on pollution/resources. Since 2008 were these taxes higher in the EU 27 than in Slovakia and Czech Republic (0.07% than Slovakia and 0.08 than CR). These taxes are significant in Slovakia since 2001. Because of these tax revenues on pollution/resources have value 0.07%. In 2008 tax revenues on pollution/resources decreased about 38% than in 2007. Share of tax revenues on pollution/resources in Czech Republic decreased about 0.18% in 2006 than 1995. Tax revenues on pollution/resources in these years decreased about 68%.

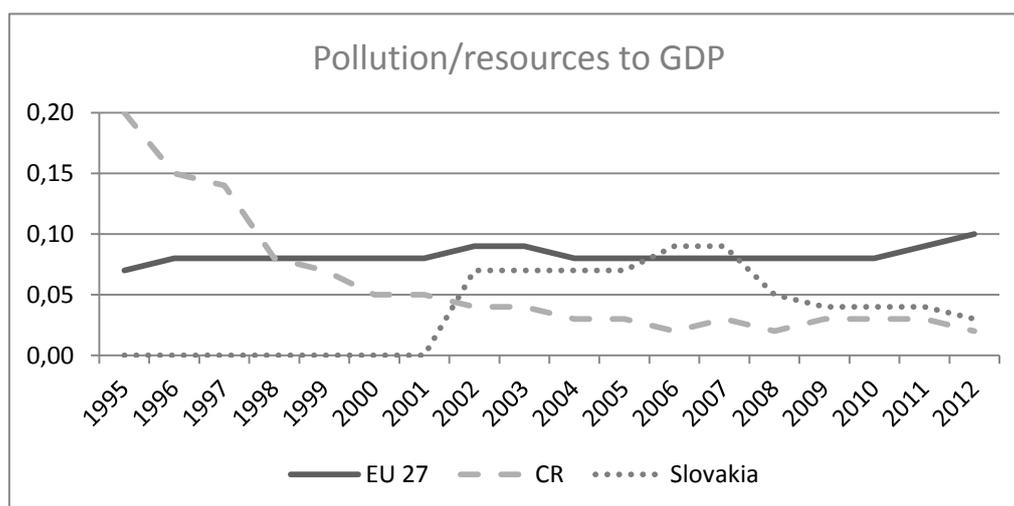


Figure 7: Percentage taxes on pollution/resources to GDP

3.4. Energy taxes by economic activity

Manufacturing and services pay the biggest part (more than 22%) of the energy taxes in Czech Republic., as seen in figure 8. The next biggest payers are households (more than 21%). Services are the biggest payers (more than 65%) in Slovakia. Manufacturing is on the second place (about 28%) in Slovakia. But Slovakia has not energy taxes from households and non-residents. Construction, agriculture and transportation are very low (insignificant) in Slovakia. Germany and Denmark are introduced for better comparison. Households pay the biggest part of energy taxes (more than 53%) in Germany and the same situation is in Denmark. Manufacturing pays from 60% transport taxes in Slovakia. Services and manufacturing pay from more than 22% transport taxes in Czech Republic. Households pay from more than 21% transport taxes in Czech Republic.

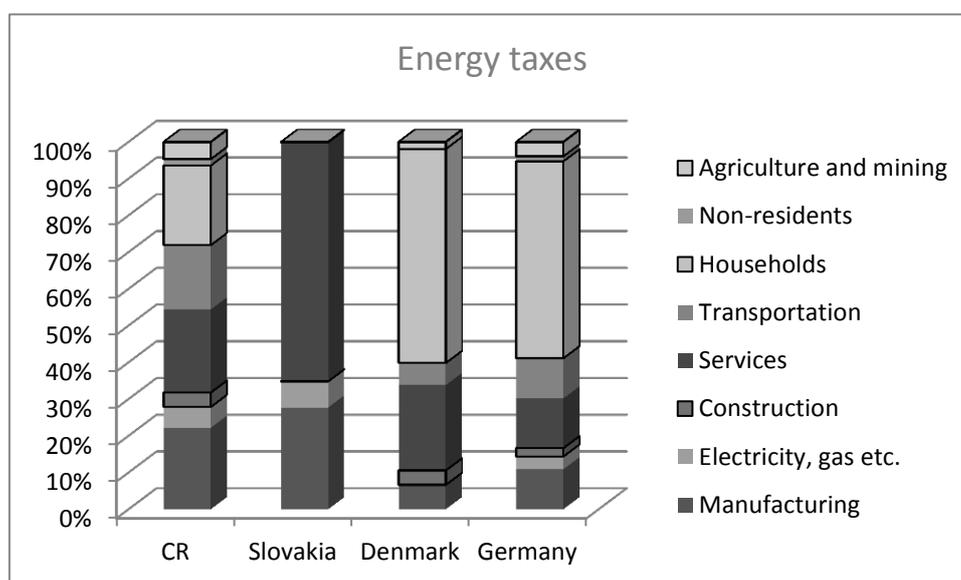


Figure 8: Energy taxes by economic activity in Czech Republic, Slovakia, Denmark and Germany.

3.4.1. ITR on energy

Since 2002, implicit tax rates on energy are represented in figure 9. This rate is defined as a ration between energy tax revenues and energy consumption. ITR achieved lower values in Czech Republic and Slovakia than in EU 28. Final energy consumption was around 2% of consumption the all EU 28 in Czech Republic and around 1% in Slovakia. Energy tax revenues are very significant environmental revenue, as seen in figure 4. Energy taxes on total environmental tax revenues of the EU 28 constitute only 1.4% in Czech Republic and about 0.5% in Slovakia. This is a reason why ITR achieve higher values in Czech Republic than in Slovakia.

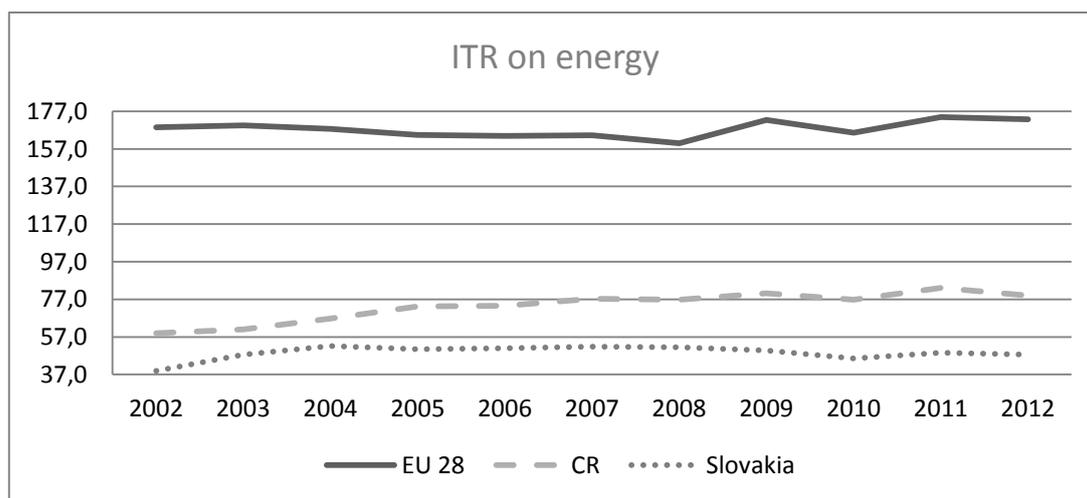


Figure 9: Implicit tax rates in the EU 28, Czech Republic and Slovakia

4. Conclusions

Entry into the EU meant for states a lot of changes. A big significance had protection of environment. So the states came into force Directive 2003/96/ES. The EU determined minimum rates of environmental taxation. Energy tax rates are higher in Slovakia than in Czech Republic. Electricity tax rate is the highest in Denmark (111.69 € per MWh for non-business). Environmental protection could be implemented a lot of provision – taxes, subsidies, fees and next economic instruments. Development environmental tax to GDP was decreased in Slovakia since 2004. Both of indicators increased in the years, but GDP rose faster than environmental tax revenues. Czech Republic has similar trend like the EU 27 since 2005. Environmental taxes to TSC are higher in Slovakia and Czech Republic than in the EU 27 since 2002. Czech Republic had from 1995 to 2012 similar trends. Slovakia had increasing trend to 2004 and since this year had rather decreasing trend. The reason of this situation is that Slovakia had increasing environmental tax revenues but TSC increased faster than environmental tax revenues.

Energy tax revenues are the highest revenues from environmental taxes all over the EU. Slovakia has energy tax revenues to GDP lower than Czech Republic. Transport tax revenues to GDP and taxes on pollution/resources to GDP are higher in Slovakia than in Czech Republic. The energy taxes development is similar in Slovakia than other environmental taxes since 2004. These taxes are by 0.67% lower in Slovakia than in Czech Republic and are by 0.28% lower than the EU 27 in 2012. Czech Republic has the highest energy taxes to GDP since 2000. The main reason is that Slovakia and other states have not this tax for households, but Czech Republic has energy tax for this group. Households in Czech Republic produce more than 21% revenues from energy taxes. This energy tax is imposed on the most on services in Slovakia. Because of ITR on energy is in Czech Republic higher than in Slovakia. Difference is 40% in 2012. GDP has the biggest effect on environmental taxes from selected factors.

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Sustainability and quality of life: the development model

Piero Mella¹ and Patrizia Gazzola²

*¹Department of Economics and Management, Pavia University, Via S. Felice, 5, 27100
Pavia, Italy, e-mail: piero.mella@unipv.it*

*²Department of Economics, Insubria University, Via Monte Generoso, 71, 21100 Varese,
Italy, e-mail: patrizia.gazzola@uninsubria.it*

Abstract

The aim of the paper is to analyze the evolution of the concept of sustainability and the connection with the quality of life (QOL). Exploring different dimensions of sustainability should be connected with the exploration of quality of life and developments on a global level as it is there, where sustainability can be destroyed or ensured. Sustainability should be based on social cohesion. The reason behind this is the difficulty in integrating the numerous needs of citizens and requirements of different cultures. This paper explores the link between quality of life and sustainability, it shows a model that explains how sustainability can help to improve the quality of life of citizens, examining, in particular, how culture and the territory (state, regional, provincial or local level) must be integrated in the development model. The research considers that the goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations. In this paper we argue that sustainable social development offers the most appropriate set of values for the creation and maintenance of good level of quality of life.

Keywords: Sustainability, development, quality of life, culture, territory, behavior, archetypes

1. Introduction

Attention to *sustainability* has led to an expansion of the concept to include more aspects. It has become a value-laden concept comprising many ideals such as equity, choice, confidence, and quality. Given that the term now has environmental, economic, social, and political dimensions, a broad, undifferentiated use of the term makes sustainability difficult to understand. Sustainable growth does not represent an option but is rather a necessary condition for success in the medium-long term; social responsibility becomes an important strategic factor (Clarkson, 1995). Growth and

development must be compatible with the needs and expectations of the citizens: consensus and social legitimization favor the conditions of trust necessary to achieve earnings and competitive advantages (GBS, 2001).

Sustainable development approaches everything in the world as being connected through culture and territory to the quality of life. For example, an island community may have to focus among other things on sustainable fishing, whereas a community dependent on forest products will have a different priority. Quality of life (QOL) is affected by internal or personal attributes of people and by the external or societal environment in which they live. The external/societal impact on QOL directly links quality of life to sustainability.

The paper explores this link and highlights the relativity of the concept of quality of life. The research describes human behavior and it shows a model that explains the connection between sustainability and quality of life. The work helps to understand how sustainability can improve the quality of life of citizens, examining, in particular, how culture and the territory must be integrated in the development model. The paper follows two purposes. First an attempt is clarify the meaning of the concept of sustainability and sustainable development by reviewing the existing approaches to this issue. This includes a reflection of the relationship to the concept of the quality of life buy discussing the question. Second a proposal to analyze sustainable development approaches and the connection with territory, culture and the quality of life starting from human behavior.

2. Methods

For the research the authors use some of the basic methods of the scientific research to obtain the information necessary to the complex systemic processing of the issue. The methods usually complement each other and, in consequence, overlap. The authors predominantly use methods of qualitative research, based on the theoretical analysis of available literature on sustainability frameworks, as well as methodologies for the integration of development models and decision-making.

The paper starts with the literature review, conducted analyzing the lines of thought retrieved in the major and specialized journals. The authors describe and synthesize the literature on the topics of *sustainability* and *quality of life*. The second part is about the development of a model useful to the public regulators for understanding the main behavioral structures on which the quality of life of the citizens depends. The model helps to develop the concept of social sustainability and QOL (Mella, 2012; 2014) and embraces a wide range of complex questions from “What dimensions reveal good quality of life?”; “What is the importance of material and immaterial aspects for achieving a good quality of the life?”; “What interactions are there between these dimensions? (Glatzer, von Below, Stoffregen 2004). The two subjects, sustainable social development and QOL, have mostly been treated separate from each other so far. The main contribution of this line of research is to explain the fundamental relation between the sustainable development (Porritt, 2007) and the QOL.

3. Literature review

The first well known definition of sustainable development was introduced in the Brundtland Commission report in 1987: “Development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development WCED, 1987). Sustainability is based on the idea that resources should as needed for present needs but not be used faster than they can naturally regenerate and be available for future and that the negative effects of the processes for production of goods can not be transferred to future generations. Elkington goes more into detail when arguing that companies should not only focus on enhancing its value through maximizing profit and outcome without worrying about the consequences of general environmental but concentrate on environmental and social issues equally (Elkington, 1997). In effect sustainability implies: «... a broad interpretation of ecological economics where environmental and ecological variables and issues are basic but part of a multidimensional perspective. Social, cultural, health-related and monetary/financial aspects have to be integrated into the analysis» (Söderbaum, 2008).

Moreover, referring to the definition by the “Brundtland Commission” (1987), Adams (2006: 1) observes: «Over these decades, the definition of sustainable development evolved. ... This definition was vague, but it cleverly captured two fundamental issues, the problem of the environmental degradation that so commonly accompanies economic growth, and yet the need for such growth to alleviate poverty».

The United Nations Secretary-General, Kofi Annan (2002), challenged business leaders to join an international initiative, the Global Compact, that would bring companies together with UN agencies, labor and civil society to embrace a set of shared values and principles in the areas of human rights and labor and environmental standards.

Costanza e Patten (1995) emphasized, taking the meaning of sustainability from biology, that: «Biologically, sustainability means avoiding extinction and living to survive and reproduce. Economically, it means avoiding major disruptions and collapses, hedging against instabilities and discontinuities. Sustainability, at its base, always concerns temporality, and in particular, longevity». Nevertheless, in general, as Pearce (1989: 69) has commented: «defining sustainable development is not a difficult issue. The difficult issue is in determining what has to be done to achieve sustainable development, assuming it is a desirable goal».

At present the most complete and adopted guidelines are the “Sustainability Reporting Guidelines on Economic, Environmental and Social Performance” (2000), published by the Global Reporting Initiative (GRI), that indicate the main topics firms should particularly focus on in their sustainability reports and propose performance indicators to communicate the impact of business activity based on three areas:

- *economic*, which refers to general aspects regarding the sustainability of corporate business in the long run;
- *social*, which refers to the impact of corporate activity on the firm’s stakeholders;
- *environmental*, which includes the evaluation of the impact of processes, products and services on natural resources (air, water and soil), biodiversity and human health.

The United Nations Conference on Sustainable Development promoted a framework for sustainable development that emphasizes a *three pillar approach* to institutional reform: economic development, social development and environmental protection (Johannesburg Plan of Implementation JPO, 2002).

At the World Environment Conference in Rio de Janeiro in 1992 was developed a framework known as Agenda 21 (2003) and Local Agenda 21 which has been taken up by an increasing number of cities in countries around the world. In 2012, twenty years after the first Earth Summit the key directions of green economy development and poverty elimination were discussed at the Rio+20. The concept of sustainable development was revised by putting the emphasis on the social and human dimensions that inherently broaden the scope of ecological and economic pillars of sustainable development (Gazzola, Dymchenko and Panova, 2014). According to the Rio Declaration 1992 and Agenda 21 (2003), any strategy for sustainable development has to include all dimensions of *economic, social, ecological, spatial* and *cultural* development (World Bank, 2001). Sustainable social development here means continuous progression towards creation of a human society that treats equally all *cultural, racial* and *language differences*. Equitable distribution of resources, revenues and information, are other necessities of social justice. There are a numbers of ways of illustrating the relationship between the three pillars (Cato 2009). In accordance with the WCED (1987) sustainability ideal we use the John Elkington model's (Figure 1): the "3 overlapping circles" model (the central part of the figure), which acknowledges the intersection of economic, environmental, and social factors. (Elkington, 1997; Schafer et al. 2000).

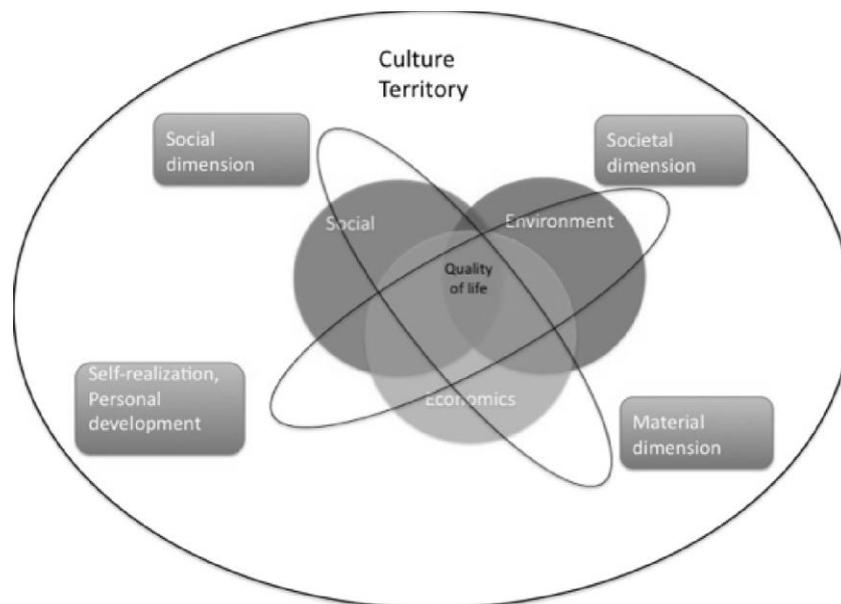


Figure 1: Sustainability and the spheres of the quality of the life (Source: Author)

The second concept we analyze is Quality of life that is conceived of as a focus on a person's well-being and mental state, in a broad and multidimensional sense (Böhnke, 2005; Vesan et al., 2011); QOL is «*meant to represent either how well human needs and aspirations are met or the extent to which individuals or groups perceive satisfaction or dissatisfaction in various life domains*» (Costanza, et al. 2006 p. 268). This definition allows us to link *sustainability* to QOL: the environmental, social, political and economic

sustainability means enabling humans to maximize their current QOL without damaging the ability of future generations to acquire an equally satisfactory degree of their future QOL (Chiu, 2003). The connection between quality of life and sustainability in the literature is evidenced by the continual interchanging of terms such as environmental quality, livability, quality of life and sustainability to describe similar concepts in this area (van Kamp et al. 2003).

The goals of social sustainability are that future generations should have the same or greater access to social resources as the current generation (Mak, Peacock, 2011; Davidson, Wilson, 2009). Social sustainability incorporates equity of access to key services (including health, education, transport housing and recreation), as well as equity between generations, meaning that future generations will not be disadvantaged by the activities of the current generation (McKenzie, 2004).

Quality of the life is multidimensional but for the research we can consider 4 spheres, as shown in Figure 1.

- *Material sphere*: the material standard of living is generally defined by the amount and the quality of goods and services offered to individuals by the public goods supply, including education, public transport, health care, child and senior care etc. We also consider the quality of the natural environment as belonging to this sphere.
- *Social sphere*: this sphere contains interpersonal aspects and refers to the need for social affiliation which is characterized by family, friendship and care. It therefore stresses the importance of those reproductive activities for quality of life that take place outside of the market (Colantonio, 2010) encompassing human rights, labor rights, and corporate governance (Walker, van der Maesen, 2004) that is becoming increasingly entwined with the delivery in sustainable community discourse and the urban sustainability discourse.
- *Personal development and self-realization*: the aspects of this sphere are very heterogeneous, include: status, professional self-realization, fun and playing, as well as societal and political participation. In a broader understanding we also include in this category: development options, meaning of life, availability of time, aesthetics etc.
- *Societal sphere*: in this sphere we include collective values like freedom, security, participation, solidarity and justice connected with the improvement of quality of life (Beck, van der Masesn, Walker, 1998) through education, justice, community participation and recreation.

If we put in the model the *culture* and the *territory* we can complete the development model (Figure 1).

4. Result and discussion

Because sustainability refers to the bridge between the present and the future, we think that sustainability is not just about the environmental issues such as depletion of the commons, waste and recycling, energy efficiency, water resource, building design, carbon emission, etc. but it is also in relation with social equity, economic prosperity and it includes human development, values and differences in cultures. Then, environmental issues cannot be separated from the wider challenges of social, economic and

institutional issues. Sustainable development approaches as being connected with territory and culture to the quality of life.

In terms of the world being connected by territory we can consider that Pesticides sprayed in Chile have the potential to harm fish stocks off the coast of Japan. The air pollution we create in Los Angeles affect the quality of air in Asia. On the flip side, clean air practices on one continent will positively impact air quality across the ocean. The kind of living is matters of personal choice, but personal choices are affected by the cultural environment. For example in some cultures the quality of life is connected with the satisfaction of material needs; in others it is connected with the reduction of the material needs (Hofstede, 1984).

Also time is very important for the connection with the sustainable social development and the quality of life. Today, we are either benefitting or suffering from the choices of our grandparents and other ancestors. Their decisions about how to farm their land, for example, continue to impact the agricultural practices of today. Looking to the future, the economic choices we make and policies we endorse today will be the ones affecting our children and grandchildren as adults. This pattern of behavior that emphasizes the benefits of *short-term individual* and *local*, rather than long-term, collective and global calls to mind an important systemic archetype (Figure 2-left) that precisely describes these behaviors as widespread and common in all ages and in all countries of the world that they can be regarded as a natural characteristic feature of human behavior.

The aim of archetypes, is to rapidly increase the capacity of the observer, the manager, the authority or the decision-maker to see the systemic problems, recognize the structures that determine these problems, and identify the main variables and their effects for the purpose of formulating definitive solutions (Senge 2006, p. 93).

Although it adopts a broad perspective, in practice the pursuit of sustainability is fundamentally an individual local endeavor because every community has different social, economic, and environmental needs and concerns. And in each community the quality, quantity, importance, and balance of those concerns is unique (and constantly changing). For that reason – and because the best mitigation efforts also tend to be short-term and locally based – we tend to speak of sustainability mostly in terms of local actions and decisions (Monday, 2002).

The archetype that dominates the prevailing form of *human myopic behavior* is very powerful, since the individual that carries out the archetype sees it as entirely rational. In fact, every agent naturally behaves based on his own individual, local and short-term rationality, not “willingly” accepting being guided by a global rationality. The short-term individual and local advantage prevails over the long-term collective and global one in conditioning choices.

Thus in order to deal with the problem of sustainability in individual behavior, not only in the economic area but the social and environmental ones as well, regulatory authorities must act to counter the reinforcing effect of loops [R1] and [R2]. There are three important *weakening actions* for such loops; to better understand these we can refer to Figure 2-right. The *first* solution is to try to weaken or eliminate loop [R1]. Since the local advantages would immediately reveal the benefit of the individual action, an appropriate system of disincentives, even in the form of sanctions or the imposition of costs and taxes, proportional in some way to the amount of short-term local advantages, would lessen the perception of the convenience from repeating the current behavior, thus forming the balancing loop [B1], which could compensate the effects of loop [R1].

A *second* way to counter the archetype is to weaken loop [R2], which produces an underestimate by the agent of the long-run disadvantages. An incisive, widespread and continual stream of information about the negative long-run global effects due to short-term, local and individualistic behavior would lead to a conscious awareness by the agent of the global harm from his behavior. The persuasive capacity of this information must be proportional to the amount of short-term local advantages. The more relevant these are, the more the information must be insistent, repeated, uniform, credible, convincing and diffused over vast territories.

The *third* form of intervention to reduce the negative effects from the action of the left archetype in Figure 2 is to act directly on the agent's current behavior through incentives, even in the form of social and economic benefits, rewards, tax breaks, etc., to induce the agent to modify his current behavior by reducing its intensity and frequency and adopting processes and technologies that reduce the long-term global disadvantages.

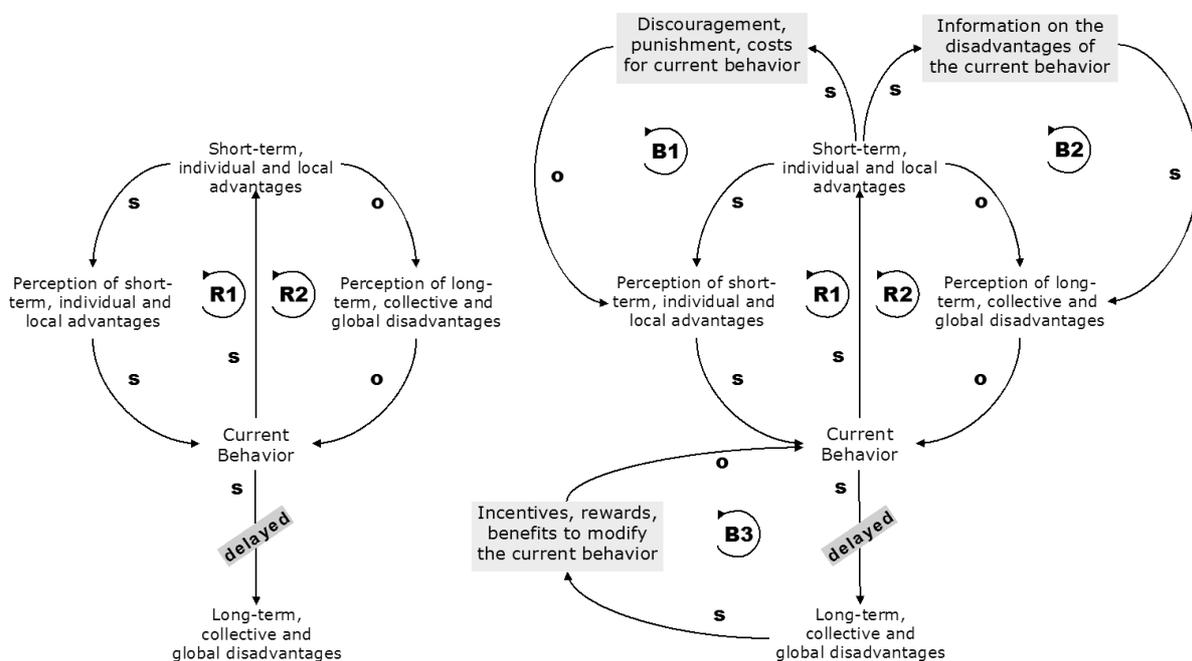


Figure 2: Models describing human myopic behavior (left) and strategies for countering it (right) (Source: Mella, 2014, sect. 1.6.6).

The archetype in Figure 2-left highlights the relativity of the concept of quality of life. Social agents prefer, in fact, maximize the quality of their individual lives or in their community, in their territory, in the short term, deferring to future decisions, often in the long run, the issue of sustainability of their quality of life.

According to (Camagni, Capello and Nijkamp, 1998) it is the interaction and balance of the physical, economic and social components of quality of life (Figure 1) that influences sustainability: «sustainability relates to the dynamic, balanced and adaptive evolutionary process, i.e. a process in which a balanced use and management of the natural environment [such that the] basis of economic development is ensured» (1998:105).

5. Conclusions

The concept of social sustainable development put emphasis on the social and human dimensions that inherently broaden the scope of ecological and economic pillars of sustainable development. Sustainable development that consider the four spheres of the quality of the life (section 3, Figure 1) implies the improvement of quality of life through education, justice, community participation and recreation (Beck, van der Masesn, Walker, 1998). The social sustainability (Colantonio, 2008) is a fundamental component of sustainable development to encompass human rights, labor rights, and corporate governance (Walker, van der Maesen, 2003; Davidson, Wilson, 2009) that is becoming increasingly entwined with the delivery in sustainable community discourse and the urban sustainability discourse. The goals of social sustainability are that future generations should have the same or greater access to social resources as the current generation (Chiu, 2003; Mak, Peacock, 2011), meaning that future generations will not be disadvantaged by the activities of the current generation (McKenzie, 2004) (Gazzola, Dymchenko, Sribnyi and Panova, 2013)

The good quality of the life can only be maintained in the long run when social and cultural environment are respected. That is, how people feel about their lives is directly affected by the state and future direction of their wider community. Consequently, quality of life is inextricably linked to the concept of sustainability.

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Is it Possible to Predict Managerial Decisions under Ethically Problematic Conditions from Personality Traits?

Andrej Mentel¹ and Pavel Žiaran²

¹*Institute of Social Anthropology, Faculty of Social and Economic Sciences, Comenius University in Bratislava, Mlynské luhy 4, 821 05 Bratislava, Slovak Republic, e-mail: andrej.mentel@fses.uniba.sk*

²*Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: pavel.ziaran@mendelu.cz*

Abstract

Objective: People differ in their aspirations to take the managerial position if their target company violates ethical standards. However, it is not clear what influences their decision. In our study, we test the structural hypothesis concerning the relation between particular personality traits and decision-making under ethically relevant situation.

In order to explain the inter-individual differences, we examine the relation between decision for (or against) managerial position under ethically different conditions and the underlying psychological processes as measured by the HEXACO personality inventory. HEXACO model distinguishes 6 personality dimensions: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience; each dimension is composed of four sub-dimensions (facets). In our study, we take into account four facets of the Honesty-Humility scale, because this scale attempts to measure the ethical dimension of personality. **Sample and methods:** In our study, 157 undergraduate students of business filled the questionnaire containing HEXACO-60 items and responded further questions dealing with their managerial decisions under ethical constraints. Structural Equation Modelling was used to link the relevant personality traits and decision-making. **Results:** Four facets of Honesty-Humility Scale are arranged into two latent variables (Relationship towards Material Values and Relationship towards Other People). These latent variables significantly predict managerial decisions both in ethically neutral as well as in ethically problematic situation.

Keywords: Personality traits, HEXACO-60, decision-making, managerial aspirations, Structural Equation Modelling

1. Introduction

Nowadays organizations are dealing with a number of ethical scandal that resonate in the society and have negative impact on the whole economy at the national as well as global level. In 2001 the world saw the fall of Enron and one of the most reputed auditing and advisory companies, due to unethical behavior of managers (Americ and Craig 2004, Koehn 2005). As a consequence, a wide spectrum of regulations and legislation was introduced, with the objective to eliminate unethical practices with its devastating consequences. In November 2014, an information appeared in the media that the world economic crisis 2008–2009 was caused, once again, by unethical decisions and practices made by individuals, managers and employees of major investments banks in the United States (Taibbi 2014, Tvardzik 2014). This brings a suggestion that the control of devastating ethical practices should be controlled already at the moment when the employee or manager is being hired to the company. The objective of this paper is to bring an evidence how four simple personality traits (modesty, sincerity, fairness and greed avoidance) of the Hexaco personality test (Ashton and Lee, 2007; Ashton and Lee, 2008) can predict managerial behavior in the ethically neutral and ethically problematic conditions.

2. Theoretical framework

Personality test Hexaco-PI-R represents a new trend in the personality psychology. Original concept of the five factor model, based on five personality traits (emotionality/neuroticism, extraversion, agreeableness, conscientiousness, and openness to new experience) was enriched by the idea of adding a new personality traits Honesty – Humility. Honesty-Humility (or h-factor) is constructed from four “narrow traits” or “facets” as follows: modesty, sincerity, fairness and greed-avoidance (Ashton and Lee 2007; Ashton and Lee, 2008). The content of the four facets of h-factor is explained in the Tab. 1.

For the purpose of a more accurate analysis we grouped the four facets into the two super-facets: (1) “Relation to the people” is created by the facets “sincerity” and “modesty”. (2) “Relation to the material values” is created by the facets “fairness” and “greed avoidance”.

Table 1: Definition of four facets of the Honesty-Humility personality trait (Hexaco-PI-R test)

Domain	Facet	Description
Relation to wards other people	Sincerity	Tendency to be genuine in interpersonal relations. Low scorers will flatter others or pretend to like them in order to obtain favors, whereas high scorers are unwilling to manipulate others.
	Modesty	Tendency to be modest and unassuming. Low scorers consider themselves as superior and as entitled to privileges that others do not have, whereas high scorers view themselves as ordinary people without any claim to special treatment
Relation towards material values	Fairness	Tendency to avoid fraud and corruption. Low scorers are willing to gain by cheating or stealing, whereas high scorers are unwilling to take advantage of other individuals or of society at large.
	Greed Avoidance	Tendency to be uninterested in possessing lavish wealth, luxury goods, and signs of high social status. Low scorers want to enjoy and to display wealth and privilege, whereas high scorers are not especially motivated by monetary or social-status considerations.

More research works confirm that Hexaco test, and especially h-factor has strong predicting capacities as regards ethical or unethical behavioral tendencies, as follows: It predicts better delinquency at the work place than the previous generations of tests based on the five factor models (Lee, Ashton and De Vries, 2005). It works as a good indicator of professional and ethical integrity (Lee, 2008). H-factor is also a good predictors of the so-called Dark Triad which includes psychopathy, machiavellism, narcissism (Lee et al., 2013). It is a strong predictor of the job performance in the field of healthcare (Johnson, 2001)

3. Research objectives and hypotheses

The main goal of our research is to find whether the personality traits as measured by the six-factorial model HEXACO can predict human behavior in the context of business. We see business decisions as regulated by the wide set of rules including ethical norms and standards. However, it is not really clear whether the HEXACO personality inventory may predict decisions of participants under ethically different conditions. If the six-factor model describes the personality adequately, it should enable us to predict the subject's decisions. According to the theory of HEXACO model, the H-factor should be the best predictor of managerial decisions. This result was confirmed in our previous study (Žiaran and Mentel, 2015). In this study, we want to go one step further and to examine the internal structure of the H-factor and its influence on the decision-making under ethically relevant conditions. In this study, we may set the following hypotheses:

1. We may consider the subscales "Modesty" and "Greed Avoidance" to be indicators of the input latent variable "Relationship towards Material Values". In a similar way, subscales "Fairness" and "Sincerity" are observable indicators of the second latent variable "Relationships towards Other People".
2. Decisions for managerial or employee positions are indicators of two output latent variables according to the condition (morally neutral vs. morally problematic).
3. We propose the link between both input latent variables and both output latent variables.

In other words, we expect that the relationships towards material values and towards other people are significant predictors of (different) decisions under morally different conditions.

4. Methodology and Data

4.1. Data collection

Data was collected in the paper-and-pencil administration of the questionnaire consisting of several parts. The sample consisted of pre-graduate students of Business from Mendel University in Brno (N = 157; 108 females, age 21–22). First part was the personality inventory HEXACO-60, i.e. version with sixty item, that suits well for the research at school and universities with the limited amount of time (Ashton and Lee, 2009). Scoring key to the test is available online (Ashton, 2015).

Let's note that in some cases, narrow traits (facets) can have better predicting capacity than the wider traits of the Hexaco, especially as regards Honesty-Humility

dimensions and its four facets: sincerity, modesty, fairness and greed-avoidance (Ashton 1998, Ashton et al. 2014, Salgado et al. 2013).

Research, based on the lexical analysis in several cultures and languages, showed that the Hexaco is cross-culturally valid, (Ashton and Lee, 2015).

Personality inventory was followed by the number of tasks covering various topics of decision-making in the business context. For this study, four of them are relevant. They cover the decisions for managerial and employee position under two conditions briefly described in the vignettes (short stories) introducing these items. First of them is ethically neutral, i.e. the company described in the vignette doesn't violate ethical standards. The second is ethically relevant, i.e. participants have to express their willing to become manager or employee in the company clearly violating commonly accepted ethical standards and norms.

All items were in the form of five-grade rating scale (1 = strongly disagree to 5 = strongly agree). Before the analysis, all negatively-keyed items were rescored to obtain positive item-total correlations for particular dimension.

4.2. Data analysis

The HEXACO-60 was scored according to the original procedure, i.e. for each dimension as well as sub-scale, the arithmetic mean of responses to relevant items were calculated. The exploratory factor analysis shows that each sub-scale is reasonably correlated with particular dimension and the six-factor structure may fit the data well (det r = .001; KMO = .658; $\chi^2(147)=175.028$; $p > .05$; for the factor pattern matrix, see Tab. 2).

Table 2: Factor pattern matrix; Maximum likelihood extraction, Direct Oblimin Rotation

	Emotionality	Extraversion	Openness to Experience	Agreeableness	Honesty – Humility	Conscientiousness
Sincerity	-0.073	-0.047	0.008	-0.016	0.642	-0.021
Fairness	0.185	0.055	0.020	0.035	0.568	0.223
Greed Avoidance	-0.015	-0.120	-0.116	0.150	0.488	-0.142
Modesty	0.112	0.053	-0.082	-0.016	0.350	-0.295

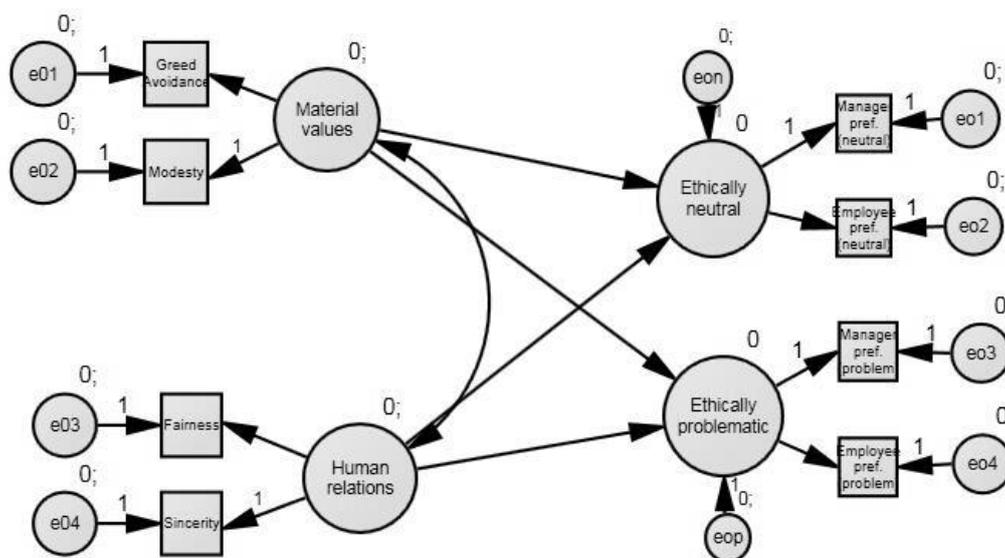


Figure 1: The Structural Equation Model of the proposed relations between variables

We use AMOS package (Arbuckle, 2006) to test the structural hypothesis about the subscales of H-dimension and the decisions under two different conditions.

The structural diagram showing these assumptions and hypotheses is in the Fig. 1.

5. Results

Also the most strict criterion of the model-data fit shows insignificant difference between the model and the data ($\chi^2(15) = 18.401$; $p > .242$). Also the commonly used and more permissive fit indices show that model fits the data very well (RMSEA = .038; CFI = .988; NFI = .943).

The estimated regression weights are in Tab. 3; standardized weights are in Tab. 4.

Table 3: Regression Weights (non-standardized)

			Estimate	S.E.	C.R.	P
Ethically neutral condition	←	Relations to Material Values	-2.381	0.982	-2.425	0.015
Ethically neutral condition	←	Relations to Other People	1.151	0.736	1.563	0.118
Ethically problematic condition	←	Relations to Material Values	-1.372	0.483	-2.839	0.005
Ethically problematic condition	←	Relations to Other People	0.104	0.350	0.296	0.767
Preference to be Manager (Neutral)	←	Ethically neutral cond.	1			
Preference to be Employee (Neutral)	←	Ethically neutral cond.	-0.934	0.144	-6.487	***
Preference to be Manager (Problematic)	←	Ethically problematic condition	1			
Preference to be Employee (Problematic)	←	Ethically problematic condition	-0.655	0.147	-4.451	***
Greed Avoidance	←	Relations to Material Values	1.586	0.361	4.397	***
Modesty	←	Relations to Material Values	1			
Fairness	←	Relations to Other People	1.099	0.301	3.650	***
Sincerity	←	Relations to Other People	1			

Table 4: Standardized regression weights

			Estimate
Ethically neutral condition	←	Relations to Material Values	-1.113
Ethically neutral condition	←	Relations to Other People	0.700
Ethically problematic condition	←	Relations to Material Values	-0.540
Ethically problematic condition	←	Relations to Other People	0.053
Preference to be Manager (Neutral)	←	Ethically neutral condition	0.871
Preference to be Employee (Neutral)	←	Ethically neutral condition	-0.809
Preference to be Manager (Problematic)	←	Ethically problematic condition	0.962
Preference to be Employee (Problematic)	←	Ethically problematic condition	-0.661
Greed Avoidance	←	Relations to Material Values	0.664
Modesty	←	Relations to Material Values	0.461
Fairness	←	Relations to Other People	0.561
Sincerity	←	Relations to Other People	0.627

We may interpret the Tabs 3 and 4 in the following way: Higher level of the variable Relationship towards Material Values (i.e. more modest and greed-avoidant participants) predicts significantly lower level of managerial preference under both conditions (morally neutral as well as morally problematic). However, their values are visibly different: Under the ethically problematic condition, the regression weight is approximately one half of the weight observed in the neutral case.

On the other hand, higher level of the variable Relationships toward Other People (i.e. more fair and sincere participants) predicts slightly higher albeit non-significant level of managerial preference under the ethically neutral condition. However, in the ethically problematic case, this regression weight is close to zero.

6. Discussion and Conclusions

Our findings can be summarized in two ways: First, the internal structure of the H-factor divided into two latent sub-dimensions seems to be reasonable both on conceptual as well on statistical level. Conceptually, it makes sense to combine Modesty and Greed Avoidance into one latent variable measuring the relationship towards material resources. The same can be said about the Fairness and Sincerity scales – they can be seen as indicating the common latent variable measuring the relationship towards other people. However, we have to examine whether such a conceptual construction has a predictive power in relation to external tasks. If we take into account the decision-making under ethically sensitive conditions, it should be reliably explained by the variables dealing with ethical aspects of personality. Our study supports this expectation. In ethically problematic situation, the decision for a managerial position is almost exclusively predicted by the relationship towards material things (modesty predicts avoiding of such a job and vice versa). In ethically neutral situation where the participants saw no important transgressing of moral standards, not only relationship toward material things but also toward other people played a role. However, the latent variable combined of fairness and sincerity appeared to have just a small influence on the decision.

The second aspect of our study is the attempt of predictive validation of the HEXACO personality test. If the “ethical” dimension has some practical sense, it should be proved to be a reliable predictor of morally relevant decisions. We do not compare the predictive qualities with other instruments, such as NEO-PI-R (Hřebíčková, Urbánek and Čermák, 2002); this work has to be done later. However, our aim is to open the discussion about psychological factors influencing economic decisions.

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Full operating cycle and its influence on enterprise characteristics: V4 food and beverages processing firms case

Grzegorz Michalski¹

¹Department of Corporate Financial Management, Faculty of Engineering and Economics, Wroclaw University of Economics, Komandorska 118, 53-345 Wroclaw, Poland, e-mail: Grzegorz.Michalski@gmail.com

Abstract

The research aim of the study is to determine the rules governing the modern cash management in enterprises with a full operating cycle with particular emphasis on environmental conditions influencing enterprises. Having a full operating cycle is defined as a situation in which the small or medium enterprise has a stock of materials or raw materials, which then as a result of the technological process converts the finished products, offers them for sale through both cash sales and sales on the basis of the use of trade credit receivables. Used in this definition, full operating cycle consists of the conversion of inventories (including the time required to collect the materials and / or raw materials, processing them, and the time required storage of finished products before transfer) and the full period of collection of receivables. Research hypothesis is the belief that the currently observed in many companies operating in industries using full operating cycle, assessed by investigators as “excessive” cash reserves, are dependent on factors that give to describe the relationship between risk and uncertainty and the expected and realized under conditions of risk and uncertainty in the value added generated by enterprises with a full operating cycle. External factors resulting from the economic situation surrounding the company, interact with the operating cycle of the overall enterprise operational risk which is reflected in the level of cash held. At the core of the research hypothesis is the belief that the level of cash and cash management policies in the enterprise in an integrated manner with other elements resulting from the operating cycle contribute to moderating the risk of the enterprise and that it can be shown using empirical data from companies operating effectively in practice business.

Keywords: financial efficiency, working capital management, operating cycle, food processing firms

1. Introduction

The full operation cycle is connected with higher probability of imperfection in the realization business cycle. The aim of management of cash is to define the resources of cash in the firm at such a level that it contributes to the highest increase in owners' property. In other words, it's about bringing the firm's held liquid resources to a level that is optimal from the point of view of the balanced costs of maintaining liquidity and total cost of holding too low a level of resources. The type and size of these costs is partly dependent on the financial strategy conducted by the firm (Michalski 2014; Michalski 2015). The relationship between the level of cash and other current assets, such as the previously discussed inventory and accounts receivable, depends on the specificity of the firm. Firms operating in a situation of high uncertainty and risk will have relatively higher cash resources – compared to the level of other current assets. Another element that may affect the growth of the average level of cash in the enterprise and increase their relative share in the structure of current assets is the amount of the costs of transactions and the cost of capital. Generally, it is recommended that the level of each of these current assets like cash, inventories, and receivables, be analysed separately. Connections between them are then taken into account when designing the cash poll. The approach to cash management in enterprises is different from the approach taken in large companies. As in most cases, when the owner controls all matters pertaining to the cash in the enterprise, it is possible for the owner to flexibly adapt the cash management models to a much greater extent than in the case of companies in which the knowledge of the individual areas related to the inflows and outflows of cash is distributed among many employees, or even between different branches of the enterprise. Based on observations of current inflows and outflows, an enterprise can classify its situation in the cash management as one of the following: I. Future inflows (CIF) and outflows (COF) are possible to predict, and inflows are greater than outflows. II. Future inflows (CIF) and outflows (COF) are possible to predict, and outflows exceed inflows. III. Future inflows (CIF) and outflows (COF) are possible to predict, but it is not possible to determine which kind of cash flow prevails. IV. Future inflows (CIF) and outflows (COF) of cash are not possible to predict.

Depending on the character and the sizes of cash inflows and outflows of an enterprise, one of the four basic models can be used for the management of cash. These models are Baumol, Beranek, Miller-Orr, and Stone models. It is normal that, for an enterprise, one of the previously mentioned circumstances does not have to be present permanently. The same enterprise can experience both a period in which there is a surplus of inflows over the cash outflows, as well as one in which there is the opposite situation or it is not possible to define it. The same applies to the predictability of future cash inflows and outflows. There are both periods in which, with no major difficulties, the trader can predict inflows and outflows, as well as periods when it becomes very difficult, if not impossible, to do so.

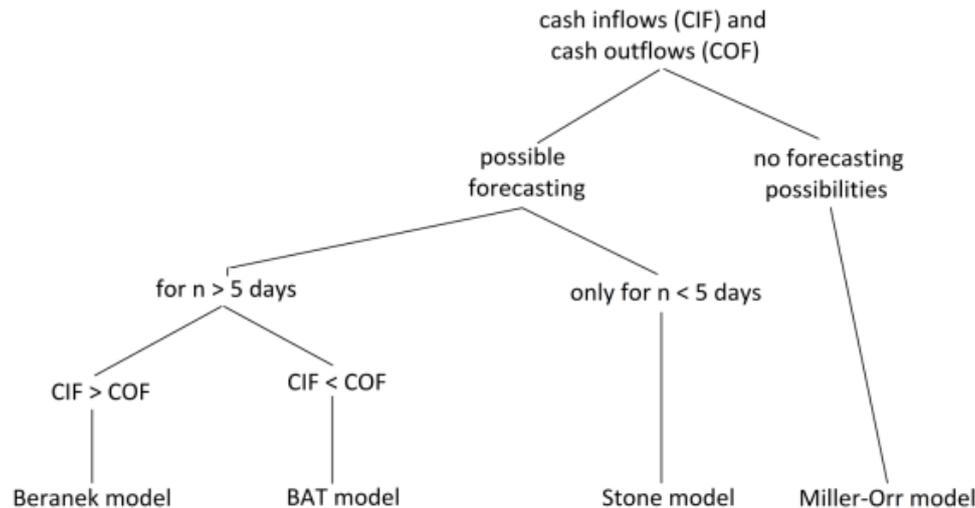


Figure 1: An integrated approach to the use of the cash-resources-management models depending on the quality of information possessed on inflows (CIF) and outflows (COF) of cash in businesses (Michalski 2014).

In each of these models, like in inventory models, it is necessary to know the minimal cash balance (LCL). The formula for LCL is based on the inventory's minimal level with adequate for cash balances reinterpretation (Michalski 2014; Michalski 2014):

$$C^* = L_{cash} = \left(-2 \times SD^2 \times \ln \times \frac{CC \times G^* \times SD \times \sqrt{2\Pi}}{P \times K_{loc}} \right)^{0,5} \quad (1)$$

where SD = standard deviation of daily net cash inflows/outflows, K_{loc} = the cost of the lack of cash, $L_{cash} = C^*$ = low cash level or minimum cash level, CC = cost of capital, $\Pi = 3,1416\dots$, P = the sum of all cash inflows (CIF) and cash outflows (COF) in analyzed period, K_{loc} = full expected cost of lack of cash, and G^* = average size of one cash transfer, which is the basis of standard deviation calculation. In the Beranek and Baumol-Allais-Tobin (BAT) models, transfer G^* is twice the optimal cash level; in the Stone and Miller-Orr models, the average transfer G^* is assigned from real historic data or from its anticipation (Michalski 2015; Michalski 2014).

The cost of the lack of cash depends on the risk sensitivity of the firm and that cost could be estimated as follows (Michalski 2014):

$$K_{loc} = |\Delta V_{NCSH}| = \left| \Delta FCF_{0(NCSH)} + \frac{\Delta FCF_{1..∞(NCSH)}}{CC(NCSH)} \right| \quad (2)$$

where ΔV_{NCSH} = lack of cash firm value influence (usually the firm value destruction).

Depending on the kind of business, a lack of cash is always destructive and costly, but not always at the same level. During a higher risk pressure, K_{loc} is higher than the time with lower operational risk.

The goal of the paper is to find if there is an correspondence between fact of having full operating cycle and firms cash levels observed in real economy. As main representatives of real economy, are used firms from two agriculturally connected sectors: processing of food and processing of beverages industries. That is not a perfect choice, but, at first, such sectors have a full operating cycle, and we have good quality data for that sectors for firms that operate in V4 countries.

Table 1: Unleveraged betas levels for OECD countries at the end of the year.

[unleverag.beta]	2010	2011	2012	2013
TOTAL	0.88	0.82	0.86	0.60
BEVERAGES	0.83	0.73	0.80	1.17
FOOD	0.71	0.74	0.74	0.69

Source: A. Damodaran Page: Betas by Sector

[2015-03-21 access: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html]

As we can see in Table 1, unleveraged betas for 2010–2012 period were stable for total population of the firms. In 2013 general population have noted decreasing of that operational risk measure, but beverage producers noted higher level of that indicator, what could be interpreted as increasing level of operational risk. Cash levels in firms are part so called liquid assets or known also as working capital levels. Levels of cash from investment point of view are maintained in firms for hedging purposes against the risk of illiquidity connected with risk of breaking production fluency and risk of lack final offer for the clients (Bates, Kahle, et al., 2009; Faulkender and Wang, 2006). Investments in current assets with higher liquidity (cash and near cash assets), have also built in value considered from real option approach. We think about option of American type connected with holding more liquid current assets and value of option of European type from holding less liquid current assets components like inventories and accounts receivables (Michalski 2014; Qineti et al., 2011; Soltes and Rusnakova, 2013; Michalski, 2013). There is believed that, both cash and other current assets levels should be as small as possible (Ferreira and Vilela, 2004; Kim, Mauer and Sherman, 1998; Miller and Orr, 1966). Unfortunately too small cash level is not accurate in higher risk sensitivity context. If financial management decision should be done in context of future free cash flows generated by the firm in the risk and uncertainty context, then truth is that the risk is higher, the working capital levels have higher utility (Belas, J., Cipovova, E., Novak, P. and Polach, J., 2012; Uzik and Soltes, 2009; Abdullah and Polak, 2013). There exists very few firms not suffering from that risk, and they do not suffer in the same way always (Opler, Pinkowitz, Stulz and Williamson, 1999; Pinkowitz and Williamson, 2001). Firms sensitivity on risk is different, and it depend on factors connected with its business environment (Kulhanek, 2014; Ozkan and Ozkan, 2004; Hudson and Orviska, 2013). In that paper our model explains noted in empirical data phenomenon of sensitivity on risk (Dittmar and Mahrt-Smith, 2007). We also can derive a suggestion, that cash to total assets indicator can serve as forecasting information and forewarning signal about whole manufacturing part of economy as firm environment (Horvatova, 2008; Kalcheva and Lins, 2007; Gavurova 2012). Cash levels are a result of use active policy in attract the offer to clients by on time and full answer on the purchasers needs (Michalski 2014; Michalski, 2009). Scale of investment in cash and near cash assets levels and money tied in capital involved in cash levels is a result of enterprise position in economic environment (Gavurova, Soltes, Balloni 2014; Pinkowitz, Stulz and Williamson, 2006; Gavurova, 2011). In effect there are entities that do not hold large levels of cash. That strong in position firms have small financial vulnerability and lower sensitivity on risk and do not afraid of situation in which risk of too small level of cash occur (Michalski, 2012b; Gavurova and Hyranek 2013). It is because the cost of holding too small levels of cash to total assets for that kind of firms is very small or even they have no such opportunity cost or is not linked with negative value calculated from real option approach (Soltes, 2010). But also, there are firms with large financial vulnerability and sensitivity on risk connected to small levels of cash in relation to total assets (Michalski,

2012a). That entities need to keep larger cash levels to hedge against costly risk of too small cash levels (Michalski, 2014a; Soltes and Gavurova, 2013, Bartak and Gavurova 2014; Abdullah and Polak, 2013). Too small cash levels lead that group of firms to negative changes in their sale levels. Destruction of cash revenues creation possibilities is dangerous for them and is hard to rebuild possibilities to create future cash revenues. Free cash flows are generated in context of uncertainty and risk and depend also on cash management policy of the firm (Michalski 2014; Michalski, 2012b).

$$\Delta V = \Delta V_{TZ} + \Delta V_{BZ} = \Delta FF_{0(TZ)} + \frac{\Delta FF_{1..∞(TZ)}}{C_{(TZ)}} + \Delta FF_{0(BZ)} + \frac{\Delta FF_{1..∞(BZ)}}{C_{(BZ)}} \quad (3)$$

where: ΔV = enterprise value growth, ΔFF = free cash flows increase or decrease (could be positive when increase or negative when decrease). C = rate of cost of capital financing of the firm, indices: BZ = to small cash levels consequences, TZ = consequences of holding of cash levels.

2. Model and data

The risk and uncertainty are mirrored in cost of capital rate that could be used to evaluate current economic value of future free cash flows. The firm keeps larger levels of cash, and does that, because its managing team has presumption that effect of that action will be firm value building factor. Strategic decision about level of investment in capital tied in cash levels is made in context of all advantages and all disadvantages. General maximizing value of the firm equation for cash Wilson based model is presented below (4). (5). (6) and (7):

$$\Delta V = \left(-\left(\frac{Q}{2} + L_{cash}\right) \times v - \frac{\left(\frac{P \times K_{sup}}{Q} + \left(\frac{Q}{2} + L_{cash}\right) \times v \times C_{nf}\right) \times TAXS}{CoC} \right) \quad (4)$$

$$\left(-\left(\frac{Q}{2} + L_{cash}\right) \times v - \frac{\left(\frac{P \times K_{sup}}{Q} + \left(\frac{Q}{2} + L_{cash}\right) \times v \times C_{nf}\right) \times TAXS}{CoC} \right)' = 0 \quad (5)$$

$$-\frac{v}{2} + \frac{P \times K_{sup} \times TAXS}{Q^2 \times CoC} - \frac{v \times C_{nf} \times TAXS}{2 \times CoC} = 0 \quad (6)$$

$$Q^* = \sqrt[2]{\frac{2 \times P \times K_{sup} \times TAXS}{v \times (CoC + C_{nf} \times TAXS)}} \quad (7)$$

where: SD – standard deviation of distribution of cash levels, K_{loi} – the cost of the lack of cash, the cost of the lack of cash (K_{loi}) includes also alternative costs of short of speculative cash levels, C_{cash} – the cost of maintaining cash (the percentage). Q – order quantity; P – demand for cash in period (year, month); K_{sup} – cost per order; C_{cash} – holding cost factor ($C_{cash} = CoC + C_{nf}$); and $v = 1$, except cases with foreign currency.

Risk sensitivity stimulates the cost of the lack of cash and in effect, risk sensitivity is responsible for grooving levels of cash. Each firm should try to suit its cash levels to its business environment. Individual risk sensitivity is a result of firm answer on changes in its internal economic health but also is response on general economic changes. Here is presented: current ratio, return on assets ratio, return on equity ratio and cash to total assets ratio in food and beverage producing firms reported in Amadeus database. That

results are presented in comparison between full operating cycle firms (right) and general population of such firms (left). Especially we are concern on 2010-2013 period. Empirical data confirms our projections derived from theory based on our model (Michalski 2012 Michalski 2013). That is useful to describe expected relationship of cash levels and total assets (CSH/TA) and it depends on firm individual risk sensitivity level. Michalski and Mercik (Michalski and Mercik 2011) and Zietlow and Michalski (Zietlow and Michalski 2012) presented such sensitivity on risk relation on Polish nonprofit organizations.

In full operational cycle context, according to our predictions, current ratio should be higher for full operating cycle firms, return on assets ratio should be higher for full operating cycle firms, return on equity ratio should be higher for full operating cycle firms and cash to total assets ratio should be smaller for full operating cycle firms. The empirical results are near to that expectation (see figures 2, 3, 4 and 5).

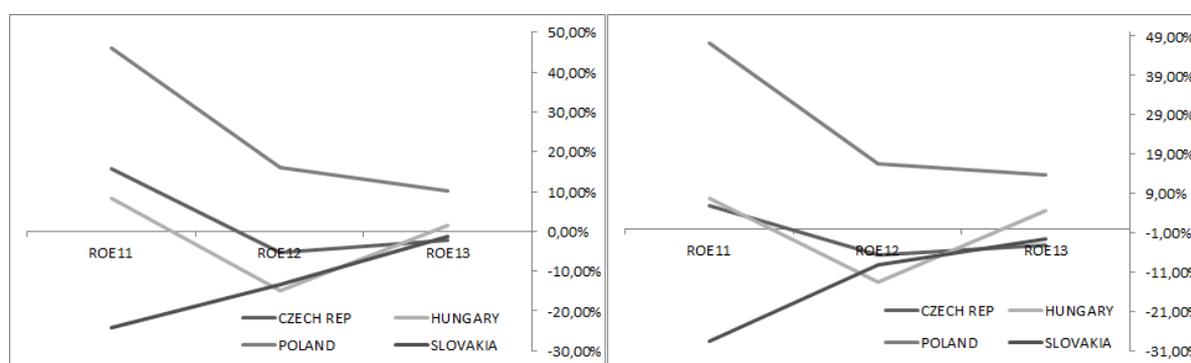


Figure 2: Comparison of dynamics of Returns on Equity (ROE) levels for general population (left) and dynamics of Returns on Equity (ROE) levels for only full operating cycle (right) food and beverages processing firms that operate in V4 countries.

Source: own study based on data from 2700 firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JUN 24]

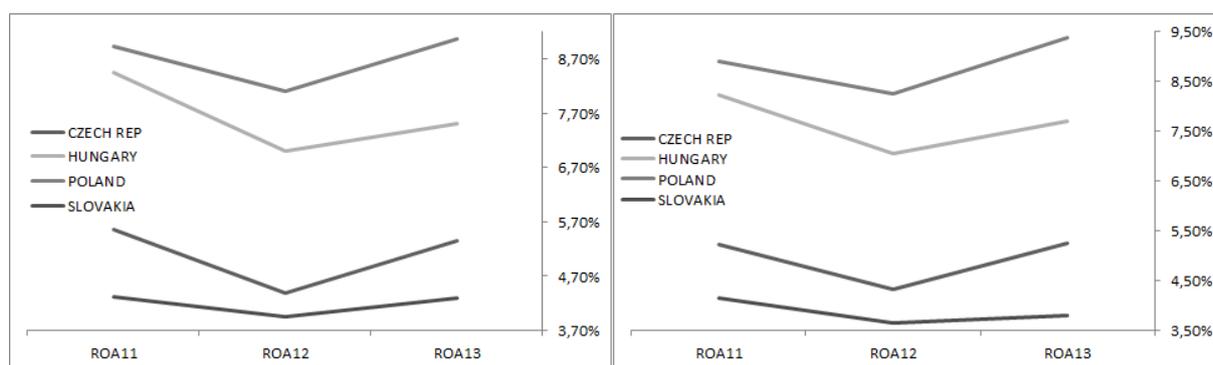


Figure 3: Comparison of dynamics of Returns on Assets (ROA) levels for general population (left) and dynamics of Returns on Assets (ROA) levels for only full operating cycle (right) food and beverages processing firms that operate in V4 countries.

Source: own study based on data from 2700 firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JUN 24]

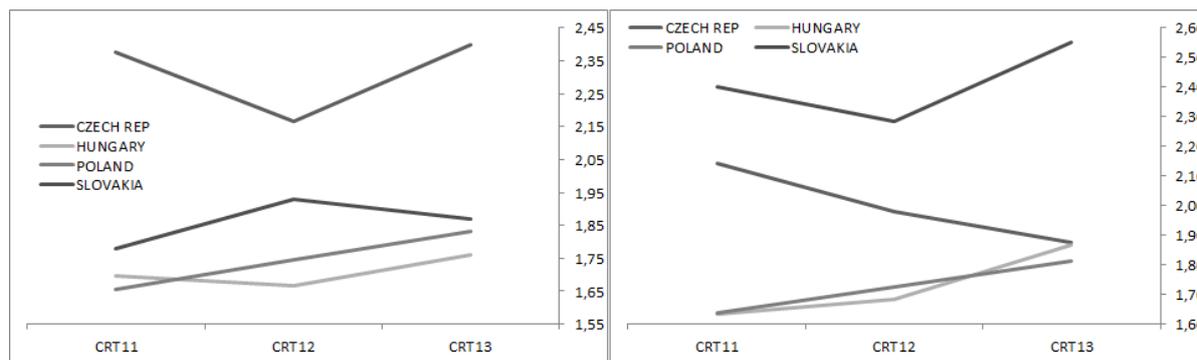


Figure 4: Comparison of dynamics of current assets to current liabilities levels (CRT) for general population (left) and dynamics of current assets to current liabilities levels (CRT) for only full operating cycle (right) food and beverages processing firms that operate in V4 countries.

Source: own study based on data from 2700 firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JUN 24]

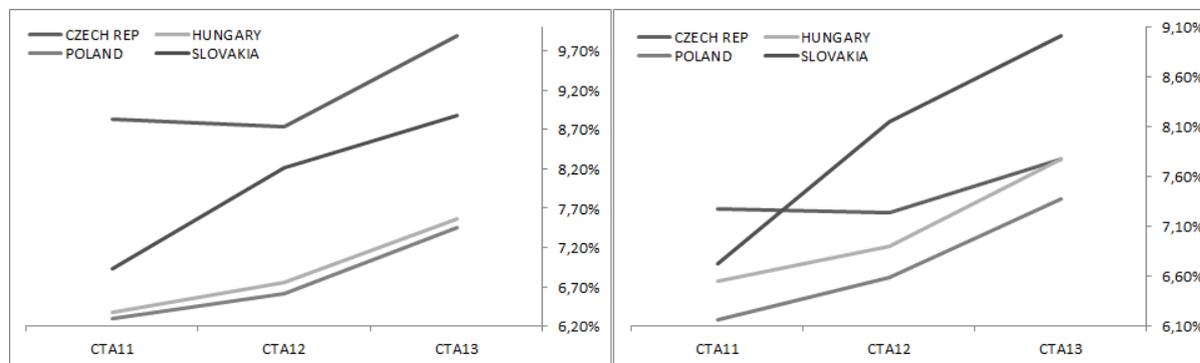


Figure 5: Comparison of dynamics of cash to total assets (CTA) levels for general population (left) and dynamics of cash to total assets (CTA) levels for only full operating cycle (right) food and beverages processing firms that operate in V4 countries.

Source: own study based on data from 2700 firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JUN 24]

3. Discussion and Conclusions

Bem et al., claim that liquidity management area, or broadly speaking, working capital management, is still considered secondary (Bem et al. 2014a; Bem et al. 2014b) and that the concept of the financial situation assessment with financial liquidity is to be a key area (Bem et al. 2014b). Such paper is one from an attempts in changing such a perspective. Further study should take in mind next configurations of branches, countries and liquidity indicators. Next research should be concentrated on future control of overall fit of the our model and its predictions in conditions with higher operational risk, cross the countries and cross the sectors research, that could answer how the risk sensitivity characterize the firms from various business branches, and various countries. Presented data from firms is with one accord with our model predictions. Forecasting of the our model is useful for make quick judgments about current and future condition of the general population of enterprises, that population risk sensitivity and as global effect of that. There is possible to guess future condition of

the whole manufacturing part of economy as well. The goal of the paper was to find if there is an correspondence between having full operating cycle and firms ROA, ROE, current assets and cash levels observed in real economy. That correspondence, as is presented in Figures: 2, 3, 4 and 5, exists with average probability. As main representatives of real economy, were used firms from four sectors: processing of food and processing of beverages and that illustration showed us that financial markets changes in countries of the V4 region have influence on possibilities of supporting the economic condition by operational risk influence. The paper findings also show that the V4 region can share its experience in the cash managing area with other European countries. The value-based model of cash holdings served to theoretical expectation how cash levels should works in real economy in connection to firm characteristics. Finally empirical data illustrated the fit of enterprise cash levels with presumptions of the model. Our analysis used as illustration, an empirical data from Poland, Slovakia, Czech Republic and Hungary. Cash levels in enterprises as dependable on the condition of financial sector changed according to our model expectations.

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Exploring entrepreneurial characteristics in rural tourism: A case study of Croatia

Ines Milohnić¹

¹ *Department of Management, Faculty of Tourism and Hospitality Management Opatija,
University of Rijeka, Primorska 42, P.O.B 97, 51 410 Opatija, Croatia, e-mail:
ines.milohnic@fthm.hr*

Abstract

The purpose and aim of this paper is to identify the characteristics of entrepreneurs in tourism in Croatia's rural areas in terms of creating and sustaining market competitiveness. Results were obtained using the interview method on a sample of 200 entrepreneurs who run their businesses in rural parts of the Republic of Croatia. A structured questionnaire was specially designed for the needs of the research. The study includes three groups of characteristics: 1) general characteristics (gender, age, educational background, experience and tradition), 2) the motivation for setting up a business, and 3) perception of work and the problems entrepreneurs are faced with. The research has shown that the typical entrepreneur is a micro entrepreneur with secondary school qualifications and aged 41–50, suggesting that middle-aged persons with great experience in business and life, and many business contacts and acquaintances, are usually the ones to engage in entrepreneurial ventures. A small number of respondents are continuing the entrepreneurial tradition of their parents. The greatest interest of entrepreneurs is in further education concerning how to use new forms of marketing (social networks, e-marketing), draw from European and national funds, reach out to new markets, and create networks with other entrepreneurs and design joint offerings. Research conducted indicates the need to provide further education through workshops for micro and small entrepreneurs to ensure and encourage cooperation for the development of entrepreneurship, competitive ability, knowledge transfer and the sustainable development of rural areas.

Keywords: individual characteristics, micro entrepreneur, rural tourism, competitiveness, education, partnership, EU project

JEL: L26, L83, L29

1. Introduction

According to the general definition of the Council of Europe, rural tourism refers to tourism in rural areas together with all the activities that take place at those locations, and its most important features include peaceful surroundings, the absence of noise, a preserved environment, communication with hosts, home-made dishes and learning about farm work. Tourism in rural areas includes eco-tourism, farm-based tourism, agri-tourism, rural tourism, farm household tourism, tourism on family farms, eco-rural tourism and other forms (Jelinčić, 2007). Across Europe, rural areas are characterised by a lack of steady income, a high average population age, a low educational level, neglected architectural heritage, an insufficient level of basic services and infrastructure and unresolved property relations (Fuller-Love et al., 2006).

Entrepreneurship in Croatia's rural areas and, in turn, tourism development in those areas, have a short history (Mišćin and Mađer, 2008). The utilisation levels of both the available workforce and available resources are low, and greater commitment to tourism in rural areas is essential to create new jobs and generate income for family farms (Ministarstvo poljoprivrede, šumarstva i ruralnog razvoja Republike Hrvatske, 2014). Entrepreneurship in Croatia's rural tourism is poorly developed as a result of a long process of neglecting rural areas and because the tourism industry in Croatia is focused on seaside tourism.

The demand for services in rural tourism and a growing desire of people to spend time in the outdoors, take part in traditional customs, and taste indigenous food are encouraging more and more entrepreneurs to start their own businesses in rural areas. Entrepreneurship (micro and small) is seen as a promising way of developing rural areas (Fuller-Love et al., 2006, Skuras et al., 2003) and a tool for creating jobs for residents and improving their quality of life (Irvine and Anderson, 2004), all the more so because of the general upward trend in the share of self-employed persons in entrepreneurship in rural areas (Blanchflower and Oswald, 1998).

The purpose and aim of this paper is to underscore the special features of entrepreneurial characteristics in tourism in rural areas. Considering that most of the territory of Croatia encompasses rural areas, the research conducted presents an important step in making accurate conclusions and identifying opportunities for taking concrete action. It is apparent that entrepreneurs in rural areas are faced with numerous constraints, such as limited access to large markets, scant opportunities for networking, lack of knowledge about new technologies, and difficulties in raising additional capital (Irvine and Anderson, 2004, Fuller-Love et al., 2006). The greater presence of elderly residents in rural areas also affects the further development of entrepreneurship (Skuras et al., 2003). The basis for successful entrepreneurship in tourism in rural areas is seen in taking advantage of opportunities for further diversification, strengthening partnerships, and embracing and providing education on new technologies that can help to create an approach to winning new markets and, consequently, building competitiveness (Fuller-Love et al., 2006).

To begin with, a question needs to be asked: Why so some people start a business of their own, while others in the same situation do not? The answer could be in the fact that the former possess certain attributes that the latter do not have. This assertion was confirmed by the results of surveying entrepreneurial characteristics, which are a crucial precondition to the development and success of a family business.

Listed among the most important success factors are motivation, personal inclination, the wish to be independent, and the need to become “my own boss” and “run my own show” (Vaught and Hoy, 1981).

The characteristics of successful entrepreneurs are reflected in (Megginson, 1997):

- a desire for independence
- a strong sense of initiative
- motivation
- expecting quick and concrete results
- making their own business decisions
- entering business by chance or by design.

Generally speaking, many authors have dealt with the characteristics of entrepreneurs. In his book *Innovation and Entrepreneurship*, Peter Drucker (1992) takes a close look at this area. Highlighted among the characteristics of entrepreneurs are innovativeness, reasonable risk taking, self-confidence, hard work, an ability to set goals, and responsibility.

When considering the characteristics of managers (owners, entrepreneurs), education, family tradition, age structure, gender structure and other features are often taken into consideration. Earlier research showed that entrepreneurs have a lower level of education, while recent studies point to a higher level, in some cases, the level of master (or doctor) of science (Perić and Milohnić, 2004; Cerović et al., 2014).

The research carried out focuses on the importance of the individual characteristics of entrepreneurs in rural tourism; the multitude of individual special features, motivations and attitudes; specific behavioural traits; and demographic characteristics linked with entrepreneurial business.

The paper’s primary objectives are to analyse and appraise:

1. the socio-demographic profile of entrepreneurs,
2. their motivatedness for starting up and sustaining a business, and
3. how they perceive doing business in rural tourism.

The results of research should provide answers to the primary objectives set in this paper and be useful to entrepreneurs and destination managers alike by helping to enhance the competitive ability of the entire tourist destination. Research results thus provide a sound platform for developing future guidelines and strategies for the development of rural areas.

2. Research Methodology

In accordance with the primary objectives of this paper, the opinions of entrepreneurs, whose business activities are tied to rural tourism areas, were surveyed. Concurrently, a vision of the plan and strategic orientation of their business facilities was created and areas of business were identified where respondents wish to acquire new knowledge and skills to improve their performance.

For the purpose of research, a structured questionnaire was designed, consisting of 69 questions divided into seven groups. The aim of the first group of questions was to understand the socio-demographic profile of entrepreneurs in rural tourism areas. Within this group were also questions asking respondents to define the special features of business operations in their facilities. Economic indicators of performance (revenue, planned investments, etc.) were examined by the second group of questions, while the third group consisted of rating-scale questions focused on analysing the respondents’

psychological profile, educational background and work experience. The fourth group investigated the motivations for starting entrepreneurial businesses specific to rural tourism. The fifth set of questions, based on a rating scale, required the respondents to make a self-evaluation of their competencies in several key business segments. The willingness of respondents to acquire new knowledge and skills was analysed by the sixth set of questions, while the seventh group examined the respondents' level of satisfaction with their overall performance.

The survey was conducted in August 2014 on a sample of 200 entrepreneurs (100 from Primorje-Gorski Kotar County and 100 from Istria County) using the interview method and a self-administered questionnaire. Data were processed using the statistical software package SPSS Version 22.

3. Research Results

3.1. Sample characteristics and socio-demographic profile of respondents

According to legal form, entrepreneurs in rural tourism are mostly registered as a physical person – sole trader (72%) engaged in renting rooms and holiday flats, a limited liability company (16%) or a family-run farm (10%).

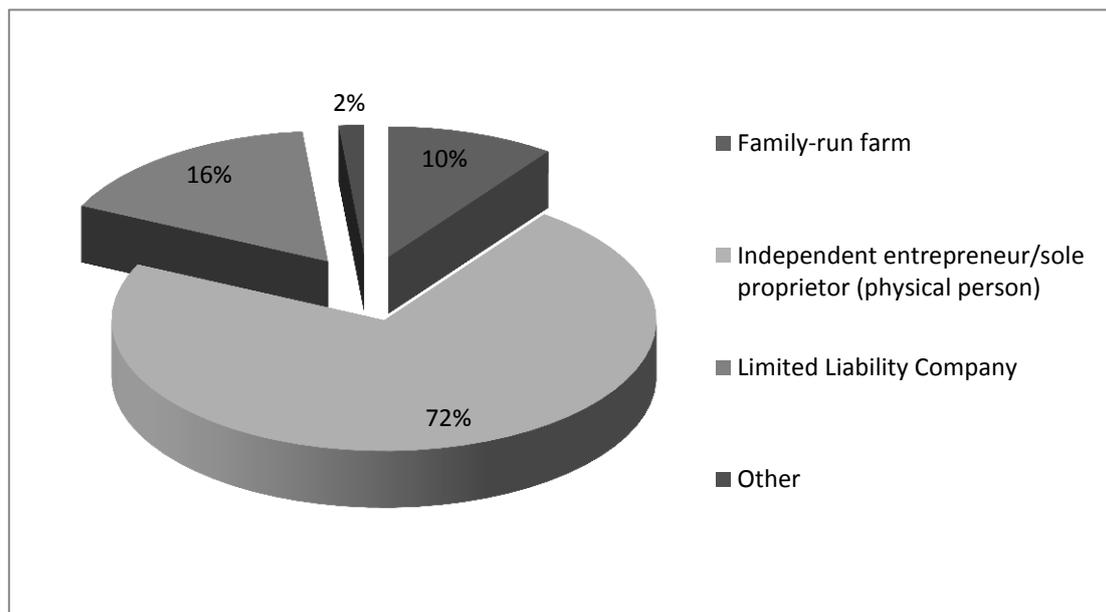


Figure 1: Entrepreneurs by type of business entity registered

The survey shows that fully 81% of entrepreneurs employ a small number of workers (one to four employees) who are family members, indicating they are family micro entrepreneurs.

Socio-demographic characteristics were researched in an attempt to bring together data on the gender, age and educational structure of entrepreneurs in Croatia's rural tourism.

Table 1: Socio-demographic characteristics

SOCIO-DEMOGRAPHIC CHARACTERISTICS		(%)
GENDER	Male	42
	Female	58
AGE	20-30	11
	31-40	21
	41-50	30
	51-60	27
	60 and over	11
EDUCATION	Elementary school	2
	Vocational school (3 yrs)	29
	Secondary school (4 yrs)	39
	College (2 yrs)	14
	Higher education school, faculty (3 or 4 yrs)	20
	Specialisation, M.Sc., Ph.D.	5

The number of women taking part in the survey (58%) was slightly higher than the number of men (42%). Results obtained indicate that entrepreneurship in rural tourism is mainly linked to middle-aged or elderly persons. Respondents with four-year secondary school qualifications (39%) prevail in the classification by educational background.

3.2. Experience and family tradition

An investigation of entrepreneurial experience established that entrepreneurs in rural tourism possess previous experience (life and work experience) and that becoming an entrepreneur was not their first job.

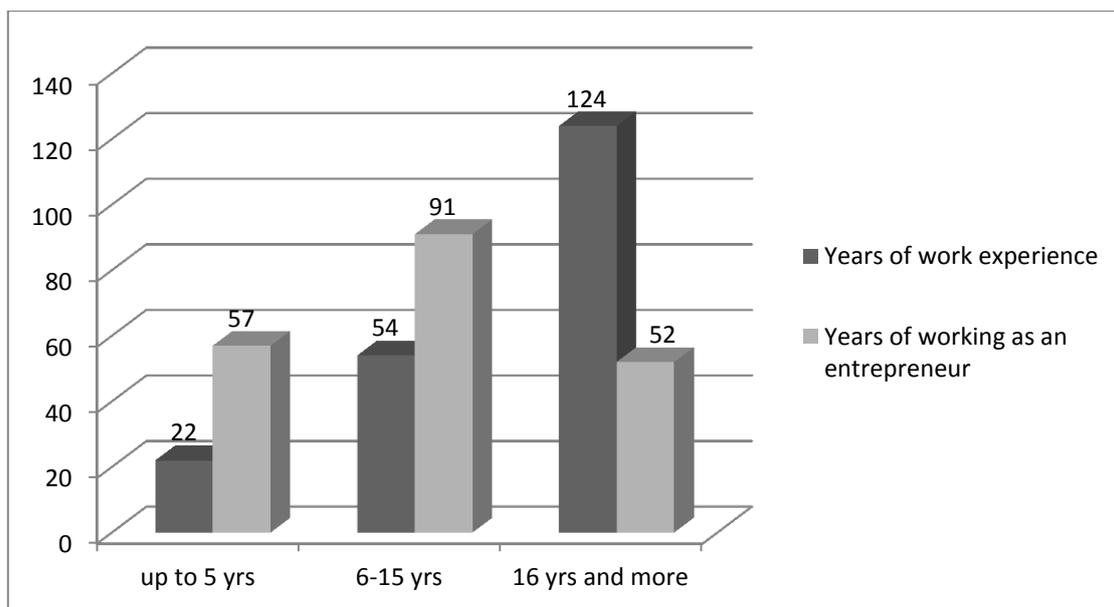


Figure 2: Entrepreneurs by years of employment and entrepreneurial experience

In the social system prior to Croatia gaining its independence, the possibilities of becoming an entrepreneur were restricted to trades and crafts but only in certain industries and with a limited number of workers. Private entrepreneurship was not socially recognized and the trades and crafts were constantly under the scrutiny of the state. This is why there is a lack of true entrepreneurial tradition in Croatia, in which a business would be passed on from one generation to the next. The results of research show that entrepreneurs did not inherit their business or their entrepreneurial spirit from their parents (81%), and most of the parents of the entrepreneurs surveyed were not self-employed (62%).

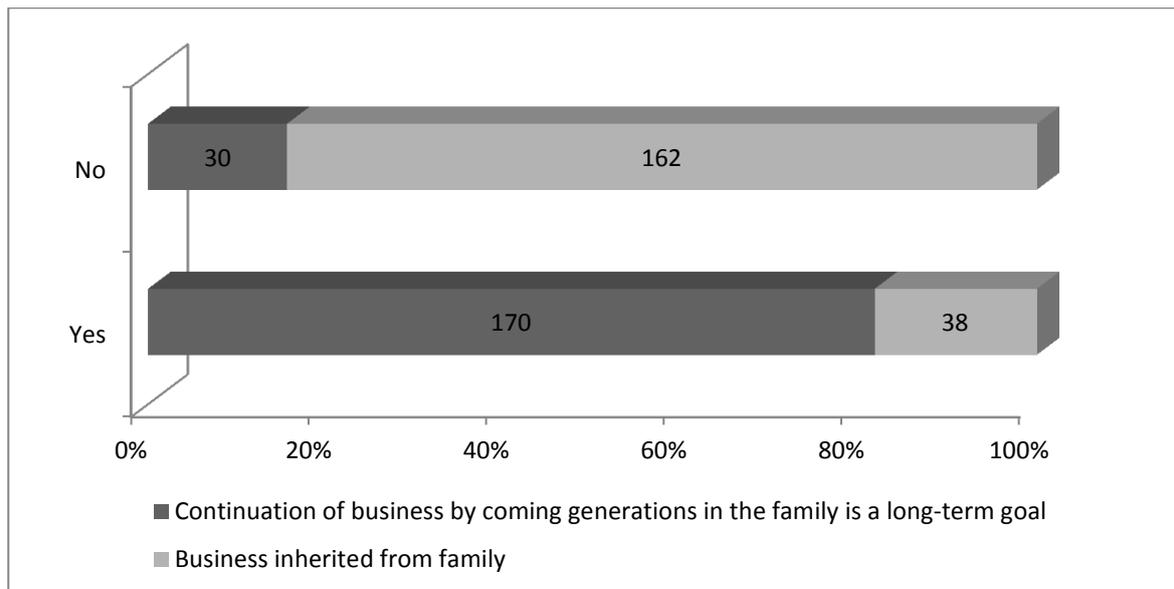


Figure 3: Intergenerational connections

Fully 85% of respondents pointed out that their long-term goal is to ensure the continuation of their business into the next generation, and they involve family members in their businesses (82%). Despite the popular notion that private businesses are passed down from generation to generation, particularly in rural regions, the fact is that most entrepreneurs are the first generation to start their own business.

3.3. Attitudes of entrepreneurs concerning elements of business operations and personal competencies

3.3.1. Motivation

A five-point Likert scale was used to rate the key motivations, which made entrepreneurs start up a business, and the personal viewpoints of entrepreneurs regarding entrepreneurial operations.

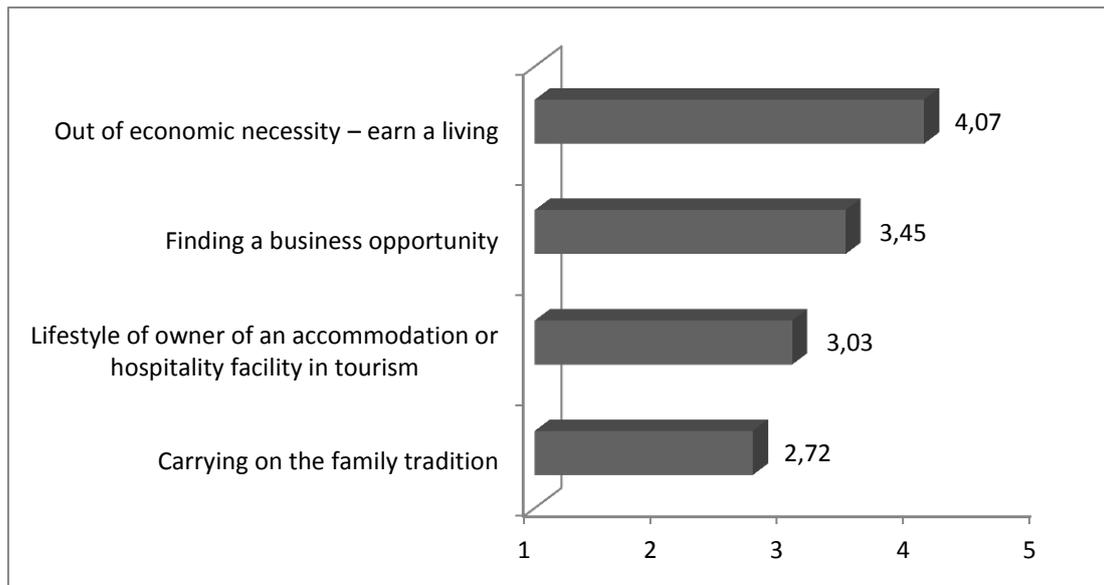


Figure 4: Key motivations for starting a business

“Out of economic necessity or as a source of livelihood” (4.07) and “Finding a business opportunity” (3.45) are singled out as the most important motivations for starting a business. This result coincides with past research in entrepreneurial motivations (Vaught and Hoy, 1981, Perić and Milohnić, 2004).

An analysis of the personal viewpoints of entrepreneurs was carried out based on the individual ratings given by entrepreneurs to 17 statements provided.

Table 2: Personal viewpoints of entrepreneurs

No.	Question	Average score
1	Government bureaucracy and legislation are overly demanding of entrepreneurs	4.47
2	I want to be independent/self-reliant in business	4.24
3	I gained a lot of valuable work experience in the past	4.15
4	I ask advice of people who know a lot about resolving the problems and tasks I am faced with	4.13
5	I have the knowledge and experience needed to survive and develop new business opportunities	4.07
6	There are tourist attractions in the region where I do business	4.06
7	I have control over my own fate	4.03
8	My previous work experience really does help me in my current business	4.00
9	I will have to acquire additional knowledge if I am to continue operating efficiently	3.98
10	My past formal education is suited to the present activities I am engaged in	3.62
11	History and tradition play a vital role in our family business	3.42
12	I am willing to take risks	3.24
13	I make use of help from the environment, such as	3.16

	the help of experienced consultants, legal advisers, accountants, and tax advisers	
14	There are good opportunities for developing entrepreneurship in the region where I operate	3.12
15	In the region where I operate, the infrastructure (roads, buildings, communication...) provides the support needed for new firms to start operating	2.94
16	Whoever needs help from state programmes for entrepreneurs, can find there what they need	2.60
17	Tax regulations and other government legislations are easy enough for entrepreneurs to understand	2.42

The problem issue “Government bureaucracy and legislation are overly demanding of entrepreneurs” stands out and demonstrates that entrepreneurs agree that state and tax regulations are not easily understood and nor are government programmes and incentives easily accessed.

Also examined were the various areas in which entrepreneurs are interested in acquiring additional knowledge.

Table 3: Entrepreneurial need for new knowledge

No.	Question (I am interested in learning about...)	Average score
1	New forms of marketing (social networks, e-marketing)	4.18
2	How to draw from European and national funds	4.11
3	How to win new markets and gather data about those markets	4.10
4	How to network with other entrepreneurs and design a joint offering	4.02
5	Time management	3.80
6	Family entrepreneurship (e.g., how to transfer business on the next generation, and so)	3.79
7	How to manage employees and delegate tasks	3.71
8	How to procure raw materials	3.56

Through open-ended questions in the questionnaire, respondents expressed their desire, as entrepreneurs, for education in the fields of accounting and tax regulations, and agriculture, and their wish to acquire knowledge about the customs and habits of foreign guests as well as about special forms of tourism.

Family micro entrepreneurship in tourism has a vital role as a “social shock absorber”. A part of the working age population is losing jobs in all industries for a variety of reasons, ranging from a poorly-conceived privatization model to the consequences of economic crisis. Some people see a way out by starting entrepreneurial activities based on their personal assets. Also, a large number of young educated people, who see no job opportunities after finishing school, are deciding to become self-employed on the homestead, which is how most of the businesses of family micro entrepreneurs get started.

4. Discussion and Conclusions

The purpose and aim of this paper is to present the results of research conducted within the framework of the Hint-Lab Project. Research results identify the difficulties and problems involved in developing entrepreneurship in Croatia's rural areas and can serve as a solid platform for developing future guidelines and strategies for the development of rural areas.

This research contributes considerably to fostering cooperation and integration among existing and new tourism projects aimed at developing entrepreneurship, competitive ability, knowledge transfer and the sustainable development of frontier regions. With regard to increasing the competitiveness of this sector, research conducted indicates the need to provide further education through workshops for micro and small entrepreneurs in the following thematic areas:

- Accessing and using EU funds for micro and small entrepreneurs
- New forms of marketing (social networks, e-marketing)
- Entering new markets and gathering information about those markets
- Networking with other entrepreneurs and designing a joint offering
- Developing guidelines for the joint marketing of tourism products and service providers in rural regions.

The applicative conclusion resulting from the literature review and research conducted suggests the need of making the outcome of this and similar research available to all levels of destination management. The greatest benefits of the research results are associated with the proactive development of micro entrepreneurship with the aim of ensuring the quality of entrepreneurial programmes and taking into consideration the sustainable development of rural regions to improve the wellbeing of local residents and enhance market competitiveness. The results of the research advocate the continuation of future research, especially in monitoring the development of entrepreneurs in tourism in rural areas, as well as the quality of entrepreneurial products and services to help boost competitive ability. Finally, these researches should be extended to other tourist destinations, and an analysis made of private accommodations in rural regions of Mediterranean tourist countries. The limitations of the research include the size of the sample, as well as the fact that research did not include the opinions of guests who chose services and facilities in rural areas. Future research would also need to study that segment by continuously surveying the attitudes of both guests and destination managers, taking into account all stakeholders in a destination.

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Twin Deficits in CEE Countries

Rajmund Mirdala¹

¹*Department of Economics at the, Faculty of Economics, Technical University of Kosice, Nemcovej 32, 04001 Kosice, Slovak Republic. E-mail: rajmund.mirdala@tuke.sk*

Abstract

Central and Eastern European (CEE) countries experienced periods of dynamic economic convergence associated with external imbalances during the most of the pre-crisis period. Parallel occurrence of current account and fiscal imbalances revealed plausible implications of fiscal (in)discipline on external macroeconomic position of individual countries. According to the intertemporal approach to the balance of payments, the lack of fiscal discipline reduces sustainable improvements in the current accounts. In the paper we investigate causal relationship between discretionary fiscal policy changes and current account adjustments in the CEE countries. Our results from employed even study methodology revealed significant influence of the fiscal stance to the current account determination.

Keywords: fiscal imbalances, current account adjustments, economic crisis

1. Introduction

The reality of persisting fiscal and current account deficits became obvious in many advanced as well as advancing, emerging and low-income countries seemingly without a direct association with the phase of business cycle or trends in key fundamental indicators. Central and Eastern European countries experienced periods of improved conditions for maintaining the overall macroeconomic stability during the last decade. Accelerated convergence toward western European countries associated with high real output growth rates implied increased intention to reduce excessive internal (fiscal deficit) and external imbalances (current account deficit) to maintain fast and sustainable economic growth. Despite relatively high rates of growth in export performance, all countries from the group experienced current account deficits during the most of the pre-crisis period.

Crises period affected both fiscal stance of government budgets and current accounts pre-crisis levels and trends in all countries from the group. As a result, leading path of both indicators significantly changed. Overall fiscal budgetary stance became determined by mutually contrary discretionary fiscal forces while remained affected by lagging recession. Economic crisis also intensified redistributive effects (cross-country expenditure shifting) that provided quite diverse and thus spurious effects on current account adjustments.

In the paper we analyze parallel occurrence of fiscal and current account imbalances in the Central and Eastern European countries. We identify episodes of large current account and fiscal policy changes to provide an in-depth insight into frequency as well as parallel occurrence of deteriorations (improvements) in current accounts and fiscal stance of government budgets.

2. Large Changes in External Balances (Event Study)

2.1. Methodological Notes to Large Changes in CAPB and Current Account

Observation of periods associated with large changes in CAPB and current account requires some introduction to the methodology that will be employed. Changes in CAPB as well as the current account are usually addressed to the adjustments on one of the sides determining their overall balance (or dynamics) or both at the same time. The balance of the government budget is determined by the set of fiscal arrangements on the side of revenues and/or expenditures followed by an improvement or deterioration in the fiscal stance. The balance of current account is determined by the competitiveness effects associated with expenditure cross-country shifting via export (inflows) and/or import (outflows) dynamics.

There seems to be several approaches to measure large fiscal changes and to evaluate effects of fiscal episodes. For example, Alesina and Ardagna (2009) identify three types of fiscal adjustment episodes to analyze episodes of fiscal consolidation. For the purpose of our study we employ this methodology revised (adapted) by Abbas, Bouhga-Hagbe, Fatás, Mauro and Velloso (2011) who investigated episodes of large fiscal and current account changes. However, we slightly adjusted key measures to suit better for our sample of countries. As a first it is necessary to emphasize that we focus on large and continuous changes in fiscal stances and current accounts. Durability of adjustments is thus crucial to avoid misleading effects of short-term volatility. At the same time, there are no sharp reversal movements¹ in the main trend allowed during identified episodes of large changes to presume a continuity of fiscal or current account adjustments. We suggest that investigation of key features of large and continuous changes in both indicators provides some insights into empirical validity of the intertemporal approach.

Extracted episodes of large fiscal stance and current account changes will be identified by to following measure: (1) Continuous cumulative improvement (deterioration) in CAPB or current account by at least 2 percent of GDP share. (2) Improvement (deterioration) of real output by at least 1.5 percent on annual base within identified episode of large CAPB or current account adjustment. However, we have observed relatively low interconnection between rates of real output growth and dynamics in CAPBs and current accounts that is why we identify episodes of large changes in CAPB and current account with and without real output growth rates interference separately. We also investigate large changes in overall savings-investments gap to GDP ratios as well as private savings-investments gap to GDP ratios following measure (1) to observe

¹ However, small reversals are allowed (up to 20 percent in reverse direction again the main trend) to preserve a substantial quantity of identified periods. In original study from Abbas, Bouhga-Hagbe, Fatás, Mauro and Velloso (2011) no reversals in the trend are allowed at all.

more detailed mechanism of intertemporal approach in the Central and Eastern European countries during the pre-crisis and crisis periods.

2.2. Cyclically Adjusted Primary Balance

To assess detailed overview of large fiscal policy changes and their effects, it is necessary to estimate an influence of fiscal adjustments based on tax and/or expenditures changes on fiscal balance. However, it seems to be necessary to reveal changes on revenues and expenditures sides of government balance associated with automatic effects induced by changes in macroeconomic environment and effects of discretionary fiscal policy actions. In first case, i.e. a cool-down of real output growth may be followed by a cut in government revenues (due to reduced tax capacity of an economy in the time of crisis) and an increase in government expenditures (i.e. due higher unemployment benefits). As a result, deterioration of a fiscal balance will occur. At the same time, similar effects on the fiscal balance will be followed by discretionary taxes cuts or expenditures increases. Fiscal stance of a government budget may thus reflect mixed effects of automatic changes in budgetary revenues and expenditures associated with business cycle fluctuations as well as discretionary changes on both sides of government budgets associated with discretionary fiscal policy actions.

To eliminate effects of a business cycle to the fiscal stance of a government budget it is necessary to eliminate influence of cyclical movements of fiscal variables. As a result of filtered business cycle impacts, together with some other adjustments (i.e. exclusion of interest payable on the side of government expenditures), cyclically adjusted primary balance (CAPB) will be calculated. Empirical literature provides many approaches to calculate CAPB. In general, main algorithm follows the same procedure: (1) estimation of the potential GDP, (2) determination and calculation of key revenues and expenditures categories responses to the fluctuations in cyclical GDP, (3) adjustments in budgetary revenues and expenditures according to the cyclical effects in both sides of government budget. As a result we obtain cyclically adjusted structural or primary balance. On the other hand we have found some differences in step (2) in current empirical literature reflecting relative diversity in approaches employed to estimate income elasticities of main budgetary variables (on both revenue and expenditure sides). At the same time, most studies calculated cyclical component in real output by estimating potential output (and output gap) using simple HP filter² or potential employment based on detrending NAIRU calculations.

Bouthevillain et al. (2001) calculated fiscal elasticities using econometric regressions or derivation from tax or expenditures laws and from detailed information on the distribution of income and revenue. Altâr, Necula and Bobeica (2010) estimated tax and revenues elasticities by applying methodology similar to that employed by OECD and by the European Commission. Authors decomposed main components of revenue and expenditure budgetary sides using linear system of equations. Girouard and André (2005) calculated income elasticities of four different types of taxes while on the expenditure side there is only single item – unemployment related transfers – that authors treated as cyclically sensitive.

² Despite a wide criticism of Hodrick-Prescott (HP) filter for inducing a spurious cycle in the time series (i.e. it cannot reflect an impact of structural breaks) as well as for poor approximation near the endpoint (so called endpoint bias), it still represents one of most frequently used filter in the current empirical literature.

Günaydın and Uğraş Ülkü (2002) employed vector-error correction (VEC) model to estimate income elasticities of budgetary components. Provided there is a long-run equilibrium (cointegration) between GDP and budgetary variables, expected elasticity coefficients are represented by normalized cointegrating coefficient derived from cointegrating equations.

To cyclically adjust a government budget, that is to estimate the underlying fiscal position when cyclical and/or automatic components are removed we follow a VEC methodology implemented by Günaydın and Uğraş Ülkü (2002).

Cyclically adjusted primary balance (CAPB) is calculated by subtracting the cyclical component (B^C) from the primary government balance (PB):

$$CAPB_t = PB_t - B_t^C = PB_t - \sum_{i=1}^n B_{t,i}^C \quad (1)$$

where (PB) represents actual government budget balance (B) less interests payable (E^I):

$$PB_t = B_t - E^I \quad (2)$$

and ($B_{t,i}^C$) represents a cyclical component of each of n revenue and expenditure budgetary categories included in the model given by the following equation:

$$B_{t,i}^C = B_{t,i} \cdot e_i \cdot Y_t^{gap} \quad (3)$$

where (e_i) represent individual elasticities of each particular budget category (that responds automatically to real output fluctuations) included in the model and (Y^{gap}) represents output gap expressed as a percentage of GDP.

2.3. Income Elasticities of Budgetary Categories

In our model we include three types of budget revenues (revenues from direct taxes, indirect taxes and social contributions) and one budget expenditure category (unemployment related transfers) that seem to respond to short-run (cyclical) movements in real output. As a result, we expect that selected fiscal variables automatically respond to the cyclical fluctuations in real output.

To estimate income elasticities of budgetary categories we expect that there is a long-run equilibrium relationship (cointegration) between each included fiscal variable and real output. Cointegration methodology introduced by Johansen (1988, 1991) and Johansen and Juselius (1990) will be employed to estimate the long-run equilibrium relationships between different types of budgetary variables and real output in the Central and Eastern European countries. Johansen method is applied to the unrestricted vector autoregression (VAR) model that can be written by the following moving average representation of n non-stationary variables containing p lagged values:

$$Y_t = \mu + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (4)$$

where Y_t is a $n \times 1$ vector of the contemporaneous endogenous variables, μ is a $n \times 1$ vector of the constants, A_i are $n \times n$ polynomial variance-covariance matrix, $\varepsilon_t \sim N_n(0, \Sigma_\varepsilon)$ is a $n \times 1$ normalized vector of exogenous shocks (innovations) to the model representing unexplained changes in the variables.

If at least two of the variables are cointegrated of the order one (I(1)) the VAR representation in the equation (4) can be rewritten by subtracting Y_{t-1} to the following vector error correction model (VECM):

$$\Delta Y_t = \mu + \Pi Y_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \quad (5)$$

where ΔY_t is a $n \times 1$ vector of the first differences of stochastic variables Y_t ,

$\Pi = \sum_{i=1}^p A_i - I$, $\Gamma_i = -\sum_{j=i+1}^p A_j$, I is $n \times n$ identity matrix.

Presented VECM contains information on both short-term and long-term adjustments to changes in Y_t included in estimated Γ and Π respectively. Γ is a $n \times n$ matrix that represents the short-term dynamic – adjustments to changes in Y_t . Π is a $n \times n$ matrix consisting of the long-run coefficients – the cointegrating relationships (cointegrating vectors) and of the error correction term. Π can be decomposed as follows:

$$\Pi = \alpha \beta' \quad (6)$$

where α represents $n \times r$ a loading matrix containing coefficients that describe the contribution of the r long-term (cointegrating) relationships in the individual equations and denotes the speed of adjustment from disequilibrium, while β is a $n \times r$ matrix of long-run coefficients and represents the r linearly independent cointegrating vectors (each column of β is the cointegrating vector). The number of cointegrating relations among variables of Y_t is the same as the rank (r) for the matrix Π . If it has a full rank, the rank $r = n$ and it means there are n cointegrating relationships and that all variables are I(0). If a vector Y_t is a vector of endogenous variables that are I(1), then all terms in equation (5) are I(0), and ΠY_{t-1} must be also stationary for $\varepsilon_t \sim I(0)$ to be white noise. If the matrix Π has reduced rank, $r < n$, there are $n - 1$ cointegrating vectors and even if all endogenous variables in the model are I(1), the level-based long-run component would be stationary. VECM requires that there exists at least one cointegrating relationship.

In order to find a presence of cointegrating (long-run) relationships, we use trace test and maximum eigenvalue test. Determination of rank and estimation of the coefficients are computed as maximum likelihood estimation. The corresponding likelihood-ratio test statistics are:

$$\begin{aligned} \lambda_{trace}(r) &= -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i) \\ \lambda_{max}(r, r+1) &= -T \ln(1 - \hat{\lambda}_{r+1}) \end{aligned} \quad (7)$$

where r is the number of cointegrating vectors under the null hypothesis and $\hat{\lambda}$ is the estimated value for the i th ordered eigenvalue from the Π matrix. Under the trace statistic, the null hypothesis that the number of cointegrating vectors is less than or equal to r is tested against the alternative that there are more than r vectors. Whereas under the maximum eigenvalue test the null hypothesis that there are r cointegrating vectors is tested against the alternative of $r+1$ cointegrating vectors.

Provided that time series for direct tax revenues, indirect tax revenues, social contributions, unemployment related transfers and real output are $I(1)$ ³ we estimate four different VEC models employing quarterly data for the period 2000Q1–2012Q4 (52 observations) for government expenditures, real output, inflation, tax revenues and short-term interest rates drawn from IMF database (International Financial Statistics, September 2014). Time series for direct tax revenues, indirect tax revenues, social contributions, unemployment related transfers and real output were seasonally adjusted. Tests for the cointegration were computed using two lags as recommended by the AIC (Akaike Information Criterion).

Results of both Johansen cointegration procedures (trace statistics and maximum eigenvalue statistics) confirmed our hypothesis about existence of one long-run equilibrium (cointegrating) relationship between each fiscal variable and real output. Normalized cointegrating coefficients derived from each cointegrating equation represent elasticity coefficients of each fiscal category with respect to real output.

2.4. Episodes of Large Current Account and Fiscal Changes

In this section we analyze occurrence as well as substantial features of episodes containing large current account and fiscal changes in the Central and Eastern European countries since 2000. Substantial changes in current accounts and CAPBs will be identified according to associated trends in the real output to observe possible interferences with the performance of the countries. At the same time we identify large changes in private savings-investments gap to GDP ratio and overall savings-investments gap to GDP ratio⁴ and indicate possible causalities and implications according to an intertemporal approach.

Figure 1 reveals identified large current account changes. Individual countries from the group experienced several episodes of continuous current account adjustments that in total represent 45 episodes of which 26 refer to the current account improvement and 19 to the current account deterioration. We found that during more than 55 percent of episodes the current account adjustments did not interfere with the real output leading path (either positively or negatively). This result is contrary to conclusions proposed by i.e. Abbas, Bouhga-Hagbe, Fatás, Mauro and Velloso (2011).

³ Detail results of unit root test are not reported here to save space. Like any other results, they are available upon request from the author.

⁴ Rule for identification of large changes in the private savings-investments gap to GDP ratio and the overall savings-investments gap to GDP ratio follows just condition (1) from the section 5.1 for a proposed identification scheme. Otherwise we identified much lower occurrence of both episodes.



Figure 1: Episodes of Large Current Account Changes (2000Q1-2012Q4)

Note: Variables – cyclically adjusted primary balance – CAPB (GOV_B_CA) and current account (CU) are expressed as percentage share on GDP. Real output growth rate (GDP_D) is expressed as percentage change of the annual real GDP over the corresponding period in previous year.

Data in tables below each sub-figure represents large changes (+ for improvement, - for deterioration) in (1) cyclically adjusted primary balance (CAPB), (2) private savings-investments gap to GDP ratio (SPIP) and (3) overall savings-investments gap to GDP ratio (SI). Last row represents (4) annual changes in real output. For (1), (2) and (3) each individual sign (+ or -) represents a large change during one year (four quarters) backward.

█ CU (-) (with negative real GDP interference) █ CU (-) (w/o negative real GDP interference)
 █ CU (+) (with positive real GDP interference) █ CU (+) (w/o positive real GDP interference)

Bulgaria experienced 8 large continuous current account changes: 4 improvements (2 episodes with and 2 episodes without GDP interference) and 4 deteriorations (3 episodes with and 3 episodes without GDP interference). Episodes of large current account changes were associated with corresponding SPIP and SI episodes. Large CAPB episodes were less frequent and were partially associated with large current account changes during the crisis period.

Czech Republic experienced 6 large continuous current account changes: 4 improvements (3 episodes with and 1 episode without GDP interference) and 2 deteriorations (both 2 episodes without GDP interference). Large and durable current account improvement in the first half of the period was associated with corresponding CAPB episode. In the second half of the period (and especially during the crisis period) large current account changes were especially followed by lagged corresponding episodes of SPIP adjustments.

Hungary experienced 6 large continuous current account changes: 4 improvements (3 episodes with and 1 episode without GDP interference) and 2 deteriorations (both 2 episodes without GDP interference). Episodes of large current account changes in the middle of the first half of the period were associated with a lagged occurrence of SPIP, SI and CAPB episodes. At the same time it seems that large changes of domestic (private and public) components of SI adjustments followed contrary trends with a dominance of SPIP effects. The only crisis period current account episode was associated with slightly lagged continuous changes in both CAPB and SPIP.

Poland experienced 9 large continuous current account changes: 6 improvements (3 episodes with and 3 episodes without GDP interference) and 3 deteriorations (all 3 episodes without GDP interference). During the first half of the period we observed a parallel occurrence of current account deterioration and SI episodes. However, only one current account episode (2005) was associated with short CAPB episode while the rest of them occurred in parallel with large SPIP changes. Despite general improvement in parallel occurrence of current account episodes as well as SPIP and CAPB changes, SPIP and CAPB episodes tended toward divergent adjustments.

Romania experienced 7 large continuous current account changes: 2 improvements (1 episode with and 1 episode without GDP interference) and 5 deteriorations (1 episode with and 4 episodes without GDP interference). Deteriorating current account episodes during the whole pre-crisis period were associated purely with large SPIP changes causing SI adjustments (despite the last that clearly preceded CAPB deterioration at its beginning). While an episode of continuous current account

improvement at the beginning of the crisis period occurred again in parallel with large positive SPIP episode, there also seem to be a substantial, though lagged, occurrence of the episode with large CAPB improvement.

Slovak republic experienced 7 large continuous current account changes: 4 improvements (3 episodes with and 1 episode without GDP interference) and 3 deteriorations (all 3 episodes without GDP interference). Large changes in CAPB and SPIP followed contrary trends during pre-crisis period. However, episodes of large SI changes generally reflected associated large continuous current account changes and thus appear to be clearly parallel. Occurrence of volatile current account episodes (shifting of positive and negative episodes) intensified during the crisis period and occurred in parallel with SPIP episodes.

Slovenia experienced 2 large continuous current account changes: 2 improvements (1 episode with and 1 episode without GDP interference) and no deteriorations. A rare occurrence of continuous large current account episodes reflects a relative SI stability during the pre-crisis period. Episode of the current account improvement at the beginning of the period occurred in parallel with positive SPIP and SI changes as well as subsequent, though lagged, CAPB episode (this scenario happened again at the beginning of the crisis period). However, negative CAPB, SPIP and SI episodes don't seem to be associated with corresponding current account episodes.

3. Discussion and Conclusions

Current account adjustments revealed crucial implications of the continuously rising international economic and financial integration of this group of countries (increased indebtedness, lacking competitiveness, fiscal imbalances, foreign capital inflows, etc.). However, there is still enough room to investigate partial effects of dynamic changes in key current account determinants to observe associated current account adjustments.

Changes in the fiscal policy stance associated with changes in CAPB affected current accounts in the Central and Eastern European countries. Despite some differences, we have observed similar trend in the leading paths of current accounts and savings-investments gaps that clearly follow main outcomes of an intertemporal approach. However, expenditure shifting effects associated with current account imbalances in each individual country do not seem to be determined solely by internal balance between savings and investments. The beginning of the crisis period clearly reduced these misalignments. In all countries from the group we examined persisting negative SI imbalances originated in excessive fiscal deficits.

Occurrence of episodes of large CAPB changes seems to be uniformly distributed across the whole period. In the whole group of countries we observed some sort of alteration in episodes of CAPB improvement and deterioration in the medium term period. All countries (except for Hungary) experienced large deteriorating episode at the beginning of the crisis period followed by improving episode (except for Poland) with differing lag revealing a crucial need of a fiscal consolidation.

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Influence of components of working capital on performance of companies manufacturing machinery and equipment in the Czech Republic

Zdeněk Motlíček¹, Pavlína Matějová², Dana Martinovičová³
and Sylvie Riederová⁴

¹*Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: zdenek.motlicek@mendelu.cz*

²*Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: pavlina.matejova@mendelu.cz*

³*Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: dana.martinovicova@mendelu.cz*

⁴*Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: sylvie.riederova@mendelu.cz*

Abstract

The approach to working capital management significantly affects the performance of companies. Nevertheless, this effect varies depending on the observed industry and company's size and it may be assumed that it is also dependent on territory differences. The paper presents an empirical research aiming to identify particular links between working capital and performance of the company. The findings appropriately complement Czech and foreign literature focused on impact of net working capital or working capital on profitability indicators. The present research has been conducted on medium-sized companies located in the Czech Republic and manufacturing machinery and equipment. The obtained results suggest the most suitable area of focus for optimization of working capital in relation to performance for the types of companies defined above.

Keywords: Working capital, sales, ordinary cost, direct cost, earnings, economy result, inventory, receivables.

1. Introduction

Working capital management and setting working capital policy are important areas in the field of enterprise asset management. Despite the fact that working capital management belongs to operational management activities, setting working capital policy significantly influences strategic management activities in the form of needs for purchase, production and storage. Net working capital comprises inventories, receivables and financial assets (Kislingerová, 2010). Management of all these components is then considered as net working capital management (Pavelková and Knápková, 2009).

Changes in the size of individual components of working capital are expected to have a meaningful effect on costs and sales, which has been confirmed by previous authors' research (Motlíček and Martinovičová, 2014; Motlíček, Matějová and Martinovičová, 2015). In accordance with Tomek (2007), it can be assumed that extending receivables collection period and reducing products delivery period can attract new customers and consequently it can increase sales. Nevertheless, these tools of sales promotion are also connected with increase in receivables and increase in inventories, which are associated with increase in costs. This situation has been also described by Lind et al. (2012). The authors, moreover, claim that increase in components of working capital creates a higher level of tied-up capital and a decline in profitability indicators. Changes in receivables conversion period are usually balanced by changes in payables conversion period. Based on this assumption, inventory management plays a key role in working capital management since inventories have a substantial effect on cash conversion cycle development. According to Bei and Wijewardana (2012), attention should be focused on management of relevant components of net working capital. This may be justified by factors like time-constraints and profitability impacts.

Management of net working capital components significantly influences the performance of companies. From the point of view of working capital management, asset turnover appears to be a predominant factor of corporate performance (Pavelková and Knápková, 2009; Kislingerová and Hnilica, 2008). In addition, Režňáková (2010) argues that aggressive policy of net working capital management improve the performance of companies from the owners' point of view since the effect resulting from the increase in return on capital employed exceeds the impact of lower economic profit that is caused by the decrease in sales. This is in agreement with Vahid et al. (2012); according to these authors, the company should be oriented towards achieving the shortening of cash conversion cycle. The shortening of cash conversion cycle can be also considered as a way of funding small and medium sized enterprises in developing markets. Režňáková (2010) notifies that there exist differences between individual industrial branches. However, as Filbeck and Kruger (2005) have observed, these differences remain time-constant.

Banos-Caballero, García-Teruel and Martínez-Solano (2014) expect a concave relation between the performance of the company and the degree of working capital. Based on their findings, the length of cash conversion cycle should be extended only to a certain point, and then it should be shortened. The derivation of ascertained relation is used to find this optimum. This is in line with Nazir and Afza (2009, A); moderate policy in asset management, which is based on higher ratio of current assets to total assets, is associated with higher rate of profit. In this case, it may be supposed that the examined industry can be found on rising part of concave curve, which has been depicted by

Banos-caballero, García-Teruel and Martínez-Solano (2014). Similar conclusions have been reported by Tufail (2013).

However, with regard to distinctive findings of research studies, it can be concluded that there exist differences not only for particular industrial branches, but also for particular regions and countries. For example, Bei and Wijewardana (2012) have noted that sixty-four per cent enterprises in Sri Lanka use aggressive policy of working capital management. The factor of country differences have been further described by Hill, Kelly and Higfield (2010) or Nazir and Afza (2009, B). The results of both studies affirmed a positive correlation between the amount of cash flows and working capital expenditures. In consequence, it can be implied that enterprises give preference to invest money in working capital and avoid investing in securities and other investment instruments. Nevertheless, there exist several specific factors affecting this decision-making issue. These are mainly size of companies and marketability on stock exchanges (Bigelli and Sánchez-Vidalá, 2012; Al-Najjar 2013), degree of production diversification (Subramaniam et al., 2011), separation of ownership and management structures (Ozkan and Ozkan, 2004). The factor of financial constraints in acquiring external financial sources has been mentioned by all stated authors.

In conclusion, it follows that many different determinants need to be considered in context of research focusing on influence of net working capital on performance of companies. Country and industry differences, company's size and marketability or macroeconomic development may be regarded as the most important ones.

The aim of the study is to identify the relation between working capital and performance of companies. More specifically, it is to identify the relation between working capital components and operating profit in case of medium-sized companies located in the Czech Republic and manufacturing machinery and equipment.

2. Methodology and Data

The data of companies of only one industrial branch and only one size have been chosen for the purpose of the paper. Based on the findings of secondary research, this approach seems to be essential since the degree of working capital differs significantly across companies of distinct industrial branches and distinct size. Data have been obtained from the Amadeus database and cover years 2011 and 2012. The study is focused on medium-sized enterprises, located in the Czech Republic and manufacturing machinery and equipment (i.e. section 28, according to CZ-NACE classification). Incomplete entries for years 2011 and 2012 were removed from the sample. The final sample then consists of 24 companies that have met all requirements mentioned above.

The purpose of the study is to depict the impact of net working capital components on performance of selected companies. In order to achieve this purpose, it has been decided to examine the impact of inventories and receivables on operating profit of companies. However, it is possible to assume that these individual components of working capital may have a contradictory effect in relation to profit of the companies. As a result, the overall effect does not have to be statistically significant. With regard to this assumption, both effects are investigated separately; subsequently the effects are compared and their impact on corporate profit is drawn.

The core of the research comprises three regression models. First regression model serves to confirm the presumption that pre-tax profit is determined as the difference between sales and corresponding costs and that both costs and sales have the same

impact on profit. Next two models represent the impact of working capital on costs and sales. For completeness and correct specification, the variable of fixed assets is incorporated into the models. Furthermore, the models include inventories and receivables. Receivables are expressed as an average collection period; other variables are given in absolute values. Regression models have been developed and verified in the econometric software Gretl. All assembled models have become the subject of economic verification and subsequent statistical verification. Statistical verification is based on the confirmation of classical linear regression model assumptions. The following regression models are applied in the study:

$$EBIT = S - OC + \varepsilon \quad (1)$$

$$OC = AFA + AINV + TREC + \varepsilon \quad (2)$$

$$S = AFA + AINV + TREC + \varepsilon \quad (3)$$

where:

EBIT is operating profit,
S are sales,
OC is operating costs,
AFA are average fixed assets,
AINV are average inventories,
TREC is average collection period,
 ε is error term.

3. Results

For testing the assumptions presented in methodology section, first regression model has been conducted to assess the relation between explanatory variable, defined as operating profit, and response variables, defined as sales and operating costs. Final model describes 100 percent variability of the sample and it does not evince any violation of assumptions of classical linear regression model. The model has unequivocally confirmed the presumption that both changes in sales and changes in operating costs have the same impact on resulting profit before interest and taxes. Model is illustrated in table 1.

Table 1: Impact of sales and costs on EBIT

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const.	-2.20517e-11	1.84138e-11	-1.1976	0.24443	
S	1	0	618196467459066.7500	<0.00001	***
OC	-1	0	-565059696131583.2500	<0.00001	***
Mean dependent var.	4139.375	Stand. deviation of dependent var.		7839.542	
Sum squared resid	5.68e-20	Standard error of regression		5.20e-11	
R-squared	1.000	Adjusted R-squared		1.000	
Log-likelihood	535.854	Akaike criterion		-1065.71	
Schwarz criterion	-1062.17	Hannan-Quinn criterion		-1064.77	

Next, the impact of working capital components on operating costs has been analysed. In this model, receivables in the form of average collection period have been added as a

response variable. As has been shown in authors' previous research (see Motlíček, Matějová, Martinovičová, 2015), the variable of receivables is rather complex one. It may be assumed that if the variable is expressed in absolute values, it can follow the changes in demand and thus changes in variable costs. However, the variable can wrongfully show a strong impact on the size of costs. Therefore, the model uses the variable of receivables expressed as average collection period, which due to the structure should prevent changes described above. Regression model 1 is presented in table 2.

Table 2: Impact of assets on operating costs

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
Const.	19178.3	6165.02	3.1108	0.00551	***
AFA	0.796492	0.133408	5.9704	<0.00001	***
AINV	3.99041	0.531269	7.5111	<0.00001	***
TREC	35.5578	221.777	0.1603	0.87423	
R-squared	0.849470		Standard error of regression		2.627814
F(3, 20)	37.62125		Adjusted R-squared		0.826890
Log-likelihood	-55.05432		P-value(F)		2.05e-08
Schwarz criterion	122.8209		Akaike criterion		118.1086
Mean dependent var.	65489.17		Hannan-Quinn criterion		119.3588
Sum squared resid	1.10e+10		Stand. deviation of dependent var.		47783.54

Model 2 explains almost 85 percent variability of the sample and it is statistically significant at 5 percent significance level, as well as all the variables used, except for average collection period. Focusing only on issue of working capital, which is the subject of the study, it can be noted that increase in average size of inventory by one Czech crown lead to increase in operating costs by 3.99 Czech crowns. This significant impact is caused by the fact that each inventory unit is related with both costs of delivery and costs of storage.

The variable of average collection period is not statistically significant. Nevertheless, this result is considered to be expected and the variable has been added to the model for the opportunity of complete comparison with model 3. In case of model 3, based on the results of previous research (see Motlíček, Pinková and Martinovičová, 2014), a relatively strong link between average collection period and sales of the company can be anticipated.

Within the statistical testing of model 2, problems relating to heteroskedasticity of data have occurred. Yet, the non-fulfilment of classical linear assumptions on 5 percent significance level is indicated only by some of the tests and in addition the violation is not so serious. Hence, this deficiency has been solved by the model with corrected heteroskedasticity. Although the model has not shown the normal distribution of error term, it is not rejected.

Subsequently, the impact of working capital on sales has been examined. Also, in regression model 3, the assumption of homoscedasticity of data has been violated, which has been solved by the model with corrected heteroskedasticity. Results are summarized in table 3.

Table 3: Impact of assets on sales

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	21404.1	4665.37	4.5879	0.00018	***
Avr_FA	0.706531	0.0693167	10.1928	<0.00001	***
Avr_INV	3.95794	0.57529	6.8799	<0.00001	***
REC_Tur_	89.6507	217.676	0.4119	0.68483	
R-squared	0.897434		Standard error of regression		1.592015
F(3, 20)	58.33201		Adjusted R-squared		0.882049
Log-likelihood	-43.02668		P-value(F)		4.54e-10
Schwarz criterion	98.76558		Akaike criterion		94.05336
Mean dependent var.	69628.54		Hannan-Quinn criterion		95.30351
Sum squared resid	1.42e+10		Stand. deviation of dependent var.		52276.98

Model 3 describes almost 90 percent variability of the sample and it is statistically significant. All other response variables are also statistically significant, with the exception of average collection period. This finding is due to initial assumptions rather surprising. Based on previous knowledge, the authors of the study believed that a longer maturity of receivables represents a competitive advantage and eventually it increases sales of the company. This surmise has not been confirmed, but the impact of inventories on sales is relatively strong. Provided that there is increase in size of inventory by one Czech crown, it will lead to increase in mean value of explanatory variable by 3.96 Czech crowns.

4. Discussion and Conclusions

Discussion of the results is divided into three parts concerning separately the impact of working capital on operating costs of the company and the impact of working capital on sales of the company. Third part of discussion section is devoted to comparison of these two effects.

With regard to model 2, which has been aimed to describe the impact of net working capital on operating costs, it could be concluded that expectations presented in the introductory part have been accomplished. Based on the results of the model, it may be assumed that there exists a significant impact of inventories on operating costs of the company. In accordance with authors' assumptions, the impact of average collection period on operating costs has not been proved. Nevertheless, the effect of average collection period may be observed in case of financial costs, which has been demonstrated in a recent paper of the authors (Motlíček, Matějová and Martinovičová, 2015). The ratio of financial costs on ordinary costs is negligible and as a result, the impact of average collection period on ordinary costs is statistically insignificant as well. The purpose of the study, however, is to assess the influence of working capital only on operating area of the business and so this issue is omitted. Consequently, the authors believe that it would be appropriate to direct the following research on financial area of the business, which will require detailed evaluation based on primary data obtained.

With respect to the impact of working capital on sales of the business, a significant deviation from original assumptions can be observed. This is mainly manifested in the statistical insignificance of average collection period. The acquired result is contradictory both with scientific expectations and with authors' previous research

findings. This problem and other problems associated with regression models development may be caused by the lower number of available data. Although all accessible data were utilized, the number of observations in analysed industrial branch in the Czech Republic is relatively small. The solution can be viewed in use of another source of secondary data or in extension of analysed territory from the Czech Republic into the whole Central Europe. In the context of this possible extension, similar market conditions and similar financial constraints can be anticipated. The findings regarding the impact of inventories on sales are in line with authors' expectations.

Based on the comparison of outputs of models 2 a 3, it may be concluded that inventories are the only component of working capital that influences operating profit. When comparing these two contradictory effects, it can be assumed that the negative effect prevails and that increase in average size of inventory by one Czech crown leads to decrease in mean value of operating profit by 0.033 Czech crowns. Given the tightness of the difference and the findings mentioned above, the authors consider this study as a first probe into the issue, to which it is appropriate to establish the research examining a larger territorial area or the research extending primary data.

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Company-investor Communication via Internet: Analysis of Companies Listed on the Zagreb and Sarajevo Stock Exchanges

Mia Mrgud¹, Irena Pandža Bajs² and Ana Mulović³

¹Department of Business Law, School of Economics and Business in Sarajevo, University of Sarajevo, Trg oslobođenja – Alija Izetbegović 1, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: mia.mrgud@efsa.unsa.ba

²Department of Marketing, Faculty of Business and Economics Zagreb, University of Zagreb, J.F. Kennedy Square 6, 10000 Zagreb, Croatia, e-mail: ipandza@efzg.hr

³Department of Business and Management in Media, University North, Square Ph.D. Žarka Dolinara 1, 48000 Koprivnica, Croatia, e-mail: ana.mulovic@unin.hr

Abstract

The importance of company-investor communication and corporate disclosure as a means of reducing the existing information asymmetry has been emphasized in the light of the recent regulatory initiatives in the European Union which focus on promoting the active role of investors in corporate governance. Company-investor communication is important and provides present and potential investors with an accurate portrayal of a company's performance and prospects, which is crucial for the efficient functioning of capital markets. Several previous studies in accounting, finance, and economics investigate the quality of corporate reporting via internet, mostly on developed markets. On the other side, only a small part of the existing research in marketing focuses on the shareholders as the audience of crucial significance. In this paper, a unique interdisciplinary approach to the topic is introduced combining methodologies from the previous studies. Based on the analysis and comparison of the content of web sites of the companies listed on the Zagreb Stock Exchange and Sarajevo Stock Exchange conclusions are derived on the level of company-investor communication and corporate disclosure via internet, and means for their improvement for the purposes of promoting good corporate governance practices.

Keywords: company-investor communication, investor relations, corporate disclosure, internet, corporate governance, stock exchange, disclosure regulation

1. Introduction

The importance of company-investor communication and corporate disclosure as a means of reducing the existing information asymmetry has been emphasized in the light of the recent regulatory initiatives in the European Union which focus on promoting the active role of investors in corporate governance. Company-investor communication provides present and potential investors with an accurate information about company's performance and prospects (Brown, 1994), which is crucial for the efficient functioning of capital markets.

Corporate disclosure via websites is seen as a potential means of improving investor relations and capital market efficiency. Nowadays, on-line corporate disclosure and communication via websites have become the norm for corporate communication. In accordance to that, communication through websites can be seen as one of the important investor relation activities incorporated in company's marketing communications strategy.

There is still not much regulation on corporate disclosure via the Internet, and most of it is therefore voluntary. However, some countries today pose a requirement on companies to have an official website with certain relevant and significant information disclosed on it (OECD, 2014).

This paper examines the extent to which websites of companies in Bosnia and Herzegovina and Croatia are used for company-investor communication and corporate disclosure. There are no national rules, standards or recommendations in both Bosnia and Herzegovina and Croatia dealing with disclosing of information via corporate websites specifically. Based on the analysis and comparison of the content of websites of the companies listed on the Zagreb Stock Exchange and Sarajevo Stock Exchange conclusions are derived on the level of company-investor communication and corporate disclosure via internet, and means for their improvement for the purposes of promoting good corporate governance practices.

2. Literature Review

As the importance of the Internet was growing, financial reporting via the Internet has become a popular subject of research in accounting, finance, and economics during the last decade. The experts agreed that the impact of the Internet on financial reporting is significant and also results in a significant growth in non-financial and non-audited information and brings benefits both to companies and users such as investors (Xiao et al., 2002 in Bollen et al., 2006).

One of the first biggest studies examining web based business reporting was the one of Lymer et al. (1999) conducted for the IASC, which included 660 companies, i.e. the largest 30 listed companies in 22 countries in Europe, Asia-Pacific and North and South America. Most of the studies of web based business reporting are focused on investigating and providing descriptive statistics on financial and business reporting of companies via the Internet, which is then used as a dependant variable in examining its relation with a range of independent variables. These independent variables include: country, company size, level of profitability, industry type, need for new external equity capital, quality of the firm's corporate reporting practices, sophistication of the expected web site users etc. (FASB, 2000). Critics to the above mentioned line of the research

consider it as mostly practitioner focused, and also adopting a technological imperative perspective (Xiao et al., 2000 in Lybaert, 2002).

Only a small part of the existing research in marketing focuses on the communication with shareholders as the audience of crucial significance. Company-investor communication via internet is much more than web based financial reporting to existing and potential investors. According to Al-Barghouthi et al. (2013) investor relations should be more than disclosure and disgorgement of financial information. Thus investor relations via Internet should create communication with shareholders by making them informed about company's financial and non-financial information.

2.1. The Concept of Investor Relation

Marston and Straker (2001) suggest that investor relations are „the communication of information relating to a company to the financial community, analysts, investors and potential investors“. The main focus of investor relation concept is to provide communication between a company and companies' investors. In his study Brown (1994) presented the investor relation as a “strategic corporate marketing activity” which combines finance and communication. So, it can be concluded that investor relations are important part of a company's marketing communications strategy. In accordance to that Dolphin (2004) emphasizes that investor relations need to be part of a marketing communication programme and that communication with financial stakeholders has a significant role in developing corporate communication strategy.

Some studies (Craven and Marston, 1997 in Dolphin, 2004; Regas et al. 2014) propose that institutional investors may be more willing to invest in a company that provides well-organized and controlled investor relations activities. Successful investor relations activities can impact on corporate image and reputation through different communication media which further lead to improved business results and better stock market evaluations. According to Regas et al. (2014) “if investor relations are successful in providing information about the company to investors, investors become knowledgeable about various aspects of the company's business valuation”. Thus, lower uncertainty leads to lower risk for investors, which makes company more attractive for investing.

The main goals of all investor relations activities could be: creating communication with shareholders by keeping them informed of the company's financial and non-financial information, establish a financial media relations, communicating with professional analysts, and reaching foreign investors and counseling top management, and keeping them informed about the status of the company's share in the market (Grunig and Hunt, 1984 in Al-Barghouthi, 2013).

2.2. Company-Investor Communication via Internet

In Laskin (2009) classification the media communication through web sites and e-mail facilities is seen as one of the investor relation activities. The internet can be used as a mass medium that informs large groups of investors and corporate web sites can be the channels for supplying investors with a set of valuable information (Hassink et al., 2007). In recent years is noticeable the increased use of corporate websites as a new medium for communication with investors and financial community (Al-Barghouthi, 2013).

Through their web sites companies could provide investors with annual reports, and other financial information, but also can use direct forms of communication, such as mailing lists and online participation (Geerings et al. 2003). New possibilities are exclusively offered by the Internet, for example the distribution of videos of shareholder meetings, off road shows, a storage space, archiving of documents over several years, subscription to a newsletter, a space for dialogue via a forum of shareholders or the possibility of raising questions (Pozniak, 2015).

In order to describe different activities and company's web site content, Geerings et al. (2003), explained the three stages of investor relations on the Internet. The first stage is the offering only the general company information – full annual reports, interim reports and standalone financial information. The second stage involves using the Internet to provide other valuable information to investors – in terms of content e.g. financial news, share prices, and structure e.g. financial calendars, and in order to combine existing sources of information, so that investors could be better informed. The third stage includes specific advantages offered by the Internet – the use of hyperlinks, specific file formats, internal search engines, cookie technology, the possibility of changing the language in which the information is offered, the possibility of downloading files, also making a direct contact with individual investors or groups of investors through e-mail or mailing list facilities and the option of interactive activities with investors, such as the online sessions through video-audio recordings and online participation in meetings (Geerings et al. 2003).

2.3. Corporate Disclosure and Governance

Corporate disclosure is considered a key element of investor protection, especially protection of minority shareholders (La Porta et al., 2000; OECD, 2004). The importance of disclosure needs to be considered in line with the fact that being informed is a precondition for exercising many of the shareholder rights. Not only shareholders, but potential investors as well, need access to regular, reliable and comparable information containing sufficient details (OECD, 2004). The well known accounting frauds and corporate governance scandals in developed countries have increased the demand for improvements in corporate disclosure and transparency. As a response to that companies are sometimes being encouraged or even required to use the Internet as the primary disclosure tool (Kelton and Yang, 2008). Also, recent regulatory initiatives of the European Commission in terms of enhancing shareholder activism, as an important corporate governance mechanism, request for improving shareholders' rights and facilitating shareholder monitoring (Neville, 2011). This generally reinforces the need for transparency and disclosure.

The fifth OECD Principle recommends timely and accurate disclosure on all material matters regarding the corporation, and it is stated specifically that the channels for disseminating information can be as important as the content of the information itself. The channels should provide for equal, timely and cost-efficient access to relevant information by users (OECD, 2004). In that respect the Draft Review of the OECD Principles (2014) acknowledges the opportunity for improving information dissemination via company websites.

According to the OECD Principles, corporate disclosure should include material information on: (1) the financial and operating results of the company; (2) company objectives, (3) major share ownership and voting rights; (4) remuneration policy and specific information about board members; (5) related party transactions; (6)

foreseeable risk factors; (7) issues regarding employees and other stakeholders; and (8) governance structures and policies; without limiting to these information only (OECD, 2004). Nowadays, the emphasis is being placed even more on timely disclosure of information between regular reports and ensuring equitable treatment of all shareholders (OECD, 2014). Providing equal access to disclosure to all investors at the same time is recognized as one of the IOSCO Principles for Periodic Disclosure by Listed Entities, and in some jurisdictions disclosure on the companies' websites is viewed as a means of complying with it (IOSCO, 2010).

As a final consequence, a strong disclosure regime can help in attracting capital and maintaining confidence in capital markets (OECD, 2004). La Porta et al. (2000) find that what successful regulations of the markets in the US, Germany and Poland have in common is the extensive, mandatory and accurate disclosure of financial information by the companies which is enforced by tightly regulated financial intermediaries.

3. Methodology and Data

In this paper a unique interdisciplinary approach to the topic is introduced, which combines methodologies from the previous studies. This study extends the scope of the previous studies by including the information on corporate disclosure as recommended by the OECD Principles (2004), and by providing a comparison of company-investor communication of a sample of listed companies on the Sarajevo Stock Exchange (SASE) and Zagreb Stock Exchange (ZSE). Beside the fact that this study uses a unique approach, it should be noted that research in this area generally in both countries is scarce. For the purposes of this study, a combined data collection instrument has been constructed based on the studies of Lybaert (2002), Geerings et al. (2003) and Gowthorpe (2004).

After analysing disclosure recommendations and acknowledged best practices in corporate governance and marketing communication literature, and also after taking into account data collected in the previous studies, an adjusted set of questions has been developed focusing on company-investor communication specifically. The questions are then categorized in a three-stage model, as a modified version of the Geerings et al. (2003) model: Stage I – Annual and interim reports on the Internet; Stage II – Other investor related information; and Stage III – Communication efficiency. The Stage I resembles mostly to the same stage in Geerings et al. (2003). It is only complemented with the questions about corporate governance report and statement on corporate governance principles compliance, and it checks for all the parts of the annual report separately (similar to Lybaert, 2002) due to experience based expectations about disclosure practices of companies listed on the SASE. The Stage II like the same stage in Geerings et al. (2003) includes other valuable information to investors (also consulted Lybaert, 2002 and Gowthorpe, 2004), but additionally includes a complete set of new questions based on the disclosure recommendations contained in the OECD sub-principle V.A. (OECD, 2004). The Stage III also combines questions from the previous studies. However, the focus is not on the technology used, but on evaluating company-investor communication efficiency.

The sample consists of 40 open non-financial joint stock companies in Bosnia and Herzegovina and Croatia, 20 of them listed on the Official market and Primary Free market of the Sarajevo Stock Exchange, and 20 of them listed on the Official market of the Zagreb Stock Exchange. These market segments include the most liquid shares traded on these stock exchanges, whose issuers are required to comply with the most

strict disclosure requirements in both countries. These companies should be motivated for the Internet reporting, as they are probably followed by institutional and retail investors. This is in line with the previous studies which mostly cover only the largest companies listed on the most liquid market segments of the stock exchanges (Lybaert, 2002).

After randomly selecting the sample companies, the next step was identifying their official web sites to be used for the analysis. The data was collected in a short time interval of three days in January 2015, in order to achieve comparability having in mind possibility of fast changes on the Internet. The web sites of the companies in the sample were examined with the goal of identifying and comparing common features and differences in disclosure behaviour among the companies listed on the two stock exchanges.

Also, the study seeks to test two hypotheses. The first hypothesis (H1) is: Companies listed on both the SASE and ZSE disclose only mandatory information on their websites or less. As already stated, there are no national rules, standards or recommendations in both countries dealing with disclosing of information via corporate websites specifically. According to that, the term mandatory information in H1 is used for the information that companies are required to publicly disclose under the current laws and regulations in these countries. It is based on the findings of some previous studies in both countries which cover only certain aspects of company-investor communication and disclosure (Pervan, 2006; Trivun et al., 2009; Bučo, 2012; Omazić, 2013), and which generally point to poor disclosure practices of companies, especially in B&H. In order to determine which information companies listed on the SASE and ZSE are required to disclose to the public as mandatory, provisions of the relevant laws and regulations in both countries were analysed. For testing this hypothesis, the results of the legal analysis were subsequently compared to the results provided by the model.

The second hypothesis (H2) is: Companies listed on the SASE disclose less information for investors on their websites than companies listed on the ZSE; and it is based mainly on the expectation that the laws and regulations applicable in Croatia, as an EU member state, impose stricter requirements on companies with respect to the amount of information required to be disclosed, but also on the expectation of better enforcement of the laws and regulations in Croatia. Even though the results provided by the model were sufficient for testing this hypothesis, comparative law approach had to be used in discussing the results and making final conclusions.

4. Results

Results show that even though companies listed on both stock exchanges have their official websites, there are huge differences between the two samples. Only 65% of the companies listed on the SASE include any financial information on their websites. On the contrary, financial information is available on all the websites of companies listed on the ZSE. Both vertical analysis by the item and horizontal analysis by the company are performed on the collected data. For the purposes of horizontal analysis, a score for each of the companies separately was created as the simple sum of the “fulfilled” answers encoded as 1.

While almost all the companies in Croatian sample (only one company doesn't) do have multilingual website, almost half of the Bosnian companies don't (45% use only Bosnian language). The other language is, as expected, always English, and only some of

the companies use more than two languages. Beside the significant difference in the number of multilingual websites between the two samples, there is also a significant difference in the quality of English versions. So, English versions of websites of companies listed at the SASE most often don't include any investor related information in English, or they include only some. On the contrary, Croatian companies most often make available all the information in English as well.

As for the Stage I – Annual and interim reports on the Internet, after excluding one Croatian company that was formed in August 2014 from the sample which naturally can't have the reports available, results show that basically all the companies from Croatian sample disclose all parts of the annual and interim financial reports on their websites. Situation is significantly different with the Bosnian sample, where not even all the companies that do provide some financial information on the Internet make available all the parts of the financial reports. The practice of non-disclosing notes part of the annual report and reports for previous years continues (only 20–30% of the sample discloses these reports). Only one company (5%) listed on the SASE discloses a statement on compliance with corporate governance principles. Horizontal analysis shows that all the companies from the Croatian sample (except for the one excluded) score 10 or more (most of them maximum 13) on a scale of 0 to 13, while only two companies from the Bosnian sample fit to that, scoring 10 and 11.

The gap between the Bosnian and Croatian companies becomes smaller in Stage II – Other investor related information which mainly checks for the disclosure practices as recommended by the OECD Principles, but it still remains significant. Vertical analysis shows that companies listed on the ZSE usually (80% or more) disclose invitations to and minutes from the general meetings, information on major share ownership and voting rights, names of the board members, and information on foreseeable risk factors. The least disclosed items of the ZSE sample are: analysts' reports (20%), remuneration policies (30%), information on independency of supervisory board members (40%) and other directorships (35%), and surprisingly press releases (40%). As for the Bosnian part, most of the companies disclose: invitations to general meetings (55%), but much less (30%) minutes or any information on the meetings already held; information on major share ownership and voting rights (55%), names of the board members (75% and 80%); and press releases (65%). Everything else is only occasionally disclosed. None of the companies listed on the SASE disclose any information on their remuneration policies, nor do they provide any analysts' reports. It should be noted that these are also the least disclosed items in the ZSE sample. When analyzed horizontally, it is showed that 9 out of 20 Croatian companies and only one Bosnian company score 15 or more on the scale of 21 questions. However, four of the Croatian companies also have low scores in this stage.

The analysis of the website activities which companies use to communicate with their investors (Stage III – Communication efficiency) also shows that there are significant differences between Croatian and B&H companies. Croatian companies have more user friendly websites with internal search engine available in comparison with Bosnian companies. More than 50% of analyzed websites of Croatian companies have available direct e-mail contacts to investor relations department, while only 5% of B&H companies use that facility to communicate with investors. Also, the most of Croatian companies (75%) have available separate Investor site inside corporate website and half of them use the different presentation for investors while only 20% of Bosnian companies have separate site and set of information for investors, and just 3 Bosnian companies have the presentation for investors. In Croatia 25% of corporate websites

include frequently asked questions (FAQ) related to investor; while none of the Bosnian websites contain that. Also, none of the Bosnian websites have provided for the date of the last update, while 45% of Croatian companies include that information. In average Croatian companies use 6 and Bosnian 3 out of 17 communication activities. Beside the differences, Bosnian and Croatian companies also have some similarities with respect to the use of communication facilities on their websites. Companies do not use online participating in meetings and chat rooms at all. The similar number of Croatian and Bosnian companies has available information about successful completed projects (60-65%) and new media such as YouTube channel or social media links as LinkedIn (20-25%) on their websites. Neither Croatian (5%) nor B&H (15%) companies use much of video-audio recordings of meetings and other investor related materials.

In the end, the results of the comparative law analysis have shown significant differences in the relevant provisions of the laws and regulations between the countries. Unlike the law in the FB&H, Croatian Law on Capital Markets contains provisions requiring companies to disclose mandatory information to the public in a way which will allow fast and equal access to that information, and also to provide the regulator with the proof of compliance (Art. 440). Most importantly, it establishes the official register of mandatory information, and solidary liability of companies and members of its organs for the damages suffered by the investor in certain cases of irregularities in public disclosure of information (Art. 442-444). It also imposes certain language requirements with respect to disclosing mandatory information depending on the markets where securities of the Croatian companies are listed (Art. 438). Comparative analysis also shows that Croatian companies are required to disclose quarterly reports, and to make their annual reports publicly available for at least five subsequent years (Art. 401-403). Croatian Law on Companies requires disclosing of the statement on compliance with corporate governance principles including specific elements (Art. 272.p). There are no such requirements under the laws in the Federation of B&H.

5. Discussion and Conclusions

Based on the analysis and comparison of the content of web sites of the companies listed on the two exchanges conclusions are derived on the level of company-investor communication and corporate disclosure via internet, and means for their improvement for the purposes of promoting good corporate governance practices. The analysis of the first two stages of the model confirms the second hypothesis: Companies listed on the SASE indeed disclose less information for investors on their web sites than companies listed on the ZSE. Furthermore, it can be concluded that companies listed on the SASE are mainly still at the first stage as defined by the model, which means that these companies didn't even reach the stage that many continental European companies were at some 15 years ago (Geerings, 2003). As for the companies listed on the ZSE, they are generally approaching the end of the second stage.

As for the companies listed on the SASE, this study confirms that the attitude: "all the information is a trade secret" (Bučo, 2012) dominates in disclosure practices. It doesn't have to be further explained how the weak and non-transparent disclosure practices can contribute to unethical behaviour and even loss of market integrity, which may presume great costs not only for the companies and their shareholders, but for the complete economy of Bosnia and Herzegovina (OECD, 2004).

It seems that the greater scores of the companies listed on the ZSE can be at least partly explained by the differences in mandatory provisions of company laws of the two countries, and other regulations imposed by the regulators and stock exchanges. It should be noted that, Croatian laws impose greater disclosure requirements and contain certain important enforcement mechanisms, while no such provisions exist in the legislation of Federation of B&H. Companies in both countries generally avoid voluntary disclosures of many items (like remuneration policies), but the first hypothesis can be with certainty confirmed only for the Bosnian part of the sample.

The usefulness of companies' reporting on the Internet also depends on how easy it is to download or analyse the data (Ashbaugh et al., 1999 in Lybaert, 2002). As stated, not many of the companies in both countries provide financial data in a processable format. When added the fact that these companies do not use online participating in meetings and chat rooms at all, one comes up to a conclusion that these companies potentially are not much interested in intensifying their relations with investors.

The study limits itself to disclosure practices without raising the question of transparency which is a different concept requiring further content analysis.

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The feasibility of a tax swap between environmental taxation and payroll taxes in United States

Danuše Nerudová¹ and Marian Dobranschi²

¹Department of Accounting and Taxes, Faculty of Economics and Business Administration, Mendel University in Brno, Czech Republic, danuse.nerudova@mendelu.cz

²Department of Accounting and Taxes, Faculty of Economics and Business Administration, Mendel University in Brno, Czech Republic, marian.dobranschi@mendelu.cz

Abstract

The main objective of this paper is to research the tax swap between environmental and payroll taxation in order to reduce the deadweight loss. Following the trajectory proposed by the double dividend hypothesis, this study examines the potential of carbon taxation enactment accompanied by payroll tax cuts in order to lower the tax burden of these pre-existent distortionary taxes. The feasibility of tax swap mechanism between environmental and payroll taxation is verified via estimating and comparing their efficiency costs. The results obtained from empirical analysis and simulation validates the potential of the tax swap, where the efficiency costs of payroll taxation are considerably larger than of environmental taxation. Therefore we demonstrate that there is “enough room” to implement a tax shift mechanism which would have a double dividend outcome – pollution reduction and decreasing the efficiency costs of the payroll taxation.

Keywords: environmental taxation, social security contribution, efficiency costs, tax swap, deadweight loss.

1. Introduction

One of the possible outcomes of Pigouvian proposal to tackle negative externalities using taxation is the double dividend hypothesis. This hypothesis sustains that environmental levies would provide a double outcome if associated with offsetting measures. In this particular context, environmental taxes would not only decrease pollution but will also increase the efficiency of fiscal system. Our concern is the issue of efficiency costs associated with carbon taxation and how the burden of this environmental tax can be offset by operating tax cuts into payroll taxation such as employer’s social security contribution. This paper differs from previous papers that have assessed the issue of a

tax shift between environmental and payroll taxation such as Metcalf (2007a, 2007b), Rauch and Reilly (2012) and Murphy (2013) because we choose to compare the deadweight loss of these levies to the amount of tax revenues and not to the individual welfare as done by aforementioned authors. This study relies on a dual approach theoretical and empirical analysis. In the first part we establish the theoretical background of deadweight loss estimation and propose a contrasting method to calculate the efficiency costs of payroll taxation on labour demand in comparison with mainstream proposal that focuses insistently on the labour supply such as Feldstein (1994). In order to strengthen our methodology we compare our proposal of tax shift with previous tax shifts that advocate new carbon taxation enactment followed by income tax cuts, such as proposed by Jorgenson and Wilcoxon (1990), Bovenberg and de Mooij (1994) and Fullerton and Metcalf (1997).

The second part of this paper is focused on empirical analysis, we used the data available for United States, where we calculate the deadweight loss for both environmental taxation and employer's social security contribution. Comparing the amounts of efficiency costs between these two levies, we determine that there is "enough room" to implement a tax swap. In order to consolidate our results we simulate a gradual decrease of employer's social security contribution followed by correspondent environmental tax increases, complying with revenue neutrality condition.

2. Literature review

The concept of double dividend hypothesis regarding carbon taxation stresses the idea that environmental levies could have a double outcome: less polluted environment and less distortionary fiscal system. However, enacting a new carbon tax is affected by tax-interaction effect due to the already pre-existent distortionary fiscal system. From this tax-interaction effect the overall gross costs of carbon taxation are increased by pre-existent distortionary taxes. Taking into consideration the negative impact of the tax-interaction effect, a tax swap is proposed by mainstream economics such as Fullerton and Metcalf (1997), Goulder (1991, 1995), Metcalf (1998), Poterba (1991), Jorgenson and Wilcoxon (1990), Bovenberg and de Mooij (1994) and others. This tax swap mechanism aims to operate income tax cuts accompanied by carbon taxation enactment, respecting the condition of revenue neutrality.

The above primary studies support the idea of a second outcome from carbon taxation which would offset the distortionary impact of direct taxes. However, applying income tax cuts leaves the real income unaffected (identical budget constraint curve), which means that the impact over the "dirty goods" is unchanged and pollution will not decrease significantly. In this particular setting, with an inelastic demand for fossil fuels, where the prices rise through carbon taxation and real income increases due to the income tax cuts, will produce only a shift of supply to the left, without substantially affecting consumption pattern as shown by Nerudova and Dobranschi (2014). This is due the fact that the demand for fossil fuels is highly inelastic as shown by Dahl (1993, 2012) which means that carbon taxation will only increase prices and the state will achieve only movements along the demand curve for fossil fuels, assuming other variables are *ceteris paribus*. On the other hand, shifts into the demand for fossil fuels are determined not only by price modification but also by the prices of other goods considered as substitutes. Therefore incentives granted to the pollutant agents such as other direct tax cuts followed by enactment of the carbon taxation, creates incentives

that will boost the production of substitutes (less carbon intensive goods, green sources of energy).

In order to establish the basis of the deadweight loss analysis or efficiency costs (these terms will be used interchangeably) analysis that affects labour market, we consider necessary to focus upon the impact of payroll taxation on labour demand. Previous studies that have stressed the problem of deadweight loss (hereinafter as DWL), have insistently analysed the supply side of labour market, having as central issue the income tax DWL and its impact over the labour supply. Lind and Granqvist (2005, 2010) consider that mainstream economists address the distortionary effect of a tax as the extent to which the value and impact of a tax is reduced because of its side effects. For example increasing the amount of payroll taxation levied on companies will increase the labour costs leading to decrease of labour demand or even closing businesses altogether. Auerbach (1995) states that the deadweight loss from a tax system is the amount lost in excess of what government collects. Taking the case of payroll taxes supported by a company and their impact on labour demand, there are two effects associated with this tax: substitution and scale effect.

3. Methodology and Data

The problem of distortionary effect was assessed in detail by Harberger (1964), where the author stresses that mainstream economics have wrongly misjudged the excess burden of direct versus indirect taxes. Harberger's important contribution in measuring the excess burden of an excise tax can be summarized into following explanation – when a tax of good X of T_x per unit is the only distortion present, the welfare cost of that tax can be measured by:

$$-\frac{1}{2} T_x \Delta X \quad (1)$$

Where: ΔX = is the change of consumption of X induced by the tax; $t_x = \frac{T_x}{P_{x0}} \Rightarrow t_x =$ the percentage change; $\Delta X = \eta_{xx} X t_x$; where η_{xx} is own-price elasticity for product demand. Deriving $\Delta X = \eta_{xx} X t_x$ and substituting ΔX with $\eta_{xx} X t_x$, and $P_{x0} t_x$ for T_x the author obtains an alternative formula to measure excess burden:

$$-\frac{1}{2} X P_{x0} \eta_{xx} t_x^2 \quad (2)$$

However in order to simplify the calculation, and considering that $X P_{x0} t_x$ represents the tax yield R_x then the formula above can be rewritten:

$$-\frac{1}{2} R_x \eta_{xx} t_x \quad (3)$$

Where R_x represents the tax revenues therefore simplifies the determination of deadweight loss, because tax yield (R_x) and tax rate (t_x) usually are published, the only element left to estimate is the own-price elasticity of the good X . In our case, to calculate deadweight loss (hereinafter DWL), η_{xx} is the own price elasticity of demand for fossil fuels.

Important contribution to the analysis of distortionary effects of labour taxation have been brought by Feldstein (1995a), where the author adopts a different method in comparison with Harberger (1964), where the author replace the traditional

uncompensated Marshallian labour supply elasticity with the Hicksian compensated elasticity, obtaining a significantly higher DWL of income taxation in US in comparison with previous results obtained by Harberger (1964).

Therefore the formula to calculate the DWL will be:

$$\frac{1}{2}\eta ssc^2 wL \quad (4)$$

Where: η = compensated (using the Feldstein (1995) and Hamermesh (1986)) elasticity of the Labour Demand with respect to the wage rate, holding the output constant; ssc^2 = is the square of the social security contributions of the employer rate and wL = represent earnings of labour gross of income tax (i.e. gross income).

Because $ssc \cdot wL = SSCyield$ (payroll tax yield – meaning the social contributions collected to the public budget), then the final formula to calculate DWL of payroll taxes paid by employer is:

$$\frac{1}{2}e ssc SSCyield \quad (5)$$

In order to estimate the efficiency cost of payroll taxation, a key element of the analysis is to calculate the own-price elasticity of the labour demand. The responsiveness of labour demand to changes into wage rates is measured as an elasticity, where is observed the change in percentage in employment inflicted by 1 percentage change into the wage rate.

Therefore, following the law of demand, an increase into the cost of labour will produce an inverse reaction into the employment level. The elasticity of labour demand with respect to its wage rate is governed by two effects: the substitution and the scale effect. The scale effect expressed as elasticity can be defined as the percentage change into employment associated with a change into wage rate, holding production technology constant, in other words the labour demand response without substitution effect. Accordingly, the substitution effect, manifests more in the long-run and is expressed as elasticity in the labour demand response to a change in wage rate holding output constant.

Allen (1938) defines the elasticity of substitution between the capital and labour services as an effect of change in relative factor prices on relative inputs of the two factors, holding output constant.

$$\sigma = \frac{d\ln(K/L)}{d\ln(w/r)} \quad (7)$$

Therefore the own-wage elasticity of labour demand according to Hijzen and Swaim (2008) at a constant output and constant r is:

$$\eta_{LL} = -(1 - s)\sigma < 0 \quad (8)$$

Where s is the share of labour in total costs production. In here the constant output elasticity of the labour demand is smaller (highly inelastic) for a given technology, where labour's share is greater because there is relatively less capital toward which the company can substitute labour when labour costs rise. The scale effect or the elasticity of scale strictly depends on the absolute value of the product demand elasticity, η , and the share of labour in total production costs:

$$\eta'_{LL} = -[1 - s]\sigma - s\eta \quad (9)$$

In the formula (6) the first element captures the substitution effect, which shows the extent to which a firm substitutes away from labour when is face with a wage rate increase, for a given level of output. The second element of the above formula captures the scale effect, which shows the reduction in employment due to the reduction in output as a response to the higher cost of labour, leading to higher output prices and therefore lowers sales. For a given cost share of labour in total production costs, the scale and the substitution effect due to the change in wage rate are both negative.

In analyzing the own price elasticity of labour demand, Hamermesh (1986) dismisses the simple choice of measurement such as total employment and total hours. Because we focus our analysis on the aggregated level of US economy, where we assume that employees are heterogeneous, we will use total hours worked to be used instead of total employment. On the other hand the measure of the price of labour, according to Hamermesh (1986) should be average hourly earnings instead of average wage rate.

In this paper the calculation of deadweight loss of environmental taxation in United States, incorporates the traditional Harberger proposed formula (3). We use three different types of raw statistic data: the environmental tax revenues, the environmental tax rates and the own-price elasticity of demand for fossil fuels. First set of data is available on the OECD Database, but the last two sets of data are missing and require a difficult procedure of determining. In order to simplify the analysis, we will use the meta-analysis provided by Dahl (2011) and use their average estimates on own-price elasticities for fossil fuels demand, which is considered as highly inelastic, estimates ranging between -0.2 and -0.4 . The third set of data involves a messy aggregation of dispersed and irregular taxation of fossil fuel consumption in the US. Therefore, we choose another approach of calculating the tax ratio of environmental levies.

Taking the data provided by U.S. Energy Information Administration (U.S. IEA), we choose the Energy Intensity data, from which we use Total Primary Energy Consumption per Dollar of GDP – meaning how much energy had a country used in one year to produce 1 U.S. Dollar worth of gross domestic product. This energy consumption is expressed in British Thermal Units – Btu's. On the other hand we used the data provided by World Bank Database – World Development Indicators where is specified the Fossil Fuel Consumption of Energy in percentage out of total energy consumed in analyzed countries. Going forward we calculated the Real GDP using the GDP deflator and calculating the Deflator for 2000–2011 period, with the base year being 2005 (2005 = 100). After determining the Real GDP, we calculated the total energy consumed produced burning fossil fuels by using data provided from World Bank and US IEA. Having total fossil fuel energy consumed per year expressed in US dollars and also the total environmental taxation revenues reported by OECD Statistics also in US dollars, we were able to determine the effective environmental tax rate in the US.

After determining the effective environmental tax rate we calculate the DWL of the environmental taxation using the traditional Harberger's (1964) formula (3). Following the previous described methodology to calculate the deadweight loss for environmental taxation and payroll taxes, we intend to compare the net loses between both taxes. We expect that the deadweight loss of payroll taxation will be much higher compared to the indirect taxation such as environmental taxes in the US. This comparison will enable us to propose a tax swap between payroll and environmental taxation in order to decrease the efficiency costs of the former and increase the less-costly environmental tax rates. This swap could represent one of the most important premises to satisfy the double dividend hypothesis with respect to carbon taxation theory. For comparative reasons we

estimate both types of elasticities – uncompensated and compensated with respect to labour demand for wage rate. In case of environmental taxation deadweight loss calculation we will rely on the results obtained by Dahl (1993, 2011) from where the average own-price elasticity for fossil fuels demand will be used in order to calculate the deadweight loss of environmental taxation enacted in the US.

The calculation of labour demand elasticity with respect to wage rate uses the Marshallian uncompensated formula and also Hicksian compensated own-price elasticity of labour demand. The uncompensated own-price elasticity of labour demand with respect to wage rate formula is:

$$\eta_{w,L} = \frac{\% \Delta L}{\% \Delta w} = \frac{\delta L}{\delta w} \chi \frac{w}{L} \quad (1.1)$$

And respectively:

$$\eta_{LL}^* = -(1 - s)\sigma \quad (1.2)$$

Where σ represents the substitution effect and s is the labour cost share in total costs of production; $-(1-s)$ represents the weights or the output elasticity with respect to the capital (capital cost share if factor markets are competitive). Therefore the compensated Hicksian own-price elasticity of demand takes into account only the substitution effect holding the output constant. We assume that there are constant returns to scale and capital and labour as inputs are close to perfect substitutes, hence the effect of substitution is $\sigma = 1$.

4. Results

The results obtained for Environmental taxation deadweight loss calculation are presented in Table no. 1. The DWL of environmental levies is determined using a lower and upper level of own-price elasticity of demand for fossil fuels according to the primary studies of Dahl (1991, 2011). The data displayed are in averages for the period of 1999–2012, where the DWL were calculated for the US. First set of results, DWL1 was obtained using a lower level of elasticity, where we assume that own-price elasticity of demand for fossil fuels is highly inelastic using as an average estimate of -0.2 . Therefore the DWL1 for a highly inelastic demand has a significantly small size, both in absolute and in percentage. The efficiency loss amount has a level of 0.1% out of total revenues from environmental taxation in the US. Increasing the elasticity of demand for fossil fuels give us the second set of results regarding the deadweight loss of environmental levies – the DWL2, where we use an average estimate of -0.4 . Even if the demand for fossil fuel is still considered as inelastic, the efficiency cost (DWL2) for this level of elasticity reaches 0.2% with respect to Environmental tax revenues in the US between 1999–2012.

Table 1: The efficiency costs of Environmental taxation and Employer's social security contribution, in US, for the period of 1999–2012

Average			Average		
Environmental Tax Revenues	Billion \$	110.16	Employer's Social Security Contributions	Billion \$	433.23
Effective Environmental Tax Rate	Percent	1.01	Employer's Social Security Contribution Rate	Percent	8.59
Elasticity		-0.20	Uncompensated Elasticity		-0.35
Elasticity		-0.40	Compensated Elasticity		-0.73
DWL1	Million \$	-109.68	DWL1	Billion \$	-6.69
DWL1%	Percent	0.10	DWL1%	Percent	1.59
DWL2	Million \$	-219.36	DWL2	Billion \$	-13.57
DWL2%	Percent	0.20	DWL2%	Percent	3.14

*Source: Own calculation. **All results represent averages for period 1999–2012, for the US data.

On the other side, in order to determine the DWL of employer's social security contribution (hereinafter as SSC) supported for its employees we used the data provided by OECD Statistics regarding the employer's annual average social security contribution rate, for the period of 2000-2011 in the US. In order to calculate the own-price elasticity of labour demand with respect to wage rate we used both (1.1) and (1.2) formulas for uncompensated and compensated own-price elasticity of demand for labour. Another particularity in calculating both types of elasticities, we choose to use annual average working hours and average annual hourly earnings instead of using traditional total employment and annual average wage rate to determine the own-price elasticity of demand for labour, data that was provided by OECD Statistics. The results regarding the efficiency cost of employer's social security contribution in the US is presented in Table no.1. Similarly to the environmental tax deadweight loss calculations, we estimated also two sets of DWL for employer's SSC, using traditional Marshallian uncompensated elasticity of labour demand to calculate DWL (1.1) and Hicksian compensated own-price elasticity of labour demand to estimate the DWL (1.2). The results regarding compensated own-price elasticity of labour demand are consistent with those obtained by Lichter, Peichl and Sieglöch (2013).

As can be seen in Table no. 1, the deadweight loss of employer's social security contributions, in average for 1999–2012 period, is substantially higher, both in absolute and percentage measures than the DWL of environmental taxation. While the average DWL of environmental levies ranges between 109.68 million \$ and 219 million \$, the DWL of employer's SSC, in average, amounts between 6.69 billion \$ and 13.57 billion \$. On the other hand there is a significant difference in percent of both DWL's, where the maximum level of the Environmental taxation reaches 0.20% of revenues in comparison of employer's SSC that amounts up to a level of 3.14% of revenues collected from this tax. Therefore if we choose to evaluate the efficiency costs with respect to both types of taxation, weighting one tax against another we can support the idea that a tax swap between analyzed direct and indirect taxes is feasible. Where carbon taxation introduction can be accompanied by an employer's social security gradual reduction, in order to decrease the distortionary effect of SSC on labour costs by offsetting with less distortionary, indirect-wise environmental levy such as carbon taxation. The substantial differences between the efficiency cost of both types of taxes stays into the responsiveness of demand curve for each taxed item – labour in case of SSC and fossil fuels in case of environmental taxes. Another pertinent explanation of the feasibility of

this tax swap mechanism stays into the fact that employer's SSC "artificially" increases the labour costs driving a wedge between marginal cost and marginal product of labour. This means that employer's social security contribution targets one of the fundamental inputs of production – labour, compared with environmentally oriented taxes which target general commodities which can be considered as outputs.

Table 2: Simulation of gradual decrease of employer's SSC rate and required increases of environmental tax rate, in US, average for 1999–2012 period.

Increase/ Decrease Rate	Reduction in Employer's SSC Revenues	Employer's SSC rate reduction	SSC Revenues after gradual cuts	SSC Revenues loses after cuts	Environmental tax revenues increase	Environmental tax rate required increase	Increase of Environmental tax rate in rapport with initial tax rate
	Billion \$	Percent	Billion \$	Billion \$	Billion \$	Percent	Percent
5%	21.66	8.19	411.61	21.66	131.82	1.20	119%
25%	108.32	6.47	324.95	108.32	218.48	1.99	198%
50%	216.64	4.31	216.64	216.64	326.80	2.97	297%

*Source: Own calculations. **SSC – Social Security Contributions.

The results of simulation presented in the Table no.2 show that a decrease by 5% of employer's SSC will require a 119% increase of environmental tax rate, in average for the US, in order to collect the same amount of revenues to the public budget. On the other hand a 50% decrease of employer's SSC will require a 297% increase of environmental tax rate, in order to respect the revenues neutrality condition.

Table 3: The recalculation of the DWL of employer's SSC and environmental taxation in the US, after the gradual decreases of payroll taxation and necessary increases of environmental tax rate

Payroll tax		5%	25%	50%	Environmental taxation		5%	25%	50%
Employer's SSC	Bil. \$	411.61	324.95	216.64	Environmental Tax Revenues	Bil. \$	131.82	218.48	326.80
Employer's SSC Rate	%	8.19	6.47	4.31	Effective Environmental Tax Rate	%	1.19	1.98	2.97
Uncompensated Elasticity		-0.35	-0.35	-0.35	Elasticity 1		-0.20	-0.20	-0.20
Compensated Elasticity		-0.73	-0.73	-0.73	Elasticity 2		-0.40	-0.40	-0.40
DWL1	Bil. \$	5.90	3.68	1.63	DWL1	Bil. \$	0.16	0.43	0.97
DWL1%	%	1.43	1.13	0.75	DWL1%	%	0.12	0.20	0.30
DWL2	Bil. \$	12.35	7.70	3.42	DWL2	Bil. \$	0.31	0.87	1.94
DWL2%	%	3.00	2.37	1.58	DWL2%	%	0.24	0.40	0.59

*Source: Own calculation. **The results presented are in average for the US, in the 1999–2012 period.

In order to strengthen our proposal of gradual tax cuts of employer's SSC and increases of environmental tax rate, we choose to recalculate the DWL's of both levies after modifications operated into their tax rates and correspondent tax revenues. It is important to mention that this offsetting measures achieve, in average, a great reduction of the employer's SSC DWL decreasing from 3% up to 1.58% of revenues collected. On the other side, the simulated increases of environmental tax rate show only minor increases of the efficiency costs ranging between 0.24% and up to 0.59% of revenues collected using this levy. Our results are consistent with those obtained by Nerudova and Dobranschi (2015) which enable us to conclude that there is a high potential to implement a tax swap mechanism where payroll taxation that affects labour demand can

be reduced at the expense of environmental tax rate increase, achieving a double outcome – reducing the distortionary effects of labour demand taxation and increasing environment protection using corrective levies.

5. Conclusion

The aim of this paper was to validate the second outcome of double dividend hypothesis. Starting with the question: Can carbon taxation swap with payroll tax cuts decrease the excess burden? We analyzed the efficiency costs of both types of taxation. The results obtained for the United States confirm that there is “enough room” to implement a gradual tax swap mechanism. Given the fact that the efficiency costs of environmental taxes are considerably lower (both in absolute and percentage values), than payroll taxation in the US, it is possible to apply payroll tax cuts and consequently increase the ratio of environmental taxation. Nevertheless this tax swap should be done in a framework where revenue neutrality condition is fulfilled.

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Ethical certification: Between competitive advantage and new enterprise’s values

Kamila Nováková¹, Raúl Compés López²
and José María García Álvarez-Coque³

¹*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Czech Republic, Zemědělská 1, 613 00, e-mail: novakova.kamila@yahoo.com*

²*Department of Economy and Social Sciences, Universitat Politècnica de València, Camino de Vera, s/n, 46022 Valencia, Spain, e-mail: rcompes@esp.upv.es*

³*Department of Economy and Social Sciences, Universitat Politècnica de València, Camino de Vera, s/n, 46022 Valencia, Spain, e-mail: jmgarcia@upvnet.upv.es*

Abstract

The aim of the paper is to provide a contribution to explore the socio-ethical aspects of companies in Spanish agrifood sector. Besides the food safety and quality requirements, there are initiatives to promote socio-ethical principles of the business to support the non-monetary issues related to the agrifood sector. Any awareness of socio-ethical principles in the daily business routine can be considered as a potential competitive advantage for individual company. The objective of the paper was to examine whether there are significant differences among individual industries within the Spanish agrifood sector in terms of social and ethical aspects. A sample of 66,047 different agrifood companies in the year 2012 was examined. Results of both empirical tests prove that at least one industry category stochastically dominates another industry category and therefore, the differences may originate from the social and ethical consciousness of individual company.

Keywords: business ethics, human resources, Spanish agrifood sector, socio-ethical certification

1. Introduction

The agrifood industry is a sector of crucial economic and political importance. Therefore, it is one of the most regulated sectors in the EU, with significant implications for human safety, environmental issues and economic sustainability (Iakovu et al., 2014). The growing importance of the agrifood sector in terms of number of employees involved or its contribution to environmental impacts has led to increased demands for addressing ethical and social issues related to their supply chain (Iakovu et al., 2014), so

called from wheat-to-bread chain (Gracia et al., 2010). The social and ethical aspects are objects of the interest for this paper.

Contemporary global political and economic situation is characterized by an increasing trend toward alternative forms of governance. Rising incomes and world-wide food scares have given rise to demand for assurance of the quality and safety food issues. These signals have been forwarded back to suppliers who are asked to incorporate the quality and safety management standards to their production and distribution processes (Fulponi, 2006). Majority of governmental efforts on the global level are often seen today as ineffective in negotiating far-reaching agreements in the increasingly complex political system and government-led regulations are considered as costly (Kalfagianni, 2014). Instead, any institutional initiatives introduced by private actors (i.e. firms, society) for governance began to gain ground (Conde et al., 2013; Bitzer et al., 2013).

The rise of private standardization belongs to the natural response for globalization and development of market economy as one of the main initiative to survive, being economically profitable and, more importantly, being based on the alternative and traditional values. These types of governance include not only quality and safety assurance, but also certification, code of conducts or labelling. Besides the quality and safety standards, private standards focusing on the environmental sustainability, ethics or various social aspects are gaining more and more relevance (Gawron and Theuvsen, 2009; Henson, 2011). Moreover, systematic values assurance and improved behavior within the community are considered cornerstones for improving the competitiveness for European agrifood companies for the upcoming decades. We understand these challenges to be crucial in the future for agrifood sector and its “re-localized” economics, and agree with Downey (2006) who claim that the whole European agrifood sector is being rapidly reshaped by international policy developments, combined with non-monetary issues as food security, ecological sustainability and future viability of rural regions.

In this context, the aim of this paper is to examine whether there are significant differences among individual industries within the Spanish agrifood sector in terms of social and ethical aspects. In other words, we aim to provide the empirical evidence whether the social and ethical aspects in Spanish agrifood companies are identical according to the location within the commodity vertical, or whether there is any room for improvement. The examined aspects are not based on company performance or size. Therefore, the potential differences may originate from the social and ethical consciousness of individual company.

The paper is structured in the following way. First, the most relevant and recent theoretical and empirical literature review is provided. Next, methodology is summarized, such as the data base used, the selected variables and the research model development are presented. Following that, results are commented on and discussed. Finally, the main conclusions and recommendations for further research are set out.

2. Background and hypothesis

2.1. Theoretical framework

According to the Solow’s neoclassical model for growth, investment in labor and capital is a key factor to achieve the economic growth. Modern growth theories also see human capital as an important factor for economic growth, even though it cannot be transferable like land or fixed capital. Porter’s theory on the value chain highlights the differences

between individual companies and their internal processes, where “each of these activities can contribute to a firm’s relative cost position and create a basis for differentiation” (Porter, 1985, cited in Ghemavat, 2002). He claims these are the sources of the competitive advantage. He ranks the business ethics of business relationships and quality of the human resources to the secondary, supporting, activities. These activities support the primary functions of a company (such as sales, logistics, or operations) and therefore, indirectly relate with the value company is creating. The more value a company creates, the more profitable it is likely to be. Besides, according to the Porter’s hypothesis, well-crafted voluntary approaches¹ may increase both environmental performance and economic efficiency (Porter and van der Linde, 1995, cited in Grolleau, et al., 2007).

To improve not only the profitability, but also the production quality of the Spanish agrifood companies, there have been introduced initiatives from the EC (European Commission) to improve European Agricultural product quality policy. Besides the marketing standards, geographical indications and organic farming, there are certification schemes, both national and private. For example International Organization for Standardization (ISO), which provide standards giving specifications for products, services and systems and ensuring quality, safety and efficiency. They mainly facilitate the international trade. Generally, the certification schemes have very diverse objectives, they are often too broad and do not include any sector specific aspects. There are also remarkable differences among countries. On the other hand, any certification initiative supports sharing of information and therefore has a significant effect on the companies’ competitiveness.

2.2. Empirical research

There is a vast empirical literature which looks into the certification schemes, supply chain management techniques or providing stakeholder’s perspective on both issues (Blazovich et al., 2014; Conde et al., 2013; Fulponi, 2006; Grolleau, et al., 2007; Kalfagianni, 2014). However, it is often regardless the production activity or purely based on secondary data analyses, difficult to repeat or verify on specific research sample, or verify the third-party methodology (Blazovich et al., 2014). The specificity of the industry is very relevant, since the certification schemes are often too general and need to be adjusted according to the industry (Conde et al., 2013). Studying in more detail the individual parts of the agrifood sector allows better understanding of the nature of each part and more accurate recommendations (Alarcon and Polonio, 2014; Gracia, Magistris, and Albisu, 2010; Iakovou et al., 2014).

This section reviews the recent empirical research literature and provides its research sample, area, location of the research, methods used and the main results. The quality of communication within the agrifood industry and its influence on companies’ competitiveness were subjects of interest for Gracia et al. (2010). They analyzed 175 agrifood stakeholders in Spain to examine the inter-organizational relationships by structural equation modeling. Their findings confirmed that as the quality of relationships improves, the stakeholder competitiveness increases. The question of company performance was examined also by Blazovich et al. (2014), too. They focused on 76 companies marked as ‘100 Best Companies to Work For’ by Fortune magazine and analyzed their performance and riskiness based on data from Compustat database. They used standardized t-tests and Wilcoxon single-rank tests and they found that the performance of

¹ For example, ISO 14001 or EMAS

employee-friendly firms is better and their risk is lower. The relevance and importance of certification was explored in the study of Bitzer (2013). He examined 6 partnerships in Peru through exploratory case studies and proved that certification serves as a signal to realize change through the market. Besides certification as a non-material asset of partnerships, he linked certification to business opportunities on the global markets. Alarcon and Polonio (2014) designed their research to highlight the determinants of technological innovation in Spanish agrifood sector. They used a panel data of 449 agribusinesses between 1998 and 2008 and through regression analysis they proved the important position of good-quality human resources contributing to innovation in a company.

2.3. Hypotheses

Based on the theoretical and empirical preview, the hypotheses tested in this study are stated as follows:

H₁: the level of business ethics in a company depends on the industry within the Spanish agrifood sector.

H₂: the quality of human resources in a company depends on the industry within the Spanish agrifood sector.

3. Methodology and Data

3.1. Data base

The data base used in this paper was taken from the database Amadeus, provided by the Bureau van Dijk. The analytical part was conducted from the representative sample of firms from the Spanish Agrifood sector in 2012 reported in the database Amadeus. From the database the sample of 66,047 different agrifood companies was extracted. This sample consists of SME² with 94.5% of observations and of large companies with 5.5%. We focus on SMEs because most firms from the Spanish Agrifood sector are small or medium sized. Moreover, we only examined SMEs because as Novak (2010) pointed out, there are different characteristics of the SMEs which lead to different mechanisms of building the business relationships within the commodity vertical compared to larger enterprises, although the latter are also oriented towards long-term high-quality relationships.

All the statistical analyses of data were conducted in the SPSS software.

3.2. Variables

Business ethics have been measured through the credit period (CrP, days, eq. 1). It explains the average period taken by the company in making payments to its creditors. The lower is the period the better developed is business ethics in the company (Chern, et al., 2013; Wu et al., 2014).

$$CrP = \textit{Credit period} = \frac{\textit{creditors}}{\textit{operating revenue}} \cdot 360 \quad (1)$$

² Company size categories taken from the database Amadeus, based on the following criteria: operating revenue, total assets and number of employees

Human resources are considered for the purposes of this paper as social aspects of the company and were estimated as a ratio of labor costs and operating revenues (LCOR, %, eq. 2). According to the industry average, the score is calculated for the individual agri-food company and all companies are then marked as below average and above average, compared to the peer group, similarly in the previous variable *Credit period*. The higher is the value for this variable, the higher is the quality of the human resources used by the firm (Alarcon and Polonio, 2014).

$$LCOR = \text{Labor costs over operating revenue} = \frac{\text{labor costs}}{\text{operating revenue}} \cdot 100 \quad (2)$$

Using NACE Rev. 2³ industry groups to identify industry membership, we define the industry benchmarks according to the industry average of both measures calculated using all firms in the industry reported in the database Amadeus in 2012. To test our hypotheses, we created average-industry-adjusted variables measuring how much the company's measure differs from the average values of all other firms within the particular industry and classifying them into categories: below-average and above-average. The agri-food industry examined in this paper consist of agricultural producers (01.), manufacturers of food products (10.), manufacturers of beverages (11.), wholesale trade (46.) and retail trade (47.) according to the NACE Rev. 2.

3.3. Research model development

As a first step it is important to determine and specify the variables involved in the model. In this paper, we used the variable *credit period* (CrP, days) to explain the business ethics in a company. We introduce this assumption based on the fact that granting a permissible delay to settle the accounts between buyer and seller encourages the demand but at the same time and more importantly, it has a negative impacts on costs and default risks to set up ethical and long-term business relationships within the commodity vertical (Chern, et al. 2013). The quality of the human resources in a company were estimated through the indicator *costs of employees over operating revenues* (LCOR, %). We consider this indicator as appropriate for estimating the quality of the human resources in a company, as Alarcon and Polonio (2014) considered, too.

Both variables used in this paper: *Credit period* and *Quality of human resources* take positive integer values and are ordinal. The variable industry is nominal categorical variable and therefore, instead of Pearson's statistics, Spearman's statistics or parametric ANOVA, it is appropriate to use the non-parametric Kruskal-Wallis test (eq. 3, 4). The logic of this test is as follows: Observations from all k nonempty groups are jointly sorted and ranked, with the average rank being assigned in the case of ties. The number of records tied at the j th distinct value $t_{j,f}$ is calculated incorporating the frequency weight, and the sum of $T_{j,f} = t_{j,f}^3 - t_{j,f}$ is also accumulated. For each group the sum of ranks, $R_{i,f}$, as well as the number of observations, $n_{i,f}$, is obtained. The test statistic unadjusted for ties is

$$H = \frac{12}{N_f(N_f+1)} \sum_{i=1}^k \frac{R_{i,f}^2}{n_{i,f}} - 3(N_f + 1) \quad (3)$$

where $N_f = \sum_{i=1}^k n_{i,f}$. The statistic adjusted for ties is

³ Derived from French: "Nomenclature générale des Activités économiques dans les Communautés Européennes", second revision, valid since December 2006

$$H' = \frac{H}{1 - \sum_{i=1}^m \frac{T_{i,f}}{(N_f^3 - N_f)}} \quad (4)$$

where m is the total number of tied sets. The one sided p -value is $p_1 = \Pr(\chi_{k-1}^2 \geq H') = 1 - \Pr(\chi_{k-1}^2 \leq H')$, where χ_{k-1}^2 follows a chi-square distribution with $k-1$ degrees of freedom. $p_1 < \alpha$ will reject the null hypothesis. All the testing uses an alpha of .05.

4. Results and discussion

4.1. Sample description

Table 1 presents descriptive data on 66,047 Spanish agrifood companies, and includes 62,438 small and medium-sized enterprises (SMEs), subjects for our analyses. The data reports the state-of-the-art as at the end of the year 2012.

Table 1: Agrifood sector in Spain (based on data from Amadeus, 2012): Basic overview

	Industry (NACE Rev. 2)					Total
	01. ⁴	10.	11.	46. ⁵	47. ⁶	
Number of employees (th)	110	219	43	221	484	1,077
Turnover (billion €)	16.6	62.8	14.1	80.4	94	267.9
Added value (billion €)	3	10	3.2	7.2	15	38.4
Number of companies (th)	16.2	9.8	2.4	24.2	13.4	66
Percentage of SMEs (%)	98	91	92	94	98	95

In the columns, there are individual categories of agrifood sector, according to the NACE, second revision; and in the rows there are several basic descriptive indicators. We include also the total column, to provide the relevance within the Spanish economy. We also decided to use individual column for manufacture of beverages (NACE 11.), even though its relative size. The main reason was to comply with and respect the NACE methodology. On the last row, there is a percentage of SMEs in each individual industry.

Table 2: Industry frequencies

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	15,859	25.4	25.4	25.4
10	8,775	14.1	14.1	39.5
11	2,178	3.5	3.5	42.9
46	22,537	36.1	36.1	79.0
47	13,089	21.0	21.0	100.0
Total	62,438	100.0	100.0	

Table 2 provides the industry membership for our research sample. The Spanish commodity vertical starts with the individual agricultural producers (25.4%), continues with food and beverages manufacturers (17.6%) and ends with the traders, both wholesale and retail (57.1%).

⁴ Refers to Crop and animal production, hunting and related service activities

⁵ Wholesale trade, except of motor vehicles and motorcycles

⁶ Retail trade, except of motor vehicles and motorcycles

4.2. Verification of hypotheses

To test the first hypothesis H1, whether the level of business ethics in a company depends on the industry within the Spanish agrifood sector, we examine the indicator credit period. We evaluate each company by a score, depending whether is above or below the industry average, which we calculated for all SMEs reported in the database Amadeus in 2012 with respect to the industry. As shown in table 3, the results demonstrate the Kruskal-Wallis statistics equals to 60.676 with the four degrees of freedom. The significance value has the value of .000, which is less than our alpha of .05. Therefore, based on the level of significance, there is a relationship between the level of business ethics in a company and industry a company is operating in. The lower the significance value, the less likely it is that business ethics and industry are unrelated. In this case, the significance value is so low that it is displayed as .000, which means that it would appear that the business ethics and industry are, indeed, related

Table 3: KW-test: Credit period grouped by industry

	CrP_Score
Chi-Square	60.676
df	4
Asymp. Sig.	.000

We test our second hypothesis, whether the quality of human resources in a company depends on the industry within the Spanish agrifood sector, by analyzing the labour costs over operating revenues and five categories of Spanish agrifood industry. Our data analysis for second hypothesis parallels the method used to answer first hypothesis. Again, we use Kruskal-Wallis test to determine if there are statistically significant differences between five groups of the agrifood industry on an ordinal dependent variable: quality of the human resources.

Table 4: KW-test: Labor costs over operating revenues grouped by industry

	LCOR_Score
Chi-Square	589.650
df	4
Asymp. Sig.	.000

As presented in the table 4, the Kruskal-Wallis statistics equals to 589.650 with the four degrees of freedom. The significance value has also the value of .000, similarly with the first hypothesis. Again, based on the level of significance, there is a relationship between the quality of the human resources in a company and company's industry.

Results of both empirical tests prove that at least one industry category stochastically dominates another industry category. However, since we have five categories in our research design, determining which of these five groups differs from each other is important. For these purposes, the post hoc tests can be applied. In this paper, however, it is crucial to prove, that there is a significant difference among industries of agrifood sector in terms of business ethics and quality of human resources.

Since there are categories of industry significantly dissimilar from other categories, we can see a room for improvement. Since both of the examined indicators are relative, there is no direct link to the company size. In other words, even small companies can

reach positive above average values of analyzed indicators and therefore ranks among ethical companies and companies employing good-quality personnel.

These seem to be fairly significant and are in line with other studies on agrifood performance (Bitzer, 2013; Grolleau, et al., 2007). This paper adopted the variable selection from the study of Alarcon and Polonio (2014) and we also focused on agribusinesses as Gracia et al (2010) or Alarcon and Polonio (2014), however, our research sample is larger – we examined more than 66 thousand of Spanish agrifood companies in the year 2012. Our research is also fully reproducible and verifiable; since we used the standardized accounting and economic data from the database Amadeus from Bureau van Dijk. Many studies also distinguish the company size, we also decided to analyzed SMEs separately, as the 94.5% of our research sample, with the different economic results from large and very large companies.

However, to avoid any biases in further research, more detailed and opened certification methods need to be employed. There is a need for measurable metrics for company assessment to be able to state whether a company is getting closer or further from the broadly acceptable values of socio-ethical indicators.

5. Conclusions

This paper studies the business ethics of a company as well as quality of the human resources in Spanish agrifood industry. A sample of 66,047 different agrifood companies was examined as at 2012. Results indicate that there is a relationship between the level of business ethics in a company and industry a company is operating in. Given these results, we conclude that level of business ethics of individual companies in individual parts of the commodity vertical is significantly different.

Regarding the quality of the human resources in individual agrifood companies, findings indicate that there are significant differences between five groups of the agrifood industry on the quality of the human resources.

Since there are differences between companies in individual parts of the agrifood chain and both examined variables were relative, we conclude that there is a space for improvement and the differences originate from the social and ethical consciousness of individual companies.

This study was limited in terms of data availability from the database Amadeus, in other words, in the paper no field research was employed. The compromise selection of variables explaining the business ethics and human resources in a company shall be confirmed by the field research, for example by a survey on Spanish agrifood companies. On the other hand, this research design allowed us to analyzed considerably large dataset and therefore, our results have the statistical significance.

For the further research we recommend to focus more on the competitiveness of individual companies and risks related with their operations. Since there is a lack of data in terms of company certification, another compromise can be expected.

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Parameter estimation for dynamic model of the financial system

Veronika Novotná¹ and Vladěna Štěpánková²

¹Department of Informatics, Faculty of Business and Management, Brno University of Technology, Kolejní 4, 612 00 Brno, Czech Republic, e-mail: novotna@fbm.vutbr.cz

²Department of Informatics, Faculty of Business and Management, Brno University of Technology, Kolejní 4, 612 00 Brno, Czech Republic, e-mail: stepankovav@fbm.vutbr.cz

Abstract

Economy can be considered a large, open system which is influenced by fluctuations, both internal and external. Based on non-linear dynamics theory, the dynamic models of a financial system try to provide a new perspective by explaining the complicated behaviour of the system not as a result of external influences or random behaviour, but as a result of the behaviour and trends of the system's internal structures. The present article analyses a chaotic financial system from the point of view of determining the time delay of the model variables – the interest rate, investment demand, and price index. The theory is briefly explained in the first chapters of the paper and serves as a basis for formulating the relations. The purpose of the article is to set up a dynamic model of a financial system which would express a real economic situation and respect the effect of the history of factors under consideration. The determination of the delay length is carried out for the time series representing Euro area. The methodology for the determination of the time delay is illustrated by a concrete example.

Keywords: financial system, dynamic system, time delay, investment demand, interest rate, price index

1. Introduction

One of the natural trends in most fields of science is to study various model situations which subsequently enable us to analyse the simulated processes, more accurately specify the conditions under which they function, make practical conclusions from the findings, find an optimal solution etc. If an economist wishes to assess the impact of certain real steps in an economic system, he creates an economic model and uses historical facts to verify his theory. Therefore, it is very often necessary for them to get involved in the modelling of complicated economic phenomena and systems, analysis and verification of these models, prediction, and optimal decision-making.

Dynamic models based on the theory of non-linear dynamics are applied to cases where relations cannot be effectively studied by traditional analytical methods which are based on linearity, stability and a stable equilibrium point. The theory of non-linear system dynamics has developed along with the development of computer technologies and with the possibilities this development has brought. This theory is capable of showing what the relation of the whole to a change of its individual parts is, and what the differences between the whole and its parts are. More precisely, chaotic motion in dynamic systems is specified by the so-called chaos theory. This theory provides tools in dynamic systems which allow explaining complicated behaviour of the system as a result of the behaviour and trend of its internal structures. At the same time, this theory can be used in many areas of economics, it can be applied, for instance to economic cycle, economic growth, or the relation between microeconomic and macroeconomic structures.

The functioning of a financial system, which is part of an economic system, may be explained on the basis of a non-linear economic model. However, when we investigate certain economic quantities as functions of time, we must take account of the fact that a quantity may also depend on its preceding values or on the preceding values of other quantities.

This article analyses a chaotic financial system from the point of view of determining the time delay of the model variables – the interest rate, investment demand, and price index. The theory is briefly explained in the first chapters and serves as a basis for formulating other relations. The purpose of the paper is to set up a dynamic non-linear model of a financial system which would express a real economic situation and respect the effect of the history of the factors under consideration. Determination of the delay length is carried out for the time series representing Euro area. To determine the time delay, a statistics method will be used, which captures the nature of the relation between the time series. The methodology for the determination of the time delay is illustrated by a concrete example.

2. Literature review

Efforts by economists and mathematicians to apply models of dynamic systems to economics have a long history. In economics, state variables may be represented by such quantities as production, consumption, investment, etc. The modelling of phenomena which are based on economic reality and described by statistical data, is facilitated in particular by methods from various fields of mathematics such as differential calculus (Aluf, 2012; Balasubramaniam, 2014; Faria, 2013), statistics (David, 2013), (Plaček, 2013), linear and dynamic programming (Hassan, 2011), optimization (Subagyo, 2014; Zaarour, 2014), etc. The current methods for investigation these systems are focused primarily on the identification of states in which the system behaviour is predictable, and states in which the system shows signs of deterministic chaos.

The study of non-linear dynamic systems was extended especially by mathematicians such as Ljapunov, Pontryagin, or Andronov. Their work was later continued by Smale in the USA, Peixoto in Brasil, and Kolmogorov, Arnold and Sinai in the Soviet Union. In 1975, a new type of motion in dynamic systems was discovered which is currently referred to as “chaotic motion”. This new type of motion was described as unstable or fluctuating with a large number of periods, but not as quasi-periodic. Non-linear systems are characterized by the random appearance of structural changes with random motion

such as bifurcations. Since 1989, when the first treatise of chaos control was published by Huber, chaos control has attracted great attention due to its potential application to physics, chemical reactors, control theory, biological networks, artificial neural networks, telecommunications etc. In the last few decades, much effort has been devoted to the theory of chaos control, primarily in the areas of unstable equilibrium points and unstable periodic solutions (Hubler, 1989). The methods which have been developed are in particular suitable for the case of chaos suppression in various chaotic systems (Wu, 2010; He, 2013; Chen, 2014).

In the areas of finance or social economics the internal structures are often non-linear and the mutual relations are very complicated. This is why studies investigating the effects of internal structural characteristics of such a system represent the system as a system of differential equations with a possible chaotic behaviour. Chaos in a financial system was first demonstrated in 2001 (Ma, 2001a; Ma, 2001b). Later on, in 2007, a new attractor was proposed for a modified chaotic finance system (Cai, 2007). In 2009, a hyper chaotic finance system was proposed from the modified chaotic finance system (Ding, 2012). Chen (Chen, 2014) and Yu (Yu, 2012) presented a 4D chaotic finance system, over which they achieved control by means of linear feedback and speed feedback controllers.

3. Non-Linear Dynamic Finance System

A finance system can be understood as a set of markets, institutions, laws, regulations and techniques on the basis of which all types of financial transactions are carried out. Models of dynamic finance systems may contain certain trends indicating the significance of sensitivity of the parameters to initial values from which the systems subsequently evolve towards structural changes. These may cause fluctuations over a long period of time. One must realize, however, that occurrence of these properties may not necessarily be caused by economic activity. Similar properties may then pass into mechanisms which are able to cause a change in the structure of the economy, leading to a state in which chaotic behaviour occurs (Ma, 2001a; Ma, 2001b).

In the publications (Ma, 2001a; Ma, 2001b) the key part of the financial model was simplified for simplification reasons. It was decided, based on detailed analysis and experiments, that the model will comprise the following variables: x for the interest rate, y for the investment demand, and z for the price index. An important property of these variables is their sensitivity to a change of information known in the economy. Since the effect of the sensitivity of these variables to a change of information in time is precisely the problem being investigated, the changes of these variables in time are defined as the state variables: $\dot{x} = dx/dt$, $\dot{y} = dy/dt$, $\dot{z} = dz/dt$.

As a result, the model of the financial system is represented by three differential equations:

$$\begin{aligned}\dot{x} &= z(t) + (y(t) - a)x(t) \\ \dot{y} &= 1 - by(t) - x^2(t) \\ \dot{z} &= -x(t) - cz(t),\end{aligned}\tag{1}$$

where a stands for household savings, b for the cost of investment, and c for the demand elasticity of commercial markets. All these three model parameters are assumed to be positive.

According to (Ma, 2001a; Ma, 2001b) a dynamic financial system represented by a system of ordinary differential equations should comprise chaotic behaviour. This assertion has been investigated on the basis of numerical experiments, performed with this system, and has been confirmed by other publications (Ding, 2009; Chen, 2014).

In (Chen, 2008) and (Son, 2011), the system (2) was modified by adding delayed feedbacks into the system. This modification is based on the finding made in (Holyst, 2000) and (Holyst, 2001) that chaotic behaviour of a microeconomic model can be stabilized, if we use the Pyragas delayed feedback control. The DCF (delayed continuous feedback) method proposed in (Pyragas, 1995) can be applied to experimental systems.

If we consider the effect of the past, adding feedback to the system, we obtain a new system:

$$\begin{aligned} \dot{x} &= z(t) + (y(t) - a)x(t) + k_1(z(t) + (y(t) - a)x(t) - (z(t - \tau_3) + \\ &\quad (y(t - \tau_2) - a)x(t - \tau_1))) \\ \dot{y} &= 1 - by(t) - x^2(t) + k_2(1 - by(t) - x^2(t) - (1 - by(t - \tau_2) - x^2(t - \tau_1))) \\ \dot{z} &= -x(t) - cz(t) + k_3(-x(t) - cz(t) - (-x(t - \tau_1) - cz(t - \tau_3))), \end{aligned} \quad (2)$$

where k_1, k_2, k_3 is strength of the feedback and τ_1, τ_2, τ_3 is length of the time delay.

In contemporary literature on the solvability of systems of differential equations with delayed arguments, one can find a number of results which can be applied to problems from economic practice. A general theory of the solution of the above-mentioned problem as well as related problems can be found, for instance, in (Půža, 2010; Půža, 2011; Půža, 2012).

In the present article, however, we wish to discuss the possibility of determining the length of the time delay in the model for real data.

4. Correlation Analysis

To determine a suitable length of the delay between the variables, we have used correlation analysis, in particular the sample correlation coefficient. Correlation analysis is one of the important tools used in analysing relations between measured variables. By using the sample correlation coefficients r , we are mainly trying to determine whether the corresponding correlation coefficient is non-zero, which would amount to the statistical proving (at a selected significance level) of a relation between the corresponding variables. The strength of the linear relation between the variables X, Y is measured by the Pearson correlation coefficient. Stochastic independence of the components X, Y of a normally distributed vector is equivalent to their non-correlation. The sample correlation coefficient r is then defined as the sample covariance divided by the product of sample standard deviations, provided these are positive. Equivalently, r can be expressed by the formula

$$r = \frac{S_{XY}}{S_X S_Y}, S_X^2 > 0, S_Y^2 > 0 \quad (3)$$

and, subsequently, significance is tested by the two-sided zero-hypothesis test

$$H_0: \rho = 0, \text{dependence}, |t| \leq t_{1-\frac{\alpha}{2}}(n-2),$$

$$H_0: \rho \neq 0, \text{independence } |t| > t_{1-\frac{\alpha}{2}}(n-2),$$

where the test statistics has the form $t = \frac{r}{\sqrt{1-r^2}} \sqrt{n-2}$, n being the sample size. (Anděl, 1993)

If normal distribution is not confirmed, then to find an applicable distribution of the test criterion under small values of n , the sample correlation coefficient needs to be transformed. This can be done by using the Fischer transform to the Z quantity. As a test criterion, the U quantity can be used, which has an approximately standard normal distribution.

4.1. Computations

The computations of the correlation coefficients have been done by the Statistica program. Some of the modules of this program are specific, others are very universal, and the greatest advantage of this program is its user-friendliness.

There were analysed the data obtained from <http://www.tradingeconomics.com/>. There were analysed quarterly time series of 27 values for the period from fourth quarter 2007 till first quarter 2014, representing the quarterly value of the GDP deflator, interest rate and GFCF of Euro area. Correlation analysis was performed for the situation considering a delay of 1–4 quarters. From the frequency histograms can be concluded that the selected data are not normally distributed, primarily the time series of GFCF and interested rate.

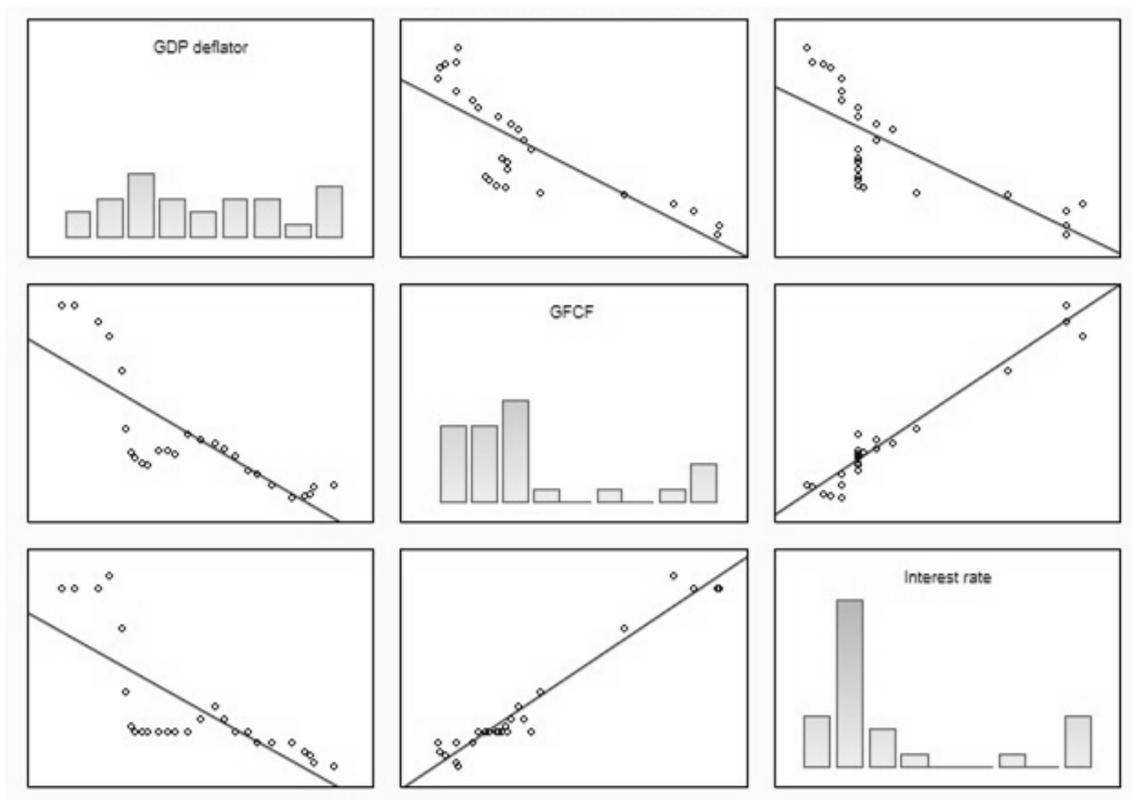


Figure 1: Frequency histograms and dot chart matrix

After the graphical analysis there was performed the Kolmogorov-Smirnov test. We tested the null hypothesis H_0 that the data come from a normal distribution at a significance level $\alpha = 0.05$. The test at a significance level of 5% did not reject only one variable, the GDP deflator. Only for this variable could be the assumption of a normal

distribution, with values GFCF and interest rate assumption, we must reject the normal distribution. It was therefore necessary to use data transformation in order to continue the correlation analysis.

Correlation analysis confirmed that the addition of delayed feedback to the model of financial system is absolutely justified. However simplifying assumption in the length of the delay, which does not change for each variable in relation to others, must be rejected. We can assume that this simplification based on subsequent method for solution of systems of differential equations with delay by using methods that do not allow such a system to deal with different delays. Given the current familiarity with differential equations with delayed or, more generally, deviated argument, or so-called functional differential equations, we have the possibility to apply the method of solving a significantly more general mathematical model, which may provide us with a wider range of results, including a comparison of the impact various parameters might have. Therefore, it is possible to generalize and write the model as follows:

$$\dot{x} = z(t) + (y(t) - a)x(t) + k_1(z(t) + (y(t) - a)x(t) - (z(t - \tau_3) + (y(t - \tau_2) - a)x(t - \tau_1)))$$

$$\dot{y} = 1 - by(t) - x^2(t) + k_2(1 - by(t) - x^2(t) - (1 - by(t - \tau_4) - x^2(t - \tau_2))) \quad (2)$$

$$\dot{z} = -x(t) - cz(t) + k_3(-x(t) - cz(t) - (-x(t - \tau_3) - cz(t - \tau_5))),$$

where k_1, k_2, k_3 is the strength of the feedback and $\tau_1, \tau_2, \tau_3, \tau_4, \tau_5$ the length of time delay. The strongest association was established for Euro area for the length of time delay $\tau_1 = 1, \tau_2 = 4, \tau_3 = 1, \tau_4 = 2, \tau_5 = 1$.

5. Conclusion

When modelling complex economic problems, we are often faced with the fact that relations of particular quantities are variable in time. One way of incorporating the dynamics of processes in a model is to consider time a continuous quantity and to describe dynamical models by means of differential equations. When specifying a model's structure, the dynamic character may be taken into account by incorporating delayed impact of both exogenous and endogenous variables.

The model discussed in this paper can be expanded in the future. One option is generalization of the model, which would allow us to work even with non-constant delay, etc.

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The impact of the choice of evaluation criteria and the type of tender on the awarding public contracts (in the case of construction contracts at the local level in the Czech Republic)

František Ochrana¹, Kristýna Hrnčířová² Michal Plaček³ and Milan Půček⁴

¹*Center for Social and Economic Strategy, Faculty of Social Sciences Charles University, Prague, Celetná 20, Czech Republic, e-mail: ochrana@fsv.cuni.cz*

²*Center for Social and Economic Strategy, Faculty of Social Sciences Charles University, Prague, Celetná 20, Czech Republic, e-mail: hrncirova@fsv.cuni.cz*

³*Private College of Economic Studies Znojmo, Loucká 21, Czech Republic, e-mail: placek@svse.cz*

⁴*Private College of Economic Studies Znojmo, Loucká 21, Czech Republic, e-mail: pucek@svse.cz*

Abstract

Public procurement may be examined from different perspectives. Using the Czech Republic as an example, this study is devoted to examining the impact of decisions made by the contracting authority regarding a public tender on the tender process itself and on the outcomes of the tender. The contracting authority addresses a number of decision-making issues regarding public procurements. For example, it needs to decide between two types of criteria (choosing between a single-criterion evaluation or rather opting for several evaluation criteria). At the same time, the authority is free to choose among different types of award procedures while adhering to certain restrictions imposed by the Act on Public Contracts. Using a sample of 1,027 construction work contracts awarded in the Czech Republic, the study examines, in more detail, the impacts of individual choices made by the contracting authority (namely the type of evaluation criteria chosen and the type of procedure for awarding contracts) on the estimated and final price of public contracts. Recommendations on how to streamline the process of public procurement can be drawn from conclusions from the empirical analysis.

Keywords: contracting authority as a rational partaker, selection of an evaluation criterion, estimated value of a public contract, final price of a public contract, public procurement in the Czech Republic.

1. Introduction

A large portion of GDP is reallocated via the institution of public procurement. In the Czech Republic, according to the Ministry for Regional Development, about 11–13% of GDP is allocated through the institution of public procurement. In the “Annual Report on Public Procurement in the Czech Republic in 2013” (p. 10) it is stated that the volume of the public procurement market is about 500 billion CZK. This is a considerable amount of public resources. It is therefore important to look for ways to increase the efficiency of public procurement. Assuming that the public sector could manage greater efficiency in the awarding procedures as to generate a savings of one percent, it would be possible for the public sector save an additional 5 billion CZK. This is an undoubtedly large amount of public resources that would be eligible for use in other public programs.

Additional savings can generate a different factors. These two factors relate to both formal (legal) public procurement procedures (see, e.g. Jurčík 2007, 2012, 2014), as well as economic aspects of public competition (Strand, Ramada, Canton et al., 2011). In this paper, we focus on examining some of the factors that are related to the demand side of public procurement (activities of the contracting authority). The aim of this study is based on an empirical analysis of a sample of 1,027 public construction contracts (at the local level in the Czech Republic) to examine what role the election evaluation criteria and the selection of the award procedure has on the final cost of procurement as well as recommendations for practice drawn from a theoretical exploration of generalized conclusions.

2. Basis of Research

Contemporary theory examines public procurement from various aspects. It analyses e.g. public procurement as a procedure regulated by the relevant legal regulation or as a contract under which a business transaction takes place (Bolton, Dewatripont, 2005). The contracting authority performs as the entity that in a public tender is seeking certain goods or services. The tenderer offers to fulfil the demand for goods or services to the contracting authority. At first glance it might seem that the awarding of public tenders and private purchases is not fundamentally different. In fact, it is not (see OECD, 2002). The private consumer decides for himself, while the contracting authority represents the public. It makes decisions for the public on numerous issues, such as these: What goods (in quantity and quality) are to be secured, in what form will they be secured and who will provide them? If the authorities within the public administration decide that the provision of goods (services) will be outsourced, it solves the problem of how the most appropriate tendering procedure will be chosen so that the tendering procedure is transparent and economically efficient.

The answer to the question of what goods are to be secured by the authorities of public administration, has a normative nature and is governed by the applicable legislation. The authorities of the public administration have selectively specified in legal regulations which goods and services they must secure. They are legally obliged to produce some goods and services directly. Others may be provided using alternative means (through outsourcing).

The question of in what form will the goods/services be secured goods lays within the realm of political decision-making (Prager, 1994) and takes the form of an institutional

dilemma: what institutional form of securing the necessary goods and services should be chosen?

The authorities in public administration have an option of either producing the given goods themselves through in-house production, or to have them provided externally (through outsourcing). When the decision takes the form of in-house production, the relevant authority in public administration acts as a direct producer of the given product/service. In case the authority in public administration decides, in line with the relevant legal regulation, to outsource the given product and service, then it acts as the provider of the given product/service with a decisive criterion of quality and efficiency of the produced goods/services (Nemec et al., 2008), or possibly other factors (see e.g. Levin, Tadelis, 2005).

In case the relevant authority in public administration rationally decides to provide the necessary goods or services using an external form, it becomes a public contracting entity. The conditions for using outsourcing are demonstrated, for example, by Nemec et al. (2014). For the delivery of public goods and services, a public tender is announced. The external provision of public goods and services is formally governed by the relevant legislation. In the Czech Republic it is Act No. 137/2006 Coll., On Public Contracts, as amended. Under this act a public contract is specified as a contract performed under a written agreement between the contracting entity (purchaser) and the supplier(s). The contracting authority should not only monitor whether the public procurement is in compliance with all the formal (legal) procedures, but should also take into account the aspects of the rational allocation of public resources and the role of the factors that create a competitive and transparent environment. The creation of a competitive environment is related to the competitive effect and the effect of transparency. We presume that the more the public tender resembles the open market, the lower the price of public contracts will be. Thus, the more goods/services which are brought into public procurement tenders, the greater the chance that the final price will be lower compared with the expected value. The effect of transparency is related to the openness of the procurement procedure. We proceed from the assumption that the more open the tender process, the greater the chance that the final price of the procurement will be lower.

Verification of this proposition is currently being addressed by various authors. From European authors, we could mention the study by Strand, Ramada and Canton (2011) and GHK (2010) in this regard, where the authors demonstrate the impacts of openness in public tender processes on the efficiency of public procurement from the example of the E.U.. The issue is also being studied in non-European countries. In this regard, the work of Iimi (2006) could be mentioned. He analyses public procurement in Japan and concludes that a one percent increase in the number of public tender applicants reduces the final cost of a public contract by 0.2%. Within the Central European region, this issue is dealt with by e.g. Pavel and Kubík (2011), Nikolovová et al. (2012), Kameník et al. (2011). From their research it may be concluded that the more open the type of award procedure is, the more it may be assumed that the final price of a public contract will be lower. Within our research we build on the results of these studies and by using a sample of public contracts, we attempt to examine how the choice of the tender procedure type affects the final price of the public procurement.

3. Methodology and Data

In this section of the paper, we ask the following research questions in the context of the competitive effect of ideas and the ideas of transparency effect:

1. What impact do the selection criteria and evaluation have on the final price of procurement?
2. What kind of impact does the choice of the type of tenders have on the final price?

For this purpose, we make use of examining a data file consisting of 1,027 public contracts for construction works (2013). These are public contracts which were contracted by entities from the regional and local governments. Our research sample differs from all cited Czech authors in that it includes a period of time after which an amendment to the Public Procurement Act by Act no. 55/2012) came into effect.

The reason for opting for the research sample of public contracts from the building industry is due to the fact that public contracts for construction works represent the most homogeneous set of public contracts, in contrast to heterogeneous contracts for services and supplies. Empirical data were obtained from the publicly available portals Bulletin of public contracts (www.vestnikverejnychzakazek.cz) and Contracts plus (www.zakazky-plus.cz), using a random selection. From the given set of public contracts small-scale public contracts (for which is not required public tender announcement) were excluded as well as public tenders which lacked some of the following selective information: date of publication of the public tender; registration number; name, type and main activity of the contracting authority; name and type of the construction contract; type of award procedure; evaluation criteria; date of award of the public contract; number of bids; originally estimated price; final price and additional information, whether it is a simplified below-the-threshold tender procedure. The purging of these omissions from the original data file resulted in a sample of 557 public contracts, of which 482 were single-criterion contracts and 75 were multi-criteria contracts. These are public contracts where the contracting authorities are the local governments (counties, municipalities and public corporations). To analyse the sample, standardized methods for calculating the difference in prices were used, as were also utilised, for example, by Nikolovová et al. (2012), as well as descriptive statistics and regression analysis.

4. Results

4.1. Selection of the type of criteria and price of a public contract

The difference between the final and expected price may be expressed either as a price differential (calculated as a difference between the final price and the expected price) or in the form of a normalised difference in prices, as specified by Nikolovová et al. (2012).

Hence:

$$\text{NRC} = (FP - EP)/EP, \text{ where} \quad (1)$$

- NRC is a normalised difference in prices,
- FP is the final price of a public contract,
- EP is the estimated price of a public contract.

The given formula states that provided the final and expected (estimated) prices are equal, the value of the difference is zero. If the price difference is negative, it means the final price is lower than the estimated price. If the final price is higher than the estimated price, then the price difference is positive. The higher the price difference from zero, the higher the difference between the final and estimated price is. In our examined case, when the contracting authority decided upon an evaluation of the public contracts based on a single-criterion, the distribution of normalised difference in prices was as follows (see Figure 1 – Normalised difference in prices of public contracts evaluated based on a single-criterion).

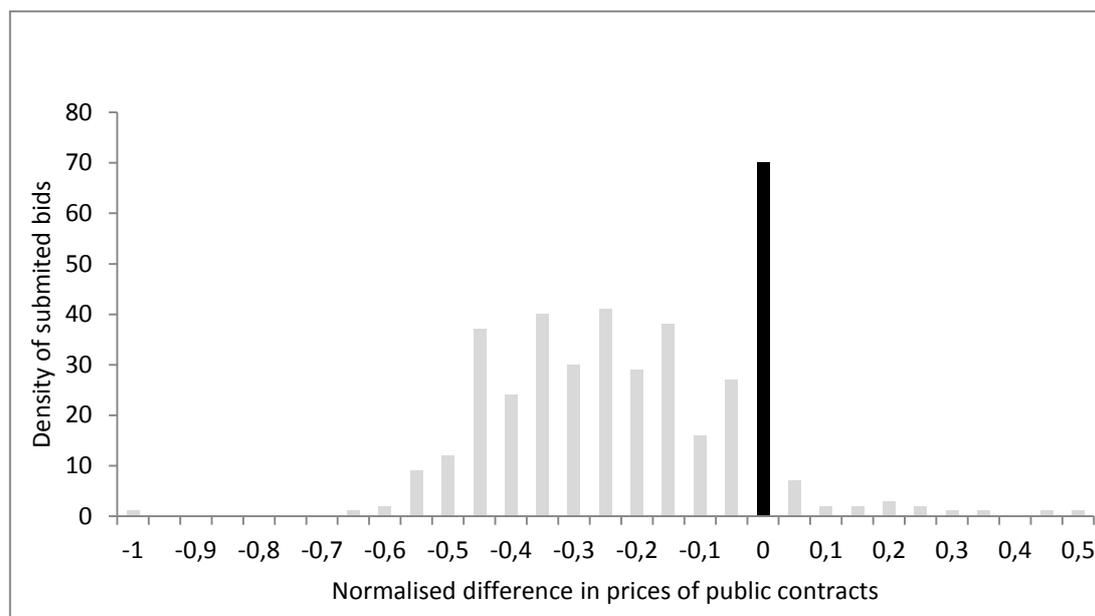


Figure 1: Normalised difference in prices of public contracts evaluated based on a single-criterion

As evident from Figure 1, the normalised price differential ranges from -1 to $+0.5$. Most of the reviewed offers have a higher expected (estimated) price than their final price. In almost one fifth of reviewed public contracts (17.6%), both the estimated and final prices are identical.

If we follow the case where the contracting authority has decided upon an evaluation of public contracts based on multiple criteria, the results of the examined standardised differences in prices are as follows (see Figure 2).

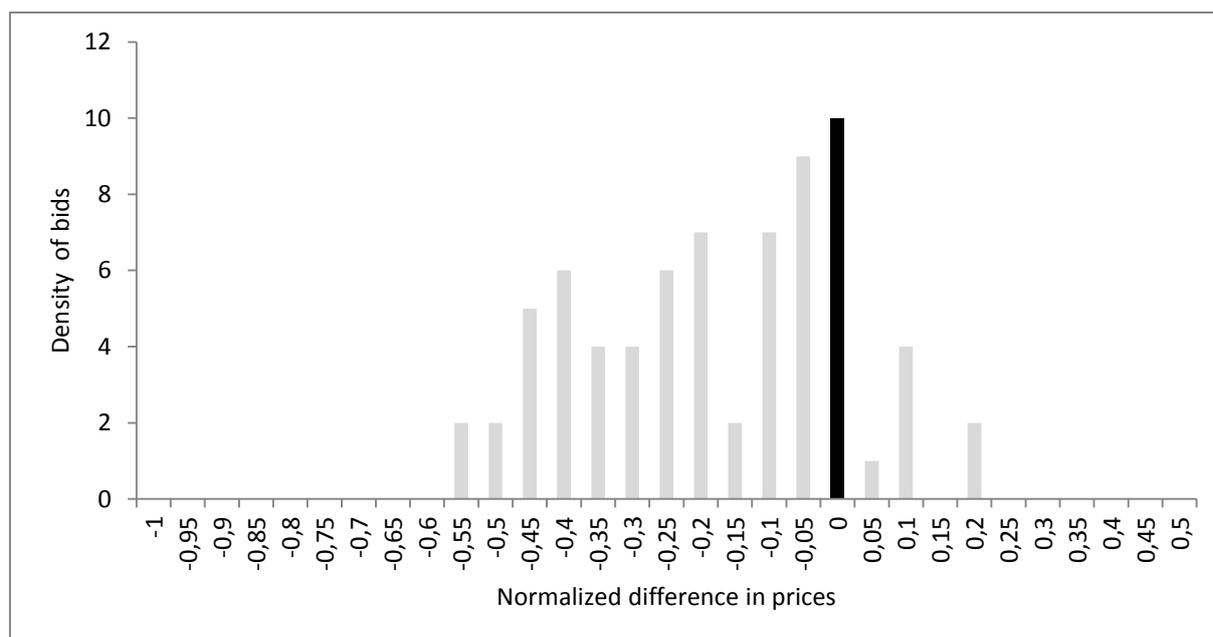


Figure 2: Normalised difference in prices (multi - criterially evaluated public contracts)

The normalised difference in prices of multi-criteria evaluated public contracts ranges from -0.55 to $+0.2$. Compared to single-criterion evaluated public tenders, the normalised difference in prices for multi-criteria evaluated public contracts demonstrates a narrower range. However, even in this case the majority of reviewed contracts are clustered on the left of zero. This means that the majority of surveyed public contracts have a higher estimated price compared to their final price.

4.2. Implications of the choice of type of tender procedure on the final price of public tenders

We shall now look at the effects of the type of award procedures on the final price of public tenders. Within the examined sample, all types of procurement procedures were adopted except for a tender dialogue. The various types of procurement procedures were represented as follows (see Table 1).

Table 1: Representation of individual types of procurement procedures by the number of contracts (%)

Type of award procedure	Review of public contracts (%) of a given type	
	Single-criterion	Multi-criteria
Open	40	36
Restricted	3	13
Negotiated procedure with publication	9	9
Negotiated procedure without publication	10	
Simplified below-the-threshold procedure	37	42
Negotiated procedure without publication of tender notice/call for tender participation	1	

In our analysis we assume that the most open tender procedure of all is the open procedure. It most closely approximates the conditions of the so-called completely competitive market. In this type of award procedure, an unlimited number of contracting entities participate whom cannot communicate with each other so as to influence, with certainty, the tender results. With regard to the competitive effect of an open tender procedure, it should hold true that vis-à-vis other types of procurement processes the open procedure will achieve the highest (negative) average normalised price difference. The results of the analysis are shown in Table 2.

Table 2: Average normalised price by the type of award procedure

Type of award procedure	Average normalised price (single-criterion evaluation)	Average normalised price (multi-criteria evaluation)
Open procedure	-0.2894	-0.2589
Restricted procedure	-0.2698	-0.2369
Negotiated procedure with publication	-0.2149	-0.2728
Negotiated procedure without publication	-0.03619	-
Simplified below-the-threshold procedure	-0.236	-0.1444
Total	-0.2336	-0.2094

When interpreting the performed calculations, one should be reminded that the further away from zero the average price difference is, the greater the differences between the estimated price and the final price are. A negative difference means that the final (tendered) price is lower than the estimated (expected) price. As is evident from the calculations, the open procedures and restricted procedures had, in fact, the largest recorded difference (measured in absolute terms) and which was common in both single-criterion and multi-criteria evaluations of public contracts.

The average price differentials provided a certain “rough image” for assessing the influence of various kinds of procedures on price. A more precise answer can be given by a regression analysis. In our model, we assume the premise that the more open selection process is, the more space there is for the competitive behavior of bidders, which should lead to pressure resulting in a lower price. Our model of this hypothesis confirms this. The resulting equation is as follows:

Normalized price

$$= -0.120583378615 - 0.0366775284093 \times \text{type of tender procedure}$$

Open procedure and the restricted procedure have the biggest influence on the final price. For correctness it is also necessary to highlight the low explanatory power of the model. The adjusted coefficient of determination amounts to only 0.05617. However, we can say that this finding was confirmed by the studies of other authors (Paul, 2010), (Pavel, Kubik, 2011). From the above analysis, we can deduce that the number of bidders will have a strong impact on the normalized price, i.e. true competition in the construction sector, since the greater the number of participants is, the harder it is for

companies to be able to coordinate their behavior (Soukopová, Malý, 2013). The number of participants can also be influenced by the kind of tenders announced. A negative correlation was also found between this proceeding and the difference in prices for contracts evaluated based on multiple criteria.

In a further analysis we focused on the effect of the expected value of the contract on the type of selection process. The resulting correlation coefficient 0.3581 is statistically significant at a significance level of 95%. There is an approximately moderately strong dependence, which can be interpreted so that open tenders were selected for contracts with a higher expected value and vice versa for contracts with a lower expected value utilizing closed tenders.

Similarly, we investigated the influence of the size of the estimated value of public contracts on the number of criteria, i.e. if the price has an effect on whether the contracting authority selects only one criterion, or, to the contrary, multiple criteria. Correlation analysis do not showed a statistically significant relationship between the expected value and the number of procurement criteria.

5. Discussion and Conclusions

Overall it may be established that the competitive effect manifests itself at most with open types of tender procedures, for both single-criterion and multi-criteria evaluated contracts.

This can be explained by the fact that within an open procedure, the contracting entity invites bids from an unlimited number of tender participants. By this decision the contracting authority establishes framework conditions for the emergence of a competitive environment. Opting for a restricted tender procedure also leads to a competitive effect. Within a restricted procedure, the contracting authority invites an unlimited number of candidates to apply to participation in the tender procedure and to demonstrate their qualifications. Next, the contracting authority invites selected candidates to submit their bids. These two types of award procedures thus demonstrate a high level of having a competitive environment. In the case of the negotiated procedure with publication, the corresponding process is similar to the restricted procedure. However, following the submission of tender bids, the contracting authority negotiates with the tender participants in order to achieve the most favorable conditions. Because the only evaluation criterion is the bid price, both the tender applicant and contracting authority act in the context of rational expectations and following a submission of bids the contracting entity negotiates with the relevant applicants so as to minimize the price. Because participants usually already have experiences from past public tenders where a bid price is the only evaluation criterion, they guess the bid prices of their competitors and accordingly submit their price quotation so as to maximize their expected winning chances while still offering a price that is on their part acceptable with regard to the expected profits. Since all rationally behaving tender applicants behave in the same way, the spontaneous result is a formation of a competitive tender environment with an impact on the final price of a public contract. This may result in a low final bid price.

As is evident, a high difference between the final price and the expected price was recorded for the case of the negotiated procedure with publication, when contracts were evaluated based on multiple criteria. This is an interesting finding that may have been

influenced by the relatively small number of data samples on multi-criteria evaluated contracts.

In contrast, the negotiated procedure without publication records a low degree of competitiveness. Within this procedure, the contracting authority invites specific tender applicants with whom the authority of public administration (contracting entity) first deals with on the conditions of fulfilling the public contract, and candidates are, only thereafter, invited to submit their bids. This type of procedure proves a low degree of competitiveness. This may explain the fact that for negotiated procedures without publication under our examination, the difference in prices was hardly noticeable. It approaches zero. A low competitive environment has also manifested itself in the case under our examination in that this procurement procedure is where the public contract was most often awarded to a single supplier. The potential supplier \therefore did not have to take into consideration any prospective competition in its price offer. The applicant acted rationally in a way that he expected his victory in the public tender with certainty and therefore brought his price offer closer to the estimated price. This demonstrated a minuscule difference between the estimated and final prices.

It is concluded that the empirical analysis is consistent with the findings of other studies investigating public contracts for construction. If there are differences in the findings between our research and studies mentioned, then it is probably due to the fact that the authors cited (Pavel and Kubik) are limited (unlike our research) to research on public procurement for extensive transport infrastructure (level of contracting authorities with the state administration). Another reason for the differences in findings may be that previous research is examining procurement for other award conditions set out by amendments to the Public Procurement Act. Our examined sample was entered under the new provisions, when (from 04. 01. 2012 – 12. 31. 2013) the financial limits changed for public contracts for supplies, services and construction. But we can assume that this change is reflected in the changes in the distribution of the number of contracts around funding limits.

This problem has not been the subject of research in our study. We intend to pursue it in detail, along with the search for answers to other questions unanswered in other future research resting on a representative dataset on public procurement.

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Fringe benefits in the form of share-options-employment programs

Milena Otavová¹, Veronika Solilová² and Miloš Grásgruber³

¹*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: milena.otavova@mendelu.cz*

²*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: veronika.solilova@mendelu.cz*

³*Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: milos.grasgruber@mendelu.cz*

Abstract

A fringe (employee) benefit can be identified both as the fulfilment of the employer in the favor of the employee beyond the law; and extra working or non-working conditions, which are created and provided by employer voluntarily. Fringe benefits should be addressed by the interplay of the interests of employees and personnel managers using the knowledge of tax and insurance (social security contributions) issues, as some of the fringe benefits are in an advantage in case of tax and social security contributions. Further, it is proved that the by-product of providing fringe benefits is increased staff loyalty to the organization. This article will be focused on the fringe benefit in the form of share-options-employment programs, which belong to less frequent in the Czech Republic. With regard to this area is firstly outlined historical development of this form of benefit, secondly is defined the moment of establishment of tax obligation and then is analyzed and explained the method of taxation on the side of employees, including social security contributions. In addition, the deductibility of expenses on the side of employer is also taken into account as well as related tax issues in multinational environment. Based on the complex analysis of the legal framework of this kind of fringe benefits is proposed clearer legal framework, mainly due to the fact that this area is currently not explicitly incorporated into the Income Tax Law.

Keywords: fringe benefits, Czech Republic, tax obligation

1. Introduction

A fringe (employee) benefit can be identified both as the fulfilment of the employer in the favor of the employee beyond the law; and extra working or non-working conditions,

which are created and provided by employer voluntarily. At present, as states (Macháček, 2013) the most widespread fringe benefits are e.g. provision of meals at a discounted price, provision of company vehicle that an employee may also use for private purposes, contributions to pension and/or life insurance of employees, provision of extra duration of holidays and others. Furthermore, (Duda, 2014) adds other most desirable benefits such as additional salary (extra wage), language courses, on-site parking, discounts on company products and services, and contribution to recreation.

The fringe benefits should be negotiated in collective agreements, internal regulation, labor contracts or other contracts – e.g. managerial contracts. The system of fringe benefits should match the varied demands and needs of employees and it should not be limited to only one kind of benefit. Further, it should respond to employees' feedback. The remuneration system should be designed to increase the competitiveness of the company in attracting employees, to respond to the ever-increasing labor costs and help to stabilize the top workers. Therefore, it is necessary to respond to questions about how to motivate employees and altogether optimize the tax burden of provided benefits, how to keep step with other employers in the area of fringe benefits while not encumber its own budget.

The fringe benefits should be addressed by the interplay of interests of employees, personnel managers and tax experts using the knowledge of tax and insurance. It belongs to the payroll area that represents difficult economic area, due to the conflict of interests of employer and employee. As states (Vančurová, 2013) the aim is to find a compromise in which both parties will be satisfied economically, while also respecting the applicable law regulations. However, the dedication to optimize the system of fringe benefits is beneficial for both parties, as the convenient ways of employees' remuneration can be found.

The fringe benefits have a positive effect for both employees and employers, because its use is in some cases preferable than to provide a wage increase. However, (Duda, 2011) states, that in case of the lack of information about fringe benefits, employees prefer wage increases before the fringe benefits. Despite of the fact that some of the fringe benefits are in an advantage in case of tax and social security contributions as states (Otavová, Glaser, 2009). Further, it is proved that the by-product of providing fringe benefits is increased staff loyalty to the organization.

The share-options-employment programs are considered as a fringe benefit, which is offered only to managers and is designed for their motivation and as a tool to maintain them at a company. Further, the share-options-employment programs can be characterized as compensation systems based on the employees' remuneration of the joint-stock company through stock options (Hall and Murphy, 2003). If the employees subsequently become the owners of shares of the company, they have certainly a higher interest to deserve the company's prosperity. In abroad it is a widespread benefit, mostly in Anglo-Saxon countries, while, in the Czech Republic it belongs to less frequent, only employees working in the branches of foreign companies can meet with it and be a participant of the system.

2. Aim and Methodology

This article will be focused on the fringe benefit in the form of share-options-employment programs, which belong to less frequent in the Czech Republic.

With regard to this area is firstly outlined both historical development of this form of benefit and current state of the investigated issue based on the description and interpretation of scientific literature and tax laws. Secondly, on the basis of the analysis is defined the moment of establishment of tax obligation with respect to the current legislation, thirdly is analyzed and explained the method of taxation on the side of employees, including social security contributions. Then, information received will be the starting point for the preparation of model examples with aim to show the differences in terms of both the employer and the employee perspective. In addition, the acquired knowledge will be merged into a coherent result by employing synthesis induction and deduction. Finally, recommendations and proposals of clearer legal framework in case of taxation will be proposed for this type of employee benefit in the Czech Republic, mainly due to the fact that this area is currently not explicitly incorporated into the Income Tax Law (hereinafter ITL)

3. Results

At present, for stock incentive plans are the most commonly used options as one of the financial derivatives. The holder of the options has both the right to carry out contract under predetermined conditions and at the same time the right to withdraw from the contract and to leave the option without implementation. According to (Poloučka, 2009), it is the case when the option becomes inconvenient for owners.

Options-employment programs are widely used, especially in the USA, in Europe then mainly in Great Britain, France and Ireland. It is an instrument supporting employee participation. Its establishment can be traced back to the beginning of the 20th century, when it was possible to voluntarily acquire shares by employees at a predetermined price. However, in Europe, there have been widespread options-employment programs more gradual pace relative to the USA. To its expansion assisted positive steps in the form of tax reforms, which related to financial participation. At present, can be traced a support of financial participation in connection with the project of the European Commission. It is a project called PEPPER report (Promotion of Employee Participation in Profits and Enterprise Results). Within the project, according to the Commission of the European Communities are mentioned suggestions, which should contribute to a financial participation in the European Union.

The life cycle of options can be divided into four basic parts (Štýbr, 2011), specifically, the first part is *the grant of an option*, i.e. time of making a contract for the provision of options, the second part is *the maturity of an option*, i.e. the point at which the holder is entitled to use the option, the third part is *the application of an option*, i.e. the holder of option uses its rights to apply of an option, and the last part is *the expiration of an option*, i.e. mostly the last day when it is possible to use the option right.

With regard to the taxation each part of the life cycle of option is the important moments. *The grant of an option* in the form of free provision to purchase shares is not taxable income for employees¹. *The maturity of an option* is also without any effect with respect to the tax liability. However, the decisive moment for taxation is *the application of an option*, when the employee decides to apply the option. After that, the taxable income arises to the holder of an option. The taxable income is determined as the difference between the purchase price of shares embodied in the option contract at time

¹ For more details see Decree GDF no. D-6.

of the application of the option and the current market price of the shares. Further, it is important to mention that in addition to the tax liability on that income will be realized in some cases social security contributions payments.

The moment for taxation was confirmed by the Supreme Administrative Court, which upheld its decision ref. *No. 2 Afs 58/2011-67*, that the taxable income arising from employee options to purchase shares at a certain date in the future at a predetermined price arises at the moment of the application an option. In connection with the subsequent sale of the shares the income will be taxed under *Other income*, according to § 10 of the ITL. However, taxation in connection with the sale may not always occur, in specific cases, according to the ITL can be used for the income tax exemption (this issue will be mentioned in details at the end of this paper). In case that the shares will not be sold, during time of its possession, income in the form of dividends accrues to the owners of the shares. This income is classified under § 8 of the ITL, which is taxed in the scheme at the source, i.e. the taxpayer who shall pay dividends and also transfer tax to the tax authority has to tax the income at a special rate under § 36 of the ITL (known as a withholding tax). For the recipient of the dividend this tax scheme means that he will receive the net value of payment/dividend, i.e. the amount after taxation (income received will not cause an obligation to file a tax return).

Regarding the statutory regulation of the options-employment programs in the field of taxation and social security contributions, it is necessary to mention that currently there is not clear legal framework in the Czech Republic for this area. It is also argued by (Novotný, 2012). Therefore, there are applied the general provisions on taxation of employee income and Decree of the Ministry of Finance of the Czech Republic (hereinafter MFČR).

There are applied following legal statements for the taxation of options-employment programs under the national legislation:

- In case that a reward of the application of the option is provided by the employer himself, it is the income from employment under § 6 para. 1 point. a), point 1 of the ITL. This income is subsequently included into the taxable wages of employees by employer, further it is also subject to social security contributions.
- In case that a remuneration is done by other person who is a part of the same group as the employer (e.g. parent, affiliated company or subsidiary), the income is evaluated under § 6 para. 1 point. d) of the ITL. If the person is a foreign corporation and is not considered as a tax payer in accordance with § 38c of the ITL, is crucial for the taxation whether the sale of shares under options passes through accounting of the Czech subsidiary, which employs the worker or not. In case that *the sale of shares is reinvoiced* to the Czech subsidiary, i.e. the costs of options-employment programs are carried by the Czech subsidiaries, the price difference is included into the taxable wage of employee and it is also subject to social security contributions. Otherwise, if the *reinvoced of these costs is not done* (e.g. from the parent company to the subsidiary), i.e. the costs of options-employment programs are carried by the foreign company. It means for employees that they are required to tax this income in their tax returns for the personal income tax in the Czech Republic. Notwithstanding, this income is not subject to social security contributions.
- As was already mentioned, the ITL does not consider whether the costs incurred in respect of options-employment programs are for employers understood as expenses (costs) incurred to generate, assure and maintain

income. It can be said that it is not generally considered as tax-deductible expenses. However, if the company proves that the costs are associated with workers' rights, it can be used § 24 par. 2 point. j, point 5 of the ITL² and subsequently these costs are understood as tax-deductible.

- In connection with the sale of shares to employees under the option rights, the employer must also respect § 24 par. 2 point. w) of the ITL with regard to the implementation of tax-deductible expenses. On the basis of this provision, the acquisition price of share is considered as a tax-deductible expense, but only up to the amount of income from the sale of the share. It means that in case of the costs related to the repurchase of shares to employees is only tax-deductible the value, which corresponds to revenues from subsequent sales. Then the difference between the purchase price at which the employer bought shares (if it is higher) and a strike price paid by the employee is considered as a non-deductible expense.

Model example 1: Tax resident of the Czech Republic, single, childless, an employee of ABC company. The value of his gross salary amounts to CZK 50,000. Within the options-employment programs, the employer offered him an option to purchase shares in the future (50 pieces) at a predetermined option price i.e. at the market price of the shares on the date of grant of the option. The life of the option is set at 7 years. The waiting period of the option is 4 years. After the waiting period, the employee decided to apply the option. The option/strike price, i.e. the price at the market price of the shares on the day of the grant of the option, is set at CZK 1,000. Employer (ABC company) purchased own shares at CZK 1,150 on the day of the purchase. The market price of the shares on the date of application of the option amounted to CZK 1,300.

Solution: Income from the options is considered as an income from employment. In this case it is also subject to social security contributions. The amount of income will represent the difference between the market price of the shares on the date of application of the option and the strike price. For details see tab. 1 below.

The value of non-monetary income = (CZK 1,300 – CZK 1,000) × 50p = CZK 15,000

Table 1: Taxation of income of the employee derived from the Czech company

Items	Amount [CZK]
Monetary income	50,000
Non-monetary income	15,000
Assessment base for social security contributions	65,000
Social insurance (employer) 25%	16,250
Health insurance (employer) 9%	5,850
Tax base	87,100
Tax (rate 15%)	13,065
Tax credit on taxpayer	2,070
Tax after tax credits	10,995
Social insurance (employee) 6.5%	4,225
Health insurance (employee) 4.5%	2,925

² Expenses (costs) on the working and social conditions, health care, and increased range of rest periods of employees spent on workers' rights under the collective agreement, internal regulation of the employer, employment or other contracts, if this law (i.e. ITL) or a special law provides otherwise.

Value of the net salary of the employee would be totaled as CZK 31,855 CZK (i.e. CZK 50,000 – CZK 13,065 – CZK 4,225 – CZK 2,925).

Further, in connection with the application of tax-deductible expenses, the employer will be considered the value of the difference between the price of the shares for which it was purchased and the strike price paid by the employee **as a non-deductible expense**.

Purchase price of shares	CZK 1,150 × 50p = CZK 57,500
Sale price based on the option contract (strike price)	CZK 1,000 × 50p = CZK 50,000
Tax-deductible expenses for employer	CZK 50,000
Non-deductible expenses for employer	CZK 7,500

Model example 2: Tax resident of the Czech Republic, employed in a multinational company, in a subsidiary established in the Czech Republic. Within the options-employment programs, the employer offered him an option to purchase shares in future (50 pieces) at a predetermined option price i.e. at the market price of the shares on the date of the grant of the option. The life of the option is set at 7 years. The waiting period of the option is 4 years. After the waiting period, the employee decided to apply the option. Assume that the exchange rate is CZK 27. The option/strike price, i.e. the price at the market price of the shares on the day of the grant of the option, is set at EUR 50. The market price of the shares on the date of application of the option amounted to EUR 70.

The method of taxation in case that:

- a) the parent company *reinvoices* to the Czech subsidiary costs associated with the implementation of option rights,
- b) the parent company *does not reinvoice* to the Czech subsidiary costs associated with the implementation of option rights.

Solution:

Ad a) In case that the parent company reinvoiced to the Czech subsidiary costs associated with the implementation of option rights, the Czech subsidiary as an employer is obliged to add the non-monetary income to the salary of an employee. As an exchange rate will be used the exchange rate set by the Czech National Bank for the last day of the calendar month preceding the month in which the income tax advances are withheld. This methodology is set in § 38 para. 4 of the ITL, which is applied for the conversion of foreign income for the determination of the income tax advances from employment.

Ad b) In case that the parent company is not considered as a tax payer in accordance with § 38c of the ITL and it does not reinvoice to the Czech subsidiary costs associated with the implementation of option rights. Then an employee is obliged to file its tax returns for the tax on personal income and add this income there. Further, the employee has to prove this income through a document issued by the foreign parent company. As an exchange rate for the conversion of foreign income will be used the uniform exchange rate set by the Czech National Bank based on § 38 para. 1 of the ITL. In this context is necessary to note that this income will not be subject to social security contributions from the side of employer or the employee.

Table 2: Taxation of non-monetary income in the case of the application of the option

Variant	A [CZK]	B [CZK]
Non-monetary income ³	27,000	27,000
Social insurance (employer) 25%	6,750	–
Social insurance (employee) 6.5%	1,755	–
Health insurance (employer) 9%	2,430	–
Health insurance (employee) 4.5%	1,215	–
Tax base	36,180	27,000
Tax base rounded	36,200	–
Tax (rate 15%)	5,430	4,050

As can be seen in tab. 2 above, with regard to the total tax and social security contributions a variant B is significantly more profitable in comparison with a variant A, specifically in this case an employee gains savings in the amount of CZK 4,350.

As was mentioned above, in case of a subsequent sale of the shares the income will be taxed if the tax exemption does not apply to it. As states (Brychta, 2014) for this purpose can be used a provision in § 4 para. 1 point. w) of the ITL, which under certain conditions allows the income from the sale of shares to exempt. Specifically, income will be exempted from the taxation, if the period between the acquisition and sale of the securities exceeds three years. Further, another exemption can be applied, in § 10 para. 3 point. c) of the ITL, under which the income from sales of securities is exempted, if the total amount of income does not exceed CZK 100,000 during the tax period at one tax payer. In this connection must be highlighted that the limit of CZK 100,000 is related to an income rather than a profit from the transaction (as an income subtracted by expenditure). Moreover, if the income exceeds the limit of CZK 100,000, after that total amount of income will be taxed, and not the amount that exceeds the limit. The tax base from the sale of securities is the difference between revenues (income) and expenses from the sale of securities, when the expenses based on § 10 para. 5 ITL are both an acquisition price of shares and expenses related to the sale and charges for trading on the securities market during the acquisition of securities. Thus, if the employee subsequently sells shares and conditions for exemption of the income are not fulfilled, the employee may apply the value of the acquisition price of the shares as expenses to the achieved income. In this aspect is necessary to examine what is actually the acquisition price in case of the purchase of shares under the option. It is possible to say that the acquisition price is created by the price at which the shares were acquired and also by the value of non-monetary income (i.e. the difference between the purchase price of the shares based on the option contract at the time of the application of the option and the current market price of the shares), which had already been subject to the income tax from employment.

4. Discussion and Conclusions

The paper dealt with the issue of the fringe benefits in the form of share-options-employment programs. As was mentioned above, in the Czech Republic this issue has not still been explicitly incorporated into the ITL. However, the moment for taxation in connection with the application of the option was confirmed by the Supreme

³ EUR 20 × 50p × CZK/EUR 27

Administrative Court through its decision ref. No. 2 Afs 58/2011-67, which states that the taxable income arising from employee options to purchase shares at a certain date in the future at a predetermined price arises at the moment of the application an option.

In connection with the Court decision, it would be appropriate to include a specific provision for the option-employment programs in to the ITL. The provision would clearly state that the option granted to an employee presents its taxable income at the time of the application of the option, and this taxable income equals to the difference between the market price of the underlying securities at the time of the application of the option and the strike price. Furthermore, it is necessary to draw attention to the fact that this specific provision is contained in many countries of the European Union.

In respect of the costs of an employer, which were marked in model example 1 as non-taxable, it should also enter into the debate. On one hand, based on the context of the current legislation it is a correct identification. On the other hand, the costs incurred in connection with the maintenance of key employees in the company. Therefore, according to the general definition of tax deductible expenses i.e. shall be used to generate, assure and maintain income, we believe that the costs for the maintenance of key employees meet the general definition of tax deductible expenses.

Furthermore, in connection with this kind of fringe benefit the insufficient tax advantages for employees must be highlighted. Currently, there is only one tax relief in case of the subsequent sale of shares that is possible to apply in the ITL. Specifically, so called time test, when the income is exempted after 36 months of holding shares. Again, it should be noted that, for example in the UK are significant tax relief.

In addition, there were modeling two examples of the Czech tax residents who apply the fringe benefits in the form of share-options-employment programs. The most preferable model example was, where the foreign parent company does not reinvoice to the Czech subsidiary the costs associated with the application of option rights. In this case, the income is not subject to social security contributions from employer either employee side. Moreover, the fictitious increase of the tax base by social security contributions is not realized.

The paper should contribute to a proper understanding of the taxation and social security contributions of both the non-monetary income in connection with the application of the option rights to purchase shares, and in connection with the subsequent sale of these securities.

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Globalization to Relocalization: Bypassing Barriers to innovation and Entrepreneurship in Developing Countries

Cathy-Austin Otekhile¹ and Milian Zeleny²

¹*Department of Marketing and Management, Faculty of Management and Economics,
Tomas Bata University in Zlin, Zemědělská 1, 613 00 Zlin, Czech Republic, e-mail:
otekhile@gmail.com*

²*Graduate School of Business, Fordham University New York City, NY, USA, e-mail:
mzeleny@fordham.edu*

Abstract

In this era of globalization exhibiting signs of reversal towards relocalization; developing countries face multidimensional and diversified challenges coupled with problematic innovation and entrepreneurship environment. The aim of this paper is to examine the barriers to innovation and entrepreneurship in the context of developing countries and how to bypass these barriers on the pathway to transforming the developing countries' economies. The methodological approach adopted is based on the national innovation model, a case study of four selected countries which have been able to go round these barriers and the research of Cornell University. This research reveals that the barriers which hinder entrepreneurship and innovation in developing countries can be bypassed. The results of this paper have implications for reframing National Innovation policy to promote entrepreneurship and innovation.

Keywords: Globalization, Relocalization, Innovation, Entrepreneurship, Developing countries

JEL Classification: O30, L26, F60

1. Introduction

The era of giving development aids to the developing countries is fast giving way to the development of indigenous entrepreneurship and innovation. There is a shift towards an entrepreneurial economy. Today despite the economic downturn, entrepreneurs all over the world are enjoying the era of a new dawn according to a report in Economist magazine, 2009. The entrepreneurs of small and medium sized firms play a key role in employment creation and innovation (Szirmai, et al, 2011). The transformation of the

economies of the developing countries can come from within by building on its “specificities and capabilities”. The need to take advantage of its abundant resources both material and human resources is pivotal to the growth of these countries. Several countries like China, South Korea, Taiwan, Brazil and Singapore have experienced rapid economic catch-up due to “absorbing” and “creatively” adapting international technological knowledge (Naudé et al., 2011).

A large number of enterprises operate in the informal sector in developing countries. It is one of the largest means of employments to women and men. Their inability to conform to the registration procedures could be due to the burdensome procedures and costs associated with registering businesses, lack of access to finance and perhaps their activities are not included in the law. According to the most recent estimates, non-agricultural employment in the informal economy represents 82 percent of total employment in South Asia, 66 percent in Sub-Saharan Africa, 65 percent in East and South-East Asia (excluding China), 51 percent in Latin America and 10 percent in Eastern Europe and Central Asia. (ILO, 2002a; ILO, 2002b)

Entrepreneurship and Innovation in the past decades have attracted the attention of policy makers, academicians and the general public. It is vital for the competitiveness and economic recovery and growth of a nation at the macro level. And on the micro level, it is a driving force which makes firms competitive. This paper presents that globalization produces a recursive processes toward relocalization by attempting to examine how developing countries can bypass the barriers to entrepreneurship and innovation.

Edmund Phelps the Nobel Laureate prize winner 2014 said “the explosions of economic knowledge in the 19th century must be the effect of the emergence of an entirely new kind of economy: a system for the generation of endogenous innovation decade after decade as long as the system continues to function. Only the structuring of these economies for the exercise of indigenous creativity and pathways from there to innovation – for what has come to be called “indigenous innovation” – could have put these nations on rapid paths of sustained growth”. The upsurge in the societies experiencing catch up goes far beyond sustainable growth. As evolving entrepreneurs multiply, more and more people are creating new methods and products.

The experience of the “Asia Tigers” and Mexico shows that developing countries have the potential for innovation and technology management but the challenge is how to tackle the problematic scenarios of the developing countries and bypass those hurdles (Ali et al., 2009). This paper is divided into four sections; the first section deals with the introduction, the second section gives a detail review of some selected literatures and theoretical background, section three highlights the methodological approach and the section four is focused on the conclusion.

2. Theoretical Framework

2.1. Entrepreneurship and Innovation

Schumpeter (1934) defined an entrepreneur has an innovator who initiates something “new” and eliminates the old to implements change. Entrepreneurship is a driving force for innovation and an engine which propels economic development. This economic development includes five cases: introduction of a new method of production, new

products, opening of new markets, and new sources of supply, new forms of organizations. Drucker a management guru defines entrepreneurship as a managerial process for creating and managing innovation. In the United States an entrepreneur is often defined as one who starts his own, new and small business but according to Drucker not every new small business mean entrepreneurship. The culture to innovate must exist in a firm or organization without which systematic innovation will not occur (Drucker, 1993)

Hackler (2012) emphasized that the act of entrepreneurship assembles the components of knowledge and technology in the innovation processes and amplifies the factors in economic growth. In this era of post-recession, it is only cities that create and foster a culture of innovation and entrepreneurship that will be better positioned for regional economic recovery, job creation, greater resiliency and the potential for regional economic transformation. The role of local government policy is important in cultivating and fostering an innovation and entrepreneurship ecosystem.

Carlsson et al. (2012) defines “entrepreneurship as an economic function that is carried out by an individual’s, entrepreneurs, acting independently or within an organizations to perceive and create new opportunities and to introduce their ideas into the market, under uncertainty, by making decisions about the location, product design, resource use, institutions and reward systems. The entrepreneurial activity and ventures are influenced by socioeconomic environment and result ultimately in economic growth and human welfare” The two definitions are overlapping, an entrepreneur can be called an innovator, if one is not innovative he cannot be an entrepreneurial. Innovation is a social process which comes from entrepreneurs who make them happen. It is finding solution to existing problems with the technologies which are new to a given society and which might not be absolutely new. Innovation can be disseminated and diffused in that society (World Bank, 2010).

Innovation is defined as implementing something new; is that there must be degree of novelty in it. And it could be new to the firm, new to the market and to the world, it could occur in any sector of the economy including the public sector, health and education (OECD, 2005). Innovation is “thinking outside of the box”. And Zeleny (2012) further stressed that “innovation is not free and autonomous process of applied creativity is technically, economically and politically subservient to the holders and owners of the innovation.”

The victory of entrepreneurship is driven by intense technological changes. The computer, mobile phones and internet is changing entrepreneurship at a quick pace. Today even cash trapped innovators can reach the markets that were once dominated by giant organizations. The internet provides a cheap platform for entrepreneurs to build interactive businesses. Meg Whitman grew rich by developing an online market place, eBay, where people could buy and sell without ever meeting. Information Communication Technologies (ICT) opens up many opportunities for innovation and also could make an important difference to firm’s technology uptake and innovation performance. It could also be a powerful tool to help developing countries overcome barriers to technology uptake and innovation performance by broadens the group of innovators. Innovation takes place in different sectors including services, agriculture and mining. Many opportunities for innovation have arisen in the lower technology sectors with high opportunities example the production of palm oil in Malaysia. (OCED, 2012; Economist, 2009).

2.2. Globalization to Relocalization

The shift from globalization to relocalization is the current trends taking place around the world although it could be hidden. It is assumed that globalization as a social process has reached its peak and reverted to relocalization. Some scholars have focused on the aspect of local food system, seeing the relocalization strategy as a tool to improve the local economy. According to Zeleny “it is the global experience and knowledge that is becoming embodied in local communities.” Zeleny (2012) identified some dominant characteristics of high tech innovations. The reintegration of tasks and knowledge, self-service and self-help empowerment, disintermediation, mass and self-customization, high tech impact and support net bypass. There is a “ricorso” towards entrepreneurship and innovation in both developed and developing countries. Some scholars see it as the answer to the growing global unemployment rate caused by the economic crisis.

2.3. Barriers to Innovation and Entrepreneurship

Developing countries no doubt experience barriers to innovation and this is the reason behind their specifically remaining undeveloped; unconducive business climate, governance climate and low education. Segarra-Blasco et al., (2008) analyzed the barriers to innovation through three groups of barriers, the cost of innovation of projects, lack of knowledge and market conditions. Catalonia government designed its own regional innovative policy in order to promote the establishment of new firms and to reduce barriers to innovation. The empirical analysis shows a disparity regarding the propensity to innovate and the perception of barriers. A large percentage of innovative firms find barriers to starting innovation projects.

Examples of other barriers include: Brain drain which constitutes a significant challenge for developing countries. The worst affected countries have more than 80 percent of their professionals abroad such as Haiti and Jamaica, most are in the sub-Saharan Africa (Liberia, Sierra Leone and Somalia) or Asia (Cambodia and Afghanistan) (Aubert, 2004; Docquier, 2011). Red-Tapism and costs are the main impediments for start-ups and innovation in developing countries based on a panel data analysis of 61 developing countries from 2008-2014. The legal procedures and cost are important for entrepreneurship and innovation. The empirical results revealed that there are bureaucratic barriers and cost that poses obstacles to starts-up and innovation (Doruk and Söylemezoğlub, 2014).

In most developing countries there are poor provisions of basic infrastructures such as energy, transport, telecommunications and water. Some studies have looked at the relationship of infrastructures in developing countries with growth at the microeconomic and macroeconomic levels (Estache, 2004; Straub, 2008). Most Manufacturing industries have been crippled or closed down due to poor energy supply or outages. Manufacturing industries have to depend on the alternative energy supply which invariably increases the production cost of local goods. “The unreliable access to energy and poor transportation and communication systems raises the cost of doing business and global competitiveness” and therefore infrastructures is pivotal to the survival and competitiveness of entrepreneurship and innovation (UN Economic Commission for Africa; Ihugba, Odi and Njoku, 2013). Skill and education also plays an important role in innovation and entrepreneurial activity. Low level of and lack of quality educational sector at all levels including vocational training and adult education can hinder innovation (OECD, 2009; 2012).

3. Methodology and Data

The methodological approach adopted is based on qualitative and quantitative analysis. The secondary data are from online database, journals and articles and books. The secondary data were obtained from the World Bank. Based on our focus on innovation and entrepreneurship, we have created a model of national innovation system based on the NIS model of Lundvall, 1992. This NIS model reflects the systematic rise of systematic approaches to the study of technology development as opposed to the linear model of innovation. The parameter of innovation based on newly registered firms was analyzed. The data on new firms incorporated in eight developing countries within the period of (2004–2012) was analyzed and a case study approach was also used to examine four countries who have bypassed barriers to innovation and entrepreneurship.

The Global Innovation Index (GIS) a model of Cornell University, INSEAD, and WIPO 2014 was analyzed. This measures innovation based on a combination of innovation input (that is, institutions, human capital research, infrastructure, market sophistication and business sophistication) and innovation output (that is, knowledge and technology outputs and creative outputs) in a country.

4. Results and Discussion

To bypass these barriers depends on the approaches of the national innovation system adopted. Most approaches of national innovation system adopted by some developing countries has been absolutely centered on the supply side and on the linear model of government investment in basic and applied research leading to innovations which are expected to be commercialized by presumably interested public and private sector. And due to the complexity of the NIS a linear model is not appropriate. Furthermore the analyst of National Innovation System are confronted with the challenges of which aspects of the country's social, economic, political and cultural activities should be included in the national innovation system.

Entrepreneurs' benefits from the innovation system depend on the elements of the system of innovation within which they are implanted. The better the system of innovation, the more able a developing country can absorb from the global technology. Knowledge will circulate better with the domestic economy and the economy will embark on the process of technological upgrading more rapidly (Naudé et al., 2011).

In addition to overcome these barriers that poses obstacle to entrepreneurship and innovation in developing countries. Each country would have to build the on its capabilities and specificities, the indigenous knowledge and innovation of each country can be developed or built upon. The National innovation system (see Figure 1) is a network of institutions in the economy which interact in the production, diffusion and uses of new and economically useful and is either locally rooted in the borders of a nation (Lundvall, 1992). It shows the linkages of these institutions and actors within this system with one another. The Innovation policy framework, investment in human capital and infrastructures are building block upon which all other actors rest upon. The linkage of the Research and Development Institutions, Universities and Micro Small-Medium Enterprises (MSMES) is important for innovation and entrepreneurial activities. The number of firms newly registered in some developing countries (Algeria,

Bangladesh, Belarus, Botswana, Nigeria, South Africa, Turkey and Uzbekistan) shows an increasing tendency (see Figure 3). The ease of doing businesses which varies across the developing countries based on the average of each economy’s distance to frontier (DTF) scores for a 10 topics included in the aggregate ranking(starting a business, dealing with construction permit, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across border, enforcing contracts and resolving insolvency). It does not take into consideration the macroeconomic stability, the existence of bribery and corruption, security, market size, state of the financial market and level of skill and training of the labour force. Some countries in the sub-Saharan Africa and OECD implemented reforms reducing burdensome bureaucracy and improve the regulatory frameworks which has made it easier to do business (World Bank, 2014).

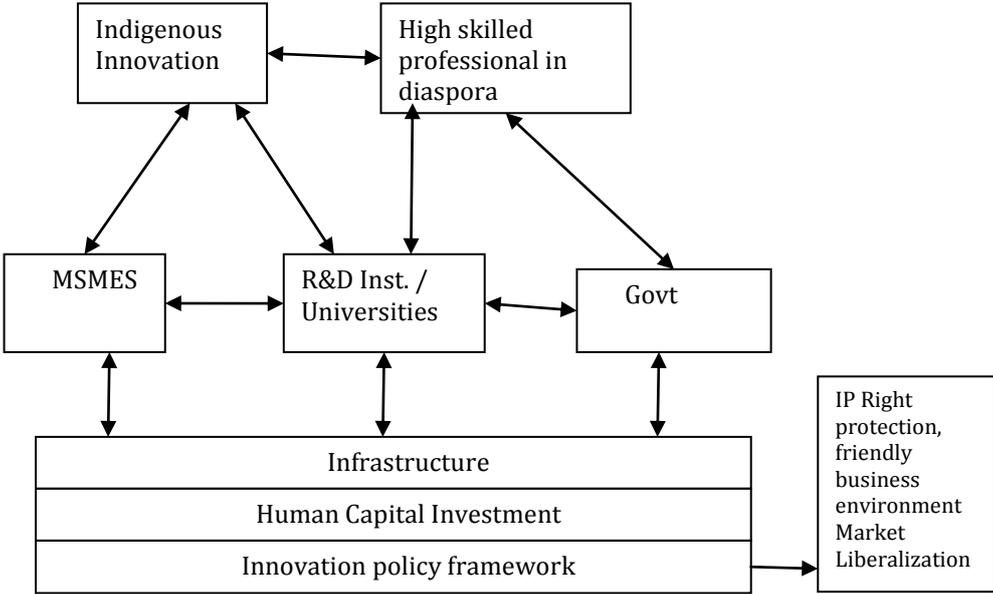


Figure 1: National Innovation System

According to the Global Innovation Index (GII), 2014 a lot of countries in the sub-Saharan Africa (Burkina Faso, Gambia, Malawi, Mozambique, and Rwanda) are significantly improving and rising in innovation particularly in human capital and research and market sophistication. Many of these countries are promoting innovation through the implementation of different initiatives and programmes. For example the government of Rwanda launched the Rwanda Innovation Endowment Fund (RIEF) to foster innovation in the areas of agriculture, ICT, energy and manufacturing in partnership with United Nations Economic for Africa. Among the developing countries the South East Asia and Oceania GII ranking is highest and Sub-Saharan Africa is the least (See Figure 2 and Global Innovation Index, 2014)

Some developing countries have catch up (see Table 1) in spite of their adversities and barriers which poses as hindrances to innovation and entrepreneurship. Despite the problematic business environment more firms are been incorporated in Uzbekistan, Nigeria, South Africa, Turkey and Botswana.

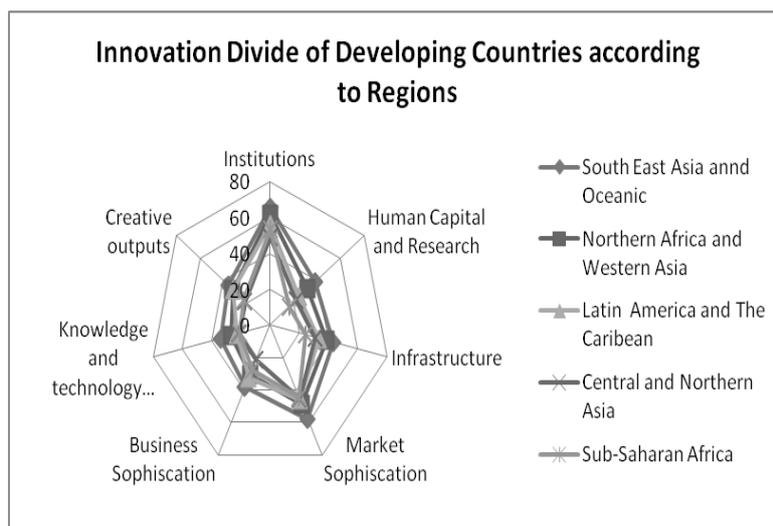


Figure 2: Innovation Divide of Developing Countries according to Regions
Source: Author based on data from Global Innovation Index 2012, INSEAD

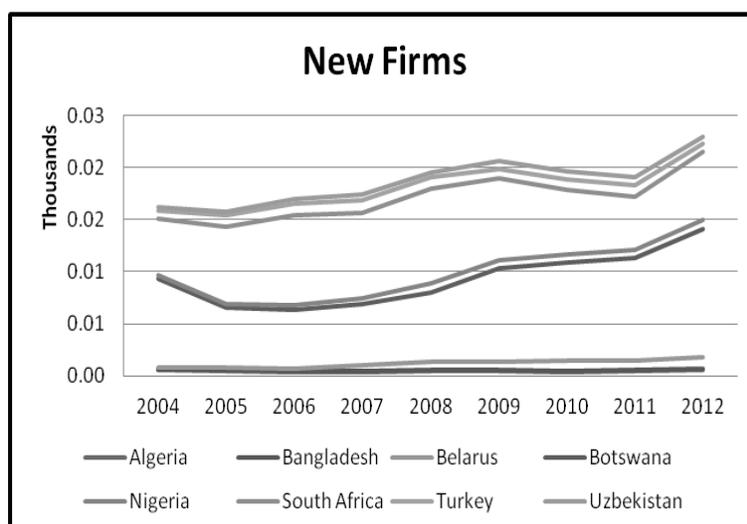


Figure 3: The number of newly registered corporations (2004–2015)
Source: Author based on data from World Bank

According to Li Keqiang, Premier of People's Republic of China emphasized in his speech at the World Economic Forum Switzerland, 2015 that structural reform must be carried through no matter how difficult it might seem as it is the effective way to foster conditions conducive for global innovation and bring about a new momentum of global economic development. The reforms in China brought the farmers' initiatives into play and allow them to be autonomous in taking decisions concerning rural production and management. Hence, the problem of hunger was solved in a couple of years. In fact, a structural innovation unleashed the creativity of the people and changed the lives of millions in China. Furthermore, a village in the eastern China with 700 households and have over 2,800 registered online stores. Everyday more than 30 million items of various sorts were sold to different parts of the world. This a clear picture of entrepreneurship. In order to foster a new engine of growth they will encourage mass entrepreneurship and innovation which will create a constant source of creativity and

wealth. (See Li Keqiang, Premier of People's Republic of China Speech, World Economic Forum, 2015)

5. Conclusion

Entrepreneurship and innovation has been widely studied by many researchers focusing on the impacts but few researchers have emphasized on the barriers and how to bypass the barriers. This paper has provided insights into these barriers and how to bypass them. It is the key to economic recovery and transformation of developing countries. By innovating and commercializing inventions and adopting and absorbing innovation developed by others, developing countries entrepreneurs affect the rate of technological change and the structural transformation of the economy (Szirmai et al., 2011).

Table 1: Examples of Four Countries that have bypassed barriers to Innovation and Entrepreneurship

India	The India Green Revolution of the 60's, innovation led to the introduction of high yield varieties of seed and increased use of fertilizers and irrigation and then led resulted in an increase in grain production. This raised agricultural productivity and provides solution to the food problem among the poor. Also the Software firm were able bypass the obstacles (to weak enforcement of IP rights, High cost of doing businesses, poor capital markets) by choosing the appropriate business model and taking advantage of its abundant and cheap high skilled labour. And leading the Institutional reform in India.
Brazil	The economic transformation of Brazil was built on the innovative approaches taken. This includes prudent macro-economic policies aimed at taming hyper-inflation, investment in education, economic diversification set up on a competitive manufacturing sector and the development of a strong internal market.
China	The economic transformation of Chinese economy has been rapid since the beginning of its structural reforms over 30 years. It has been consistent in its structural reforms which have led to economic growth. The rural reforms brought to play the farmers initiatives which helped to solve the problem of hunger.
South Korea	The experience of South Korea's draws attention to the role of developmental state in nurturing industrialization through the active support to the private sector.

Empirical evidences reveal that countries which have experienced rapid catch-up at one time or the other also had a taste of obstacles which hindered entrepreneurship and innovation. But they have been able to overcome these hurdles even under a difficult terrain and adversity. And based on our findings, the barriers to innovation and entrepreneurship appear to be more prominent in the developing countries (Sub-Saharan Africa, Latin America and Central Asia) who are trying to catch up. The National Innovation Policy is not sufficient to bring about the desired breakthrough economically.

The innovation policies of developing countries upon which the national innovation system rest should be tailored along the country's needs. A complete overhauling of the

innovation system is necessary to remove barriers to innovation (Naudé et al., 2011). A regular monitoring and evaluation of the National Innovation System is very important in order to correct any form of deviation and barriers. There should be structural reforms which must be strictly carried out and indigenous innovation should be promoted and encouraged. Lastly investment in infrastructures in partnership with the private sector in developing countries is a key in transforming these economies.

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Virtual Paradigm of Strategic Management Process

Josef F. Palán¹

*¹Department of Management and Evaluation, Banking Institute College of Banking,
Národní 2600/9, 158 00 Praha 5, Czech Republic, e-mail: jpalan@bivs.cz*

Abstract

The ideal of strategic management process is to ensure the sustainable development of a business entity. The key to success is our ability to create and maintain a competitive advantage, or rather a portfolio of competitive advantages in a rapidly changing global economic environment. The author, on the basis of action research methodology, formulates the hypothesis: “A virtual paradigm of strategic management process”, building on experimental base of development of the virtual competitive advantages and their resources, including strategic positioning of a business entity on the basis of competitive intelligence.

Keywords: virtual paradigm, process of strategic management, portfolio of competitive advantages, experimental base, strategic positioning, competitive intelligence.

1. Introduction

Lafley and Martin (2013) state: “It’s not getting any easier to win in the real world. The new normal is, to borrow a phrase from US military, a VUCA environment: volatile, uncertain, complex, and ambiguous. Growth is slowing, and the pace of change is increasing. As the world continues to globalize, companies face more competition for customers and consumers than ever before. Consumers are growing more demanding and more vocal, insisting upon better performance, quality, and service, all at better price.” Evidently, to compete within such nonlinear, turbulent and nearly unpredictable environment shifts strategic management activities on the edge of chaos. Brown and Eisenhardt (1998) explain: “The edge of chaos has been described by S. Kauffman (1995) as a natural state between order and chaos, a grand compromise between structure and surprise“. Competing on the edge contrasts with other approaches to strategy that assume clear industry boundaries, predictable competition, or a knowable future. As such, these other approaches are insightful for setting a broad strategic direction for markets in which change is slow enough that a sustainable advantage or defensible position can be identified as lasting for a long period, perhaps “even a decade or more” (Porter, 1996). A more dynamic approach, like game theory, gets closer to the

competitive reality of fast-paced change that many firms face. It is incomplete, however, because it focuses on “where do you want to go?” and neglects the other half of strategy – “how are you going to get there?” In contrast, competing on the edge assumes that industries are rapidly and unpredictably changing and therefore, that the central strategic challenge is managing change.

Previous considerations suggest many questions: How to create or sustain corporate competitive advantage or advantages? What will their life cycles be? Which paradigms of strategic thinking could help us to solve semi-chaotic development of an external environment? What will the consequences be for the process of strategic management / strategic planning? Would it be possible to develop paradigm / model which could help top management to overcome the above mentioned edge of chaos etc.?

The scientific research of decisive factors of dynamically growing companies from the perspective of sales and profit volume proved an important hypothesis, that namely basic initiative influence has the mode of top management strategic thinking. The mapping of a wider frame of strategic thinking turns logically into the process of strategic management. It is important to be aware, that inside of the process which would be the key activity of top management and owners, the entrepreneurial strategy is formulated and implemented. “It is just the mode of the entrepreneurial strategy formulation, i.e. the paradigm of strategic thinking of the top management and owners, which is as emerged the decisive factor of stagnation versus dynamic growth of the entrepreneurial subjects without regard to the legislative form of business, or age of the company representatives, or if it is a private company or public company” (Kim and Mauborgne, 1996).

So let us briefly review the three paradigms of strategic thinking:

1.1. The paradigm of conventional strategic thinking

The space of conventional strategic thinking can be defined by the vector space, which is limited by the vector of competitive advantage, i.e. the formulation and implementation of the entrepreneurial strategy would lead to creation or maintaining of company's competitive advantage in comparison with its key competitors. The vector space is also defined by the vector of financial advantage which does not express anything else than the requirement of effective investment of capital sources expressed by value maximization of the complex indicator of company efficiency EVA (economic value added). The third vector explicitly declares the adequate development of company capabilities and skills. The conventional strategic logic assumes the maximization of all three vectors and actually respects the logic of the industry competition, which is set by the strongest entrepreneurial players.

1.2. The paradigm of value innovation

Mintzberg (1978) published an influential article in *Management Science* that introduced emergent strategy, a concept he later popularized for the wider non-academic business audience in his successful 1994 book, *Rise and Fall of Strategic Planning*. Mintzberg's insight was simple but indeed powerful. He distinguished between deliberate strategy, which is intentional, and emergent strategy, which is not based on an original intentions but instead consist of company's responses to a variety of unanticipated events.

For full understanding of the paradigm of value innovation logic, it is important to compare it to conventional logic from five dimensions of strategy: industry assumptions, strategic focus, customers, assets and capabilities, products and service offerings; see Table 1.

The difference among companies evolved from fundamentally different approach to the entrepreneurial strategy formulation. The least successful companies choose the conventional approach: their strategic thinking was dominated by the thought to be at the top of competition. They formulated strategic goals on the base of systematic benchmarking and within frame of the industry logic. On the opposite side, the dynamically growing companies did not much care for what their rivals did and how they fought. Except for this, they tried through the application of strategic value innovation logic to reach a fundamentally new, incomparable value shift (Kim and Mauborgne 1996).

Table 1: Conventional strategic logic versus value innovation logic

The five dimensions of strategy	Conventional logic	Value innovation logic
Industry Assumptions	Industry's conditions are given	Industry's conditions can be shaped.
Strategic Focus	A company should build competitive advantages. The aim is to beat the competition.	Competition is not the benchmark. A company should pursue a quantum leap in value to dominate the market.
Customers	A company should retain and expand its customer base through further segmentation and customization. It should focus on the differences in what customer value.	A value innovator targets the mass of buyers and willingly lets some existing customers go. It focuses on the key commonalities in what customer value.
Assets and Capabilities	A company should leverage its existing assets and capabilities.	A company must not be constrained by what it already has. It must ask, what we would do if we were starting anew.
Products and Service Offerings	An industry's traditional boundaries determine the products and services a company offers. The goal is to maximize the value of those offerings.	A value innovator thinks in terms of the total solution customer seek, even if that takes the company beyond its industry "traditional" offerings.

(Kim and Mauborgne, 1996)

Every value innovation on the product platform exhausts their growth potential during time. Does it mean, that the company should join the industry competition within the frame of the key success factors? This evident trap of the next dynamic development can be overcome by next value innovation, this time on the service platform (maintenance, customer service, warranties, training for distributors and retailers etc.).

The next possibility of the innovation represents the delivery platform, which includes logistics and the channel used to deliver the product to customers. The specific content of the particular platform will vary in relation to the industry and company characteristics. As customers and technologies change, each platform presents new possibilities.

The extension of this world known strategy paradigm “Blue Ocean Strategy” (Kim and Mauborgne, 2005) was published by Kim AND Mauborgne (2014) in HBR article “Blue Ocean Leadership”. The four steps of Blue Ocean Leadership involve: See your leadership reality, Develop alternative Leadership Profiles, Select to-be Leadership Profile, Institutionalize new leadership practices. The Blue Ocean Leadership Grid is an analytical tool that challenges people to think about which acts and activities leaders should do less, and which leaders should do more of because they inspire people to give their all. Organizations then use the grids to develop new profiles of effective leadership.

1.3. The paradigm competing on the edge – strategy as structured chaos

The edge of chaos is a key concept in complexity theory that describes where systems can most effectively change. Systems with more structure that found at the end of chaos are too rigid to move. Systems with less structure are too disorganized. Yet, the edge of chaos is not simply a bland balanced of “not too hot and not too cold”. Rather it is where...

1. Complicated behaviours (such as execution and innovation, but not just one or the other) occur.
2. A few rules (like priorities) exist that are not arbitrary and not compromises between extreme values. They are specific rules that can create.
3. Work is required to maintain balance on the edge of chaos because it is dissipative equilibrium. There is constant tendency to fall into the attractors of structure and chaos.
4. Surprise exists. Expect the unexpected, because control is not tight and because the system is adapting in real-time to unpredictable changes.
5. Mistakes occur because systems at the edge of chaos often slip off the edge. But there is also quick recovery.

Brown and Eisenhardt (1998) introduced new strategy paradigm competing on the edge, which by my opinion anticipates wider changes within current entrepreneurial environment and also knowledge shift of management theory and practice. The key assertion is that successful firms in fiercely competitive and unpredictably shifting industries pursue a competing on the edge strategy. The goal of this strategy is not efficiency or optimality in the usual sense. Rather, the goal is flexibility –that is, adaptation to current change and evolution over time, resilience in the face of setbacks, and the ability to locate the constantly changing sources of advantage. Ultimately, it means engaging in continual reinvention. The constant change involved in competing on the edge contrasts with traditional thinking about how change occurs. Which are laws, or rules, that articulate the key assumptions and best practices about strategy, organization, and leadership that we have found to characterize firms that compete on the edge:

1.3.1. Strategy

Rule 1 Advantage is temporary. Treat any strategy as temporary. Managers who compete on the edge understand that competitive advantage is fleeting, and so they focus on continuously generating new sources of advantage.

Rule 2 Strategy is Diverse, Emergent, and Complicated. Rely on diverse strategic moves. Strategy is not a single, simple approach to the market place. It is diverse collection of moves that are loosely linked together in a semicoherent strategic direction.

Rule 3 Reinvention Is the Goal. Managers who compete on the edge look for opportunities to reinvent their businesses and then let profits follow. They worry about finding new ways to create value, but not necessarily about being the most efficient firm.

1.3.2. Organization

Rule 4 Live in present. The present is most important time frame. Today's product launch, today's manufacturing performance and today's sale bookings matter most. The approach is to maximize minimum structure. Managers, who compete on the edge use just enough structure to keep things from flying apart, keep businesses poised for change, and keep managers aware of new opportunities.

Rule 5 Stretch out the Past. Managers who compete on the edge nonetheless learn more from the past than their counterparts who don't compete on the edge. They keep their products and service platforms in the market longer than others, exploit derivative more effectively, and extent their offerings into new geographies and customer segments frequently. They often selectively use the past to jump-start new opportunities.

Rule 6 Reach into the Future. Managers who compete on the edge reach further into the future. Simply put, they manage in longer time horizon than most others. Driven by a belief that the future is unpredictable, they launch more experimental products and services, create more strategic alliances with focus on nascent markets and technologies, and employ more futurists than other firms.

Rule 7 Time Pace Change. Managers who compete on the edge pace change in their businesses with the passage of time as well as by occurrence of events. They understand that pace-as distinct from speed-is critical strategic weapon. So they set a rhythm and tempo around the number of new products or services launched per year, rhythmic refreshment of brands, or the building a new manufacturing capacity.

1.3.3. Leadership

Rule 8 Grow the Strategy. Managers who compete on the edge never start with the future when regrowing a business-they start with basics of today.

Rule 9 Drive Strategy from Business Level. The mindset is business-level driven strategy and accountability. Business managers control both parts of strategy: "where do you want to go?" and "how are you going to get there?" Success comes from skilled, fast, and agile moves at the business level.

Rule 10 Repatch Businesses to Markets and Articulate the Whole. The role of the senior managers shifts. Continuously realigning businesses with emerging opportunities and articulating and occasionally shaping emergent strategy are the principal responsibilities for best practice senior manager. Pattern recognition and articulation of the essence of patterns are the skills that can be found at the heart of the senior manager's job.

2. Methodology and Data

A basic model underlying research activities is the action research model – a data based, problem-solving model, that replicates the steps involved in the scientific method of inquiry. The desired outcomes of the action research approach are solutions to the immediate organizational problems and a contribution to scientific knowledge and theory. The author’s analytical approach exploits the deductive method based on the analysis of pieces of knowledge from a scientific research and his own experience, further the comparative analysis of a chosen set of strategic thinking paradigms. Consequently he formulates the hypothesis: “A virtual paradigm of strategic management process”.

3. Results

Rosenzweig (2013) states: “You have to know what kind of decision you’re making in order to make it well.” He argues that before we can advise people on how to make better strategic decisions, we need to equip them to recognize how decisions differ. He proposed to categorize decisions along two dimensions: **control and performance**. The first considers how much we can influence the terms of decision and the outcome. The second dimension addresses the way we measure success. Is our aim to do well, no matter what anyone else does, or do we need to do better than the others? That is, is performance absolute or relative? Combining the above mentioned dimensions creates four fields of decisions. See Fig. 1.

The crux of our discussion comes into focus when we consider the fourth field. For these decisions, we can actively influence outcomes, and success means doing better than rivals. Here we find the essence of strategic management. I am afraid, the reality is different. A span of our strategic decisions will include very often also the third and the fourth field. Managers as decision makers need to develop two vital skills. First, they must be able to discern the nature of the decision at hand. Second they need to respond with the appropriate approach (able to act now as a psychologist, then as tactician, next as river boat gambler, and perhaps once again as a psychologist) and the ability to take bold action.

PERFORMANCE	Relative	Third Field Placing Competitive Bets	Fourth Field Managing for Strategic Success
	Absolute	First Field Making Judgments and Choices	Second Field Influencing Outcomes
		Low	High
CONTROL			

Figure 1: Four types of decisions (Rosenzweig, 2013)

The author, on the basis of an introductory review of the paradigms of strategic thinking and with presumptions including VUCA external environment characteristics, formulates:

3.1. Action hypothesis: A virtual paradigm of strategic management process

Goal: Develop a virtual paradigm of strategic management process, i.e. never-ending process, which enables company to anticipate emerging entrepreneurial opportunities and their testing on the base of experiments within organization and consequently create sustainable portfolio of transient competitive advantages and assure their effective implementation within organization and simultaneously respecting an idea of corporate social responsibility.

Intervention: The core driving force to fulfil the above goal is to establish the virtual organic team (Palán, 2013), on the background of an actual management and organizational structure, which will act as a catalyst of company strategic positioning and thus generating pipelines of competitive advantages. The team members solve permanently two basic questions: “Where to play and How to win”? The team at the very minimum will consist of three first class specialists:

- Controller (strategic, financial and personal controlling)
- Researcher (specialist of research and development department with perfect knowledge of relevant industries etc.)
- Competitive Intelligence professional (excellent knowledge of economics and technology).

The virtuality of the team is derived from common usage of the information system on the basis of Business Intelligence (infrastructure of which is designed preferably for prediction analysis, i.e. data mining which will enable us to identify emerging entrepreneurial patterns etc.). ***The author understands the term “virtual” in the sense “set by the circumstances” which in practice means, that a real team can be operatively enlarged with specialists across an organizational structure in the case of identification of an important entrepreneurial opportunity.*** The term “organic” means, that the team is ever managed by a team member who has the best professional precondition for the actual theme solving. Eventual establishment of an experimental organizational unit lays within the competence of the chief executive officer and depends on courage and willingness of corporation management to risk. When the entrepreneurial opportunity was successfully tested, it would be reasonable to develop Balanced Scorecard (Kaplan and Norton, 2008) to assure its successful implementation. The BSC open modular concept can be further modified by the fifth perspective i.e. Corporate Social Responsibility. The mindset which is exploited by team members and preferably by top management and owners for strategy development and its implementation would consist of the broad variety of different approaches, which will be used in relation to the type of strategic decision.

4. Discussion and Conclusions

The deeper analysis of the paradigm of value innovation leads to conclusion, that its core is composed by the innovation of the higher level; it is rooted in the innovation of the

higher system. Sommerlatte and Braun (1999) identify the heart of the problem in the fact, that the subsystems have tendency to develop themselves in shorter cycle, than the system to which they belong. Otherwise stated: The innovation on the higher system level is not so much the matter of developing the new functions, attributes, technologies etc., but rather of the optimization of the whole spectrum of existing functions.

The premise of the strategy competing on the edge is that change is pervasive. The implication is that key strategic challenge managers face in many contemporary businesses is managing this change. The challenge is to react quickly, anticipate when possible, and lead change where appropriate. A managers' dilemma is how to do this, not just once or every now and then, but consistently. We argued that competing on the edge is the unpredictable, often uncontrolled, and even inefficient strategy that nonetheless defined best practice when change is pervasive.

Martin (2014) summarize: "Managers accept that good strategy is not the product of hours of careful research and modeling that lead to inevitable and almost perfect conclusion. Instead, it's the result of a simple and quite rough-and-ready process of thinking through what it would take to achieve what you want and then assessing whether it's realistic to try. If executives adopt this definition, then maybe, just maybe, they can keep strategy where it should be: outside the comfort zone.

Strategy making is uncomfortable; it's about taking risks and facing the unknown. Unsurprisingly, managers try to turn it into a comfortable set of activities. But reassurance won't deliver performance. The solution: Reconcile yourself to feeling uncomfortable, and follow three rules:

- **Keep the strategy statement simple.** Focus your energy on the key choices that influence revenue decision makers—that is, customers. They will decide to spend their money with your company if your value proposition is superior to competitors. Two choices determine success; the where-to-play decision (which specific customers to target) and the how-to-win decision (how to create a compelling value proposition for those customers). Capture your strategy in one-pager that addresses where you will play and how you will win.
- **Don't look for perfection.** Strategy is not about finding answers. It's about placing bets and shortening odds.
- **Make the logic explicit.** The only sure way to improve the hit rate of your strategic choices is to test the logic of your thinking. Be clear about what must change for you to achieve your strategic goal.

The above mentioned conclusions support the author's concept of the virtual paradigm of strategic management process.

McGrath (2013) published an excellent article on the topic of Transient Advantage. She stated: "Achieving a sustainable competitive advantage is nearly impossible these days. The field of strategy needs to acknowledge what a multitude of practitioners already know: Sustainable competitive advantage is now the exception, not the rule. Transient advantage is the normal". Any competitive advantage – whether it lasts two seasons or two decades – goes through the same life cycle (The Wave of Transient Advantage). But when advantages are fleeting, firms must rotate through the cycle much more quickly and more often, so they need a deeper understanding of the early and late stages than they would if they were able to maintain one strong position for many years. The above mentioned concept of the transient advantage corresponds with its interpretation within the paradigm of value innovation and within the paradigm competing on the edge. After the above considerations she formulates Strategy for

Transient Advantage: The New Playbook. Companies that want to create a portfolio of transient advantages need to make eight major shifts in the way that they operate:

1. **Think about arenas, not industries** – Today strategy involves orchestrating competitive moves in what I called “arenas”. An arena is a combination of customer segment, an offer, and a place in which that offer is delivered.
2. **Set broad themes, and then let people experiment.** Today’s gifted strategists examine the data, certainly, but they also use advanced pattern recognition, direct observation, and the interpretation of weak signals in the environment to set broad themes. Within those themes, they free people to try different approaches and business models.
3. **Adopt metrics that support entrepreneurial growth.** Firms can use the logic of: “real options” to evaluate new moves. A real option is a small investment that conveys the right, but not the obligation, to make more significant commitment in the future. It allows organization to learn through trial and error.
4. **Focus on experiences and solutions to problems.** What customer crave-and few companies provide—are well designed experiences and complete solutions to their problems. Companies skilled at exploiting transient advantage put themselves in their customers’ place and consider the outcome customers are trying to achieve.
5. **Build strong relationship and networks.** One of the few barriers to entry that remain powerful in a transient-advantage context has to do with people and their personal networks. Indeed, evidence suggests that the most successful and sought-after employees are those with the most robust networks.
6. **Avoid brutal restructuring; learn healthy disengagement.** In researching firms that effectively navigate the transient-advantage economy, I was struck by how seldom they engaged in restructuring, downsizing, or mass firings. Instead, many of them seemed to continually adjust and readjust their resources.
7. **Get systematic about early stage innovation.** If advantages eventually disappear, it only makes sense to have a process for filling your pipeline with new ones. Companies that innovate proficiently have a governance structure suitable for innovation: They set aside a separate budget and staff for innovation and allow senior leaders to make go or no-go decisions about it outside the planning processes for individual businesses.
8. **Experiment, iterate, learn.** Companies need to focus on experimentation and learning, and be prepared to make a shift or change emphasis as new discoveries happen. Finally transient-advantage leaders recognize the need for speed. Fast and roughly right decisions making will replace deliberations that are precise but slow. Leadership would be understood as orchestration.

If we compare the strategy on the edge with the strategy for transient advantage then we discover logically several overlaps which support the author’s conclusions build in the previous hypothesis. These are: Set broad themes and let people experiment. Avoid brutal restructuring (versus patching). Get systematic about early stage innovation. Experiment, iterate and learn.

Final Thoughts (Lerner, 2012) support the author’s passion for experiment.

“Despite the vast amounts written about innovation over the years, our understanding of its drivers remains surprisingly limited. While organizational economists have made strides in understanding what combinations of incentives and organizational structure

can encourage innovative breakthroughs, many of these insights have not yet received the attention they deserve in the real world.

Given this backdrop, it is worth reemphasizing the final point: the power of experiments. The last decade has seen a myriad of new approaches toward innovation in the world of start-ups, among open source projects, in contests, and the like. Some of these new organizational models will doubtless end up as miserable failures, discarded in the dustbin of history. But other novel structures are already having profound impacts. The corporate innovation model is changing as well, but more slowly. Embracing a spirit of rigorous trial and error concerning the ways in which innovation is pursued is likely to yield substantial benefits, both to the corporate experimenter and to society as a whole”.

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A Small Open Economy Model of the Czech Republic with Frictional Labor Market

Adam Pápai¹

¹*Department of Economics, Faculty of Economics and Administration, Masaryk University, Lipová 41a, 602 00 Brno, Czech Republic, e-mail: papai@mail.muni.cz*

Abstract

The goal of this paper is to identify and quantify the interactions among monetary policy, business cycle and labor market variables for the Czech Republic during the last 15 years. A dynamic stochastic general equilibrium model is used to investigate the characteristics of the Czech economy before and after the financial crisis in 2008. This small open economy model contains Taylor-type monetary rule, price and wage rigidities, and search and matching frictions. The wages setting mechanism and hours worked are the result of the Nash bargaining process. Model parameters are estimated using the quarterly data of the Czech Republic for the period 1999:Q1 – 2014:Q3. The model is able to match the business cycle properties of key economic variables relatively well. The results show that the reactions of variables to monetary shock are quite similar in both examined periods providing a clear path of the transmission mechanism. The wage rigidities are considerably higher after the crisis. Surprisingly, the estimated bargaining power of firms is relatively low throughout the whole time span. On the other hand, hiring an additional employee is rather costly.

Keywords: small open economy, labor market, frictions, DSGE model, search and matching

1. Introduction

This paper examines the behavior of several macroeconomic variables of the Czech economy and focuses mainly on the labor market. Furthermore, the goal is to capture the differences in the development of these variables in the periods before and during the financial crisis. For this, a small open economy (SOE) model was calibrated and estimated on the Czech data.

A vast amount of papers investigating the behavior of real economies have been created. Several approaches exist to estimate the characteristics of the economies, for example Vector AutoRegression (VAR) or Dynamic Stochastic General Equilibrium (DSGE) models. The popularity of the latter grew in the last decades, not only because their complexity, but also because the results can be easily interpreted. Unlike some

other kinds of models, the DSGE model's structure is derived from the behavior of individual economic agents. Therefore it is possible to change the model's structure to satisfy a wide variety of assumptions. For example, Pisca and Vašíček (2014) included government sector and inflation target into their estimation of the Czech economy.

However, only few DSGE models cover in detail the mechanics of the labor market. For example, Jakab and Kónya (2015) estimate a SOE DSGE model with price and wage frictions and search and matching function on Hungarian data. They find that many shocks affect the labor market variables. However, the labor market shocks have little effect on the rest of the economy. Similar model was estimated by Němec (2012) on Czech data. Others, like Christoffel et al. (2009) examine the impact of the changes in the labor market on the decisions of the monetary authority in the euro area.

1.1. Czech economy

A steady economic growth characterized the Czech Republic since the early 2000s until the financial crisis in 2008. The real wages were increasing, while a substantial drop in unemployment rate could be observed from over 9% in 2000 to around 4.5% in 2008. After the Great Recession, the real GDP did not manage to continue on the path of the pre-crisis growth, but rather stagnated. The growth of the wages also slowed considerably. The fluctuation of the job vacancies was the opposite of the movement of unemployment in the whole observed period, as is shown in Figure 1. This graph represents the Beveridge curve, which shows the relationship between the unemployment and vacancies. The vacancy rate peaked in 2008 before the crisis, when the unemployment reached its lowest value.

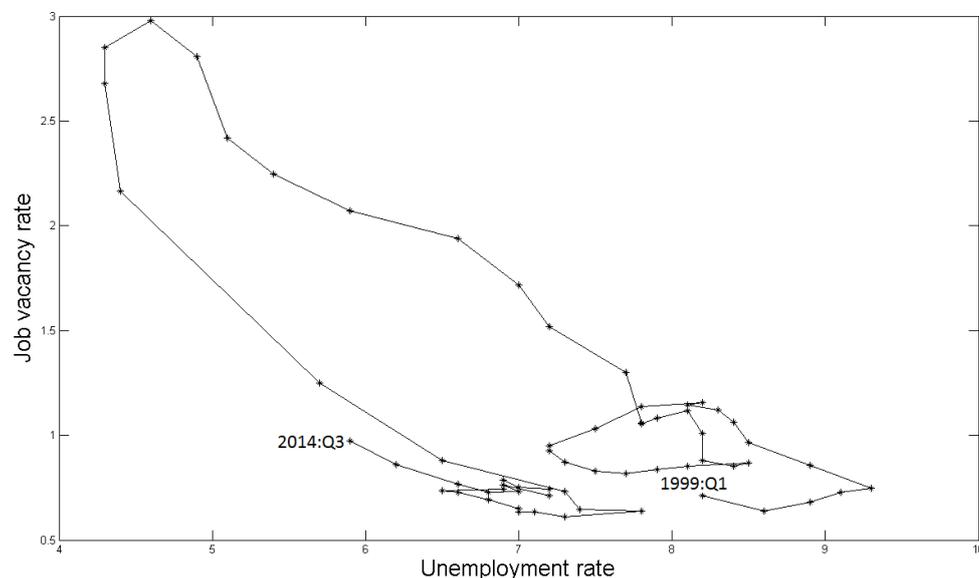


Figure 1: Beveridge curve

2. Model characteristics and structure

A model created by Albertini et al. (2012) is used for the purposes of this paper. They ran their estimation on New Zealand data. This SOE model consists of homogenous firms and households. The movements in the non-Walrasian labor market are captured by

varying hours worked (intensive margin) and also choosing whether or not the members of the households want to participate in the labor market at all (extensive margin). The wages and hours worked are negotiated between firms and employees in a Nash bargaining process. Here, the surplus of the production is divided between the two sides based on their negotiating power. The model includes a matching function, initially introduced by Mortensen and Pissarides (1994). The monetary authority is present in the form of a Taylor rule. However, there is no government sector and the sole input in the production function is the labor. To capture the behavior of a real economy, three kinds of frictions are implemented into the model's structure. First, due to the matching function, a certain part of the unemployed population fails to get paired with a vacant job position. Second, the firms face a price adjustment cost, so they might be reluctant to change their prices. Finally, the change in the wage of the employees also increases the firm's costs.

2.1. Labor market

Labor market is the place where the firms look for workers to fill their vacancies and the unemployed seek for jobs. It is an expensive, time consuming and unproductive process for both sides. When an unemployed finds a job, the vacant position becomes filled and productive. This pairing is possible because of the following Cobb-Douglas matching function:

$$M_t = \varepsilon_t^\chi S_t^\nu V_t^{1-\nu}$$

where M_t represents the number of matches in time t , ε_t^χ is the matching efficiency shock, S_t stands for the job seekers, V_t is the number of vacancies and ν is the elasticity of the matching function.

The active labor force is assumed to be constant and normalized to 1 and consists of the unemployed and the employed ($U_t + N_t = 1$). In the period t , M_t people find a job. However, at the same time a certain amount of workers lose their job. The rate, at which employees are separated from their positions (ρ^x) is assumed to be exogenous and constant. The total amount of employees in time t equals to the amount of people who kept their job and those who found a new one. The rest of the people belong to the group of job seekers:

$$S_t = 1 - (1 - \rho^x)N_{t-1}$$

2.2. Agents

The model consists of three agents: households, firms and monetary authority. Apart from these, there is a foreign sector represented by AR(1) processes.

The households maximize their intertemporal expected utility function. It is positive in difference of consumption and consumption habit and negative in labor supply. Because the model does not include capital, the households maximize their utility by choosing only the level of consumption and the hours of work. Their incomes (wage from work and interests from bonds and assets) are spent on consumption of domestic and foreign goods.

Three kinds of firms are present in the model. The first produces the intermediate homogenous goods. With the absence of capital, the only input of the production is labor in the form of employment and hours worked. The firms maximize their profit, while they have several costs. They pay wages of the workers and face quadratic wage adjustment costs as in Rotemberg (2008). The creation of empty vacancies is also costly.

The revenues of the intermediate good producers consist of selling their products to retailers on a perfectly competitive market.

The retailers combine the homogenous goods to create heterogeneous products, which they sell to the households on a monopolistically competitive market. These firms can set the prices of their product, however changing it induces additional expenses. The retailers do not hire workers, thus the wage and price setting decision is divided between the firms.

The final group of firms consists of the importers. They import differentiated goods and sell it on the domestic market. Similarly as the retailers, the importers can set their prices, while facing price adjustment costs.

The monetary authority sets the short term nominal interest rate according to a Taylor rule. It takes into consideration the past value of the interest rate, the inflation, the output gap and its growth and the changes in the nominal exchange rate.

3. Methodology and Data

For the estimation of the model, 11 time series are selected, eight for the domestic economy and three for the foreign sector. The data for the Czech economy are the seasonally adjusted real gross domestic product, CPI inflation, nominal interest rate, real exchange rate (CZK/EUR), unemployment rate, vacancy rate, hours per worker and real wage. For the foreign sector, represented by the Economic and Monetary Union, the data series of real gross domestic product, CPI inflation and nominal interest rate are used. The time series are acquired from the OECD Statistical Database and the sites of the Czech National Bank.

Quarterly data are used from the first quarter of 1999 to the third quarter of 2014. The 63 observations are divided into the *before crisis* period until 2008:Q4 with 40 observations and *after crisis* period from 2009:Q2 containing 23 observations. The observation which had the greatest drop in both of the gross domestic products (2009:Q1) was excluded, so there is a clear dividing point between the two periods. The data are logarithmized to get values in percent. Each of the 11 time series is stationarised using the Hodrick-Prescott filter with the standard smoothing parameter for quarterly data ($\lambda = 1600$).

4. Calibration and estimation method

The calibrated parameters and the prior values are the same for both periods, to capture the differences in the data and not the parameter setting. Table 1 contains the calibrated values of fixed parameters. The discount factor is set to a widely used value of 0.99 to get an annual steady state nominal interest rate around 4%. The import share is calculated from the data as the share of import in the GDP. The debt elasticity of risk premium is set to 0.001 as in Albertini et al. (2012). The elasticity of labor in the production function is set to 0.667. The scale parameter in the vacancy creation function is set to 0.05. The steady state of unemployment is calculated from the data as the sample mean, which is 7.2% in the observed period. The job separation parameter is set to 0.037. This is consistent with the average vacancy rate of 1.1%. The prior densities of estimated parameters are shown in Table 2.

Table 1: Calibration

<i>Parameter</i>	<i>Description</i>	<i>Value</i>
β	Discount factor	0.99
α	Import share of GDP	0.25
τ	Debt elasticity of risk premium	0.001
ζ	Share of labor in production	0.667
κ	Scaling factor of vacancy creation	0.05
u_{ss}	Steady state of unemployment	0.072
ρ^x	Job separation rate	0.037

The log-linearised model equations are used for the estimations. The computations are carried out in the Dynare toolbox (version 4.4.3) for Matlab. Two chains of Metropolis-Hastings algorithm are generated for both of the time periods. Each chain contains 600.000 draws of which the initial 33% was dropped.

5. Estimation results

Prior densities of the estimated parameters presented in Table 2 are set similarly as in the current literature. The deep habit parameter represents the weight of past consumption in the household's utility function. The Frisch elasticity captures the elasticity of worked hours with respect to the wage. The bargaining power parameter shows the strength of firms in the Nash bargaining process. The high values of this parameter would imply low negotiating power of the workers or low participation rate in trade unions. Elasticity of vacancy creation is set to represent linear hiring costs,

Table 2: Parameter estimation results

<i>Parameter</i>	<i>Prior density</i>	<i>Posterior Before Mean</i>	<i>Posterior Before Stdev</i>	<i>Posterior After Mean</i>	<i>Posterior After Stdev</i>
ϑ Habit	$\beta(0.5,0.15)$	0.560	0.073	0.659	0.091
φ Inverse of Frisch el.	$\Gamma(1,0.2)$	0.999	0.069	0.973	0.127
η El. of subst. (dom. & for.)	$\Gamma(1,0.2)$	0.725	0.116	0.724	0.119
ξ Firm's bargaining power	$\beta(0.5,0.2)$	0.320	0.130	0.331	0.136
ν El. of matching	$\beta(0.5,0.2)$	0.483	0.218	0.548	0.206
e El. of vacancy creation	$\Gamma(1,0.5)$	7.481	0.395	6.369	0.922
<i>Price and wage setting</i>					
γ_H Backward price (d. good)	$\beta(0.75,0.1)$	0.615	0.117	0.680	0.111
γ_F Backward price (f. good)	$\beta(0.75,0.1)$	0.768	0.094	0.756	0.097
γ_W Backward looking wage	$\beta(0.75,0.1)$	0.479	0.123	0.534	0.128
ψ_H Price adj. cost (d. good)	$\Gamma(50,15)$	37.254	8.959	40.636	11.545
ψ_F Price adj. cost (f. good)	$\Gamma(50,15)$	60.011	15.242	52.242	14.708
ψ_W Wage adjustment cost	$\Gamma(50,15)$	5.801	1.290	10.896	2.531
<i>Monetary policy</i>					
ρ_r Interest rate smooth.	$\beta(0.5,0.15)$	0.637	0.073	0.763	0.054
ρ_π Inflation	$\Gamma(1.5,0.5)$	2.489	0.473	1.852	0.466
ρ_Y Output gap	$N(0.25,0.1)$	0.282	0.099	0.287	0.098
$\rho_{\Delta Y}$ Output difference	$N(0.25,0.1)$	0.269	0.098	0.236	0.099
ρ_e Exchange rate	$N(0.25,0.1)$	0.360	0.076	0.268	0.080

while $e > 1$ would mean convex function, thus increasing costs. The price and wage setting parameters denote the frictions in the model. Finally, the monetary policy parameters enter into the decision making of the monetary authority.

The results of the estimation for the two time periods are relatively close to each other. The difference of the majority of parameters cannot be considered statistically significant, due to the overlap of the 90% highest posterior density intervals (HPDI), which are represented in Table 2 by the standard deviations of posteriors.

The value of the deep habit parameter (ϑ) increased considerably from 0.56 to 0.66. Therefore, during crisis the households value the consumption they had in the previous period more and are reluctant to deviate from it in greater extents. The inverse of Frisch elasticity (φ) and the elasticity between domestic and foreign goods (η) remained around their prior values in both periods. The bargaining power of firms (ξ) is lower than expected (0.3), probably because of the presence of trade union associations like the Bohemian-Moravian Confederation of Trade Unions (ČMKOS, Českomoravská konfederace odborových svazů). On the other hand, the hiring costs (e) are very high, 7.5 before and 6.4 after the crisis. The decrease in this value could be due to the firms' effort to lower costs during the recession.

The results show that the highest frictions (γ, ψ) are present on the goods market, especially on the market of imported goods. This is given because the importers face the volatility of the exchange rate and are less willing to change their prices. The decrease of the foreign good adjustment cost (ψ_F) after the crisis is the result of the Czech crown's lower volatility compared to the period before crisis. The wage frictions are less substantial. The wage adjustment cost (ψ_W) almost doubled after the recession, but compared to the other frictions they still remained low.

The monetary authority's interest rate smoothing parameter (ρ_r) has a mean posterior value 0.64 before the crisis. This means a relatively low volatility of the interest rates. The volatility decreased even more after the crisis, when the weight of past interest rate in the Taylor rule increased to 0.76. Inflation (ρ_π) plays a great role in the development of the interest rate. However its effect on it dropped considerably after the crisis. The reaction to the output ($\rho_Y, \rho_{\Delta Y}$) is positive and constant through the two periods. The influence of exchange rate (ρ_e) on the interest rate has slightly decreased.

Figure 2 shows the impulse response functions to a positive monetary shock. The solid line represents the responses before crisis with the 90% HPDI marked as the grey area. The dashed lines represent the period after the crisis. The reactions of the presented variables have the same direction in both of the observed periods. However, the impact of the monetary shock on these variables is twice as big during the recession period, as it was before the crisis. This difference is statistically significant for all variables except unemployment, where the response after crisis lays nearly inside the 90% HDPI of the before crisis estimation. The monetary shock causes an increase in the domestic interest rates. After this initial increase, the interest rate starts to decline under its steady state. The higher interest rate means a contractionary monetary policy. This slightly decreases the inflation and causes appreciation of the domestic currency. The households are not supplying as much labor as before, which leads to the drop in the worked hours and increases the unemployment. Because of this, the output decreases and the firms reduce their vacancy creation. The changes in vacancy and unemployment reduce the labor market tightness, which is defined as the ratio of vacancies over unemployment. This pushes the wage under its steady state value. The majority of the variables return to their steady state values by the end of the eighth quarter. Moreover, the unemployment stabilizes at a lower steady state.

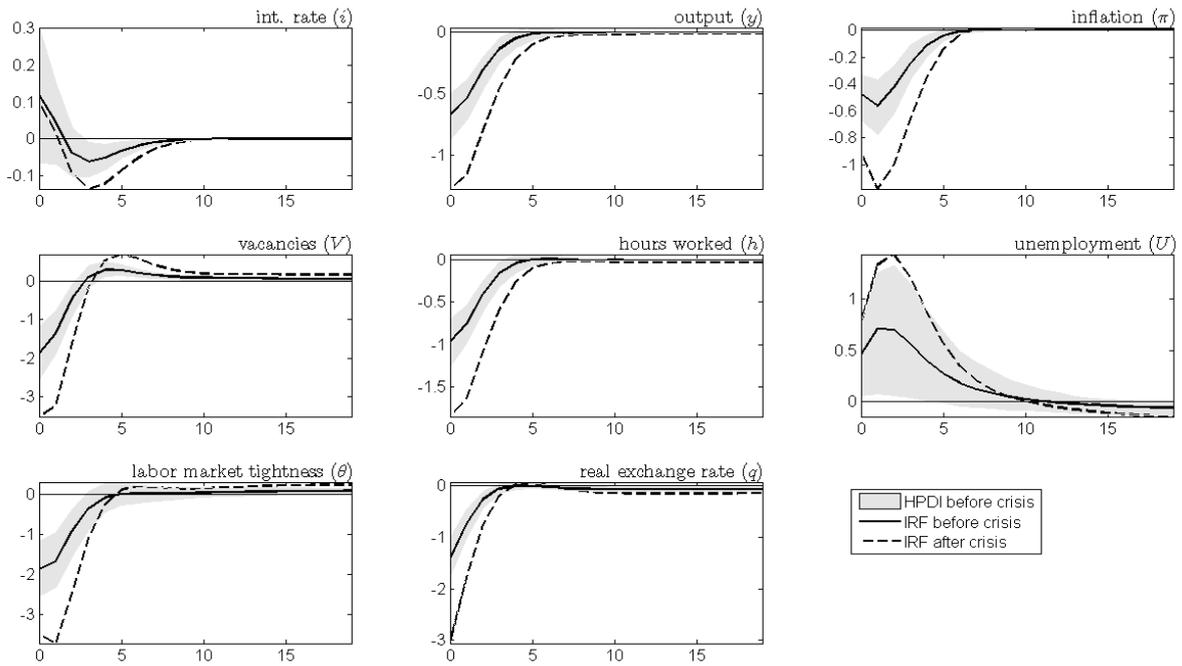


Figure 2: IRFs to monetary shock (% of steady state)

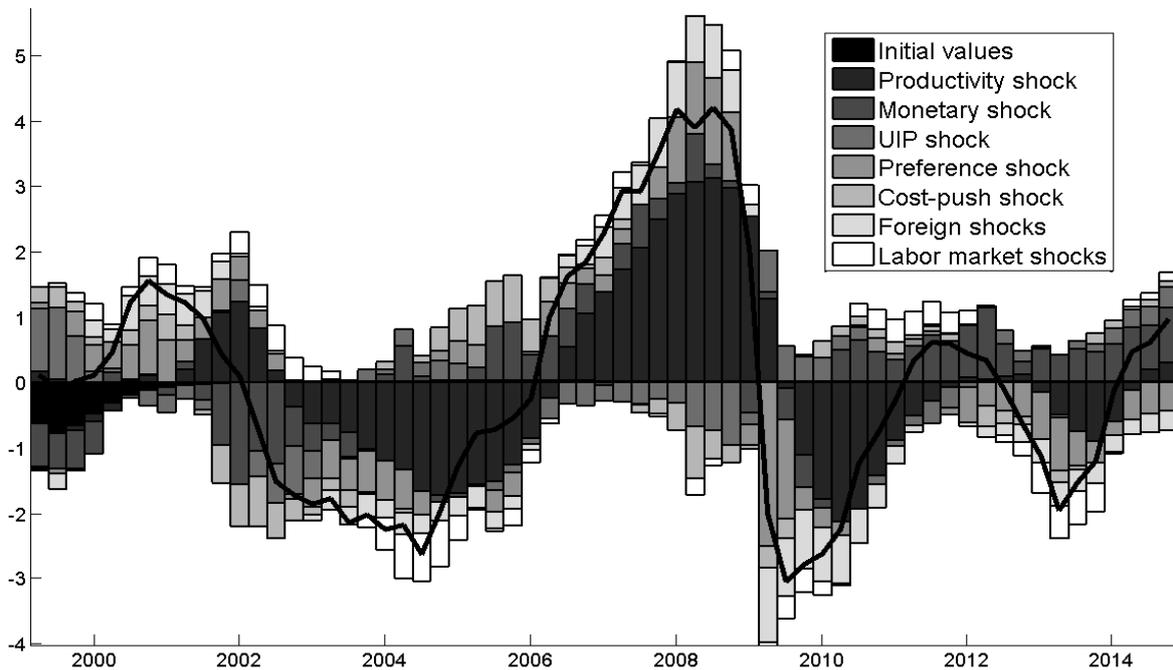


Figure 3: Shock decomposition of output gap

Figure 3 shows the historical shock decomposition of GDP gap estimated separately for the whole examined period. The volatility of the domestic output is caused mainly by the productivity shock. The monetary and preference shocks also have a noticeable impact on the output. The foreign shock includes foreign output, interest rate and inflation shocks. Their presence is mostly visible around the recession in 2008. Prior to the crisis the foreign sector influenced the domestic product positively. During the crisis

the foreign shocks pushed the output downward and brought the recession to the Czech Republic. Apart from foreign shocks, the main reason behind the drop in the product was caused by a huge negative preference shock. Since 2010 there has been a series of positive monetary shocks trying to stabilize the economy. The labor market shock in the figure consists of matching, bargaining and vacancy shocks. Its influence on the output gap changes throughout the examined period, however its overall effect is rather small.

6. Discussion and Conclusions

A small open economy dynamic stochastic general equilibrium model on Czech data was estimated and evaluated in this paper. The examined time period (1999:Q1 – 2014:Q3) was divided into two parts: before (1999:Q1 – 2008:Q4) and after crisis (2009:Q2 – 2014:Q3). The presented results are the output of two separate estimations. The model matched the dynamics of the selected variables reasonably well. Using the shock decomposition I found, that the labor market variables have limited effect on the output. According to the impulse response functions, the monetary authority is able to influence the unemployment. Also, rigidities play a considerable part in the behavior of the economy, while price frictions are more significant, than wage rigidities.

Some of the results differ from articles with similar aim. Němec (2012) for example estimated the firm's bargaining power parameter to be around 0.6. However, the majority of the results are in the boundaries of the results of other papers. Tvrz (2015) estimated the habit persistence to be 0.6, which is between it's before and during crisis value from this paper. Furthermore, in spite of a different specification of Taylor rule, the inflation weight in the decision making of the monetary authority is almost the same in the two articles.

For further research, it is rather desirable to augment the model with zero lower bound constraint, because of the current economic situation, where the Czech National Bank faces interest rates close zero.

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Regional aspects of inclusive entrepreneurship of seniors in Europe

Anna Pilková¹ and Ján Reháč²

¹*Department of Strategy and Entrepreneurship, Faculty of Management, Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovak Republic, e-mail: anna.pilkova@fm.uniba.sk*

²*Department of Strategy and Entrepreneurship, Faculty of Management, Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovak Republic, e-mail: jan.rehak@fm.uniba.sk*

Abstract

This paper studies the relationship between key factors influencing the entrepreneurial propensity of seniors and the level of inclusiveness of seniors in entrepreneurial activity in European countries. The aim is to cluster countries with similar patterns in the relationship between these two types of variables and intends to identify the success factors leading to inclusive entrepreneurship of seniors and their social cohesion. We focus on European countries that participated in Global Entrepreneurship Monitor between 2001 and 2012, and we use GEM data as the main source for our analyses. Firstly, we identify the key factors influencing entrepreneurial activity of seniors on European level, based on literature review and our previous studies. At the same time we apply senior entrepreneurship inclusivity index to measure the level of senior entrepreneurial inclusiveness in each European country on a national level. Using the results of these analyses we thereafter implement cluster analysis method to create clusters among European countries based on the similarities in the relationship between the levels senior entrepreneurial activity and entrepreneurial activity of general population. Based on that, we identify countries with above the average levels of senior entrepreneurship inclusivity. These results serve us to assess key similarities in clustered countries in terms of entrepreneurial culture and policies that have major influence on success factors and senior entrepreneurship itself.

Keywords: entrepreneurship, inclusivity of seniors, global entrepreneurship monitor

1. Introduction

The importance of senior entrepreneurship in today's economy is beyond any doubt. The changes in demographic development, as well as the increasing pressure on social, retirement and healthcare systems in Europe increases the interest of academics as well

as policy makers. The challenges these new issues open, serve as a ground for research of the various possibilities how to tackle these problems. Besides the changes in pension schemes and the increase of the retirement age, entrepreneurship of seniors represents a possibility how to increase the productivity of elderly, retain them in the active workforce as well as provides them with a possibility how to increase their income and remain active. One of the questions academic society should ask is what are the countries where senior entrepreneurship works, how should we measure the levels of senior entrepreneurship and what are the factors that lead the countries to success when regarding senior entrepreneurship. Firstly, we suggest that the adequate measure for senior entrepreneurship in Europe is based in inclusivity index. Inclusivity of senior entrepreneurship and the index that measures this activity shows us how are seniors included in the entrepreneurial activity compared to the general population This approach allows us to provide a more accurate view on the real level of inclusiveness of the seniors in the entrepreneurial activity on a national level and enabling us to compare this level internationally. Using this index, we are able to compare European countries and distinguish which are the ones with higher levels of senior entrepreneurship inclusivity. At the same time we are able to take a closer look at these countries and examine the key differences between low and high performing countries in Europe, as far as senior inclusivity is concerned.

2. Literature review

Senior entrepreneurship is studied from various view-points that we could divide into two main groups. Firstly, authors study the factors influencing senior entrepreneurship, where also our study belongs. In the second group, authors research the impact senior entrepreneurship has on economic development of countries. There are various reasons why seniors are considered to be important source of entrepreneurship. According to a number of authors there is high potential allocated in the senior population, that could ease the pressure of the demographic changes (Wainwright and Kibler, 2013, OECD/European Commission, 2013). The economic benefits of senior entrepreneurship were studied by authors from various points of view, but common conclusion is that entrepreneurship of the elderly brings social and economic benefits to the entire society, and serves not only seniors but also other social groups (Curran and Blackburn, 2001; Singh and DeNoble, 2003; Weber and Schaper, 2004; Halabinsky, Potter and Kautonen, 2012). Senior entrepreneurship is suggested to be generally less innovative as well as low growth entrepreneurship, but at the same time creates job opportunities for unemployed (Kautonen, Down and South, 2008). There are several findings on US data that suggest that senior entrepreneurship is correlated with economic growth and surplus in the social security funds (Ting Zhang, 2008). The possibility to retain seniors in the active workforce by means of entrepreneurship has been studied by various European authors as well (Curran and Blackburn 2001; Weber and Schaper 2004; Kautonen et al. 2008). At the same time, the experience gained via entrepreneurship grants a variety of skills as well as mindset that can help seniors with possible employment opportunities in the long run (OECD/European Commission 2013).

The predispositions of seniors to engage in entrepreneurial activity are studied as a number of factors limiting as well as enabling seniors to be active in this field. Health issues, time allocation preferences, and various other reasons are seen as negative factors influencing senior entrepreneurship (Curran and Blackburn 2001; Singh

and DeNoble, 2003; Levesque and Minniti, 2006). This can be the main reason why the percentage of seniors involved in early-stage entrepreneurial activity is about the half of the amount of young people starting a new business (Kautonen 2008, Hart et al. 2004).

Human capital gained through work experience represents a positive factor (Botham and Graves, 2009), but the nature of previous experience determine the actual influence on the entrepreneurial activity (Weber and Schaper, 2004).

Age of entrepreneur and the survival of the started businesses is a topic covered from various points of view and authors provide different possible explanations (Patel and Grey, 2006; Green et al. 2008). This leads us to the studies focused on the aging of human capital – whose quality declines with age and leads to higher unemployment in the pre-retirement age (Hart et al. 2004, Kautonen et al. 2008), as well as to the studies of social capital of seniors, that prove that the higher age is linked to higher social capital, as well as to the fact that broader networks facilitate the entrepreneurial activity (Baucus and Human 1994; De Bruin and Firkin, 2001)

The national level characteristics constitute an important role in economies and have a significant impact on entrepreneurial activity (Krueger et al., 2000, Mrva and Stachova, 2014, Pilkova et al., 2013, Stenholm et al., 2013, Holienka, 2013). Entrepreneurial environment concept and its understanding by today's academics is constituted on the basis of institutional theory (Bruton et al., 2010). Understanding that institutions representing the rules of the game determine, constrain or support individual's activity in the environment (Bruton et al., 2010) – in this case entrepreneurial environment. What is also necessary to mention is the division of institutions to formal (in our case mainly rules, legislature, programs) and informal (in our case mainly social and cultural norms) (North, 1990).

Based on this theory we can introduce also formal and informal institutions in the terms of senior entrepreneurship. The studies of direct influence of government programs and policies suggest that well implemented government programs have predominantly positive effect on senior entrepreneurship. These programs can be focused on entrepreneurship development, but also on entrepreneurial education, of development of necessary skills (Kautonen et al. 2008, Botham and Graves, 2009). These authors consider well designed support programs for senior entrepreneurs to be a key influencing factor of senior entrepreneurial activity.

Senior entrepreneurs were studied from the perspective of innovation, where senior businesses were significantly less innovative (Botham and Graves, 2009). Based on this finding enforcement of legislature in intellectual property rights (IPR) was determined to have a strong negative influence on senior entrepreneurship (Rehak, 2014).

Studies based on informal institutions focused on various aspects such as cultural openness and attitudes towards senior citizens. These studies confirm that positive attitudes towards seniors have a strong positive influence on their entrepreneurship. On the other hand ageism and negative attitudes towards seniors have negative effects (Ting Zhang 2008; Weber and Schaper 2004; Kautonen et al. 2008, 2009, 2011). The institutional approach was also adopted by Saul Estrin and Tomas Mickiewicz (2011) who claim that both formal and informal institutions have a strong influence on entrepreneurs. This impact is emphasized by a generation effect through a generation gap that leads to a low level of senior entrepreneurs in post-communist countries (CEE and post-soviet union countries). The weak and underdeveloped informal institutions are seen by the authors as a main reason for this missing generation of senior entrepreneurs. There has been discovered a strong impact of cultural and social norms on senior entrepreneurial propensity (Rehak, 2014).

3. Methodology and Data

The analysis is based on Global Entrepreneurship Monitor data, which is a worldwide academic study focused on entrepreneurship. GEM collects data annually using two survey instruments. Adult population survey (APS) collects data on entrepreneurial attitudes, activity and aspirations from representative adult population samples (18 to 64 years). National expert survey (NES) collects data from a sample of expert respondents that assess the state of the entrepreneurial framework conditions in their country. In our analysis we use data from 2001–2012 according to the availability, both from APS and NES surveys on national level for 32 European countries participating in GEM, that are built on 1,047,803 APS respondents. Data availability and results are visualized in table 1.

First step of the analysis is the construction of senior entrepreneurship inclusivity index SEI – which is based on two variables – Total early-stage entrepreneurial activity (TEA) of general population and Total early-stage entrepreneurial activity (TEA) of population aged 50–64 years¹. These variables are calculated by Global entrepreneurship monitor on national level and represent the entrepreneurial activity of the population in a country. The senior entrepreneurial activity index SEI is calculated by dividing TEA in age category 50–64 by the overall TEA, which provides us with the relative proportion of seniors, that are entrepreneurially active compared to the entrepreneurial activity of population per each country individually. This measure enables us to compare the entrepreneurial inclusivity among European countries.

The calculation of inclusivity index of seniors is following: SEI_k is the summary inclusivity index of seniors for the country k , SEI_{ki} is the inclusivity index in the year i , and n is the number of years where data for the country k were available:

$$SEI_k = (\sum_{i=1}^n SEI_{ki})/n \quad (1)$$

Where SEI_{ki} is calculated as a ratio of total early-stage entrepreneurial activity of the age cohort of 50–64 TEA_{ki}^s and total early-stage entrepreneurial activity of general population TEA_{ki} in year i for the country k as follows:

$$SEI_{ki} = TEA_{ki}^s/TEA_{ki} \quad (2)$$

Using the SEI index as a main variable, we implement k -means clustering method in order to divide the sample of 32 European countries in 4 sub-groups – clusters based on the national level of inclusivity of senior entrepreneurship that we further analyze. These clusters are analyzed according to three key entrepreneurial framework conditions which, based on previous research and literature review, exhibit high influence on senior entrepreneurship. These variables are based on GEM NES research, thus are calculated on national level for each country in each year the country participated in the GEM research. The variables we use for each country represent the average for the years country participated in GEM NES survey, according to the available data. In the analysis we use those variables that measure and represent government entrepreneurship programs, cultural and social norms and legal approach to intellectual property rights. Each variable represents an assessment on Likert-type scale from 1 (worst state) to 5 (best state).

¹ TEA – percentage of adult population involved in the process of actively starting a business or running a new business less than 3.5 years old

4. Results

We present our results in two steps, beginning with the calculation of senior entrepreneurship inclusivity index SEI for the analyzed countries, which we divide into four clusters using *k*-means clustering, and then compare the levels of key entrepreneurial framework conditions for each cluster of countries.

Figure 1 visualizes the senior entrepreneurial inclusivity index for the analyzed countries in Europe, already divided into four clusters. Using *k*-means clustering following clusters were created: High entrepreneurial inclusivity cluster, consisting of 3 countries with the highest SEI index values (cluster 1). Second cluster with above average entrepreneurial inclusivity of seniors, consisting of 14 countries that exhibit relatively high level of inclusive entrepreneurship of seniors (cluster 2). Third cluster includes countries with below the average entrepreneurial inclusivity of seniors, consisting of 10 countries with relatively low level of SEI index (cluster 3). The last cluster consists of 5 countries with the lowest levels of senior entrepreneurial inclusivity (cluster 4).

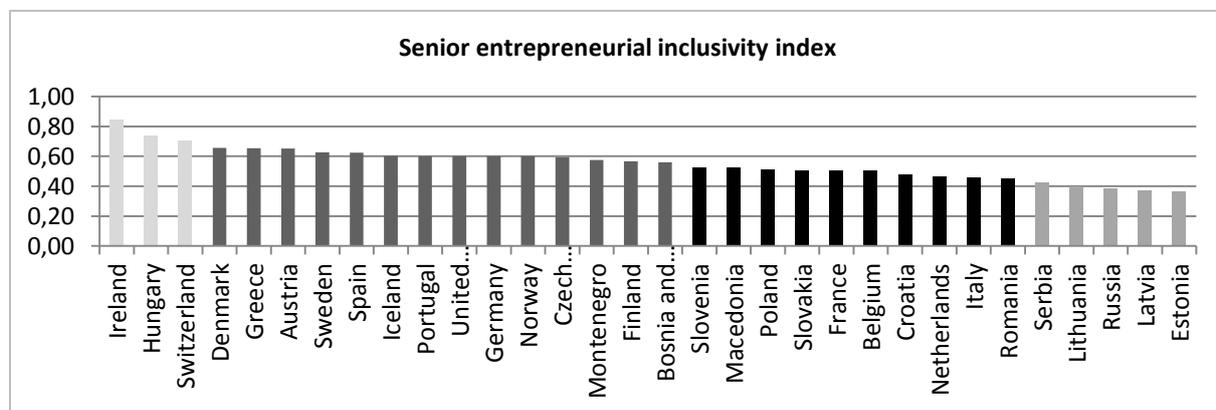


Figure 1: Senior entrepreneurial inclusivity index values for analyzed countries divided into clusters. 2001–2012

With the average SEI of 0.55, we can observe that there is an inclination of post-communist countries towards the lower end of the scale, with few exceptions such as Hungary and Czech Republic. There is also a strong dominance of former western bloc countries in the first two clusters – the ones with above the average inclusivity of senior entrepreneurs. At the same time, the cluster number 3, with below the average SEI, predominantly includes CEE countries, and the cluster with the lowest inclusivity consists exclusively of countries with communist history².

We selected three variables defining the aspects of entrepreneurial environment that proved influential to the activity of seniors starting a new business across the countries in Europe, based on presented literature review as well as previous research done by the authors. In other words, the variables we selected are important for early stage entrepreneurial activity of seniors on individual level across the countries we analyze. We selected specifically the following variables:

² Table 1 provides clusters and values for each variable, including data availability for each country

- Adequate government support programs for new businesses (Government programs)
- Culture encourages self-reliance and individual success (Cultural and social norms)
- Enforcement of intellectual property right laws (IPR law enforcement)

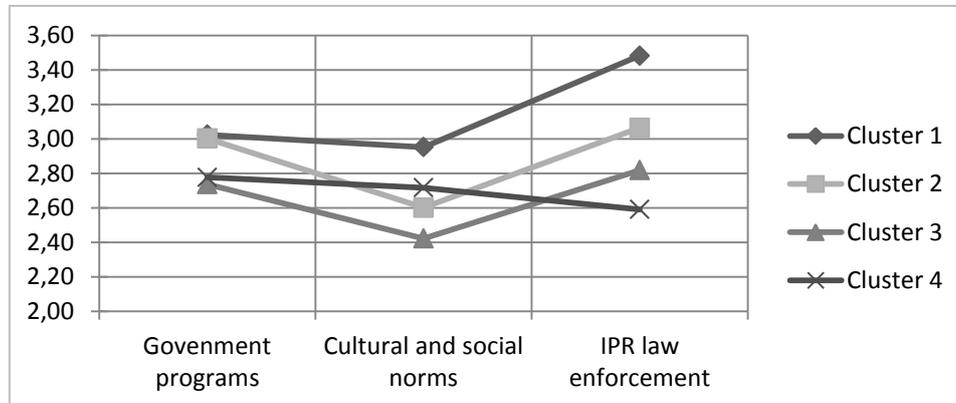


Figure 2: Key entrepreneurial framework conditions average level by cluster.

In the figure 2 we present the visualization of the average values for each variable and cluster, where a certain trend is visible. Regarding government programs, the first two clusters exhibit visibly higher values of key entrepreneurial framework condition than the latter two clusters, while the difference between cluster 1 (3.02) and cluster 2 (3.00) is very small. The two clusters with below the average SEI index have also similar values of the variable representing adequacy of government programs, where cluster 4 has a slightly higher value (2.78) than cluster 3 (2.74).

In the variable measuring the cultural and social norms through the encouragement of the culture towards self-reliance and individual success, cluster 1 exhibited highest value (2.95) compared to the other clusters. Out of the remaining three clusters, highest average score was exhibited by cluster 4 (2.72), followed by cluster 2 (2.60), and the lowest value of this variable had cluster 3 (2.42).

The last variable we compare is the level of IPR law enforcement in the clusters. According to the results, the level of this variable varies significantly for each cluster. Cluster 1 has the highest score (3.48) followed by cluster 2 (3.06), cluster 3 (2.82) and cluster 4 (2.59).

As can be seen from both figures, there are certain similarities between the clustered countries as well as certain differences. Firstly the countries with highest level of SEI index had the highest values in all three entrepreneurial framework conditions. The cluster 3 on the other hand is the one with lowest framework conditions among the countries.

Table 1: SEI index, EFCs for 2001–2012 and data availability for European countries

Country	Cluster	SEI	Government Programs	Cultural and social norms	IPR enforcement	Data availability
Ireland	1	0.84	3.31	3.44	3.49	2001–2012
Hungary	1	0.74	2.80	2.26	2.73	2001–2012
Switzerland	1	0.70	2.96	3.15	4.22	2002–2003, 2005–2006, 2009–2012
<i>average</i>	1	0.76	3.02	2.95	3.48	
Denmark	2	0.66	3.21	2.41	3.50	2001–2012
Greece	2	0.65	2.73	2.94	2.34	2003–2006
Austria	2	0.65	3.76	2.59	3.93	2005, 2007, 2012
Sweden	2	0.63	3.26	2.21	3.31	2001–2007, 2010–2012
Spain	2	0.62	3.11	2.97	2.69	2001–2012
Iceland	2	0.60	2.51	3.54	3.11	2002–2010
Portugal	2	0.60	2.67	1.94	2.69	2001, 2004, 2007, 2010–2012
United Kingdom	2	0.60	2.97	2.89	3.50	2001–2012
Germany	2	0.60	3.58	2.86	3.54	2001–2006, 2008–2012
Norway	2	0.60	2.99	2.77	3.41	2001–2012
Czech Republic	2	0.59	2.60	2.13	2.86	2006, 2011
Montenegro	2	0.58	2.76	2.49	2.35	2010
Finland	2	0.57	3.29	2.53	3.67	2001–2012
Bosnia and Herzegovina	2	0.56	2.58	2.14	1.99	2008–2012
<i>average</i>	2	0.61	3.00	2.60	3.06	
Slovenia	3	0.52	2.67	2.16	2.89	2002–2012
Macedonia	3	0.52	2.81	2.71	2.56	2008, 2010, 2012
Poland	3	0.51	2.69	2.72	2.21	2001–2002, 2004, 2011–2012
Slovakia	3	0.51	2.11	2.25	2.77	2011–2012
France	3	0.50	3.38	2.24	2.80	2001–2012
Belgium	3	0.50	3.08	2.42	3.40	2001–2012
Croatia	3	0.47	2.57	2.21	2.47	2002–2012
Netherlands	3	0.46	3.17	2.47	3.76	2001–2012
Italy	3	0.46	2.58	2.60	2.52	2001–2010, 2012
Romania	3	0.45	2.31	2.44	2.79	2007–2012
<i>average</i>	3	0.49	2.74	2.42	2.82	
Serbia	4	0.43	3.09	2.34	2.12	2007–2009
Lithuania	4	0.40	2.47	2.50	2.66	2012
Russia	4	0.38	2.42	2.45	1.98	2001, 2002, 2006
Latvia	4	0.37	2.61	3.01	2.84	2005–2012
Estonia	4	0.36	3.30	3.29	3.36	2012
<i>average</i>	4	0.39	2.78	2.72	2.59	

Source: GEM 2001–2012, Authors

5. Discussion and Conclusions

The results of our analyses can be presented and discussed in two steps. Firstly the division of the countries into four clusters according to their SEI index over the extended period of 2001–2012, provides us with interesting results per se. The formed clusters put three countries in the lime light – as the countries with the highest inclusivity of senior entrepreneurs in Europe. Ireland and Switzerland are countries with a high proportion of seniors in the population, and both are part of Western Europe. Ireland is one of the European countries with best developed programs focused on the development of senior entrepreneurs. Hungary on the other hand formed a part of the Eastern bloc, former communist regime had definitely an influence on the informal and formal institutions in the country, as well as on the entrepreneurial mind-set. However, compared to other CEE countries, the former totalitarian regime in Hungary allowed certain forms of private personal entrepreneurship, which can be considered as a factor with impact on senior entrepreneurs.

The remaining three clusters were formed with compliance to the presumption that the West European countries tend to have higher inclusivity of senior entrepreneurship and the East European countries tend to lack the inclusivity in this age cohort. At the same time the traditional approach seems to prevail, Nordic countries all fall into the second cluster, with above the average inclusivity of senior entrepreneurs. An interesting fact is that Finland – as a country with high focus on senior entrepreneurship – is at the end of the cluster 2. More surprising is the allocation of West European countries in the cluster 3, such as Netherlands, France and Belgium that would be considered as countries with high inclusivity. Even though, countries in the cluster 3 are predominantly former Eastern bloc countries such as Macedonia, Poland, Slovakia, Slovenia, Romania or Croatia. The cluster 4 constitutes solely of East European Baltic countries (Lithuania, Latvia, Estonia), Russia and Serbia. This complies with the findings of Estrin and Mickiewicz presented in the literature review. At this stage our finding partly confirm the generation gap theory, but at the same time provide evidence, that the inclusiveness of senior entrepreneurs isn't necessarily a question of regional distribution and historical background, and that there are more factors that influence the propensity of senior entrepreneurship.

The second part of our findings is based on the comparison of the average score of entrepreneurial framework conditions between the clusters. The first variable was focused on the adequacy of government programs supporting entrepreneurial activity. Our findings show that the first two clusters with above the average senior entrepreneurial inclusivity have significantly higher score regarding this framework condition. And the cluster 1 has a slightly higher average than the rest of the clusters. On the other hand the clusters 3 and 4 have similar values, but significantly lower compared to the first two clusters. These findings follow up on the results of Kautonen et al. (2011) and Kyro et al. (2012) who linked development programs with the senior entrepreneurship. We take this argument a step further and suggest that well designed government support programs not only promote senior entrepreneurship as such, but also increase the inclusiveness of senior entrepreneurs in the entrepreneurial activity.

The second analyzed variable – cultural and social norms – can be considered as an informal institution. The level to what extent culture encourages self-reliance and individual success is one of the cultural and social norms that literature and our former research suggested to be important in connection to the senior entrepreneurship. In the comparison of the four clusters, only the cluster 1 and cluster 4 clearly distinguished

themselves from the rest. Cluster 2 and cluster 3 had very similar values, and cluster 3 had a slightly higher score in this particular variable. Following the conclusion we made earlier in this article, the Estrin-Mickiewicz (2011) theory applies to our dataset to a certain extent, but predominantly to the extremes. The clusters with slightly higher and slightly lower senior entrepreneurship inclusivity include countries with both high and low levels of this particular informal institution.

The last variable – intellectual property rights law enforcement – we included in our study can be also considered as a formal institution. In this case the clusters are sorted in order from the highest enforcement in cluster 1 to the lowest enforcement in cluster 4. This seems like an interesting fact, since our presumption was the opposite – we presumed that the countries with higher IPR protection will have lower levels of the senior entrepreneurship. The results show us that the enforcement of IPR laws is higher in each cluster of countries with increasing inclusivity of senior entrepreneurship.

In this study we combined the approach of senior inclusiveness in entrepreneurial activity among European countries, with the selected entrepreneurial framework conditions for each country. Our results suggest that the government programs focused on entrepreneurship development do not only help senior entrepreneurs start their businesses, but also increase the level of inclusivity of senior entrepreneurs. At the same time based on our results we provide evidence that the Estrin-Mickiewicz (2011) theory of missing senior entrepreneurs in CEE countries applies to certain extent to our data. At the same time we found several exceptions to this theory, and we suggest that there are other factors that can strongly influence the senior entrepreneurship besides informal institutions. The IPR enforcement presumption we introduced in the literature review didn't prove in our analysis, which leads us to the conclusion that there might be different factors connected to the low innovativeness of senior entrepreneurs. To identify these factors might be one of the issues for the further research in senior entrepreneurship field.

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Homogeneity of economic performance in the euro area

Klára Plecíťá¹

¹*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: vitaskova@mendelu.cz*

Abstract

In order to test for the homogeneity/heterogeneity hypothesis of monetary integration this paper examines the economic performance of the individual euro area countries on the basis of dynamic cluster analysis using indicators of macroeconomic balance and competitiveness over the period 1999–2013. The results show that the heterogeneity of economic performance of the euro area countries has risen over time, therefore it seems, that the euro introduction per se is not a sufficient condition for promoting higher homogeneity among the euro area countries. Further, two distinct clusters of countries have emerged among the euro area countries over time: core and periphery. Members of the core are Germany, France, Italy, Austria, Finland, Netherlands, Belgium and Luxembourg, whereas the periphery consists from Greece, Portugal, Spain and Ireland. While looking at the homogeneity/heterogeneity of the core, no evidence for increasing heterogeneity among the core countries has been found, thus the source of the euro area heterogeneity lies in the periphery.

Keywords: endogeneity hypothesis, euro area core and periphery, clusters

1. Introduction

The traditional conclusion of the OCA theory is, that countries which do not pass the OCA criteria (i.e. they are not sufficiently similar in terms of their economic structures or they are not integrated enough or their economies are not adequately flexible) should not enter into a monetary union, because the costs will outweigh the benefit. Nevertheless, in the run-up to the Economic and Monetary Union many economists have agreed that the OCA characteristics are not time invariant (Frankel and Rose, 1996; Krugman, 1993) and that introduction of a common currency per se, can be expected to increase international trade and financial integration via reduced exchange-rate risk and transaction costs. Nevertheless, there is a disagreement, whether these changes will lead to an improvement or deterioration of the OCA profile of participating countries.

The optimists claim, that the euro area itself may induce the desired OCA characteristics of its member states, which are necessary for its well-functioning.

Frankel and Rose (1996) note that trade integration (increase in intra-industry trade) and business cycle correlations are endogenous, therefore there is no need to fulfil the OCA criteria before an entry into a monetary union, because they will be satisfied automatically once the country joins the union. Moreover, the increased trade linkage between countries may lead to less asymmetric shocks. In addition, Wickens (2007) points out that heterogeneity of output across the euro area, caused by differences in national inflation rates, which lead to differences in real interest rates, may be mitigated via the competitiveness channel. The rationale is as follows: if a country in a monetary union has persistently above average inflation, it triggers real exchange rate appreciation vis-à-vis its trading partners and thus makes it less competitive and leads to negative growth of its net exports, and vice versa for a country with below average inflation. Moving to fiscal rules, Darvas, Rose and Szapáry (2005) have found that reduced fiscal deficits increase business cycle synchronization, therefore fiscal Maastricht convergence criteria and the Stability and Growth Pact (SGP) may lower the probability of country-specific fiscal shocks and so improve the OCA characteristic of the euro area.

Nevertheless, there is a competing pessimistic paradigm concentrated around the Krugman's specialisation hypothesis (Krugman, 1993), which postulates that more trade integration increases trade specialisation (sectorial specialisation among countries). Similarly, Kalemli-Ozcan et al. (1999) declare that well integrated financial markets offer better risk-sharing opportunities (mainly via diversification of ownership), which further encourages trade specialisation. This in turn makes the monetary union more heterogeneous and thus the probability of asymmetric shock increases. In other words, according to Krugman's point of view, if a country does not satisfy the OCA criteria *ex ante*, it is highly improbable that it will fulfil them *ex post*. What is more, if a country meets the OCA criteria *ex ante*, the degree of the OCA optimality may decrease over time, making it more prone to asymmetric shocks (De Grauwe, 2009).

Further, differences in labour market institutions across the euro area may transform a symmetric shock into an asymmetric via differences in wage bargaining (Mongelli, 2008). Additionally if nominal wage increases exceed productivity growth, then this leads to rising unit labour costs, positive inflation differentials and loss of competitiveness.

Fiscal policy according to the rules set in the Stability and Growth Pact should be neutral over the cycle and the automatic built-in fiscal stabilisers should smooth output fluctuations. Nevertheless, unless a country is able to achieve balanced (or surplus) budgetary position over the cycle, the commitment to fulfil the SGP rules can lead to pro-cyclical fiscal policies during economic downturn (Mongelli, 2008) and thus contribute to output heterogeneity.

While the euro area countries differ in terms of their structure, originally common shocks can display various effects on individual countries. Moreover, if countries lack sufficient degree of flexibility, temporary shocks may become more permanent (Matthes, 2009). Since the nominal interest rates set by the ECB are the same for all euro area countries, countries with higher inflation rates are exposed to lower real interest rates than countries with lower inflation rates. If the higher inflation is caused by an overheating of the domestic economy, then the common monetary policy may have a pro-cyclical effect (Mongelli, 2008). If this effect is not offset by the competitiveness channel described above, it may further increase domestic demand and fuel asset and housing bubbles (Matthes, 2009) and so drift the output of the member states apart.

2. Homogeneity / Heterogeneity Hypothesis

As can be seen from the above mentioned opposing views (optimistic and pessimistic) concerning the optimality of the euro area, two different hypotheses can be formulated concerning the effects of monetary integration on the euro area countries. According to the first “homogeneity hypothesis”, which expresses the optimistic point of view, the euro area countries will become more similar over time in terms of their macroeconomic performance. This increased economic homogeneity results from the endogeneity of the OCA, common monetary policy, increased business cycle correlation, economic interdependence and flexibility, and last but not least, reduced asymmetric shock occurrence. The common monetary policy and the fiscal rules contained in the SGP should, moreover, ensure macroeconomic balance and stability. In other words, even if the euro area countries have not been perceived to constitute the OCA before the introduction of the common currency, they may improve their OCA profile over time during their membership in the euro area.

On the other hand, the “heterogeneity hypothesis”, stemming from the pessimistic point of view, postulates, that the euro area countries will become more heterogeneous over time in terms of their macroeconomic performance. This can be explained on the basis of increased asymmetric shock occurrence, pro-cyclical effects of national fiscal and common monetary policy, lack of flexibility-enhancing structural reforms and differences in price competitiveness and business cycle positions, which drive the euro area countries apart and are the sources of intra-union divergences and macroeconomic imbalances. In other words, since the entire euro area has not created an OCA before the euro adoption, its member states may become more dissimilar over time, and therefore their OCA profile may worsen.

There is no single approach for testing the homogeneity and heterogeneity hypothesis. In the empirical literature, the OCA characteristics have been tested mainly on the basis of business cycle synchronisation (Fidrmuc and Korhonen, 2006), supply and demand shocks correlation (Bayoumi and Eichengreen, 1993), intra-industrial trade models (Fidrmuc, 2004), real exchange rate volatility (De Grauwe and Heens, 1993) and last but not least, an OCA index (Bayoumi and Eichengreen, 1997). In my analysis I partially deviate from these approaches and test the homogeneity and heterogeneity hypothesis via the similarity of economic performance across the euro-area countries using clustering approach. In other words, instead of focusing on prerequisites for the currency union optimality (correlation of shocks, business cycles etc.), I focus directly on the homogeneity/heterogeneity of macroeconomic performance among the euro-area member states, because macroeconomic stability and homogeneity of macroeconomic performance across countries in a monetary union matter for the optimality of the common monetary policy (so called one size fits all) and the optimality of the whole currency area.

3. Methodology and Data

As mentioned above, the homogeneity/heterogeneity hypothesis is tested indirectly, focusing on macroeconomic performance indicators of individual euro-area countries. The advantage of this approach is, that the indicators of macroeconomic situation mirror not only the cross-country differences in terms of the transmission of the common monetary policy, business cycle synchronisation, asymmetric shock occurrence,

differences in national fiscal policies, but also other factors affecting the overall economic situation of the euro-area member states.

Cluster analysis is used to assess the homogeneity of the 12 original euro area countries (EA-12) over the period 1999–2013 on yearly basis. To capture the changes in macroeconomic stance of the individual EA-12 member states, yearly data of following variables enter into the analysis: output gap, unit labour cost, general government balance and general government debt, current account balance, net international investment position and real effective exchange rate. This set of variables describes multiple dimensions of a country's economic situation – internal balance, soundness of public finances, external balance and country's competitiveness on international markets. For closer description of the data see Table 1.

To capture the dynamic of economic development across the euro area over time, all variables are standardised over time and space (i.e. after standardization the mean of all variables is zero and the variance is unity) and clusters are derived on the basis of the Ward's algorithm for the EA-12 countries for each year during 1999 – 2013. The stability of results is confirmed using k-means clustering, but only results for the hierarchical clustering for selected years are reported in the form of dendrograms. Dendrogram is a tree-like diagram, which depicts mergers of objects at each successive step of the analysis. The lower the linkage distance of two objects, the more similar they are.

Table 1 List of variables entering into the cluster analysis

Description	Definition	Source
Output gap	Gap between actual and potential gross domestic product at 2010 market prices	Ameco
General government balance	General government net lending (+) or net borrowing (–) under the Excessive Deficit Procedure	Ameco
General government debt	General government gross debt (Maastricht debt) in % of GDP	Ameco
Unit labour cost	Real unit labour cost index (2010 = 100) – yearly changes	Ameco
Current account balance	Current account balance in % of GDP	Eurostat
Net international investment position	Net international investment position in % of GDP	Eurostat
Real effective exchange rate	Annual Real Effective Exchange Rates vs. rest of IC37 group (2005 = 100) – yearly changes	European Commission

Homogeneity/heterogeneity of economic performance among the EA-12 countries over time is examined on the basis of the maximum linkage distance, average linkage distance and the coefficient of variation, as propose Sørensen and Gutiérrez (2006). The maximum linkage distance represents simply the linkage distance between the two most remote clusters and the average linkage distance is computed as an un-weighted arithmetic average from all derived linkage distances. And last but not least, the coefficient of variation is calculated as the standard deviation of the linkage distance divided by its mean. To test the hypotheses about growing homogeneity/heterogeneity of the euro-area, coefficients of linear time trends of the average linkage distance, the maximum linkage distance and the coefficient of variation are tested for their signs.

4. Results and Discussion

On the basis of the yearly results from the hierarchical clustering technique of the euro-area countries (see Figure 1), no clear structure in terms of core and periphery is visible during 1999–2001. The only stable pattern during this period displays Luxembourg, which represents an outlier, because its economic performance cannot be compared to other countries, therefore it is often the last country added to the overall EA-12 cluster. The other EA-12 countries change their positions across clusters from year to year.

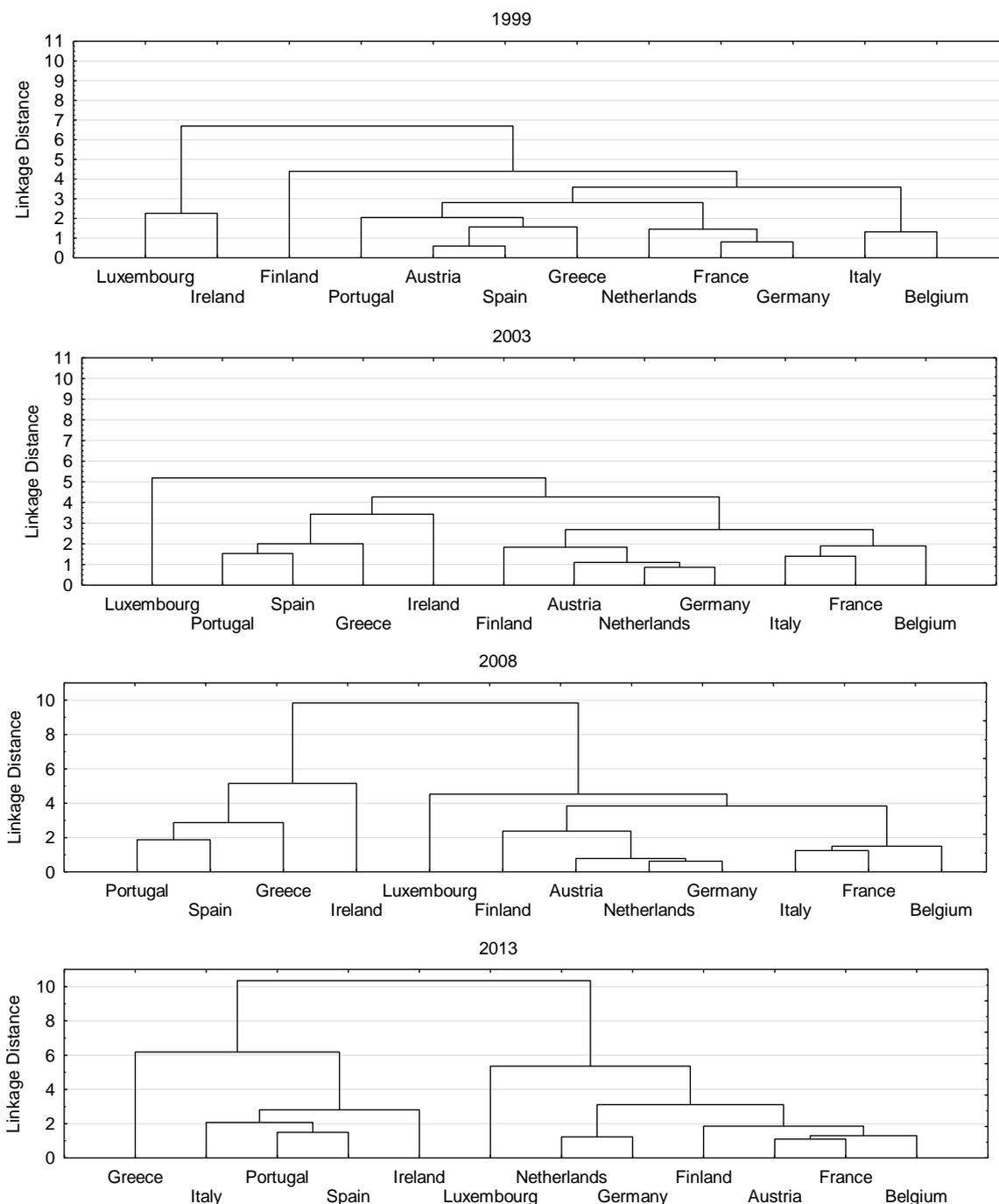
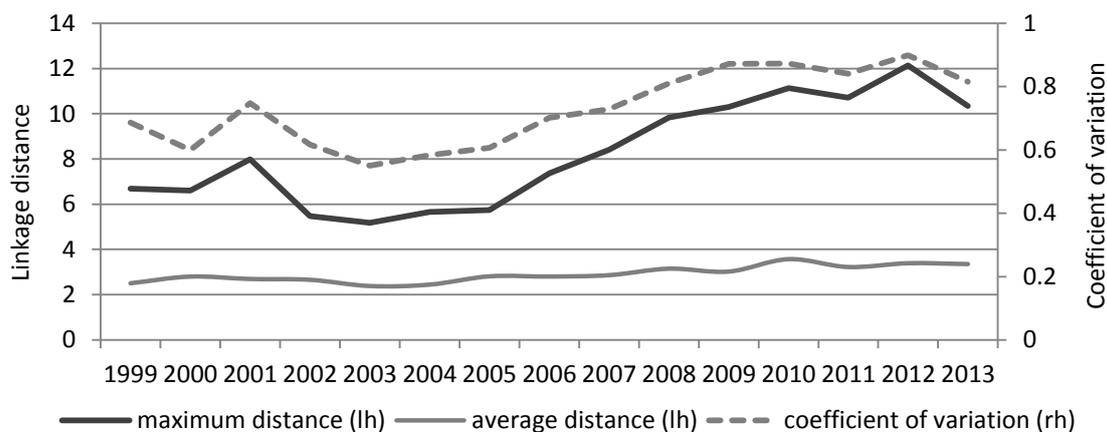


Figure 1: Dendrograms for the EA-12 based on their average economic performance in 1999, 2003, 2008 and 2013 (using Ward's algorithm and Euclidean distances)

However, things look differently in 2002–2013. Over this period there are two stable clusters of the euro-area countries (see Figure 1). In the first group there is Greece, Portugal, Spain and Ireland, whereas the second group consists of Germany, France, Italy, Austria, Finland, Netherlands, Belgium and Luxembourg. From this point onwards, I will refer to the first group as “periphery” and the latter as “core”. Looking at linkage distances of the core countries, it seems, that the economic performance of the core countries becomes more similar over 2002–2013.

To assess, whether the twelve euro-area countries have become more homogenous over time, measures of the maximum linkage distance, average linkage distance and the coefficient of variation were computed. As can be seen from Figure 2 and Table 2, all three measures have increased significantly over time and have statistically significant positive coefficients of time-trends, which indicates, that the EA-12 has become more heterogeneous in terms of macroeconomic performance and stability. The maximum linkage distance measures the distance of the most extreme cluster (country) to the rest of the EA-12 countries. From the yearly dendrograms it is evident, that until 2003 the most dissimilar country in the sample (i.e. outlier) has been mostly Luxembourg, whereas during 2004–2013 the maximum linkage distance has risen due to divergent macroeconomic developments in the peripheral countries. In other words, Luxembourg has become more similar to the core countries over time, whereas the peripheral countries were the main source of divergence in the euro area from 2004 onwards. Besides, the average linkage distance, which captures the degree of overall closeness between clusters, also exhibits a more pronounced growth over the period 2004–2013 (40%).



Note: (lh) stands for left-hand axis and (rh) for right-hand axis

Figure 2: Heterogeneity of the EA-12 over 1999–2013

The last, and so far the most complex, indicator of the overall homogeneity is the coefficient of variation, which takes into account both the variation and the mean, and thus depicts the overall distribution of clusters. As can be seen from Figure 2 and Table 2, the coefficient of variation for EA-12 also exhibits a significant upward trend during the whole period analysed, with an overall increase of 19%.

To sum up, the overall heterogeneity of the EA-12 has risen over the sample period, which in turn leads to the rejection of the homogeneity hypothesis. But so far, it is impossible to distinguish, whether the increase in economic heterogeneity is due to the amplified heterogeneity of the periphery or of the whole EA-12 group. Therefore in the next step I focus more concretely on the homogeneity of the core countries.

Table 2: Results of hypothesis tests about slope coefficient of a linear time trend in maximum distance, average distance and coefficient of variation for EA-12 and core during 1999–2013

	H ₀	H ₁	time trend coefficient	SE coef.	t-ratio	p-value
EA-12						
maximum distance	$b \leq 0$	$b > 0$	0.4336	0.0814	5.3250	0.0000
average distance	$b \leq 0$	$b > 0$	0.0684	0.0120	5.6910	0.0000
coefficient of variation	$b \leq 0$	$b > 0$	0.0205	0.0047	4.3760	0.0003
CORE						
maximum distance	$b \geq 0$	$b < 0$	-0.0454	0.0484	-0.9379	0.1821
average distance	$b \geq 0$	$b < 0$	-0.0178	0.0128	-1.3830	0.0941
coefficient of variation	$b \geq 0$	$b < 0$	-0.0042	0.0033	-1.2730	0.1119

As regards the coefficient of variation and the maximum and average linkage distances inside the core cluster, all variables are lower than those for the whole EA-12 and exhibit a downward trend, which is, however, statistically insignificant (see Figure 3 and Table 2) thus signalling no statistically significant increase in homogeneity of macroeconomic performance among the core countries. Nevertheless, no evidence for increasing heterogeneity among the core countries has been found. Therefore if the heterogeneity of the whole EA-12 has increased over time, but not so the heterogeneity of the core countries, then it can be argued that the source of divergence in the EA-12 may lie in the periphery.

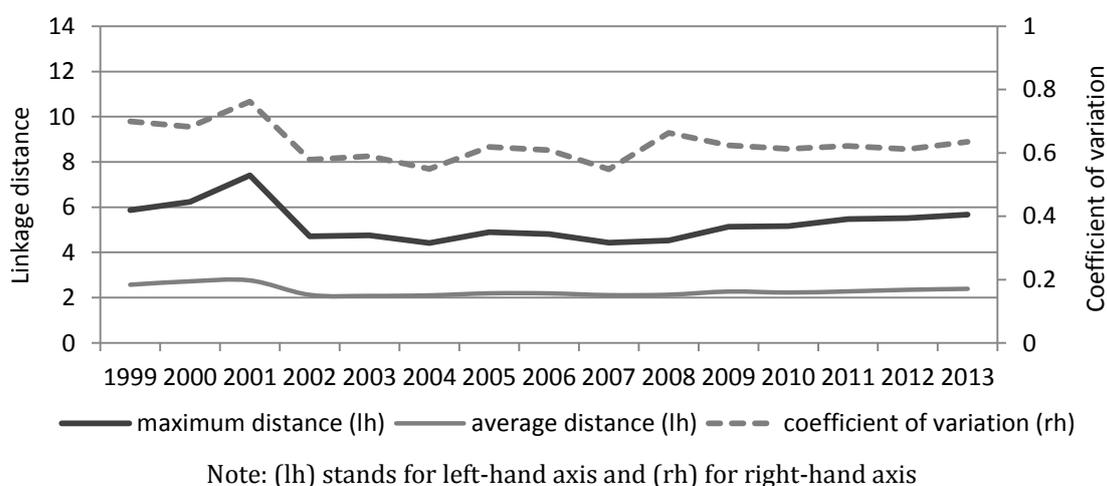


Figure 3: Homogeneity of the core countries over 1999–2013

What is characteristic for the core group, is that it amounts for more than 83% of the EA-12's GDP (and around 80% of the EA-18's GDP), therefore it could be assumed, that the common monetary policy of the ECB should mainly reflect course of events in this cluster. In contrast, from Figure 2 it is apparent, that in the case of the whole EA-12, hardly ever an increase in heterogeneity stemming from the peripheral group has been subsequently corrected. And since the source of the EA-12 heterogeneity lies from 2004 mainly in the peripheral countries, it can be argued, that the peripheral countries drift away from the core, because they are more prone to asymmetric shocks and that they lack flexible automatic stabilisers to accommodate these shocks. Thus the adoption of the euro per se does not seem to trigger an increased economic homogeneity. Moreover

due to their dissimilar economic performance, the common monetary policy may not suit them well.

The empirical evidence concerning the endogeneity hypothesis of the euro area is mixed. There are studies that confirm the endogeneity hypothesis (Fidrmuc, 2002; Gonçalves et al., 2009), other studies point out, that the euro introduction does not seem to have an impact on business cycle synchronisation (Economidou and Kool, 2009; Weyerstrass et al. 2011) and last but not least, there is a strand of empirical literature (Vieira and Vieira, 2011; Lehwald, 2012) that claims, that the endogeneity hypothesis is not verified for all euro area countries. In particular, the homogeneity of core countries has increased over time, whereas the heterogeneity of peripheral countries has been magnified. My results support this latter point of view, as I have shown, that heterogeneity of economic performance measured as maximum and average linkage distances and the coefficient of variation of the EA-12 has increased over time due to divergent economic performance of peripheral countries, whereas weak support for growing homogeneity of the core has been found.

5. Conclusions

In this paper I have examined the homogeneity/heterogeneity of the euro area economic performance on the basis of cluster analysis using indicators of macroeconomic balance and competitiveness over the period 1999–2013. I have found that the heterogeneity of economic performance of the EA-12 countries has risen over time, therefore it seems, that the euro introduction per se is not a sufficient condition for promoting higher homogeneity among the euro area countries. Further, I have shown that the EA-12 countries create two distinct groups of countries: core and periphery. Members of the core are Germany, France, Italy, Austria, Finland, Netherlands, Belgium and Luxembourg, whereas the periphery constitutes from Greece, Portugal, Spain and Ireland.

All three measures of homogeneity/heterogeneity applied on the group of the core countries indicate, that homogeneity of the core countries has not improved over time. Nevertheless, no evidence for increasing heterogeneity among the core countries has been found. Therefore if the heterogeneity of the whole EA-12 has increased over time, but not so the heterogeneity of the core countries, then it can be argued that the main source of divergence in the EA-12 might lie in the periphery. Besides any increase in heterogeneity of the core vanishes during subsequent periods, whereas increases in heterogeneity of the EA-12 remain unaltered.

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European Initiatives in the Czech Business Environment and Consumer Protection

Jarmila Pokorná¹, Eva Večerková², Jana Dudová³ and Tereza Levická⁴

¹*Department of Business Law, Faculty of Law, Masaryk University, Veveří 70, 611 80 Brno, Czech Republic, e-mail: jarmila.pokorna@law.muni.cz*

²*Department of Business Law, Faculty of Law, Masaryk University, Veveří 70, 611 80 Brno, Czech Republic, e-mail: eva.vecerkova@law.muni.cz*

³*Department of Environmental Law and Land Law, Faculty of Law, Masaryk University, Veveří 70, 611 80 Brno, Czech Republic, e-mail: jana.dudova@law.muni.cz*

⁴*Student of Faculty of Law, Masaryk University, Veveří 70, 611 80 Brno, Czech Republic, e-mail: 370579@mail.muni.cz*

Abstract

The paper deals with the consumer position in relations with entrepreneurs, particularly on legal protection of consumer against business practices of entrepreneurs. In the opposite view, it should also be clear what level of consumer protection entrepreneurs should expect in the Czech Republic. The main purpose of the paper is to determine whether the legal regulation in EU legislation (in directives and regulations) and national regulation in Czech legislation (public and private) ensure adequate consumer protection against unfair business practices of entrepreneurs in connection with their business in the Czech Republic and what procedures are banned to entrepreneurs in relations with consumers. Selected examples from practice demonstrate how national authorities could intervene in cases of violation of rules adopted for the purpose of consumer protection in the EU legislation and in national legislation and how specifically is decided about these violations in the Czech Republic. In the conclusion of paper, the authors summarize their findings from examined issue of consumer protection against unfair business practices under public and private regulation in the Czech Republic and they also offer drafts de lege ferenda.

Keywords: unfair business practices, consumer protection, unfair competition, entrepreneur, competitor, legal regulation in EU legislation, legal regulation in the Czech Republic

1. Introduction

Consumer protection may be perceived as an element foreign to the business environment, because it runs counter with the basic principle of its function, the principle of individual autonomy. This principle should enable all participants in market relations to form them based on their own free will. However, if freedom of a legal action is supposed to be true freedom, it is then essential that the free possibility of deciding on personal matters is guaranteed in the same measure to all acting entities. The principle of freedom here is combined with the principle of equality, and equality determines freedom.¹ From life's everyday reality however, we clearly see that the principle of freedom of action clashes with factual possibilities, which individual persons have and which are very often also given by the fact of whether they hold the position of entrepreneurs or consumers. For entrepreneurs, one can expect not only material knowledge and experience brought to bear in their business field, but also a higher level of knowledge and experience (e.g. legal, organizational, marketing) arising from the fact that entrepreneurs fluctuate in a competitive environment requiring such knowledge and experience, and motivating every person wanting to succeed in competition to gain such knowledge and experience. On the contrary, consumers are characterized by information deficits, an imbalance of negotiating power and the incommensurability of financial resources, so it is not possible to expect that they would take up an equal position alongside entrepreneurs.² In such cases of clear inequality of initial positions, it is not possible to be satisfied with the fact that both parties will be provided the same identical legal instruments for regulating their position. Such an approach maintains only a semblance of formal equality, but in reality, the inequality of the initial positions also causes inequality of the result.³ The only remedy to this situation is strengthening the weaker party through various legal instruments, which coordinate inequality and provide the weaker party with the necessary protection.

The inequality of the position of entrepreneurs and consumers is not typical only for the Czech market, but even the internal market of the European Union must react to it, if its characteristic in Art. 26 of the Treaty of the Functioning of the European Union is to be fulfilled – the internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of the Treaties – and if it is to open for free marketing of products of all Member States. On a European scale, the objective is balancing of positions of all participants on the market, especially achieving legal certainty, because the differences that concern the function of the market and application of internal state regulations of Member States, e.g. in the area of marketing, advertising or other forms of sales support, cause uncertainty, and uncertainty increases costs to entrepreneurs when using the internal market and evokes mistrust among consumers. If there existed a unified legal framework, if basic legal terms were defined and barriers removed arising from scattered regulations with varying quality of demands on entrepreneurs and

¹ HURDÍK, J. and LAVICKÝ, P. 2010. *Systém zásad soukromého práva*. Brno: Masarykova univerzita, spisy právnické fakulty, řada teoretická, sv. 367 (System of Principles of Civil Law. Brno: Masaryk University, scientific treatise, theoretical series, vol. 367), p. 89

² The necessity for protecting the consumer from this inequality is derived from case law of the Supreme Court of the CR e.g. in its decision on case no. 33 Cdo 1201/2012 – available at www.nsoud.cz

³ HURDÍK, J. and LAVICKÝ, P. 2010. *Systém zásad soukromého práva*. Brno: Masarykova univerzita, spisy právnické fakulty, řada teoretická, sv. 367 (System of Principles of Civil Law. Brno: Masaryk University, scientific treatise, theoretical series, vol. 367), p. 120

consumers, a united common level of consumer protection would also be created, which would provide rational balancing of positions of entrepreneurs and consumers alike. European law fulfills this task by means of directives, creating general principles, which Member States are obliged to incorporate into their national legislation. This means that a certain general standard would thus be formed, common for all Member States, whereas it is left to them separately to select a form and the means by which the standard will be achieved. The customs and cultural level of each Member State would thereby be respected.

Over a thousand directives have been adopted in the EU, the aim of which is to balance deficits naturally accompanying the position of the consumer. The limited space of this paper does not allow for going into more detail on them even in their basic features. The authors have therefore selected only one of these directives, Directive 2005/29/EC of the European Parliament and of the Council concerning unfair business-to-consumer commercial practices in the internal market,⁴ on which the effects of directives will be demonstrated. Therefore, the aim of this paper is to verify how the Unfair Commercial Practices Directive was implemented into Czech law, and whether implementation has contributed to increasing the level of consumer protection and to higher legal certainty for enterprising. To achieve the stated aim, methods of analysis of the legal regulation in private and public law regulations will be used, along with an analysis of the practice of Czech courts.

2. On legislation regulating consumer protection from unfair commercial practises in EU and Czech law

2.1. Private law aspects

Attention began focusing on consumer protection from unfair commercial practices on the European level in the 1980s, when the Council adopted a Directive relating to the approximation of the laws, regulations and administrative provisions of the Member States concerning misleading advertising (84/450/EEC), which was amended in 1997 by Directive 97/55/EC of European Parliament and of the Council amending Directive 84/450/EEC concerning misleading advertising so as to include comparative advertising. In further development, both directive were repealed and replaced by the new Directive 2006/114/EC of the European Parliament and of the Council concerning misleading and comparative advertising. While the aim of the directive on misleading advertising and its amendment was protection of entrepreneurs and consumers and the general public, the new directive only concerned protection of traders (B2B relations) against misleading advertising and its unfair effects, and determined conditions under which comparative advertising is allowed. By this directive, separation occurred of the regulation of misleading and comparative advertising when enterprising from its effect on consumers, and the directive no longer regulates consumer protection directly.

⁴ Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation (EC) No 2006/2004 of the European Parliament and of the Council

A newly adopted directive leads to ensuring a common level of consumer protection, namely Directive 2005/29/EC of the European Parliament and of the Council concerning unfair business-to-consumer commercial practices in the internal market (hereinafter the “Directive”), which attempts to further specify and deepen the standards of consumer protection, which was achieved in the 1980s. This was to occur by convergence of legal regulations concerning unfair commercial practices damaging the economic interests of consumers. The directive obliges Member States to adopt common standards of consumer protection for the case of fundamental consequences of unfair commercial practices of entrepreneurs (in B2C relations) and indirectly, beside consumers, it thus also protects the economic interests of honest competitors from those not upholding the rules of the directive. In this way, it guarantees economic competition in areas that it coordinates.

The directive regulates unfair commercial practices, which directly influence the decisions of consumers on commercial transactions concerning products (products or services), as determined in its Article 5: Unfair commercial practices shall be prohibited. A commercial practice shall be unfair if: (a) it is contrary to the requirements of professional diligence and (b) it materially distorts or is likely to materially distort the economic behaviour with regard to the product of the average consumer whom it reaches or to whom it is addressed, or of the average member of the group when a commercial practice is directed to a particular group of consumers. Commercial practices are unfair mainly if they are a) misleading in the wording of Articles 6 and 7 or b) aggressive in the wording of articles 8 and 9. For ensuring the level of legal certainty, the directive determines commercial practices, which are unfair under any and all circumstances (so-called black list – Annex I of the Directive⁵). The directive obliges Member States to determine effective, reasonable and discouraging penalties for breaching provisions of this Directive, and secure their enforceability.

The directive is based on the concept of the average consumer, who has sufficient information and is reasonably attentive and careful with regard to social, cultural and language factors.⁶ The term average consumer is not a statistical term. To determine the typical reaction of the average consumer in the given case, domestic courts and authorities must start from their own judgment while taking into account the case law of the EU Court of Justice.⁷

⁵ Annex I of the Directive (so-called black list) provides an exhaustive list of commercial practices considered unfair under any and all circumstances. Only these commercial practices can be considered unfair without it being necessary to perform assessment of individual cases under Article 5 to 9. This unified list of unfair commercial practices is valid in all Member States, and can only be changed by revision to this Directive.

⁶ The Directive however contains such provisions whose purpose is to avoid exploitation of consumers, who by their nature are more vulnerable to unfair commercial practices (e.g. children); it is desirable for the impact of such commercial practices to be judged from the viewpoint of the average member of the given group. It is therefore appropriate to include in the list of practices, which are unfair in any and all circumstances, a provision that protects children from direct luring towards making a purchase.

⁷ In terms of the so-called average consumer who may be misled by advertising, the EU Court of Justice ruled in the case C-122/10 (of 12 May 2011), in which it dealt with the question of whether in advertising, it suffices to list only the lowest price (a Swedish travel agency printed in a Swedish newspaper an advertisement for flights from Stockholm to New York for just CZK 7,820; at the far bottom, to the left of the advertisement, a link to Vingreflex.se was found with a telephone number). Leaving out the method of calculating the final price however did not prevent the consumer from making an informative decision about the purchase. The advertisement did contain only basic features; nevertheless, the seller referred to its Website in the remainder. The EU Court of Justice therefore deduced that the fact that only the initial price is listed in the advertisement cannot be considered a misleading omission of information about the character of the flight or its price.

Adoption of the directive preceded issue of Regulation (EC) No 2006/2004 of the European Parliament and of the Council on cooperation between national authorities responsible for the enforcement of consumer protection laws⁸, which brought to the EC legal system a system of unified control of the rules of the EC internal market and free movement of goods. Unified control of the internal market of the Community is founded upon information obligations of oversight authorities⁹ on each illegal act inside the Community, and is to ensure protection of consumers from breaches of the law.¹⁰

Though implementation of the directive on unfair commercial practices was performed in the Czech Republic mainly by public regulation – by Act No. 634/1992 Coll., on Consumer Protection¹¹, consumer protection is also aided by regulation of unfair competition anchored in the basic civil code – Act No. 89/2012 Coll., Civil Code (hereinafter "CC"), specifically in the prov. of Sec 2976 et seq.¹²

The regulation of unfair competition stems from the definition of the consumer in Sec 419 CC, according to which the consumer is any person, who concludes an agreement or otherwise negotiates with an entrepreneur outside his commercial activities or outside the actual performance of his occupation. In relation to unfair commercial practices and their use against consumers, the regulation unfair competition then leans on its basic provision – the general clause of unfair competition. If certain behavior of the competitor cumulatively fulfills three basic conditions of the general clause, it can be considered unfair, regardless of whether it also fulfills conditions of certain specific merits, which would indicate that unfair commercial practices have occurred (e.g. misleading advertising, misleading labeling or designation of goods or a service, inadmissible comparative advertising, evoking the danger of confusion, etc.). It is entirely possible to agree with the statement of P. Hajn that upon interpreting and applying the general clause and further provisions on unfair competition, also European directives must be taken into consideration that directly or closely involve economic competition and consumer protection. In terms of the general clause and judicial merits of unfair competition, Directive 2005/29/EC is especially important. Knowledge of the directive enables parties to a competition dispute to develop argumentation for the chosen legal remedy. It could also speed up decisions of unfair competition disputes. That is, if this concerns actions listed in the so-called black list, it is possible to qualify it as unfair under any and all circumstances. It then suffices to prove the existence of merits corresponding to one of the commercial practices listed in the black list, with no need to address other circumstances. For many other contentious issues, it will then

⁸ Regulation (EC) No 2006/2004 of the European Parliament and of the Council of 27 October 2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws

⁹ "When a competent authority becomes aware of an intra-Community infringement, or reasonably suspects that such an infringement may occur, it shall notify the competent authorities of other Member States and the Commission, supplying all necessary information, without delay" (see Art. 7 of the Directive)

¹⁰ The most meaningful and well-functioning unified control of the internal market is RASFF = Rapid Alert System for Food and Feed. Through RASFF, information ascertained in one Member State is effectively shared to all oversight authorities in other states, so measures could be adopted across the entire EC, and so the problem (harmfulness of food or feed) could be quickly resolved across the entire EC.

¹¹ An interpretation of implementation is provided in part 2.2.

¹² Adoption of the entire regulation of unfair competition from the Commercial Code (prov. of Sec 44 to 55) into prov. of Sec 2976 to 2989 of the Civil Code occurred, effective 1.1.2014 (upon recodification of private law in the CR; the Commercial Code was repealed). In the concept of unfair competition under Sec 2976 et seq. of the Civil Code, even further unification of Czech legislation with EC directives occurred, e.g. for misleading advertising, by completing the merits of intrusive harassment, etc.

depend on the judge's discretion on whether a certain action strongly or weakly influenced the consumer's ability to make a qualified and economic decision.¹³

As an example of decision-making by Czech courts when applying the general clause of unfair competition and individual specific merits, we hereby list the following cases: In its decision on case no. 23 Cdo 5184/2009 the Supreme Court of the Czech Republic deduces that competition on the market allows for a certain measure of aggressiveness; nevertheless, it is not possible to perform an action that would offer consumers products with the aid of misleading advertising or misleading packaging and labeling of products. The illegal (unfair) procedure of the defendant in the given case was not deduced by the court from how the trademarks read (the plaintiff had the trademark "Májka" for its pastes, and the defendant had the trademark "SELIKO MÁJKRÉM"), because these trademarks could be considered sufficiently dissimilar. The unfair action of the defendant arose from the method of using the defendant's trademark on products that were similar to the plaintiff's products in terms of graphics, shape, color and word arrangement. Not even the average consumer who bases his information on product appearance and label could distinguish the meat creams offered by the defendant from the original products of the plaintiff. The court judged the action to be unfair for its fulfillment of all conditions of the general clause of unfair competition.

In relation to the consumer, misleading advertising is a very frequent unfair practice of businesses. The Municipal Court in Prague in its decision on case no. 9 Ca 66/2003 deduced that for fulfillment of misleading advertising, it suffices to spread information that could cause a misleading impression (the adjudged case involved advertising electrical appliances for an exceptionally low price, when in reality, the goods listed in the advertisement were not available in the store). It therefore is not decisive whether or not the plaintiff has benefit from the promoted sale, or whether or not customers attracted by the advertisement buy a different appliance while visiting the store.

Another unfair action often affecting the consumer is misleading labeling of goods or services. In its decision on case no. 23 Cdo 2960/2012, the Supreme Court of the Czech Republic heard a case of using the defendant's designation of an "execution office". Here, the court deduced that upon maintaining a reasonable level of attention of the average consumer, it is possible to interpret that designation concerns performance of the function of executor authorized by the execution office. Therefore, a different person is not permitted to use a similar designation. The company being sued at the time of conclusion of an agreement concerning consequent contentious proceedings operated under the business name "Exekuční kancelář Praha s.r.o." [Execution Office Prague, Ltd]. The actions of the defendant, which at the time of the hearing appeared under the business name "Vymáhání a odkup pohledávek s.r.o." [Extraction and Purchase of Receivables, Ltd], against the plaintiff – client (consumer) were determined to be unfair.

As is apparent from the aforementioned facts, the viewpoint of the so-called average consumer is fundamental for the court's decision. From the decision of the Supreme Court of the Czech Republic on case no. 32 Odo 229/2006, one may deduce that the average consumer is a natural person having sufficient information and is reasonably attentive and cautious. Though legislation provides protection to the consumer, it is necessary to require of the consumer certain control efforts for ascertaining what goods

¹³ For more, see HAJN, P., ŠVESTKA, J., DVOŘÁK, J., FIALA, J. et al. 2014. *Občanský zákoník. Komentář. Sv. VI. Praha: Wolters Kluwer, a. s. (Civil Code. Commentary. Volume VI. Prague: Wolters Kluwer, a. s.), p. 1171–1173*

he is actually buying,¹⁴ or verification of conditions under which he may obtain the goods, or an overview of the offer of other competitors.

2.2. Public law aspects

Implementation of the directive on unfair commercial practices was performed in the Czech Republic mainly by Act No. 634/1992 Coll., on Consumer Protection (hereinafter “CPA”), by the prov. of Sec 4, Sec 5, Sec 5a and Appendices no. 1 and 2.¹⁵ Under Sec 4 of the CPA, “the commercial practice is unfair if entrepreneur’s conduct towards the consumer is contrary to the requirements of professional diligence and is capable of significantly influencing that consumer’s decision in such a way that the consumer may make a business decision that he would not otherwise have made. Use of unfair commercial practices when offering or selling products, or when offering or providing services or rights, is prohibited. Especially unfair are misleading and aggressive commercial practices.” Further public regulations affecting the area of unfair commercial practices, but also unfair competition, include e.g. the Act on Advertisement Regulation, the Act on Radio and Television Broadcasting Operation, and the Criminal Code.¹⁶

As opposed to the private regulation of unfair competition, in the Civil Code, legal regulation of unfair commercial practices in the Consumer Protection Act does not relate to all unfair commercial practices in general, but only in relations of “business – consumer” (B2C). In the wording of the provisions of Sec 2(1)(a) of the CPA, a consumer is considered a natural person not acting within his commercial activity or within the actual performance of his occupation. For the resulting level of consumer protection however, its definition is not important, but rather the interpretation of the term average consumer. This term is used when applying private and public regulation, but it is not definitively defined either in Czech or European law, and its content is mainly influenced by secondary legal regulations of the European Union, the case law of the EU Court of Justice and the practice of national courts of individual EU Member States. The interpretation of this term differs in individual Member States, which may et alia also be reflected in the quality of protection of especially vulnerable groups of consumers. Protection of a so-called “vulnerable consumer” is reflected in the CR in the provisions of Sec 4(2) of the CPA. In the wording of this provision, unfairness of commercial practices is assessed, if it is aimed at consumers who, due to mental or physical weakness or to age, are especially vulnerable from the viewpoint of the average member of this group. This however does not affect ordinary exaggeration advertising.

For a certain action to qualify as an unfair commercial practice, the conditions must be cumulatively fulfilled as stated in Sec 4 of the CPA. Use of unfair commercial practices when offering or selling products, and when offering or providing services or rights, is then exclusively prohibited (compare provisions of Sec 4 of the CPA). Meanwhile,

¹⁴ ONDREJOVÁ, D. 2014. *Nekalá soutěž v novém občanském zákoníku. Komentář*. Praha: C. H. Beck (Unfair Competition in New Civile Code. Commentary. Prague: C. H. Beck), p. 78.

¹⁵ In Sec 4 of the Consumer Protection Act, unfair commercial practices are generally defined, Sec 5 regulates misleading commercial practices, and Sec 5a regulates aggressive commercial practices. Appendix no. 1 is a list of misleading commercial practices (letters a) to f), Appendix no. 2 is a list of aggressive commercial practices (letters a) to h) – both appendices can be considered to be a so-called black list of unfair commercial practices (i.e. commercial practices unfair under any and all circumstances), a so-called black list of the directive has now been established.

¹⁶ Act No. 40/1995 Coll., on Advertising Regulation, Act No. 231/2001 Coll., on Radio and Television Broadcasting Operation, Act No. 40/2009 Coll. Criminal Code.

especially misleading and aggressive commercial practices are labeled unfair. In its appendices, the CPA exhaustively defines individual unfair commercial practices (so-called black list – Appendix no. 1 defines misleading commercial practices, Appendix no. 2 defines aggressive commercial practices).

As opposed to breach of private regulations, breach of public regulations is pursued by the relevant authority arising from its official capacity. Of course, this need not mean that every unfair commercial practice will be ascertained by oversight authorities and legally contained in a relevant manner. Oversight of upholding obligations determined by the CPA is rather organizationally scattered. Meanwhile, certain powers of control authorities also overlap. This does not contribute to the expected transparency of the legislation, and reflects back negatively on the level of consumer protection. In terms of public consumer protection from unfair commercial practices, the Czech Trade Inspection Authority (hereinafter “CTIA”) has so-called residual powers, not only in the wording of the CPA, but also in certain other legal regulations. The State Agriculture and Food Inspection Authority (hereinafter “SAFI”) performs oversight over the agricultural, food and tobacco product sectors. Within the framework of their organizational arrangements, these oversight authorities work with public health protection authorities (in terms of risks to human health), with veterinary administration authorities, and with trade, customs and other agencies.¹⁷

The powers of the CTIA in relation to unfair commercial practices do not just arise from the CPA, but are affiliated with a series of other public regulations, mainly Act No. 102/2001 Coll., on General Product Safety, and Act No. 22/1997 Coll., on Technical Requirements for Products. In the wording of the mentioned legislation, mainly bearing liability for putting a safe product on the market are the person who produced the product, the importer of a product from a country outside the EU and further persons in the supplier chain having a demonstrable influence on the product properties. These persons are also liable for declaring conformity of the determined products with technical requirements (this concerns CE labeling save a few exceptions). If this declaration is contrary to the determined requirements, this may concern fulfillment of the merits of a misleading commercial practice, considered *et alia*s the declaration that the product or provided service has been granted approval, confirmation or permission, though this is not the case, or such declaration is not in line with the conditions of approval, confirmation or permission (compare letter c) of Appendix no. 1 of the CPA). Also concurring that the consumer cannot always rely on all labels on a product or its packaging is *et alia*s the comprehensive database of warning information systems on the appearance of dangerous products within EU Member States. This mainly concerns the systems RAPEX (Rapid Alert System for Non-Food), and in case of foods and feed, RASFF (Rapid Alert System for Food and Feed).¹⁸

¹⁷ Besides the CTIA and SAFI, other oversight authorities according to Sec 23 of the CPA include: regional public health offices, the State Veterinary Administration, regional veterinary administrations and the Prague veterinary administration, municipal trade licensing authorities and customs offices.

¹⁸ The RASFF system was created based on Article 50 of Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety, by which general principles and requirements of food law are determined, the European Office for Food Safety is established, and procedures concerning foods safety are determined.

3. Discussion and Conclusions

Directive 2005/29/EC of the European Parliament and of the Council concerning unfair business-to-consumer commercial practices in the internal market was implemented in the Czech Republic by a public law regulation – the Consumer Protection Act. Thus, the aim of the Directive to create a common standard for consumer protection was undoubtedly fulfilled, whereby the CPA introduced a unified general ban on such commercial practices that are unfair (especially misleading and aggressive) and do not allow consumers to exercise their economic interests.¹⁹

All consumers are protected; nevertheless, even Czech law is based on the aspect of the average consumer. The CPA stipulates that the same consumers will develop certain activity to protect their interests, while also simplifying the position of entrepreneurs, because it protects them from negligent, reckless or unpredictable behaviour of consumers, and does not force them to approach every consumer individually. Meanwhile however, in the category of vulnerable consumers, the CPA respects the fact that certain especially threatened groups of consumers must be protected more stringently. The benefit of the public regulation is found in the control mechanisms using state enforcement in activities of state authorities, which act out of their official obligation and have punitive authority in the form of the right to issue fines. Public law thus ensures protection of values generally mutual for both the consumer and the entrepreneur, especially legal certainty of trade.

Private regulation protects specific affected persons through unfair competition, because it examines whether features of the general clause of unfair competition have been fulfilled in a specific case. If this is not the case, it does not concern unfair competition, though external features of a certain action do correspond to the definition of unfair commercial practices in the Consumer Protection Act. Meanwhile, it leaves it up to the initiative of damaged persons whether they turn to the court and exercise their rights, or they remain inactive. Thus, the system of public regulation is augmented by regulation of consumer protection in individual cases, in which it is possible to take into account special features of the ascertained situation, and react to specific personality features of the affected persons also on specific circumstances.

Both systems of legal regulation in effect support and complement each other, but both also run into their own limitations. The problem of public regulation is especially the significant number of state control authorities and the fragmentation of their powers. Control mechanisms are not transparent, control authorities in certain cases are only limited and the whole loses its effectiveness.

As opposed to this, private regulation is limited by the willingness of affected persons – of consumers – to exercise their right in judicial proceedings. Appearing here is the efficiency of the judicial system and simplicity of the decision-making practice of courts. The effectiveness of the regulation diminishes if judicial proceedings do not take place

¹⁹ There are certain clear differences between the wording of Art. 5 of Directive 2005/29/EC and the wording of Sec 4 of the CPA. According to Article 5 of the Directive, the term “unfair commercial practice” is understood as such a commercial practice that is contrary to requirements of due professional care (according to the CPA “professional care requirements”) and which materially distorts with or is capable of materially distorting (according to the CPA “capable of materially influencing”) the economic behavior of the average consumer, who is exposed to its effect or to which it is determined (according to the CPA “decision-making of the consumer on a business decision that he would not otherwise have made”). In our opinion however, these differences are inconsequential.

quickly, and the case ceases to be a current concern for the plaintiff, and if identical situations are judged differently.

Both systems however are important for both the entrepreneur and the consumer. Though it would seem that both groups stand on opposite sides and the advantage for one group is at the same time a disadvantage for the other group, we believe that their economic interest is identical to gain benefit from products offered on the market. A unified standard of consumer protection then not only balances the information deficits of consumers and their general position towards entrepreneurs, but it also translates to a benefit for the entrepreneur, because it makes business relations transparent and protects the entrepreneur from unfair competition of those not abiding by the rules. Although legislation, its interpretation and application will further develop, we consider the standards of consumer protection achieved by implementation of the European directive on unfair commercial practices to be satisfactory and beneficial not only for consumers, but also for supporting a favourable business climate.

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Performance Implications of Business Model Change: A Case Study

Jana Poláková¹, Gabriela Koláčková² and Ivana Tichá³

¹*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamýcká 128, 165 21 Prague, Czech Republic, e-mail: polakovaj@pef.czu.cz*

²*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamýcká 128, 165 21 Prague, Czech Republic, e-mail: kolackovag@pef.czu.cz*

³*Department of Management, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamýcká 128, 165 21 Prague, Czech Republic, e-mail: ticha@pef.czu.cz*

Abstract

The paper deals with changes in performance level introduced by the change of business model. The selected case is a small family business undergoing through substantial changes in reflection of structural changes of its markets. The authors used the concept of business model to describe value creation processes within the selected family business and by contrasting the differences between value creation processes before and after the change introduced; they aim to confirm the business model as the performance differentiator.

Keywords: business model, value creation, performance indicators, structural market changes, small agricultural enterprise.

1. Introduction

This paper analyses a small agricultural enterprise which reacted on the structural market changes by changing of its business model. The effectiveness of this change is measured by financial indicators that show the value catching process based on business model theory.

2. Changes of the agricultural market

According to FAO's study (2008) market modernization offers increased economic opportunities for producers, small and medium-sized enterprises (SMEs), and other actors in the value chain. There is a growing body of experience showing that "win-win" outcomes are possible through commercially viable business models – ways of creating value within a market network of producers, suppliers and consumers – which involve small farmers and SMEs. These business models for small farmers and SMEs must deliver essential services to producers and ensure reliable supply to buyers, while also addressing the high transaction costs and risks that buyers face when purchasing from large numbers of fragmented, cash-strapped small farmers and SMEs. This brief gives an overview of lessons learned about business models for including small farmers and SMEs in modernizing markets and agro-industries. Bečvářová (2007) says the environmental and economic conditions in agriculture are changing. Agribusiness shaping processes are typical of the inclusion of companies in many sectors that more or less participate in the production, processing and distribution of foodstuffs into a self-contained system. These changes are of such importance that they give a new shape to agrarian markets in entire foodstuff chains, change criteria in the selection of economic tools accepting new conditions of development, and require the acceleration of reform processes and a new concept of agrarian policies in this context. Csáki (2008) in her research identifies statement – as demand becomes the crucial relationship influencing conditions in a range of connected agrarian markets, the influence of the market structure of agribusiness rises. To respond to these changes in agriculture means to adapt to the new environment, seek connections with these segments of commodity / foodstuff verticals and coordinate production specialization especially with respect to permanent sales of most commodities, which often exceed the existing boundaries of the particular region.

3. Methodology and Data

This paper aims to analyze the change of business model as the reflection of structural changes. The selected family business was undergoing through substantial changes in reflection of structural changes of its markets. Particular aims are to analyze the farm before the change and after by using the business model canvas and to measure and explain the farm's effectiveness through the financial performance indicators.

A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm (Osterwalder, 2005). It describes the rationale of how an organization creates, delivers, and captures value. Business models play a central role in explaining firm performance. Afuah and Tucci (2001) propose the business model as a unifying construct for explaining competitive advantage and firm performance and define it as "the method by which a firm builds and uses its resources to offer its customer better value and to make money in doing so". Afuah (2004) focuses on firms' profitability and introduces a strategic framework in which the business model is conceptualized by means of a set of components that corresponds to the determinants of firm profitability. Zott and Amit (2008) have analyzed the performance implications of business model design entrepreneurial firms and confirmed the business model as the performance differentiator. The Business Model Canvas according to Osterwalder (2009) is a strategic

management and entrepreneurial tool. It allows to describe, design, challenge, invent, and pivot a business model. Nine basic building blocks show the logic of how a company intends to make money. They cover the four main areas of a business: customers, offer, infrastructure, and financial viability. The business model is like a blueprint for a strategy to be implemented through organizational structures, processes, and systems.

The analysis of the farm was done through interviews with owners. The main aim of financial analysis was an explanation of value catching process in the initial and new business model. The basis of the financial analysis was mainly the financial statements and the outputs of the information system of the company. Data from these sources were processed for financial analysis according to the methods which were chosen based on specialized literature recorded on the list of sources. Those methods of financial analysis which show sufficient results were chosen. For the purposes of the financial analysis of farm's return and activity were assessed from the ratio indicators. All of those indicators were examined and evaluated for the period 2006–2010, which means before the decision about the future orientation was made at the peak of the economic crisis. To evaluate in an objective and exact way the whole process of transformation of production orientation and the methods of sale through the project "Milk from the farm", financial analysis was performed based on similar indicators, what was the situation like before the start of the implementation of the described changes. The basis and source for 50 calculations were financial statements from the company for year 2011 and January – November 2012. These years were chosen to demonstrate the most significant change between years before and after change.

4. Results

4.1. Farm description

The selected farm is operated as an individually run company by a private farmer. Since 1990 the foundation of the business has been a typical agricultural production divided into crop and livestock production. The company was growing from initial 27 ha to 850 ha today on which the farm has been operating since 2009. The company's orientation responds to the rather intensive grain production of the area of Central Bohemia, therefore the main production is from farming wheat, malting barley, rape plant, legumes and beetroot. The farm is equipped with modern technology, which provides complete self-sufficiency during all sorts of common agro-technical operations throughout the year. External services are only used for the harvest period because of time efficiency measures necessary for its accomplishment; the farm provides harvest services to other subjects during the harvest time. In 1994 a new farm was built in a so-called "green field" and the dairy became a part of it. The objective of this step was not only to solve problems connected to the sale and merchandising of its own milk, which used to be a big problem, but also diversification of the production and achievement of a more stable economic position. Therefore the capacity of the dairy has been designed not only for its own milk (about 500 liters a day) but also for the milk bought from other farmers from the area. The dairy has only been processing purchased milk since 2002 when stockbreeding came to its end. The amount of processed milk is about 3 million liters a year, which means about 8,000 liters a day.

4.2. Initial Business Model

a) Organizing and Production Orientation

During the initial period the company established itself in the market with Balkan cheese (Feta type cheese), and was fully specialized in Balkan cheese from 1995 to 2009. The annual production of Balkan cheese reached 492 tons in 2007, which represented roughly a 25% share in the Czech market. The products were acquired through wholesale in an independent retail network, hotels and restaurants and most of all in retail chains. It was possible to apply a simple management system due to the narrow specialization of one product. The running of the dairy was permanently ensured by about 12 workers, mainly divided into two shifts, with the management being represented by the owners of the company. Daily operations were managed by a supervisor; each shift had its own supervisor, who also worked manually.

b) Sales and Marketing

The management of sales and marketing were very easy as there were no serious problems in the whole production which was sold via a few wholesale companies to chain stores, restaurants, hotels and catering facilities. The company Madeta, a. s., was a strategic customer which, based on a long-term contract, drew about 70% of Balkan cheese production. The production was not supplied to the target customers; it was a business to business arrangement. Most of the customers took the goods directly from the company, so there was no need to solve any transport issues. The marketing was de facto limited to dealing with customer wholesalers; from the perspective of the product those wholesalers implemented it. It meant mainly to represent the product in their catalogues and a few discount events in particular retail chains throughout the year.

4.3. Reasons of Business Model Change

The main reasons of the business model change were structural changes on a market and new needs of customers. Weaknesses of the initial business model were orientation on one product and one type of customer – wholesalers. The entrance of the new Balkan cheese producer into business together with the economic crisis meant a dramatic drop in sales and it was not possible to hold the initial business model anymore.

Based on the dairy market changes, the main objective of the business model change was to improve the whole economic situation of the farm, mainly transforming the product specialization, production management, marketing and demand of products. The change created system that gave the company better potential to address demand and reach higher sales, but also enabled the farm to free itself from the chain stores and their dominant influence on the market. The solution was found in a transfer within a sector. The farm couldn't operate on B2B market with one product anymore. The solution was to go directly to the end customer and serve him with a wider products portfolio.

4.4. The business model transformation

The process of the transformation of the production orientation and the sales methods of the farm was established at the beginning of 2011. It became fully functional in the middle of 2011 and has continuously been made precise and modified as it goes through other stages of its development in the actual process.

During the year 2011 a new production facility was purchased, renovation of the dairy was accomplished, more people were employed and the organization of the work of the company was changed. Therefore the dairy is currently producing fifteen types of fresh dairy products such as full-fat farm milk, curd, yogurt, yogurt drinks, flavoured curd creams, fresh cheese in several varieties of packaging and flavours, kephir, cheese spread and a whey drink. The whole project was called “Milk from the farm”.

4.4.1. Change in Production and Sale Organization

The change and expansion of the range of products, as well as the different method of sale, brought along a necessity to change the organization of work in its own production, and also a necessity to create an effective and flexible team of salesmen, thus a sales department.

a) Organization of Production

Milk, being a natural raw material, is necessary to process as soon as possible after milking the cow; therefore the production in the dairy must run 24 hours a day, seven days a week. Products are traditional products based on traditional technology and procedures, which brings high demands on manual work. To ensure smooth operation of production, it is necessary to have 24 FTE staff (168 hours a month) divided into two shifts. Each shift is managed by a shift supervisor with a university education, whereas one of the shift supervisors is also an overall production supervisor. Transportation of raw milk and some other input materials (mainly milk bottles) are ensured by another employee, who is also responsible for maintenance of the machinery. The supply of packaging material, flavourings and disinfecting agents are provided by different suppliers directly to the company. It is operated only with the most needed supply, in the case of most of these materials, e. g. the milk bottles – “just in time” system is applied, which reduces the amount of funds committed. All the manufacturing and logistics processes in the dairy are checked by HACCP, which is certified according to international standards.

b) Method of Sale

To implement production a brand new sale concept was created and established; “Milk from a farm” where the production is sold directly to its customer. Currently the dairy sells 90% of its production in this way. The service works with 63 regular delivery routes, while each having approximately 20–25 regular stops. Eleven delivery supplies arrive at an appointed time and serve the waiting or arriving customers. The routes are divided into six days a week, from Monday to Saturday, so the delivery vans arrive at every stop once a week. The van sells for approximately 10–20 minutes at each stop, which means that it serves about 10 customers, that makes approximately 15 thousand customers altogether.

c) Sales Department

The sales department consists of 11 permanent salesmen, each one of them has a refrigerated van at his disposal and its own specified delivery route with defined sales stops. There is also a group of approximately 4 occasional salesmen at our disposal to step in and work instead of the permanent ones in case of sick-leave or holidays. Owners, who take strategic and tactical decisions, manage the marketing and common operative management which goes through the shift supervisor and the head of the sales department. The economical department also partly consists of the company owners.

c) Marketing

Marketing and its well-considered systematic application is the fundamental aspect of the successful management of the service “Milk from the farm”. Therefore the farm must

pay permanent attention to it and take advantage of all means of the established marketing system to keep current customers and win new ones. In 2011, thus at the initial stage of the project, 2,200 thousand CZK was used for advertising and marketing, for years of regular operation about 1 million CZK a year is allocated.

This project addressing the growing demand for fresh farm products was designed according market characterization, needs and desires of individual groups of customers. The market sectors were mainly created based on an evaluation of approximately 950 emails from customers, which the company received at the beginning of the project. Individual salesmen played also an important role in segmentation when obtaining data about their customers, which was especially at the beginning, based on the communication with the customers, they recorded necessary information on prepared forms (customers' age and gender, whether they shop with children, what is their motivation, how they found out about this service etc.). About 500 forms were processed. After evaluation of the two above mentioned sources, the following market sectors were defined. The segmentation was done and six market sectors were defined.

4.4.2. Product

The portfolio of the service "Milk from the farm" currently consists of 15 dairy products out of which each was designed to have clearly identifiable and defined specific characteristics in terms of use, taste and packaging. Therefore the customer has a possibility to satisfy and meet the needs for various purposes or for different household members in one go. Another product, where an important identification parameter which increases sales is packaging, is fresh "Full-fat farm milk". Milk has in general certain natural taste and visual properties; therefore it is difficult to distinguish milk from different producers, which also goes for the so-called "Full-fat farm milk". This product makes approximately 45% of sales from the whole portfolio, so its position is vitally important. It is also a product which can be for some customers obtained from other producers (competition), e. g. via so-called milk vending machines. Therefore, in addition to the high quality of milk as well as for the identification of this product, a unique packaging was chosen – ECO-PET bottles.

4.4.3. Price

Even though it would be economically possible, the prices are kept slightly above the price level in retail because it sends an important signal to the customers, that they get above standard goods. The method of sale and the character of the product means, that all customers pay in cash while shopping, there is no discount program or bonus as part of the marketing mix. While considering this variation an opinion arose that this system would operate counterproductively on established "image" of the entire system as an above standard service with above standard products. Everyday contact with customers confirms that this idea was correct, because there has been almost no complaint about high prices from the customers' side; there were only a few exceptions.

4.4.4. Placement/Distribution

As mentioned above, the distribution system is based on a direct sale of products to customers via delivery vans to a precisely defined sales route and stop. From the marketing point of view it is necessary that the delivery on routes work smoothly and the delivery vans arrive at the stops at the arranged time. The stops are not only a place

where the products are sold, therefore a place where sales are generated, but also a place of direct contact with the customers.

4.4.5. Promotion

The farm put a lot of attention of setting promotional tools consisting PR, delivery vans identification, websites and electronic communication, radio advertising and leaflets. Therefore various kinds of communication were used to make sure that “useful information” was being provided rather than mere advertising. It was not possible to avoid it completely but it was conceived so it differed from a common advertisement as well as the service and the products do. The main advertising message was that they are good quality fresh products without preservatives, clear origin straight from the primary producers. It was emphasized that the services and products are not anonymous and the owners take personal responsibility for the dairy and farm.

4.5. The value catching process

To demonstrate the positive effect of the business model transformation are presented the results of financial analysis of initial business model and new business model. The most focus was given to the value catching process that is demonstrated through chosen financial indicators of financial analysis.

4.5.1. Financial Analysis 2006–2012

From the analyzed data of the period 2006–2010 (the initial business model) are showed in a Figure 1. It is obvious that the company was doing very well in 2006 and mainly in 2007, when the return expressed as ROE reached 19.48% or 47.26%. Due to the drop in sales in 2008, the ROE fell to a figure approaching zero. The situation improved in 2009 by the change of products which were commercialized better. Nevertheless as the second wave of economic crisis came in 2010, all the monitored indicators practically fell down to zero again. As it is apparent from the data bellow, after the implementation of the new business model there was a rapid increase of return in all monitored variables. In the year 2011 the increase was smaller, because the project was in its initial stage in that year, which meant rather high prime operating costs (introductory advertising, packaging), as well as investment costs (purchasing delivery vans, technological equipment).

The results of activity are showed in the Table 1. It is obvious from the figures that there has been significantly slower activity. Most all of the inventory turnover rapidly increased which shows a situation when the dairy kept the goods in the store for a long time followed by all the negative consequences; from the committed money in the inventories to the problems with the guaranteed storage period. Considering the activity of the transition to a range of fresh products and a company with direct sale to customers in the year 2011, an increase of inventory turnover was achieved and shortened its inventory turnover, which also indicates improved solidity of the company.

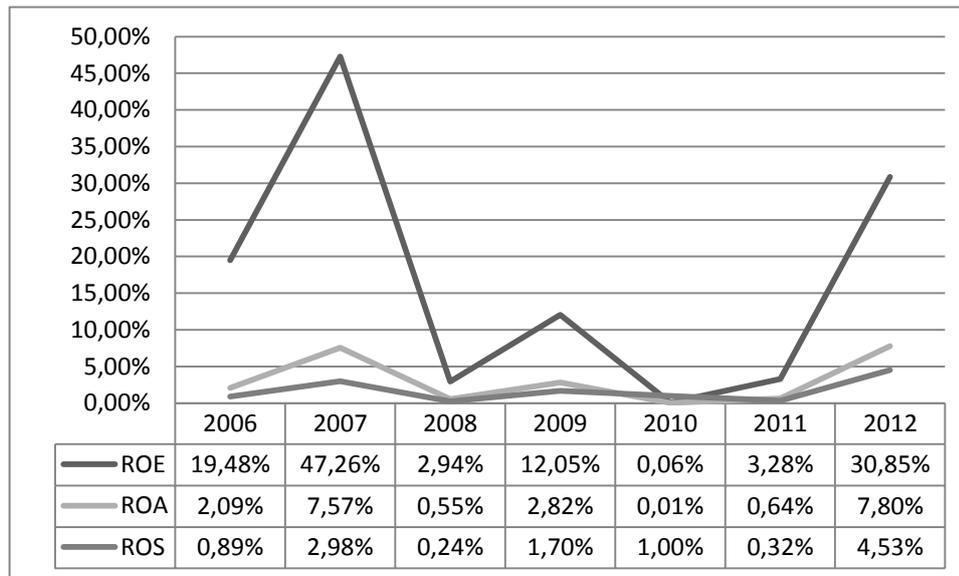


Figure 1: Profitability 2006–2012

Nevertheless the results of both the models indicate, that the implemented project improved economic situation of the company. It is obvious the positive change in all financial indicators that demonstrate the change in the value creation. The financial analyses itself doesn't give any explanation for those changes that means another tool has to be used.

Table 1: Activity 2006-2012

	2006	2007	2008	2009	2010	2011	2012
Commitment of total assets	0,42	0,39	0,43	0,60	0,50	0,49	0,58
Turnover of total assets	2,4	2,5	2,3	1,7	2,00	2,00	1,70
Inventory turnover ratio	62	211,5	16,5	10,8	7,80	11,10	8,30
Inventory turnover (days)	5,9	1,7	22,1	33,7	46,70	32,90	43,80

4.6. The Business Model Canvas

Business Model Canvas was applied to both models – initial and new one to demonstrate the changes of value creation process in the company. The Figure 2 and Figure 3 bellow analyze the change of business model through graphic canvas. The main advantage of this tool is well-arranged analyses of the main processes in the farm with the aim to find an explanation of financial analysis results.

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
External services during the harvest period Wholesalers	Organisation <ul style="list-style-type: none"> - 12 workers into 2 shifts - Shift supervisor - Management – the owner of the company Dairy <ul style="list-style-type: none"> - Milk production - Milk processing 	Crop production Livestock Production Provision of postharvest and storage services Milk Dairy <ul style="list-style-type: none"> - Production from own milk (500l/day) and from external farmers (8 000 l/day) - Product – fully specialized on Balkan cheese (25% share of Czech Market) 	B2B market- dealing with customers Wholesalers – representing product in their catalogues, few discount events in particular retail chains	Producers from surroundings Madeta – 70% of Balkan cheese production Wholesale companies <ul style="list-style-type: none"> - Most of the customers straight from a company - The whole production sold via few wholesale companies to chain stores, restaurants, catering facilitators
Key Resources Land – 850 ha Technology – self-sufficiency during all agro-technical operation		Channels Sales through wholesalers <ul style="list-style-type: none"> - Independent retail network - Hotels and restaurants - Retail chains 		
Cost Structure Agricultural production Milk processing Staff costs Technologies and machines No transport issue		Revenue Streams No direct sale Revenue stream disturbed by new Balkan cheese producer and orientation on one market – lower prices, high competition on the market The end of 2010 – the return was lower than in the previous years, the profit was almost at zero		

<http://www.businessmodelgeneration.com>

Figure 2: Business Model Canvas – The Initial Model

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
External service station - To maintenance and repair of the fleet	Organisation <ul style="list-style-type: none"> - 24 FTE staff (2 shifts) - Shift supervisor - Production supervisor - Management Just in time system	Dairy products <ul style="list-style-type: none"> - 15 types of fresh dairy products (curd, yogurt, yogurt drinks, flavoured curd creams, fresh cheese in several varieties of packaging and flavours, kephir, cheese spread and a whey drink) 	„Milk from the farm“ project <ul style="list-style-type: none"> - Products are delivered to the customers house - Presented not as „sale“ but as „service“ („We save your time“) 	Positioning <ul style="list-style-type: none"> - „we fulfil a need of customers to have a good quality fresh dairy products“
Key Resources New production facility Renovation of the dairy More employees New IS – to prevent a data from a rather large area with a relatively small purchases of a large number of customers - To identify activities of independent salesmen		„Milk from the farm“ project <ul style="list-style-type: none"> - All dairy products offered straight to customers homes Full-fat farm milk <ul style="list-style-type: none"> - ECO-PET bottle - Milk vending machines 	Channels Flexible team of salesmen – permanent and occasional salesmen Direct Sale 63 regular delivery routs (each 20-25 regular stops) <ul style="list-style-type: none"> - Delivery supplies - 6 days/week – MO-SAT 	Segments <ul style="list-style-type: none"> - Parents of small children - Supporters of healthy lifestyle - Middle-age customers and seniors - Fans („Patriots“) - Environmentalists - The others („Random Passersby“)
Cost Structure Milk from the farm cost – salesman, vans, new technologies Marketing costs – branding, advertising, maintaining the customer relationship		Revenue Streams Price system – prices are kept slightly above the price level <ul style="list-style-type: none"> - Customer pay in cash while shopping - No discount program - Everyday's contact and better quality = higher price explanation 		

<http://www.businessmodelgeneration.com>

Figure 3: Business Model Canvas – The New Model

5. Discussion and Conclusions

This paper analyses a small agricultural enterprise which reacted on the structural market changes by changing of its business model. The effectiveness of this change is measured by financial indicators based on business model theory. It demonstrates that Business Model Canvas allows to display the change of value creating process. The classic financial indicators shows, that there was a significant change. Business model description using the canvas allows to depict the shift in value creation processes and reveal the whole story. The case study described clearly demonstrates, that business model canvas is a tool appropriate for analysis and explanation of the changes in all parts of company.

The project of transformation of production orientation and the methods of sale through the service “Milk from the farm” was implemented in the small farm in the years 2011–2012, and has brought verifiable economic results and has improved its whole economic situation. After the initial developing stage, the system is currently fully-functioning and stable.

The main task of the management for the future is maintaining customers’ loyalty as well as ensuring technical operation of the project from the production and logistic perspective. Marketing will still play a crucial role in this process, so priority attention will be paid to it. It is also necessary to develop information systems and take advantage of the outputs, for instance to optimize the sales routes. The current information system should be extended and functionalities added which are used for goods registration, the issue of goods from the storage and the direct sale to the customers (e. g. bar code system). The essential aspect of the success of the whole concept is naturally the maintenance of the high quality of the products.

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The identification of key metrics of alarms in production processes using BPMN and Petri nets

Zuzana Prišćáková¹, Tomáš Orálek² and Dmytro Buy³

¹*Department of Informatics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: zuzana.priscakova@hotmail.com*

²*Department of Informatics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xoralek@node.mendelu.cz*

³*Department of theory and technology programming, Faculty of Cybernetics, Kyiv National Taras Shevchenko University, Hlushkov 4D, Kyiv, e-mail: buy@unicyb.kiev.ua*

Abstract

The main aspect of the sphere of production is to ensure the correct operation of the assembly line. The optimisation of production is important in the lean management environment. Optimisation metrics are influenced by the type of production, by the focus of the factory, the factory's rules and by the assembly line alarms. The aim of this article is the identification of key metrics which influence the origin and the solution of alarms in the automotive industry. To gain this aim, we used the analysis of the company and assembly line, lean management focus, the analysis of a target of the process, identification of the sequence procedure in processes, the definition of internal and external conditions. We created the Petri net based on the particular process map by means of BPMN notation. In the article we use Petri nets as a way to identify attributes, which slow down the process or duplicate its performance. Based on the outcomes of the Petri net simulation, we suggest optimisation and we define the equation to set the ideal time of alarm messages. We point out the deduction of key metrics influencing the alarms as one of main results of the research. The results were implemented to the assembly line in the automotive industry.

Keywords: BPMN, Petri nets, automotive industry, lean management, alarms

1. Introduction

The process management belongs to the main factors influencing the company's success. Business Process Management is a discipline involving any combination of modelling, automation, execution, control, measurement and optimization of business activity flows, in support of enterprise goals, spanning systems, employees, customers and

partners within and beyond the enterprise boundaries (WFM, 2014). BPM offers the process optimization which is created by the intake and analysis of reports from the proposal, modelling, implementation and monitoring of processes.

Optimization is a key enabling tool for decision making in engineering. It has evolved from a methodology of academic interest into a technology that continues to significant impact in engineering research and practice. The aim of the optimization is to find the critical parts of the process and to find a solution. Optimization does not mean the process effectiveness. Process effectiveness is measured on the basis of key performance identifiers (KPI).

Each process has its own specific identifiers. Identifiers are set on the basis of company's activities (the process) and optimization results. Process effectiveness is the ability to achieve the process goals and objectives planned for each process. Every process needs the process goals, otherwise your company cannot determine if its processes are doing what they are intended to do (Carperter, 2014). We use a process map to control achieving of the process goal. BPMN is one of the available notations for creating of a process map. Business Process Modeling Notation (BPMN) is a graphical notation (a set of graphical objects and rules according which they are connected together) used to model business processes (Conger, 2011).

BPMN was invented by the consortium BPMI (Business Process Management Initiative) whose main aim was to create a notation readable for everybody who is a part of the process life cycle (analysts, developers, business process owners etc.). The present meaning of the abbreviation (since the version 2.0, metamodel completion) is Business Process Model and Notation which refers to the fact that it is going on more than just a notation (Allweyer, 2010). Thanks to the BPMN, the communication gap by a proposal and process implementation was lowered successfully and therefore BPMN has become a standard by remodelling of the business process because of many means which use BPMN in praxis.

In the first place, BPMN notation stresses the intelligibility of process description for the user but by keeping of the basic principles of BPMN language (Business Process Modeling Language) that are flexibility and expendability. BPMN does not offer process effectiveness measurement. Presently, an intermediary between process optimization and process effectiveness is missing.

The aim of this paper is to describe the usage of Petri nets as an identifier of key parts of the process and as the optimization means with process effectiveness increase. This paper proposes the methodics of the procedure by solving the production process effectiveness. The methodics is based on BPM and BPMN. The Petri net is the means to define the critical parts of the process and process simulation. The proposed methodics was tested in a production company and it was chosen as a new solution of process effectiveness for lean management.

2. Business Process Management and Process Optimization

2.1. Business Process Management

Business Process Management is a management discipline focused on using business processes as a significant contributor to achieving organization's objectives through the

improvement, ongoing performance management and governance of essential business processes (Jeston, Nelis, 2014).

Currently, BPM is being used by (Ardagna, 2008):

- some vendors who only focus on the technology solution of process improvement,
- other vendors who think of BPM as business process modeling or business performance management,
- some consultants who use BPM to continue their message on business process reengineering or improvement.

2.2. Process Optimization

Process management and improvement requires leaning – that is removal of unneeded steps for improvement, cleaning – that is the simplification and improvement of remaining steps, and greening – that is the potential use of outsourcing, co-production, or automation (Conger, 2011). The application of several techniques to each process improvement step is demonstrated through the analysis of a service desk. A typical process improvement initiative undergoes the following steps (Brocke, 2010; Cadle, 2014):

- map the target business process,
- identify and remove wastes,
- identify problems,
- prioritize problems,
- identify problem root causes and remediation,
- analyze alternatives,
- redesign the process.

2.2.1. Optimization problems

From a practical standpoint, we define the optimization task as follows: given a system or process, find the best solution to this process within constraints. This task requires the following elements (Niederman, 2010; Satyanarayana, 2012, Schick, 2014):

- an objective function is needed that provides a scalar quantitative performance measure that needs to be minimized or maximized. This can be the system's cost, yield, profit, etc.,
- a predictive model is required that describes the behavior of the system. For the optimization problem this translates into a set of equations and inequalities that we term constraints. These constraints comprise a feasible region that defines limits of performance for the system,
- variables that appear in the predictive model must be adjusted to satisfy the constraints.

In many engineering problems, this subspace can be characterized by a set of decision variables that can be interpreted as degrees of freedom in the process (Satyanarayana, 2012). Optimization is a fundamental and frequently applied task for most engineering activities. However, in many cases, this task is done by trial and error (through case study) (Satyanarayana, 2012). The systematic determination of optimal solutions leads to a large family of methods and algorithms (Candle, 2014). Moreover, research in optimization can be observed at a number of different levels that necessarily need to overlap but are often considered by separate communities (Dumas, 2013; Niederman, 2010, Schick, 2014):

- At the mathematical programming¹ level, research focuses on understanding fundamental properties of optimization problems and algorithms. Key issues include existence of solutions, convergence of algorithms, and related issues such as stability and convergence rates.
- The scientific computing level is strongly influenced by mathematical properties as well as the implementation of the optimization method for efficient and “practical” use. Here research questions include numerical stability, ill-conditioning of algorithmic steps, and computational complexity and performance.
- At the level of operations research, attention is focused on formulation of the optimization problem and development of solution strategies, often by using well-established solution methods. Many of the problems encountered at this level consider structured models with linear and discrete elements.
- At the engineering level, optimization strategies are applied to challenging, and often poorly defined, real-world problems. Knowledge of optimization at this level is engaged with the efficiency and reliability of applicable methods, analysis of the solution, and diagnosis and recovery from failure of the solution method.

On the other hand, as engineers need to consider optimization tasks on a regular basis, a systematic approach with a fundamental knowledge of optimization formulations and algorithms is essential. It should be noted that this requires not only knowledge of existing software, which may have limited application to particularly difficult problems, but also knowledge of the underlying algorithmic principles that allow challenging applications to be addressed (Panagacos, 2012).

2.2.2. Business process analysis and process map

One responsibility of the process analyst is to ensure, that organizational interrelationship are not overlooked. Business process analysis uses business process maps to determine the appropriateness of changes relating to restructuring or the introduction of new business technologies, such as a computer applications or new manufacturing technology (Conger, 2011) Recall that a process is a set of steps that accomplish some business function. Process map depict the activities and interactions of all participants in a process (Damelio, 2011). Participants might include people, roles, departments, computer applications, and external organizations. If the focus is the information technology support for a process, more granular analysis showing individual databases accessed and/or updated by a process might also be shown (Brocke, 2010).

Sets of process map are developed to define current business and proposed changes, which may result in one set of maps per proposed alternative. While order techniques for graphically depicting an organization have been used, business process maps are generic and not specifically technology driven – they are therefore more easily accepted by business executives. (Cardoso, 2009; Conger, 2011)

Once a process has been leaned, cleaned, and greened, it is ready to be reconstructed for optimal performance (Damelio, 2011). Process improvement projects proceed through their own process in the steps depicted in Figure 1. Process improvement projects begin with an initiation activity, which results in mapping and documenting the target process. Once documented, the target process proceeds through three types of problem analyses for improvement: leaning the process of unneeded tasks, and greening to minimize the environmental impact of the process. Following analysis, the process is redesigned, a case for change is developed and changes are recommended. Once the

changes are approved, implementation planning begins with error-proofing used to remove the potential for problems and guarantee identification of problems should they occur. Measures or metrics are developed to monitor the success of the changes and to take the process into the future. Process error-proofing seeks to identify all possible points of failure (including human) and to design the resulting solution to reduce the likelihood, provide detection, and otherwise manage potential points of failure. (Panagacos, 2012; Candle, 2014; Weske, 2012)

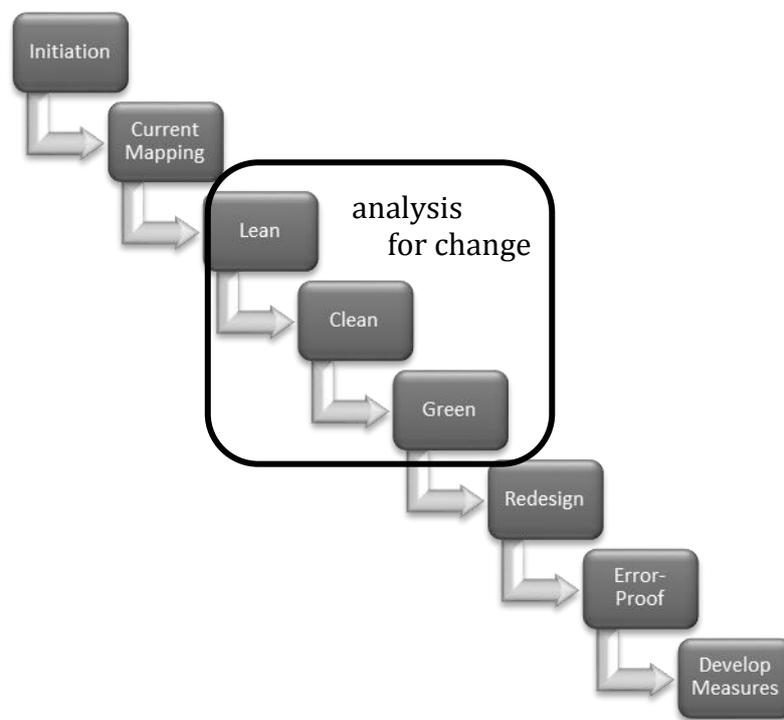


Figure 1: The steps of process improvement projects (Brocke, 2010)

The more complex and automated the process, the greater the possibility that points of failure will occur and the more critical this step becomes. Finally, many changes in process orientation are actually performed as precursor activities to the development of a service orientation for the company. (Brocke, 2010)

3. Business Process Model and Notation (BPMN)

BPMN provides a view of processes with flow charts tailored for business processes and interactions. The primary purposes of BPMN are threefold (Saphiro, 2010):

- provide a notation, that is readily understandable by all business users, from business analysts creating initial drafts of the processes, to those performing processes or implementing technology to automate them, and finally, to business people who will manage and monitor those processes,
- support notation with an internal model that has formal execution semantics enabling process model execution, as well as declarative semantics to relate processes and interactions,

- provide a standard interchange format for transfer of process and interaction models, and detailed visual information, between modeling tools.

A benefit of BPMN 2.0 is that promotes the use of a standard notation, terminology and unified definition of behavior (Briol, 2008). Another major benefit of standardized interchange for BPMN 2.0 process models is that it will allow organizations to more easily migrate from one BPM platform to another (Silver, 2011). With BPMN 2.0 interchange, customers are no longer locked-in with one vendor. If they are dissatisfied with the services or performance of a system from and simulation parameters from work flow system event logs that are in turn used to generate simulation models (White, 2008).

Business process modeling and simulation used for process or organizational (re)design provides a safe and controlled environment for testing how different processing configurations will potentially perform in the real world (Sherry, 2012). Therefore, simulation can also be used to enhance operational performance by identifying and testing process improvements. The process model and parameters that these simulations are based on are often compiled by hand.

It has been argued that even though business process simulation is compelling and easy to understand conceptually, few organizations are using it effectively or in a structured manner (Allweyer, 2010). The initial state of the simulation often reflects an empty process and therefore the simulation model is often warmed up until a steady state is achieved. Simulation analysis is most often used for strategic planning purposes where the effort to compile a simulation model is practical and the results of such a steady state model are more than adequate for the desired analysis.

Currently, the design of simulation models, the acquisition of data to properly parameterize the model, and the analysis of simulation results typically occur in an integrated environment (Silver, 2011). However, a standard can ensure that the data required to make this functionality possible can be adequately defined in the definition of a simulation scenario, and interchanged between data sources and capable tools (Freund, 2014).

4. Results

We have chosen for research process, which focus on alarms of production line. Process of alarms contains many categorizations for correctly working. The process is managed by following factors: operator, setter for montage station, foreman, maintenance manager and manager for line. The role of the operator is notification about a line error. The setter for montage station managed a main role in the process of resolving the alarm. Next workers are helpful. For further identification process, we see the process used by a process map in the BPMN notation. This process map was transformed into a Petri net (Figure 2).

This alarm process is more complex, and therefore we used the subsystem block S1. The most critical points in the network are transitions T1, T20 and T29. The transition T1 is input transition, which decides on the complexity of the problem. The transition T20 is easily transition, but in the simulation contains a lot of input tokens. The transition T29 is specifically transition because, input tokens are based on subsystem block S1. The input of subsystem block S1 is variable – affect the outputs of the network. The main output place is P29 place. This place is for information about alarm solution.

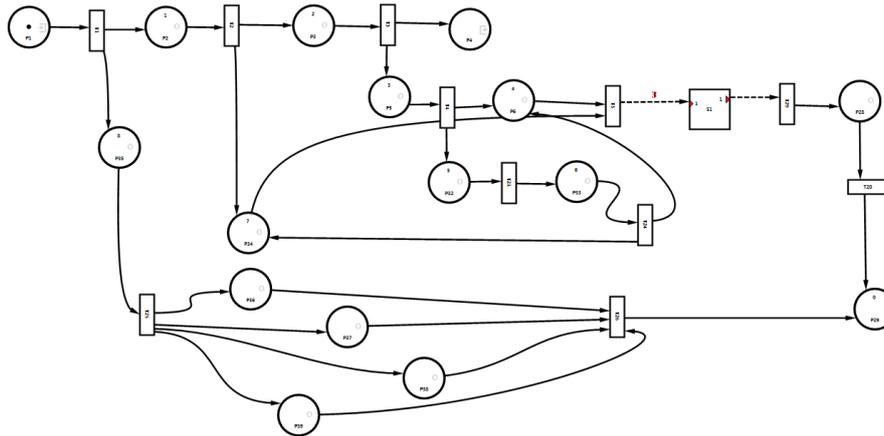


Figure 2: Petri net for the resolution process alarms

The subsystem block S1 (Figure 3) consists from only 1 input and 1 output. Input type influences the routing token. This subsystem has four output places, which are wrong output for this Petri net (P19, P21, P22, P23). Wrong output is call for external companies, ordering new parts, waiting for external component and addressing new process. Type of places is operation for subsystem block S1. The transition T9 is transition to check the expiration time. When expiration time is null, then is token passes into the place P14.

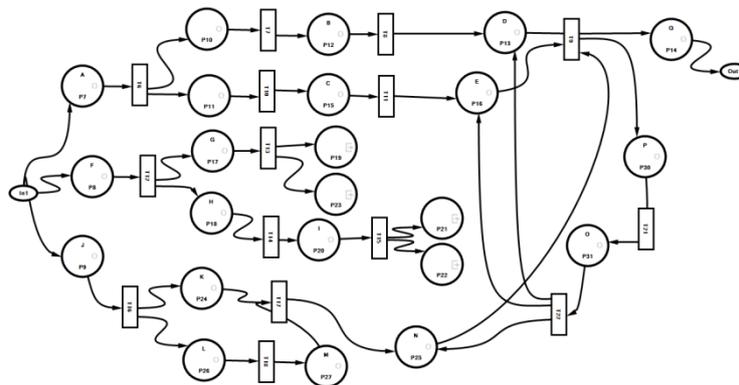


Figure 3: Petri net for the resolution process alarms – subsystem block S1

We created a simulation to determine the course of processing the alarm. Result of simulation is oscillogram as shown in the Figure 4. This oscillogram shows communication between places and return period occurs is in 15 periods.

Network simulation pointed to a fundamental problem in dealing with alarm – deciding on the allocation of one additional employee for repair. Based on the simulations, we determined the basis of key places – P13, P16, P25, P30, P31, and transitions – T1, T9, T20, T22 and T29.

The simulation results determined the key performance indicators: time of solution, number of people involved, number of solved alarms and number of backlog alarms. The time of solution is directly proportional with number of people involved. The number of solved alarms is higher as number of backlog, when number of people involved is only five (operator, setter for montage station, foreman, maintenance manager and manager for line). For a successful outcome is to be met 15 periods. Average time of period is 2,3

minutes. It follows that the optimal time for the solution of the alarm is 34,5 minutes. To reduce the delays we recommend a solution to stop the process after calling the second cooperation (only 6 people for 1 alarm – operator, two setters for montage station, foreman, maintenance manager and manager for line).

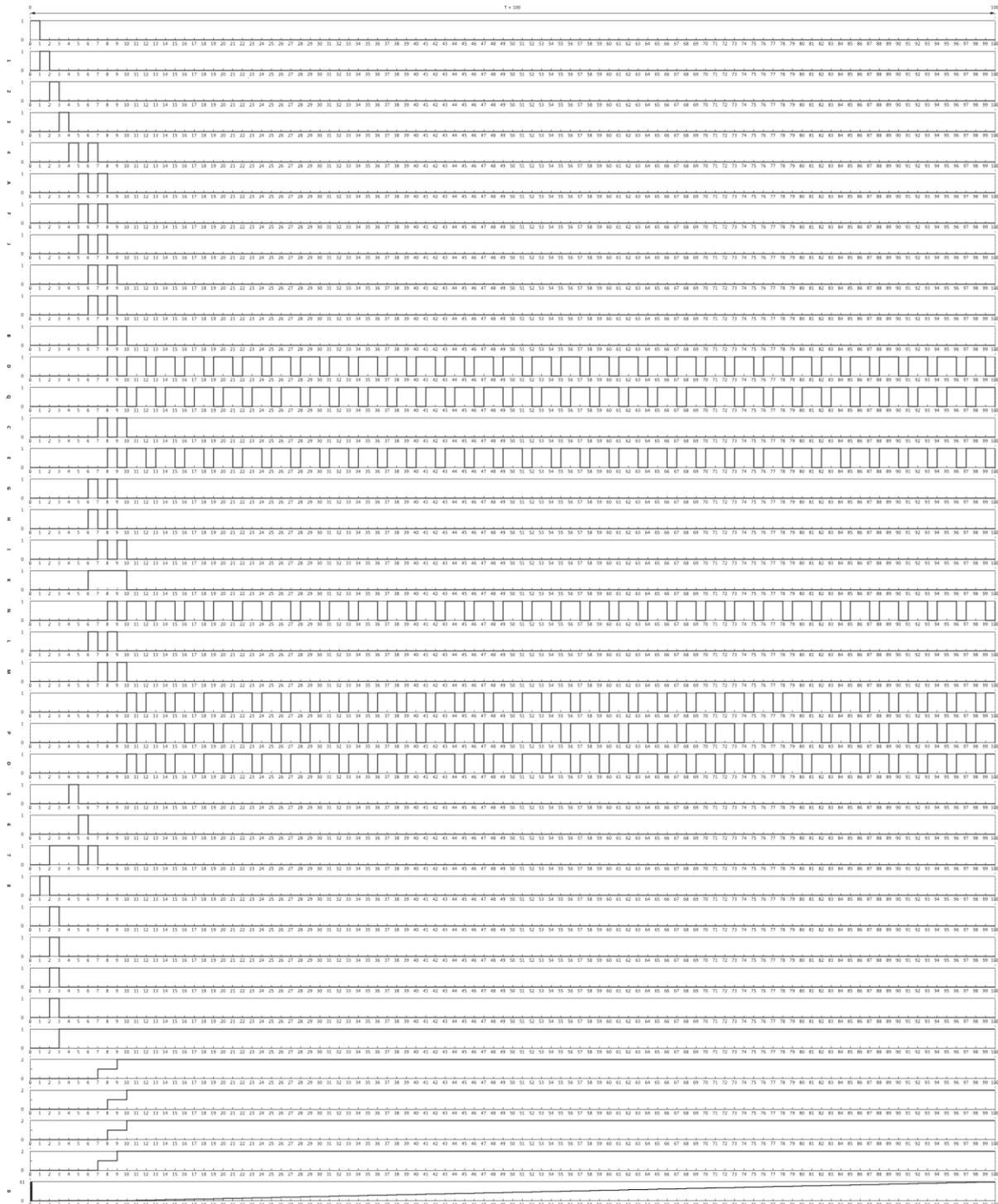


Figure 4: Oscillogram of Petri net

5. Discussion and Conclusions

This article describe a new opportunities for optimization process. Optimization is the main aspect for lean management. We can achieve a perfect optimization by using Petri nets knowledge. For input of Petri net is a process map. This process map a detailed characterization process and persons entering the process. Transformation process map we created Petri nets. Procedural events have become places and transitions are conditions. Based on the simulation of net, we determined the KPI identificators, which are mutually dependent. Adjusting the value of KPIs we have defined the ideal length of a solution to the problem.

This article highlights new options for solving the optimization process and is an essential fact for solving optimization in lean management.

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How to Measure the Extent of Accounting Harmonisation? A Case for the IFRS Adoption Index

David Procházka¹ and Jiří Pelák²

¹Department of Financial Accounting and Auditing, Faculty of Finance and Accounting, University of Economics, Prague, W. Churchill Sq. 4, Prague 3, 130 67, Czech Republic, e-mail: prochazd@vse.cz

²Department of Financial Accounting and Auditing, Faculty of Finance and Accounting, University of Economics, Prague, W. Churchill Sq. 4, Prague 3, 130 67, Czech Republic, e-mail: pelak@vse.cz

Abstract

The worldwide harmonisation of accounting has a range of intended and unintended economic consequences, which are subject of ongoing accounting empirical research on both individual company level and countrywide level. When analysing effect of the IFRS on “country-by-country level”, the researchers have to control somehow for the fact that IFRS are spread almost over all around the world. Except for some cases, all important world economies have already adopted the IFRS. However, the extent of adoption differs across countries. Some countries mandate the usage of IFRS only for consolidated financial statements of listed companies. Other countries extend the application also for individual financial statements or even for private companies. To make valid comparison among countries, a sophisticated model evaluating different level of the IFRS adoption has to be developed. The paper outlines potential theoretical approaches to solving this newly arising research issue.

Keywords: Accounting harmonisation; IFRS adoption; Harmonisation de jure; Harmonisation de facto; The IFRS Adoption Index

1. Introduction

The existence of significant differences among various national accounting systems causes an information asymmetry of local investors at expense of foreign ones, which do not possess detailed knowledge of local economic and political environment. In order to lower costs relating to obtaining information for decision-making, investors had been pushing regulators by the demand for a single set of accounting standards. The general benefits of accounting harmonisation are well known and they served as the main driver

for the introduction of International Financial Reporting Standards and their mandatory (or voluntary) adoption in many countries. The worldwide harmonisation of financial reporting through the International Financial Reporting Standards is an accounting response to the integration of world capital markets.

The paper deals with an important issue in the accounting methodology, to which researchers should pay their attention, if they develop and test models dealing with the impact of IFRS on certain economic variables. The IFRS Adoption Index is suggested as a possible measure how to control for the IFRS influence in econometrical research focusing on “country-by-country” variables. The next paper is organised as follows. Chapter 2 provides with the paper’s motivation and aims. Furthermore, the literature relevant to the research interest is introduced. Chapter 3 focuses on the development of the IFRS Adoption Index, which is a measure enabling to distinguish different levels of the “IFRS adoption de jure” among various countries. Chapter 4 presents the results of the IFRS Adoption Index calculation for the European Union countries. Chapter 5 concludes the exposition, focusing on the applicability of the model in current research and its limitations.

2. Background and literature review

The worldwide accounting harmonisation brings a wide range of expected and unintended benefits and costs (Brüggemann, Hitz, and Sellhorn 2013), which are subject of a deep research investigation. Some studies show that the benefits and costs are not spread evenly; the relative winners and losers may be distinguished (Christensen, Lee, and Walker 2007). The research evidences that the application of high-quality financial reporting standards does not guarantee the increase in the accounting quality. The reporting incentives of a particular companies (Skinner 1994; Botosan 1997; Burgstahler, Hail, and Leuz 2006; Christensen, Lee, and Walker 2008) and the efficiency of national enforcement regime (Ball, Kothari, and Robin 2000; Ball, Robin, and Wu 2003) appear to be the more important factor for high-quality financial reporting. When dealing with the effects on countrywide level, the research usually concludes that adoption of IFRS has not brought expected benefits for countries with dysfunctional enforcement, insufficient rule of law, weak investor protection, and high level of private information (Daske et al. 2008; Lee, Walker, and Christensen 2008; Li 2010; Houqe et al. 2012; Daske et al. 2013). However, the studies are unable to differentiate among countries in a detail. One of the reasons is that researchers do not control for the fact that IFRS are spread almost over all around the world, however not at the same extent in each country. To make valid comparison among countries, a sophisticated model evaluating different level of the IFRS adoption has to be developed.

The paper concentrates on a narrow aspect of accounting research methodology, which is not addressed by current research at all. An empirical evaluation of intentional and unintentional economic effects stemming from the IFRS adoption across countries is challenged by the fact that IFRS are used almost at all important economies. Therefore, it is difficult or even expelled to find a representative sample of non-adopting countries to check the effects of IFRS in adopting countries. The problem is usually resolved by comparing the situation in a given country before and after IFRS adoption. However, this enable to make a longitudinal data analysis (for restricted time-period) only, but the cross-sectional comparison across countries cannot be done. The aim of this paper is to offer potential solutions to a problem how to measure the level of IFRS adoption in a

particular adopting country in comparison with other adopting countries, focusing on the EU countries. The paper's methodology will be based on (a) literature review on international accounting harmonisation and its measurement; (b) analysis of the EU's regulatory framework for the IFRS; (c) index developed for the measurement of "IFRS adoption level" referring to the features of IFRS regime in the EU countries.

The harmonisation of accounting is defined as a process of increasing the compatibility of accounting practices by setting bounds to their degree of variation (Nobes and Parker 2012). International harmonisation of financial reporting is motivated by investors who seek the best opportunities to invest their scarce economic resources. As financial statements of companies domiciled in a particular country are used also by foreign investors, who strive for harmonising of the accounting rules to reduce information risk and bias in favour of home investors (Gordon and Bovenberg 1996). The introduction of a single set of accounting standards is supposed to enhance both understandability and comparability of financial statements across companies and countries. To keep local and attract foreign capital, states have been adopting worldwide-accepted accounting standards such as the IFRS. The successful spread of IFRS can be thus attributed either to the political motives or to the role of economic networks (Ramanna and Sletten 2009); (Ramanna and Sletten 2014).

Accounting research addresses the harmonisation process in many ways and the focus was devoted to this issue long before the international harmonisation through IFRS. The measurement of comparison among companies and the measurement of level of harmonisation among countries (Archer, Delvaile, and McLeay 1995) are one of the most important. Before any measurement model is developed, it has to be pointed out that two layers of harmonisation should be precisely distinguished. The IFRS enactment by a country is just the first step of the harmonisation process (*de jure* harmonisation). *De jure* harmonisation aims at coordinating the rules, which are supposed to be applied by entities when preparing financial statements. However, harmonisation *de facto* is more important, as harmonised rules are of no benefits, if accounting practices actually employed by entities are not in harmony (Tay and Parker 1990).

The first attempt to measure harmonisation of financial reporting practices (*i.e.* *de facto* harmonisation) can be found in (van der Tas 1988), who suggested and further refined (Van der Tas 1992) three indices for the measurement of accounting harmonisation and comparability. H-index was customised for the measurement of harmonisation within a particular domestic financial reporting system. The logic of H-index rests on the number of possible options on accounting choices and politics for accounting treatment in a given accounting area. The basic H-index was further developed in order to capture the possibility of existence two or more financial reporting systems within one national jurisdiction (C-index). After certain modification of C-index to control international factors, I-index was suggested for the assessment of accounting harmonisation within an international context. Other authors further developed and modified these indices to control for international specifics in a more proper way (Archer, Delvaile, and McLeay 1995). In addition, needed statistical properties of these indices were assessed (Archer, Delvaile, and Mcleay 1996); (Morris and Parker 1998). A comprehensive study focusing on the history and all modifications of the van der Tas's indices elaborated by (Taplin 2003) contains a framework for the evaluation of statistical properties of the mostly used international accounting harmonisation measures. (Taplin 2004) completed the development of index model by introducing the T-index, which can be considered as a general index respecting both all possible accounting specifics and required statistical characteristics. The main novelty of

T-index is that it controls for the standard error of an index used for data testing on a sample from the population (Taplin 2010).

Index-based methods are used quite extensively by accounting research for the measurement of international harmonisation of accounting (Emenyonu and Gray 1992); (Herrmann and Thomas 1995); (Emenyonu and Adhikari 1998); (Canibano and Mora 2000); (Aisbitt 2001). There are several limitations of index-based techniques hindering their utilisation in a scientifically proper way (Ali 2005). Indices are also defective conceptually, as they perceive the ultimate aim of harmonisation as a complete removal of all alternative methods and their replacement by a single accounting treatment. Economic features differ both within a firm and across firms; therefore the comparability (and thus harmonisation of rules) should be defined with reference to the application of the same accounting choice under similar economic conditions instead of the usage of the same accounting treatment in all situations (Jaafar and McLeay 2007). As a solution to this problem, statistical models are suggested to replace indices in order to measure accounting harmonisation even if companies are allowed to choose among alternative accounting treatments. First methods used a relatively simple chi-square test (Tay and Parker 1990), which cannot be although used for small and large samples (Ali 2005). Due to limitation of basic statistical models, (Archer, Delvaille, and Mcleay 1996); (McLeay, Neal, and Tollington 1999); (Rahman, Perera, and Ganeshanandam 2002) and (Jaafar and McLeay 2007) use regressions and other statistical modelling methods.

3. Methodology, Data and Results

Accounting literature concentrates mainly on measures applicable for the evaluation of de facto harmonisation. The research on de jure harmonisation is relatively undervalued. First measure was proposed by (Rahman, Perera, and Ganeshanandam 1996). Their methodology works with four possible approaches to the setting of accounting treatment; the methods are used for the comparison of legal harmonisation between pair countries. (Rahman, Perera, and Ganeshanandam 1996) define following categories of accounting rules: required; recommended or suggested; allowed or not required or not prohibited; not permitted. Among other approaches can be mentioned CIFAR Disclosure Index (Bavishi 1995); Disclose Index and Methods Index (Ashbaugh and Pincus 2001) and Accrual Index (Hung 2000). The most comprehensive measure of de jure harmonisation was introduced by (Ding, Jeanjean, and Stolowy 2005). Their model focuses on the conformity of national accounting principles with IFRS. So-called IFRS Conformity Index refers to 111 accounting items, which were classified into four categories according to their (non)application similarly to (Rahman, Perera, and Ganeshanandam 1996) methodology. Due to difficulty in distinguishing of certain differences, items were finally categorised only by two attributes – absence and divergence. The model is further refined in (Ding et al. 2007).

Despite the IFRS Conformity Index is able to measure harmonisation of national accounting standards with the IFRS in a very precise way, its usage in models assessing the impact of IFRS adoption on certain economic variables are arguable. With the growing usage of the IFRS, the economic costs of different national accounting principles mitigate. The comparison of effects from the IFRS adoption among various countries is not possible, as all (or almost all) countries have already adopted IFRS. For the purposes of statistical modelling, the level of IFRS adoption cannot be measured with reference to the extent, in which local accounting standards conform to International Financial

Reporting Standards. The solution of this issue should be based on scope of entities, which use the IFRS as their accounting system. Therefore, it is necessarily to assess conceptually the scope of companies, which are subject of IFRS reporting. In this context, we can utilise fact that IFRS are adopted in the legal framework of various countries in different ways. Further, the paper will focus on the IFRS regime in the European Union solely. This restriction has no impact on the generality of the findings and conclusions.

In 2002 the Regulation (EC) 1606/2002 on International Accounting Standards was approved. Pursuant the Article 4 of the Regulation, companies, with securities admitted to trading on a regulated market of any member state, shall prepare their consolidated accounts in conformity with the international accounting standards. In addition, the Regulation gives the EU member states options in respect of annual accounts and of non publicly-traded companies. Following Article 5, member states may permit or require (a) the companies referred to in Article 4 to prepare their annual accounts, (b) companies other than those referred to in Article 4 to prepare their consolidated accounts and/or their annual accounts, in conformity with the IFRS. Different countries apply the Article 5 of the Regulation in a different extent, even with extreme approaches (e.g. Austria vs. Denmark).

The provision of Regulation (EC) offers variety of possible patterns, how to construct framework for financial reporting in a given country. In general, the greater number of companies, which are allowed or obliged to apply IFRS in their separate and/or consolidated financial statements, the higher level of the IFRS adoption. IFRS may be accepted also for the corporate taxation, which further extends their application. The greater scope of the IFRS adoption, the more attractive is country for investors sensitive on informational risks. If a subsidiary applies the same accounting rules as the parent, the necessity for conversion of foreign subsidiary accounts to the group accounting standards is eliminated, which speeds up the preparation of consolidated statements and facilitates the decision-making within the consolidation group. Based on above, we develop a model identifying 8 cardinal areas, for which IFRS can be relevant (see Tab. 1).

Table 1: The areas of IFRS application for the calculation of the IFRS Adoption Index

No.	Areas of the IFRS adoption	IFRS required permitted	IFRS not permitted
I	Consolidated financial statements of a consolidating listed company	1	0
II	Separate financial statements of a consolidating listed company	1	0
III	Consolidated financial statements of a consolidating unlisted company	1	0
IV	Separate financial statements of a consolidating unlisted company	1	0
V	Separate financial statements of a consolidated unlisted company	1	0
VI	Separate financial statements of a non-consolidated unlisted company	1	0
VII	Financial statements of entities in certain industries ¹	1	0
VIII	Taxation	1	0

With increasing number of spheres in local economy, for which IFRS are required or allowed, the level of IFRS adoption is rising. The measure of IFRS adoption level uses a simple binary variable “1”, if the IFRS are required or allowed in a particular area or “0” if not permitted. The maximum value of the IFRS Adoption Index is “8”, if IFRS are required or allowed in all eight areas. If a country is not engaged in accounting harmonisation in any of defined areas, the IFRS Adoption Index reaches value of “0”.

¹ Some countries require companies operating in certain industries to apply IFRS in their financial statements although they are not listed companies (e.g. Belgian credit institutions, investment companies and real estate investment trusts; Bulgaria sets the duty on companies of certain size defined by assets, turnover, and number of companies; combination of both approaches is applied by Slovakia; etc.).

4. Results

The calculation of the IFRS Adoption Index for EU countries (except Croatia) is processed in Table 3. The lowest level of the IFRS adoption is evidenced in Austria, which has applied the Regulation on IAS just in the most restricted extent and minimum requirements were implemented in national legislation only. Similarly, the scope of companies applying the IFRS pursuant domestic legal regulatory framework is relatively narrow in France, Hungary and Spain. On the other hand, seven out of 27 Member States of the European Union have qualified for the Level 8 of the IFRS Adoption Index, which means that IFRS can be applied effectively by all companies both in their separate and consolidated financial statement. Furthermore, the taxation regime is relatively favourable to implementation of the IFRS.

Table 2: The IFRS Adoption Index for the EU countries

EU State	I	II	III	IV	V	VI	VII	VIII	Index
Austria	1	0	0	0	0	0	0	0	1
Belgium	1	0	1	0	0	0	1	0	3
Bulgaria	1	1	1	1	1	1	1	0	7
Cyprus	1	1	1	1	1	1	1	1	8
Czech Republic	1	1	1	1	1	0	0	0	5
Denmark	1	1	1	1	1	1	1	1	8
Estonia	1	1	1	1	1	1	1	1	8
Finland	1	1	1	1	1	1	1	0	7
France	1	0	1	0	0	0	0	0	2
Germany*	1	0	1	1	1	0	1	1	5*
Greece	1	1	1	1	1	1	1	0	7
Hungary	1	0	1	0	0	0	0	0	2
Ireland	1	1	1	1	1	1	1	1	8
Italy	1	1	1	1	0	0	1	1	6
Latvia	1	1	1	0	0	0	1	0	4
Lithuania	1	1	1	1	1	1	1	0	7
Luxembourg	1	1	1	1	1	1	1	1	8
Malta	1	1	1	1	1	1	1	1	8
Netherlands	1	1	1	1	1	1	1	1	8
Poland	1	1	1	1	1	0	1	1	7
Portugal	1	1	1	1	1	0	0	0	5
Romania	1	1	0	0	1	0	0	0	3
Slovakia	1	1	1	0	0	0	1	1	5
Slovenia	1	1	1	1	1	1	1	0	7
Spain	1	0	1	0	0	0	0	0	2
Sweden	1	0	1	0	0	0	1	0	3
United Kingdom	1	1	1	1	1	0	0	1	6

Source: Authors' own calculation based on <http://www.iasplus.com/en/resources/use-of-ifs> and http://www.pwc.com/en_US/us/issues/ifrs-reporting/publications/assets/pwc-ifs-by-country-2014.pdf;

*Note: the arithmetical subtotal for Germany is 6. However, the combination of rules does not allow for the simultaneous application of Criterion 3 and 4. See explanation in text below. Therefore, the IFRS Adoption Index for Germany is only "5"

Although accounting is the subject of EU-wide regulation under a common regulatory framework, there are considerable differences between Member States in the de jure harmonization of financial reporting. The main reason for existing differences is that the Regulation on application of IAS defines the obligation to use standards in the consolidated financial statements of listed companies only. For all other entities, a

choice of accounting standards remains fully in the responsibility of Member States. Each country follows its own motive when establishing its accounting system, especially in terms of separate financial statements, which are used for statutory, taxation and other purposes. A different national approach to IFRS adoption may then influence the outcome of accounting harmonisation within particular country.

5. Discussion and Conclusions

The IFRS Adoption Index provides a platform for differentiating among countries in those econometric models, which deal with the assessment of influence of the IFRS on macroeconomic variables (e.g. foreign direct investments, foreign trade, etc.). De jure accounting harmonisation is usually omitted in such kind of models; the harmonisation is measured only with reference to the de facto one based on comparison of local GAAP and IFRS. However, international investors demand a common financial reporting framework and the same set of financial statements regardless country, which they pour their money into. Each country responds to this demand differently; some countries require the application of IFRS only for listed companies, other countries permit all companies to apply IFRS. These nuances can be controlled for by including the IFRS Adoption Index into regression models as a supplementary explanatory variable.

However, there exist several limitations of the Index. Firstly, there are numerous fields, for which IFRS financial statements can be found useful. The Index contains eight fundamental fields, which can be modified or extended in some instances. Secondly, binary values “1” and “0” express whether IFRS are adopted or not in a particular field of financial reporting, but without any further elaboration of specifics in each country. Certain research designs may require further refinement of the level of adoption. Distinguishing between mandatory and voluntary application of IFRS can be crucial e.g. in research evaluating the comparability of financial statements. However, the extension of number of categories regarding the level of IFRS adoption from two categories (i.e. required/allowed, not permitted) to three (i.e. obligatory application, voluntary application, not permitted) triggers a conceptual problem how to sum up the results from each field. It is possible to denote the obligatory application of IFRS by mark “2”, voluntary application by “1” and not permitted application by “0”. Yet, it can be hardly assumed that obligatory application is twice better than the voluntary application of IFRS. Thirdly, the IFRS Adoption Index implicitly assumes that all fields of the IFRS adoption are equally important for the users of financial statements. This presumption enables to sum up the partial results from each field together and the IFRS Adoption Index can be thus reformulated as a percentage of fields, in which the IFRS can be actually applied, in relation to all areas of possible IFRS utilisation. The assumption, that users of financial statements perceive all areas of possible application of the IFRS as equal, helps in overcoming the conceptual shortcomings of ordinal measurement scales (Stevens 1946). Yet, the assumption is not realistic.

Further research should therefore deal with the quantification of weights to be assigned to each of defined areas of the IFRS application. The calculation of coefficients are expected to rest on the users’ perception of relative importance of each field, in which a particular country may require, permit or prohibit the application of IFRS for the preparation of consolidated and/or separate financial statements. Further improvement of the IFRS Adoption Index is expected to combine the measure

expressing the extent of de jure harmonisation (current version of the Index) with a measure capturing the extent of de facto harmonisation.

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Collaboration of users creating documents in the application TeXonWeb

Jan Přichystal¹, Václav Telenský²

¹*Department of Informatics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: jan.prichystal@mendelu.cz*

¹*Department of Informatics, Faculty of Business and Economics, Mendel University in Brno,
Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xtelensk@node.mendelu.cz*

Abstract

The use of software through the web services (SaaS) is nowadays frequently discussed topic. It could help companies to decrease the direct costs for the application software purchasing. Such software available using the web browser is the web application TeXonWeb that lets users create documents in TeX typesetting system without having to install it. This online application is available free of charge. The article deals with the problem of ensuring cooperation of more users to create or modify business or another common documents in this application. The requirements for such functionality include the option to define a group of cooperating users and distribution of the changes between them, as well as showing what certain user has modified and ensure all cooperating users could see the state of the document at the moment the document is being modified. The part of the issue is the acceptance or rejection of changes. This issue include the document versioning to allow retracing back in the history of changes. All of this is also discussed from the viewpoint of touch devices such as tablets, which is in some ways unique. The paper analyzes the current technologies that can be used to allow this functionality in a web application, mentions cases of their use and evaluate their quality. This article also describes the approach taken and the implementation of the final solution on the example of a particular implementations.

Keywords: AJAX, collaboration, document preparation, TeXonWeb, websocket

1. Introduction

Currently there on the market exists a large number of different software that allows users to prepare text documents. These applications are both commercial and open-source software. The representative of the first group could be one of the most popular word processors – Microsoft Word. Representative of the second group is for example application LibreOffice Writer. These programs are usually installed directly on the user's personal computer. Nowadays, even in this area of human activity, users start to

prefer applications accessible through a web browser as a service (SaaS)¹. They allow users to create documents without having to install specific software on their own computer. Such applications are accessible not only on personal computers, but also on touch devices (tablets) and provide the user the same comfort and functions not dependent on the particular device. This approach offers many advantages such as uncomplicated upgrades to new versions or different user interface on different devices. A typical representative applications are for example Google Drive² with the function of a word processor or Microsoft Word in Office 365³.

At the same time users creating documents often require collaboration with other users, so that they are able to share the changes, accept or reject changes, comment changes, or to cooperate on the process of document creation. One of the most sophisticated approaches offers the above mentioned Google Drive. How Google (2015) indicates, it allows users to share documents and track who performed specific changes. It also offers to see who writes the text in real time. And then we could call it multi-user text editing. The list of tools that can be used for documents preparation and collaboration states for example Crouzier (2014).

Similar application which is however dedicated to preparation of documents in TeX typesetting system is a web application TeXonWeb⁴. It does not offer any user collaboration yet and this disadvantage limits its usefulness, for example when writing scientific articles in the team of authors or when teaching seminars related to computer text processing, when the teacher wants to share the results of the tasks with students. This functionality is available, for example, in similar web applications OverLeaf⁵ (formerly writeLaTeX) and ShareLaTeX⁶. They also offer online TeX system source code editor. Their properties and comparison with TeXonWeb describes Přichystal (2014). In his article he also indicates that the application ShareLaTeX offers file sharing only for a fee and in Overleaf the document sharing is free of charge. None of them allow real time monitoring what collaborators are currently working on. Because the document sharing is an important functionality offered by virtually all competing applications and users require it, we decided to implement it into application TeXonWeb.

2. Methodology and Data

The main aim of this article is to find, develop and integrate into TeXonWeb the functionality that will allow collaboration of multiple users on the same document simultaneously in real time. Users will be able to work normally with the files (copy, rename, etc.) and when editing text it will be possible to monitor the activity of cooperating users. The owner will also be able to set who and how can work with the files.

It is clear that users will require basically the same features in TeXonWeb they have available in the applications mentioned above. Regarding the applications installed on a personal computer, there is a possibility of cooperation limited to the exchange of files between users, merging or rejecting changes and commenting them. Applications in the

¹ Software as a Service

² <https://drive.google.com>

³ <https://office.live.com>

⁴ <https://tex.mendelu.cz/en>

⁵ <https://www.overleaf.com>

⁶ <https://www.sharelatex.com>

cloud additionally offer real-time monitoring of the activities of all users. There is no need to send a document to collaborators. It is stored in the cloud and accessible to all collaborating users. The disadvantage of this approach may be the necessary connection to the Internet.

Because the application TeXonWeb is accessible through a web browser like the cloud applications are, it should offer the same collaboration solutions that are available in Google Drive or Office 365. All common operations with files that are related to file sharing is not difficult to solve using traditional technologies. The question is how to solve the above mentioned online simultaneous document editing of multiple users. Next section of this article is dedicated to studying the various technologies that allow to implement this functionality.

To implement the functionality to share documents, we first consider the design stage technology Server-sent events, abbreviated as SSE. SSE is HTML 5 technology, which allows the server to “push” fresh data to clients (web browsers). It is the perfect solution for that client may have a permanent connection to obtain new data every few seconds (Cook, 2014). Obsolete method for asynchronous data retrieval is AJAX heartbeat. As can be seen from the name, the method utilizes AJAX. AJAX is a technology that uses JavaScript and the XMLHttpRequest object to communicate with the server without a page refresh. Technology processes XML or text data sent back from the server (Garrett, 2005) and (Mahemoff, 2006). The described method therefore works by querying the server by the client, whether there are available any new data. However, most of the server responses can be “no new data are available.” This employs both client and server. Such an approach is inefficient in document sharing. Changes are made when user just inserts or deletes a single character in the text. Such editing actions are frequent and can be done very quickly and at various intervals. When using AJAX heartbeat it may produce delays in distributing the changes to the other users. On the other hand, server-sent events operates on the principle of distribution of changes to the client when the new data is available. Data is sent via pre-bound half-duplex connection. The term half-duplex in the case of document sharing is very important. Half-duplex connection only works in one direction. Therefore SSE technology is in this case unusable. If we still want to use it for sending the data from the server to the client, then we would have to choose the classic asynchronous client server communication method of sending data to the server using AJAX technology. This would significantly slow down communication and therefore the entire process of exchanging changes between cooperating users. So we know that AJAX technology and SSE are unacceptable for our purpose.

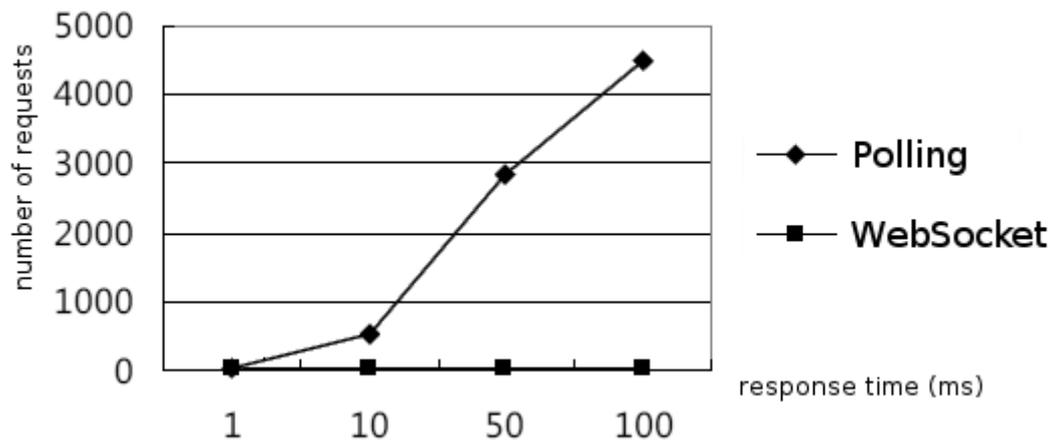


Figure 1: Polling versus WebSockets (Source: Park, 2014)

The technology that fits best for our purpose is called WebSockets. The WebSocket makes the web application to deal with the web data directly in the HTML5 and it provides full-duplex communication channels using TCP connection (Liu, 2014). We have chosen the technology because it allows us to create full-duplex connection between a client and a server. The function of the WebSocket technology was to improve performance. Two-way data communication in the real time actually corresponds to numerous concurrent connections (Park, 2014). WebSockets are meaningfully much faster than AJAX polling technology. The difference in performance between polling and WebSockets is demonstrated by the Figure 1. The x-axis represents the number of requests, and the y-axis represents the response time in milliseconds (Park, 2014).

Websocket technology can be used to create applications like chat, document collaborating, or online games. Basically it can be utilized everywhere you need to distribute online data in real-time between two or more clients. For creating the client side of WebSocket based application is possible to use HTML5 API. On the other hand, server side implementation is available in many programming languages e.g. Python (Pywebsocket), PHP (Phpwebsocket), Java (jWebSocket) and much more. In case of TeXonWeb implementation we have decided to use solution for Node.js It is called Socket.io which is the whole framework for the client and server sides. Using of framework will simplify many problems that we would have to solve without it. As an example we can introduce establishing of the client/server connection. The exact code samples are stated below in the next chapter that describes results of our work. The client side of TeXonWeb WebSockets functionality will be ensuring three main steps:

1. establishing connection,
2. emitting changes in document from user to collaborators (server) via WebSocket,
3. receiving changes in document from collaborators (server) via WebSocket.

Server side of collaborative work on documents in TeXonWeb will be based on one main step and it will distribute changes to the right clients. For implementing this logic we are going to use a predefined method and construction that framework Socket.io provides. This should contribute to the simplicity and readability of the code solution that will be implemented on TeXonWeb.

Now we will focus on the part that solves the management of file sharing. Application TeXonWeb uses Perl programming language on server side and the CGI module is used. It creates a whole HTML, which is then displayed to the user by the Web browser. As for document sharing, Perl will have the administrator role for the process of documents sharing. The Perl script will distribute shared files among collaborators. This means that when a user selects a specific file for sharing, the script copies the file to other users (collaborators) to their working directories. But, when copying files, it will not copy the entire files, it will only create symbolic links. This allows to have shared file in one place and other users will access it via a symbolic links. After performing such operation cooperation could begin.

The entire application TeXonWeb uses JavaScript programming language and jQuery for the client side. JQuery is a fast, small and feature-rich JavaScript library. It allows for example traversing and manipulating in the HTML document, event handling, animation and easily accessible AJAX API⁷ that works across multiple browsers (jQuery, 2012). jQuery will be used for further enhancement of GUI⁸ or acquiring various values of DOM⁹ application. The process of exchanging changes in the document will be implemented in JavaScript, specific methods and ideas are discussed later in this article. Part of development of document sharing is connected to existing functionality of document versioning. This would achieve capturing changes made by users in time and then it would be possible to trace who performed which changes in the document.

3. Results

The basic idea of document sharing in application TeXonWeb is to enable collaboration of more users on a single document. This area includes, besides the text editing, also manipulation with the shared file from the perspective of the owner of the shared file and from the perspective of a collaborator. File operations and file sharing is implemented using common file operations in operating system Linux on the server TeXonWeb. The sharing is enabled by creating symbolic links (Linux command `ln -s`) in the collaborator's directory referring to the source file of the file owner. At the same time when sharing is enabled the auxiliary file is created in the owner's directory. There in the file is the evidence of all users who share the file. The set of activities performed by the owner of the file include:

- a. enable sharing for specific users,
- b. disable sharing for specific users,
- c. copy file,
- d. move or rename a file.

When the various activities are carried out not only the operations are made, but also other activities that are necessary to ensure the consistency of shared files are processed. In individual cases it works as follows:

Step a: In the File Manager the file owner through the dialog Sharing determines who exactly will share the file. Each user is required to be entered individually using his existing login on TeXonWeb. At this time in the File Manager the icon will appear to the

⁷ Application Programming Interface

⁸ Graphical User Interface

⁹ Document Object Model

owner indicating that the file is shared. Colleagues in the File Manager discover a new file with sharing icon. The symbolic link is created on the file in the owner's directory and the new user is added to the list.

Step b: In the File Manager the file owner through dialogue Sharing determine whom to remove the right to share the file. It is also possible to remove all collaborators at once. At this moment shared file disappears in the File Manager of collaborator and he is no longer able to work with it. If the file owner removes all users, in the File Manager disappears icon indicating sharing. Symbolic links are removed and collaborators in the user list are removed.

Step c: In the File manager the owner copies the file. At this point a copy of the file is created and it is not shared by the other users. The symbolic link on copy is deleted. List of collaborating users is not created.

Step d: In the File manager the owner moves or renames a file. At this point, the file name is changed and also such change is applied to links of collaborators, so that the file name corresponds with the new name. Also the auxiliary file name is changed.

With a shared file could also manipulate collaborator, who may:

- a. copy shared file,
- b. cancel file sharing.

Step a: In File manager, collaborator copies the file. At this point, copy becomes a new file that is not shared by other users. The symbolic link is removed from such copy. List of collaborating users is not created.

Step b: In the File Manager in dialog Sharing collaborator cancels the file sharing. Symbolic link is removed, the file in File Manager is no longer displayed. In the list of users the certain collaborator is removed.

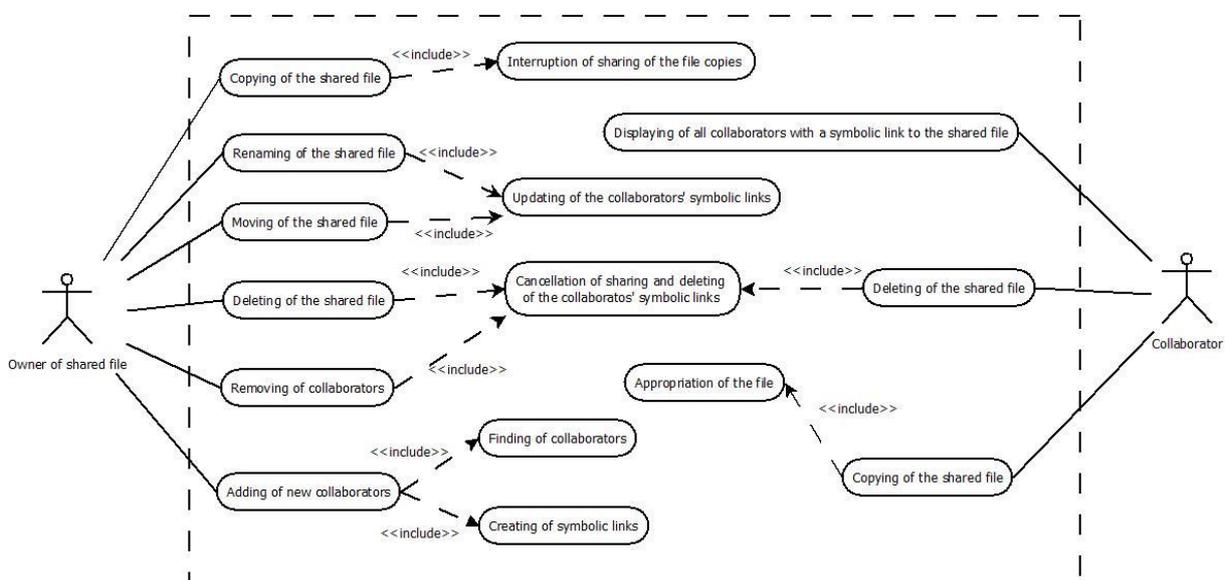


Figure 2: Use-case diagram of collaboration process

It follows that the set of operations that collaborator can do with the shared file is limited. For example, he cannot rename the file.

The situation is described by the use-case diagram in Figure 2.

File sharing also enables direct collaboration on the text of a document to multiple users at one time. This is done by using the WebSocket technology described above.

Here below are the parts of the code that facilitates the sharing of information in cooperation mode. The first part is the code placed on the client (in web browser):

```
<script src="https://cdn.socket.io/socket.io-1.2.0.js"></script>
<script src="http://code.jquery.com/jquery-1.11.1.js"></script>
<script>

// initialization of WebSockets
var socket = io();

// initialization list of collaborators
var collaboratos = getCollaborators();

// creating handler for every clients pressed key
$('#editor').keypress(function(event){
  // get cursor coordinates in editor
  var positionOfCursor = getPositionOfCursorInEditor();
  // get number of pressed key
  var keyNum = event.which;
  var data = {key : keyNum, coordinates : positionOfCursor, users : collaboratos};
  // send changes to server which will distribute the changes to collaborators
  socket.emit('document change', data);
});

// creating handler for receiving changes from collaborators
socket.on('document change', function(json){
  // making changes in editor
  // changes has been received from collaborator
  processChangesFromCollaborators(json);
});

</script>
```

Second part displayed below is the code placed directly on the server side:

```
// initializion of node.js server
var app = require('express')();
var http = require('http').Server(app);
var io = require('socket.io')(http);

// handler for every new connection
io.on('connection', function(socket){
  console.log('New user connected to shared document');

  // handler for every changes executed in shared document
  socket.on('document change', function(json){
    // send changes to all user except sender
    socket.broadcast.emit('chat message', json);
  });});
```

4. Discussion and Conclusions

Application TeXonWeb currently offers a similar functionality as competitive application Overleaf or ShareLaTeX. Users can share files with each other, whereby the number of collaborators is not limited. At this time we are working on options to track changes individual users perform to edit the document more efficiently and faster. This feature is still under development and testing. The important feature the TeXonWeb doesn't offer is the opportunity to comment the changes. This functionality is not so critical, to significantly outclass TeXonWeb. Compared with applications OverLeaf and ShareLaTeX TeXonWeb doesn't lose any important points and users can use it the same way they are used elsewhere. TeXonWeb also focuses on a slightly different group of users. While the above mentioned two competing projects focus primarily to professionals or researchers who publish more extensive and complicated documents, applications TeXonWeb focuses on novice users who don't want to install TeX system on their own computer and want to try it or for example to create a simple document. Such a typical user could also be student working on a seminar paper. TeXonWeb application users also use for creating more complex documents, such as the final works. For these users a template that greatly facilitate this activity is offered. Working with TeX for novice users may also facilitate various wizards for creating lists or tables. These features are not offered by competitive applications at all. The advantage of TeXonWeb is also set of compilers which allow users to use plainTeX, XeLaTeX or csLaTeX. The application Google Drive also offer possibility to specify different rights (read, modify, administrate) for collaborators. Such feature is not available in TeXonWeb yet.

The above mentioned deficiencies indicate what direction of further development of application TeXonWeb is planned. We primarily want to allow users to comment part of a shared document, highlight changes made by individual users by colors, and complete integration with documents version control so that it will be possible to track the history of changes of individual users and possibly retrace back in history.

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Economic Growth Spillovers: International Trade Links

Miroslav Radiměřský^{1*} and Vladimír Hajko²

^{1}Corresponding author, Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: miroslav.radimersky@mendelu.cz,*

²Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: vladimir.hajko@mendelu.cz

Abstract

The impact of international trade on economic growth is an integral part of economic theory and policy. Recently, the debate has moved from the trade determination of growth to the openness-growth interdependence and growth spillovers through trade links. The aim of this paper is to empirically investigate the impact of the trading partners' performance on domestic economic growth. We employ panel data estimation for EU countries during 1999–2011, with the weights of trade partners based on export shares. We also enhance the model by the inclusion of the trade structure (by the means of the Grubel-Lloyd (GL) index). We find the inclusion of the trade partners' growth overtakes the significance of the trade openness measure. Furthermore, the consideration of the trade structure, so far neglected in the literature, seems to be a valid extension of the model. The elasticity of domestic growth with respect to trade partners' growth is around 0.85. An increase of 0.1 in GL index (a change of trade structure towards more intra-industry trade) further increases this elasticity approximately by 0.036.

Keywords: growth, spillovers, international trade, trade partners, openness

1. Introduction

In this article, we investigate the proposition the international trade serves as a direct instrument stimulating the domestic economic growth. The European Union trade openness was around 74% in the examined period. We expect this relatively high trade interconnection should be reflected in the economic growth spillovers between the individual EU countries.

We use panel data approach for all EU countries with the exception of Croatia and Cyprus during the sample period 1999–2011 and estimate the growth spillover model enhanced by trade structure.

1.1. Presumed trade influence on growth

Arora and Vamvakidis (2002), using similar specification as the one employed in this article, argue that the elasticity of domestic growth with respect to trade partners growth is as high as 0.8 (using sample from 1960–1999). In more recent paper, Arora and Vamvakidis (2011) tested the growth spillover model to determine long- and short-run effects of China's economic performance on other countries. They argued in favor of the increasing spillovers' relevance both in long- and short-run. On average one per cent increase in China's growth means 0.5 per cent for its neighbors in the short-run and 0.2 per cent for global economy in the long-run.

Their results are consistent with the prevailing opinion in the literature, i.e. there is positive relationship between trade and growth. This relationship is closely linked to trade openness and it is expected that economic growth spillovers increase with higher degrees of economic integration. Primarily due to the lacking empirical significance the debate has moved from trade determination of growth to the openness growth approaches. Rivera and Romer (1990) and Frankel and Romer (1999) argued endogeneity is the cause of the problems and constructed a model of endogenous growth featuring a measure of economic integration. Establishing a robust causal relationship, however, has been difficult.

Baldwin (2003) provides the review of trade and trade openness literature. He monitored the development in the recent 50 years, divided into three periods according to the prevailing trade policy. For this paper, the third period, starting in the 1990s, is the most relevant. The improvements in the growth theory and better statistical data allowed more sophisticated cross-country analyses. Studies were oriented on effects of political trade barriers and their impact on growth rather than on the more general relationship between trade openness and growth. Sachs and Warner (1995), Frankel and Romer (1999), Dollar (1992) and Edward (1998) are among the most influential papers. These studies find a strong and positive relationship between trade liberalization and growth.

Frankel and Romer (1999) used geographic instruments to identify a positive effect of trade on income. Ben-David (1993) and Sachs and Warner (1995) showed open economies experience unconditional convergence. Coe and Helpman (1995) and Coe, Helpman and Hoffmaister (1997) provide evidence of positive spillover effects on growth from RandD activities in trading partners. Barro and Sala-i-Martin (2003), among others, showed the negative effects of trade protectionism on growth rates.

Rodriguez and Rodrik (2000), among others, are skeptical about these results. They argued the positive results are not robust mainly due econometric misspecification (omitted variables etc.) and deficiency in the measure of openness. Warner (2003) questioned the approach of Rodriguez and Rodrik (2000) and restored the positive relationship between growth and openness. Estevaderdal and Taylor (2013) provide detailed summary of this debate.

Clemens and Williamson (2004) and Vamvakidis (2002) examined longer-period historical data and found the correlation between openness and growth. This relationship seems to gain significance in the recent past, likely in relation with the decline of trade barriers. Lee, Ricci and Rigobon (2004) showed small positive openness

effect on growth and test robustness against reverse effect. Choudhri, Faruquee and Tokarick (2006) argued the trade liberalization leads to long-run gains and in short run it starts the adjustment. We can expect the increase in openness will lead to positive effects on growth. Sarkar (2007) examined cross-country panel data of 51 countries during 1981–2002. He showed that highly trade-dependent countries report positive relationship between the openness and growth link on.

Billmeier and Nannicini (2009) confirmed a positive and significant effect of openness on growth, while controlling for endogeneity. They show that trade liberalization had a positive effect on growth.

1.2. Trade structure importance

Unlike standard openness-growth studies focusing primarily on trade openness, Arora and Vamvakidis (2002) examined how economic performance of the trading partners influenced domestic economic growth. We go even further and expand the model with trade structure. Grubel-Lloyd index (1971) can be used to distinguish the trade structure in terms of inter- or intra-industry trade. While the classic economic trade theory typically considered the trade as the result of comparative advantage for differentiated types of goods, the notion of intra-industry trade is rooted in the so-called new trade theory, where the determinants of trade are increasing returns of scale (Krugman, 1979).

Trade is among the most important channels of growth and technological spillovers. The relationship between trade structure and economic performance could be defined from long-run point of view and from short-run point of view.

In the long-run the trade structure can be used as a proxy for the structure of economy. Bernhofen (1999) showed the similitude of economies lead to increasing intra-industry trade while the differences lead to inter-industry trade. He examined the determinants of intra- and inter-industry trade and characterized three main factors – costs, size of the respective markets and market structure. Convergence of these three factors leads to the higher value of Grubel-Lloyd index. Trade structure can then be used as a proxy for economic structure.

Economic structure is more important for long-term growth. Growth spillovers can be viewed as positive short-run shocks. Trade and its structure play crucial roles in the transmission of such shocks. Shin (2008) showed the links between economies are more pronounced in intra-industry trade. It can therefore be expected the shocks will spread more easily in intra-industry trade, i.e. in cases of higher recorded values of Grubel-Lloyd index. In this paper, we consider such shocks as exogenously determined trade partners' growth.

2. Methodology and Data

The primary data source employed in this paper is World Bank database. Specifically, we collected data for all EU countries except from Cyprus and Croatia (inclusion of which, due to the limited data availability, would unnecessarily limit the remainder of our sample) for the period 1999–2011. The indicators used are GDP per capita in PPP, measured as constant 2011 international \$ (NY.GDP.PCAP.PP.KD), GDP in constant local currency units (NY.GDP.MKTP.KN), volume of trade as percentage of GDP (NE.TRD.GNFS.ZS) and gross capital formation (NE.GDI.TOTL.ZS). We also intended to

include a measure of the applied weighted tariff rate (e.g. TM.TAX.MRCH.WM.AR.ZS), but the World Bank database provides identical values for all (sic!) European countries (for all indicators regarding the tariff rates). This is most likely a bug in the database, but since we received no response from the World Bank during the time of writing this article, we opted not to use a tariff rate measure in the estimation.

To calculate the growth in trade partner countries (from NY.GDP.MKTP.KN) we used weights based on the volume of export to the partner country as a percentage of total export from the source country, using data from Eurostat database “EU trade since 1988 by SITC” (DS-018995). Both GDP growth rates and trade partner growth rates are measured in percents.

We also used this Eurostat database to calculate the Grubel-Lloyd (1971) index, weighted using the share of total trade (import and export in current prices in Euros) with the given country on total (please note we conform to the typical reports of the index with values of the index ranging between 0 and 1 (i.e. not 0 and 100 – hence the “large” coefficient values of GL index reported in the results)). This index describes the structure of the trade (i.e. whether the trade relations of a given country can be described as intra-industry trade or inter-industry trade; with pure intra-industry trade resulting in $GL = 1$ and pure inter-industry trade in $GL = 0$). The Grubel-Lloyd index is typically calculated for a particular industry. We use weighted Grubel-Lloyd index to describe the prevailing structure of trade in the economy as a whole. The shares of the particular sectors on the total volume of trade are used to calculate the weights for the economy-wide Grubel-Lloyd index.

To capture the influence of the currency value we used broad CPI-based indices of real effective exchange rates, based on papers by Darvas (2012a, 2012b), using 178 trade partner countries.

To determine the elasticity of domestic growth with respect to trade partners’ growth, we estimate panel regression in the form:

$$\begin{aligned}
 GDPgrowth_{i,t} = & \alpha_i + \beta_1 partner_{i,t} + \beta_2 \log(GDP_{i,t-1}) + \beta_3 REER_{i,t} \\
 & + \beta_4 capital_{i,t} + \beta_5 tradetogdp_{i,t} + \beta_6 (tradetogdp_{i,t} * partner_{i,t}) \\
 & + \beta_7 GL_{i,t} + \beta_7 (GL_{i,t} * partner_{i,t}) + e_{i,t}
 \end{aligned} \tag{1}$$

Where $GDPgrowth_{i,t}$ represents the growth rate of GDP per capita, $GDP_{i,t-1}$ represents previous year’s level of GDP (included to assess the potential income convergence), $capital$ represents gross capital formation, $partner$ represents trade partner’s GDP growth rate, $tradetogdp$ represents volume of trade as percentage of GDP and GL represents Grubel-Lloyd index. We estimate the equation (1) using fixed effects, and test for the redundancy of the effects. Then we use Hausmann test in random effects specification of equation (1) to distinguish whether the idiosyncratic part of the country specific effect can be viewed as uncorrelated with the explanatory variables.

3. Results

Figure 1 depicts the trade weights (the importance of trade partners) in 2011 for individual sample period for the given countries. For most countries, these weights were relatively stable during the sample period (with difference between maximum and minimum being below 5 percentage points in most cases).

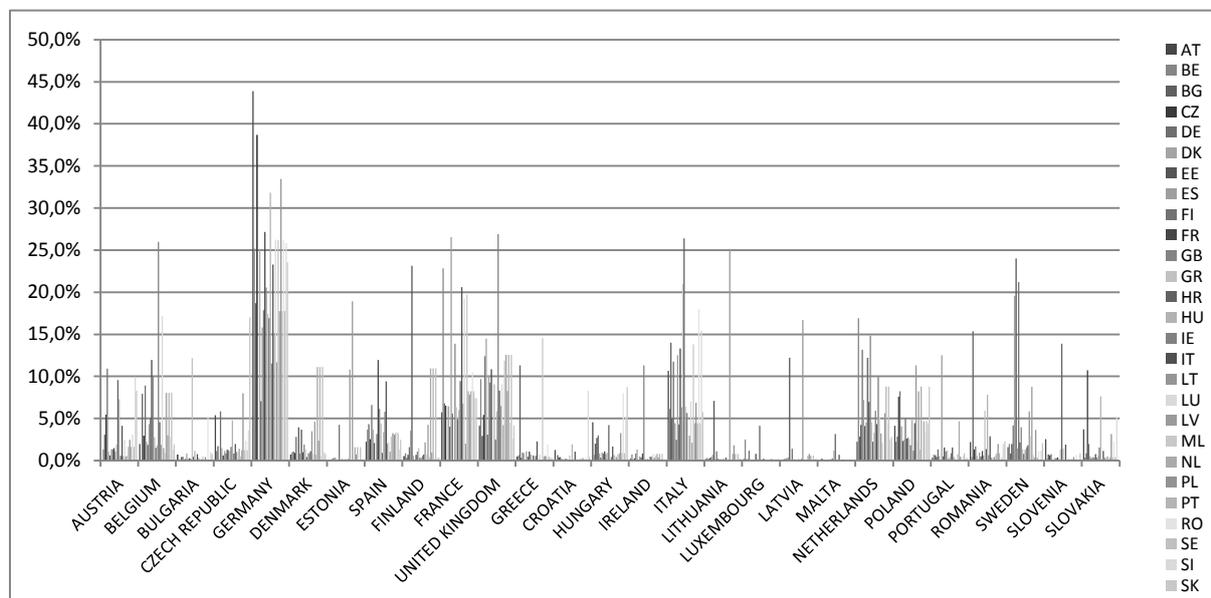


Figure 1: weights of trade partners, 2011

The Levin-Lin-Chu (2002) and Breitung (2005) common unit root test results are summarized in Table 1, indicating no common unit root processes for all series (apart from the excepted result regarding the level of GDP). As follows from

Table 3, regarding the results of random effects consistency test and fixed effects redundancy tests, the fixed effects estimator is preferred.

Table 1: Unit root test results, P-values

	Levin-Lin-Chu	Breitung
<i>GDPgrowth</i>	0.000	0.000
<i>partner</i>	0.000	0.000
<i>GDP</i>	0.119	0.999
<i>REER</i>	0.001	0.001
<i>capital</i>	0.000	0.004
<i>tradetogdp</i>	0.000	0.000
<i>GL</i>	0.000	0.031

For comparison purposes, we provide the results of multiple model specifications, i.e. with restrictions to zero on some of the explanatory variables' coefficients in Equation (1). These restrictions were applied to allow for more parsimonious representation. All of the estimated specifications indicate the elasticity of the domestic growth with respect to trade partners growth is around 0.85-0.99 and the trade partners' growth is highly significant.

Table 2: regression results, coefficient values, p-values in parentheses

	1 no interaction terms	2 openness interaction	3 openness and GL interaction	4 no conv. + openness interaction	5 no conv. + openness and GL interaction	6 “5” with sequential elimination
<i>const</i>	7.184 (0.161)	7.111 (0.165)	7.040 (0.162)	1.032 (0.113)	1.692 (0.011)	1.445 (0.003)
<i>partner</i>	0.989 (0.000)	0.959 (0.000)	0.819 (0.000)	0.961 (0.000)	0.819 (0.000)	0.850 (0.000)
<i>log(GDP)</i>	-0.754 (0.214)	-0.726 (0.231)	-0.640 (0.283)			
<i>REER</i>	-0.006 (0.344)	-0.006 (0.390)	-0.005 (0.468)	-0.011 (0.039)	-0.009 (0.074)	-0.011 (0.017)
<i>capital</i>	-0.022 (0.150)	-0.023 (0.132)	-0.022 (0.153)	-0.033 (0.014)	-0.030 (0.021)	-0.027 (0.033)
<i>tradetogdp</i>	-0.001 (0.878)	-0.001 (0.714)	-0.002 (0.624)	-0.004 (0.267)	-0.004 (0.237)	
<i>GL</i>	3.573 (0.025)	3.220 (0.047)	1.119 (0.509)	2.281 (0.107)	0.266 (0.859)	
<i>tradetogdp</i> <i>* partner</i>		0.000 (0.206)	0.000 (0.129)	0.000 (0.191)	0.000 (0.119)	
<i>GL</i> <i>* partner</i>			0.354 (0.001)		0.359 (0.001)	0.362 (0.000)
Effects specification	<i>Cross-section fixed effects</i>					

Table 3: fixed and random effects tests, by specifications

	1		2		3	
	Test statistic	P-value	Test statistic	P-value	Test statistic	P-value
<i>Fixed effects (Redundancy tests)</i>						
Cross-section F	5.38	0.000	5.23	0.000	5.77	0.000
Cross-section Chi-square	123.12	0.000	120.61	0.000	131.25	0.000
<i>Random Effects (RE consistency)</i>						
Hausman Test	17.36	0.008	16.39	0.022	21.35	0.006
	4		5		6	
	Test statistic	P-value	Test statistic	P-value	Test statistic	P-value
<i>Fixed effects (Redundancy tests)</i>						
Cross-section F	13.37	0.000	14.22	0.000	18.87	0.000
Cross-section Chi-square	249.53	0.000	261.16	0.000	313.99	0.000
<i>Random Effects (RE consistency)</i>						
Hausman Test	21.30	0.002	27.16	0.000	24.79	0.000

The most notable result is the indication that the structure of the trade is an important factor for the elasticity of domestic growth with respect to trade partners' growth. Surprisingly enough we find the trade openness is not as important as previously claimed in the wide body literature. The trade openness appears to be significant only after we omit the partner growth and GL index from the model! As indicated in more or less all our specifications (but most prominently in model specifications 5 and 6) the GL index influences the domestic growth rate. With the mean value of GL index 0.435, we can see that the shift towards more intra-industry trade slightly boosts the effect of the trade partners' growth on the domestic growth.

This result is consistent with our expectations based on the new trade theory and supports the conclusion of Shin (2008), regarding easier shock transmission.

4. Discussion and Conclusions

Our results show several interesting facts. First of all, the trade openness is not as important as previously claimed in the wide body literature – it seems the reason was omitting the partner growth from the estimates. Including it in our estimates, we confirm the significance of the trade partners' growth for domestic growth. The elasticity around 0.85 found in our sample is even higher than what was reported e.g. in Arora and Vamvakidis (2002), especially if we consider the additional influence of the structure of trade, further boosting this value roughly by 0.15 (refer to specification 6 for detailed results). In general this means that the increase of the intra-industry trade slightly boosts the economic growth. This might be the indication of more efficient use of country specific competitive advantages in certain productions and speaks in favor of the internationalization of production supply chains.

If we take into the account the number of observations (338) and consider the 1% level of significance as appropriate, we might argue that for this elasticity, given our sample, the structure of the trade is the most significant factor.

In light of our results, two main recommendations arise. First, the inclusion of the trade partners' growth measure overtakes the significance of the trade openness measure. Second, the consideration of the trade structure, so far neglected in the literature, seems to be a valid extension of the model and hence a fruitful area for further research. It is noteworthy that the presence of fixed effects indicates there are other, unobserved country-specific effects influencing the estimation. Even though we have included the control factors that might be influential from the traditional viewpoint, there is still something missing. The heterogeneity of trade factors across the group will probably be the culprit, especially if we consider the potentially significant tariff and non-tariff trade barriers. The values of fixed effects indicate this might be especially significant for countries like Bulgaria, Estonia, Latvia, Lithuania and Romania (with large positive effects) and Luxembourg, Ireland and Spain (with large negative effects).

In further extension of this research, the inclusion of wider group of trade partner countries and reliable measure of tariff trade barriers would probably be highly beneficial.

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Importance-Performance Analysis in the Context of Quality Management of Tourist Information Centres

Kateřina Ryglová¹, Ida Vajčnerová², Šárka Stojarová¹,
Martin Prokeš¹ and Eva Skálová¹

¹*Department of Marketing and Trade, Faculty of Business and Economics, Mendel
University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail:
katerina.ryglova@mendelu.cz*

²*Department of Management, Faculty of Business and Economics, Mendel University in
Brno, Zemědělská 1, 613 00 Brno, Czech Republic*

Abstract

The paper presents the applicability of the IPA method (Importance-Performance Analysis) in the process of managing/supervising the service quality of tourist information centres (TIC). TIC are important components of destination promotion and their qualitative level can have a significant impact on prolonging the time of a visitor's stay and the level of expenses in a destination. The bi-dimensional model of IPA is used for measuring the importance and the output of individual variables that have an influence on service evaluation. This analysis helps identify the prior or less important service attributes and also determine the critical areas that require more attention. The paper demonstrates the practical application of IPA for TIC in the Czech Republic. The input data were gained by means of field research that used a quantitative questionnaire survey. Graphically processed results show rather a positive situation when the most of important quality factors are found in the quadrant of optimal situation, i.e. the items characterized by high importance as well as high output. The highest importance was assigned to the item of “helpful/obliging approach to a customer” and the highest output to “the overall impression of IC”. In conclusion, the authors discuss the advantages and disadvantages of the used IPA method in the context of other methods.

Keywords: Importance-Performance Analysis, tourist information centre, quality factors, quality evaluation

1. Introduction

The area of tourism has recently been expanding considerably, which brings benefits to economic, political as well as social spheres of each country. Tourism employs more and more people and becomes an inseparable part of a social and modern life for most inhabitants. So, for the Czech Republic tourism is also a highly interesting and prospective branch of the service sector. The quality of services in the Czech Republic is still one of the areas that show significant deficiencies and that is why nowadays the quality is one of the priorities of the Conception of state politics for tourism for the period of 2014–2020.

The present trends confirm continually increasing requirements for quality. It is necessary to be aware of the fact that quality in tourism does not concern only one service but the whole range of interlinked services – supply chain; we talk about so called process of providing a service. In the context of destination management the destination is considered to be the product of tourism where the linkage of products, services, natural resources, artificially created attractions and information occurs. Due to this fact it is possible for the destination to arouse interest of many visitors (Bieger, 1996). So, quality in tourism is a complex question and thus it has to be ensured by all co-authors of the supply chain; at the same time these service providers also have to feel responsible for the quality. Understanding not only the specific features of tourism services but also the decision-making processes and psychological aspects of tourism participants are the starting line for planning and managing quality. The selection and purchase of services itself is a part of the initiating phase of this process, the result of which is influenced just by the availability and quality of information on the destination. So, the professional performance of Tourist information centre (TIC) is a part of quality in this stage of the chain – it is an indispensable element of destination management providing not only information services to the visitors of the destination but it also participates significantly in realizing the communication mix of the destination, collecting important statistical data from customers for the support of destination managers' decisions and it is also involved in mediating the communication among the subjects of private and public sectors. The comprehensiveness and trustworthiness of the information is of a high priority, in case of incoming a perfect translation into the corresponding language is inevitable.

According to the CzechTourism agency in the Czech Republic there are more than 600 information centres providing complete information service and the services connected with satisfying tourism needs in the places of their operation. The united classification of tourist information centres (TIC) in the Czech Republic is the only contemporary classification system if TIC certification. The certification itself began in 2013. The possibility of certification is available not only for the members of the professional association ATIC ČR but also for other applicants without membership.

The main activity of TIC is providing information free of charge. Additional activities can be offered against payment – these are for instance selling souvenirs, guide services, ticket sales, organizing trips to surroundings, exchange office services and others. TIC services are used not only by visitors but local inhabitants, too. As it was mentioned above, TIC is a significant part of the destination promotion and its qualitative level can have a great impact on prolonging the time of a visitor's stay, the level of expenses in the destination or increasing the local inhabitants' demands on tourism services.

Evaluating the quality of services is a frequently discussed issue and the whole range of authors continually devote their researches to searching an optimal methodology for

evaluating quality in individual areas of services. Importance-Performance Analysis (IPA) and Gap analysis rank among those methods that are often used as well as frequently discussed in professional literature. Gap analysis uses the SERVQUAL tool when in practice gap 5 is analyzed the most often, i.e. the contradiction between a client's/guest's/visitor's expectations and his/her real perception of the provided service level.

IPA is a tool for identifying the relative importance and performance of individual factors that have an impact on the monitored quality. For the first time this method was introduced in the work of Martilla and James (1977) and it is a basic diagnostic and decisive tool (Johns, 2001; Matzler et al., 2003) that facilitates the identification of factors with the highest priority for improvement (Sampson, Showalter, 1999) and according to Levenburg and Magal (2004) also the mobilization and development of the most required sources.

Despite the fact that IPA is a frequent subject of polemics concerning the practical problems of its utilization, such as for example determining measurable variables, direct or indirect importance measurement, constructing the IPA graph, statistical data treatment (Oh, 2001; Bacon, 2003; Abalo et al., 2007), the authors come to an agreement in their conclusions and recommend this methodology as a suitable research tool for the area of hospitality and tourism industries. In one of the latest researches Azzopardi and Nash (2013) subjected IPA to a critical analysis and on the basis of analyzing more than forty authors' works from the period of 1977–2007 they claim that despite its certain deficiencies IPA is recommended and utilized in the area of tourist services as a method that is relatively easily applied in empirical studies.

The basis of the Gap analysis is the presumption that the basic contradiction (gap 5) between the perceived and expected quality is the basic function of partial contradictions that emerge during the process of service creation. This model is oriented to the service as well as to the customer. The first contradiction (gap 1) emerges between customers' expectations and the management's ideas of these expectations. The second contradiction (gap 2) appears between the management's opinions of what customers expect from the service and the standards defined for providing the service. The third contradiction (gap 3) can emerge as the difference between the defined standards and real service provision. The fourth contradiction (gap 4) appears when the company does not provide its service in the level it promises. SERVQUAL, the tool of the Gap analysis, enables to evaluate quality on the basis of the difference between the consumer's expectation and perception. As the basic dimensions of service quality from the customer's point of view it evaluates the reliability, assurance, responsiveness, empathy and tangibles of the service. Individual dimensions are awarded different importance (Parasuraman et al., 1988).

The original concept evaluates 22 factors by means of the seven-stage Likert scale; responders express their expectations and evaluations of the reality for each factor. SERVQUAL provides the management with clear information on the customer's service perception. It helps determine the priorities of the customer's needs, wishes and expectations and identify the areas of discrepancies (Kandampully et al., 2001). In spite of its broad utilization SERVQUAL has often been criticized especially due to the validity, reliability and dimensional structure (Carman, 1990; Babakus, Boller, 1992; Teas, 1994).

2. Methodology and Data

The objective of the paper is to present the results related to the IPA application in the process of managing and controlling the service quality of tourist information centres. The partial goal was to evaluate the present level of quality and then to identify priority and critical factors of TIC quality in observed regions. The input data was obtained by means of a field-research in selected regions of the Czech Republic with the help of a quantitative questionnaire research. The responders/clients of 35 tourist information centres received the series of questions concerning individual factors of quality; on the 5-stage scale the importance of each factor was investigated and on the 4-stage scale the level of satisfaction with the specific factor quality performance was surveyed. The foundations for selecting the factors were the original models developed by Grönroos (1984) and Parasuraman et al. (1985). The selection set was created by 1113 visitors of TIC in the Liberecký, Pardubický and Středočeský regions – including Prague. These are regions with the highest, middle and the lowest presence of tourists in the Czech Republic.

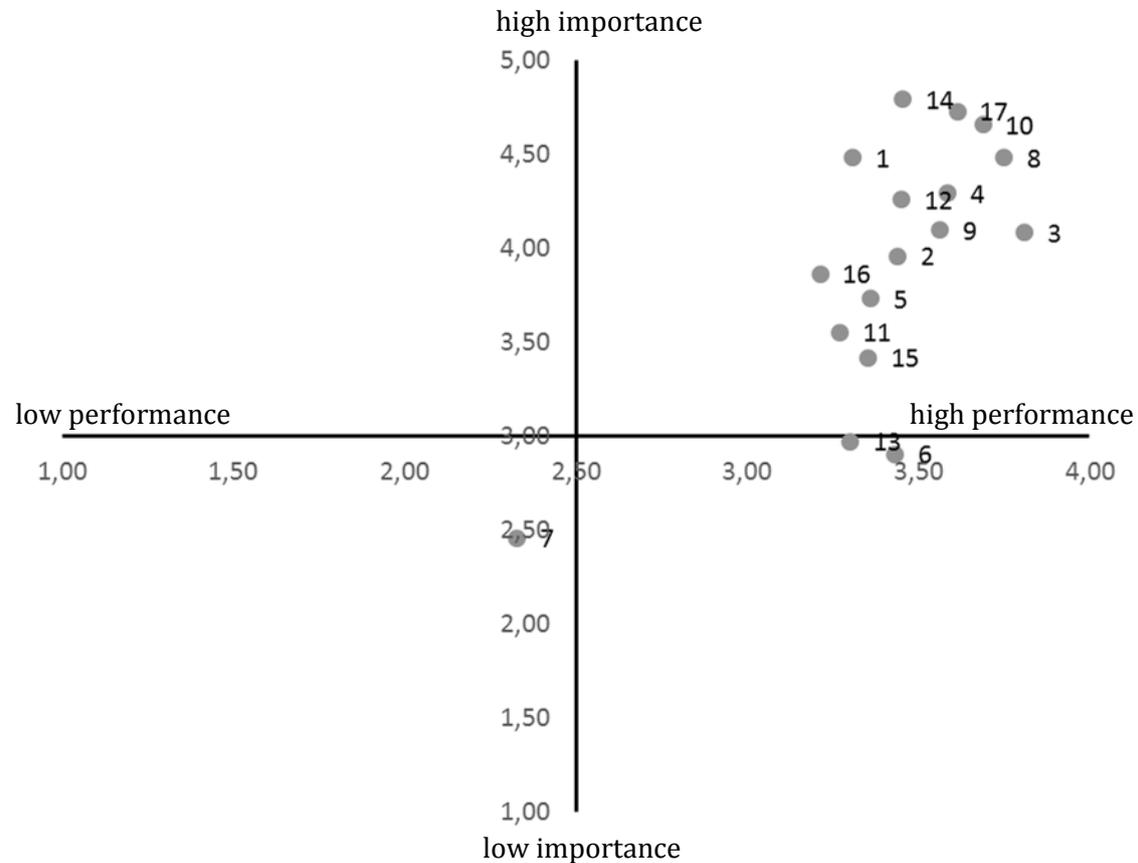
The results of IPA are presented in the form of the two-dimensional graph depicting the values of average importance on the vertical axis and those of average performance on the horizontal axis. The axes divide the graph into four quadrants and according to the factor placement in each quadrant consequent managerial decisions leading to service quality increase can be derived. The evaluated quality factors can then be divided into the following four categories (Wong, Hideki, George, 2011):

1. Factors with performance deficits (Performance Shortfalls/Concentrate here): these factors are characterized by the high importance and low performance, i.e. these factors are important for the client but their present level is not sufficient. So, the factors in this group have to be paid the priority attention leading to increasing their level.
2. Optimal factors (Key Features/Keep up the Good Work): these attributes are attached high importance to and at the same time they are evaluated by clients very positively. It is inevitable to continue in the current work with the factors so that any negative change in evaluating performance level is avoided.
3. Low priority factors: the group of factors with a low importance for the client accompanied by a low performance. Due to the low importance of the factors their low level of performance does not represent any threat to the organization.
4. Strategic Overkill/Possible Overkill: factors in this group are characterized by their low importance and high performance. The fact that the factors appertain to this management category signalizes excessive care for the factors not important for clients.

3. Results

The results of evaluating quality of tourist information centres by means of IPA in the selected regions of the Czech Republic are summarized in the following graph (figure 1). The most of quality factors can be found in the top right-hand corner that is characterized by high importance as well as high performance. The factors that were defined as the most important for the client were the following:

- obliging approach to the customer,
- the ability to provide advice,
- the good knowledge of the region, professional qualification of the staff,
- the signposts guiding towards the information centre,
- meeting all the client's requirements.



1. Signposts guiding to the IC
2. Suitability of the IC location
3. Overall impression of the IC environment
4. Free accessible promotion materials
5. Souvenirs, postcards, regional products sold
6. Staff trimness
7. Providing other activities not related to tourism
8. Meeting all your requirements
9. Providing additional advice, recommendations and other information
10. Good staff's knowledge of the region and their professional qualification
11. Professional behaviour and performance of the staff
12. Staff's communicative and verbal skills
13. Empathy, the staff's ability to empathize with your situation
14. Obliging approach to the customer
15. Gaining the staff's immediate attention on your arrival
16. Speed and readiness of the staff
17. Ability to give advice

Figure 1: The results of evaluating TIC quality in the selected regions in the Czech Republic by means of IPA (source: adapted according to Crhová, 2015)

The best evaluated factor was “the overall impression of the information centre” that is considered to be weaker as to the importance from the position of the client. From the position of quality evaluation, the information that three most important factors rank

among those five which are the best evaluated appears to be really important. Two factors (empathy, staff trimness) can be found in the quadrant of so called surplus attention (Wong, Hideki, George, 2011); these are factors with high performance but low importance for the clients. The results concerning the factor of empathy can be distorted by the fact that some responders can confuse this factor and understand it as the part of the important factors nr. 14 or 17. In the bottom left-hand quadrant there is the factor of “ensuring other activities not related to tourism” which can be characterized by low performance but also low importance. This item is not important for the customers so this low evaluation does not endanger perceiving the quality of the information centre in any significant way. The situation in the critical top left-hand corner appears to be very favourable as it is characterized by high importance and low performance – no factor appears there.

4. Discussion and Conclusions

On the basis of the results mentioned above (see figure1) we can state that the quality level of information centres in the selected regions measured by means of the IPA analysis is very high. However, it is necessary to consider the fact that evaluating quality only by means of the IPA score that is calculated as the difference between performance and importance is not very illustrative as according to the score we cannot clearly distinguish the situations when customers highly evaluate the factor that is not very important for them or when they are not satisfied with the attribute that is important for them. So, for the managerial decisions it is more suitable to use graphical displaying of the IPA results (see figure 1). According to the research conducted by Bacon (2003) and confirmed by Azzopardi, Nash (2013) it is more precise to interpret the results when the axes of the graph are determined according to mean values of importance and performance measurement. In our case, due to the extreme values of the factors 7, 13, 6, these mean values were not used for determining the axes in graph 1.

Figure 1, as it was mentioned above, suggests very positive evaluation of TIC service quality; however, it does not provide us with any information on the client’s satisfaction with partial quality factors. This deficiency is overcome by the SERVQUAL tool that enables to reveal the gap between the client’s expectation and perception of the real service. The SERVQUAL score can be then calculated not only for partial quality factors but also for the main dimensions of quality (see figure 2). Figure 2 shows not only the classical SERVQUAL score but also the weighted score that takes the importance of individual quality factors into consideration. The positive values of the displayed scores imply that in case of all dimensions the real perceived value (performance) was always higher than the client’s expectation. The increasing value of the score shows the increasing difference between performance and expectation, i.e. the performance exceeded the expectation the most in case of the dimension concerning responsibility; on the second place it was in case of empathy.

In the table 1 we can see that some quality factors reached negative values, which means that expectations in case of these factors were not fulfilled. The biggest problem can be seen even at the very first factor (signposts guiding to IC) that ranks among the five most important factors for the clients – this is very essential information for the IC management; then factors 14 and 4 appear to be problematic.

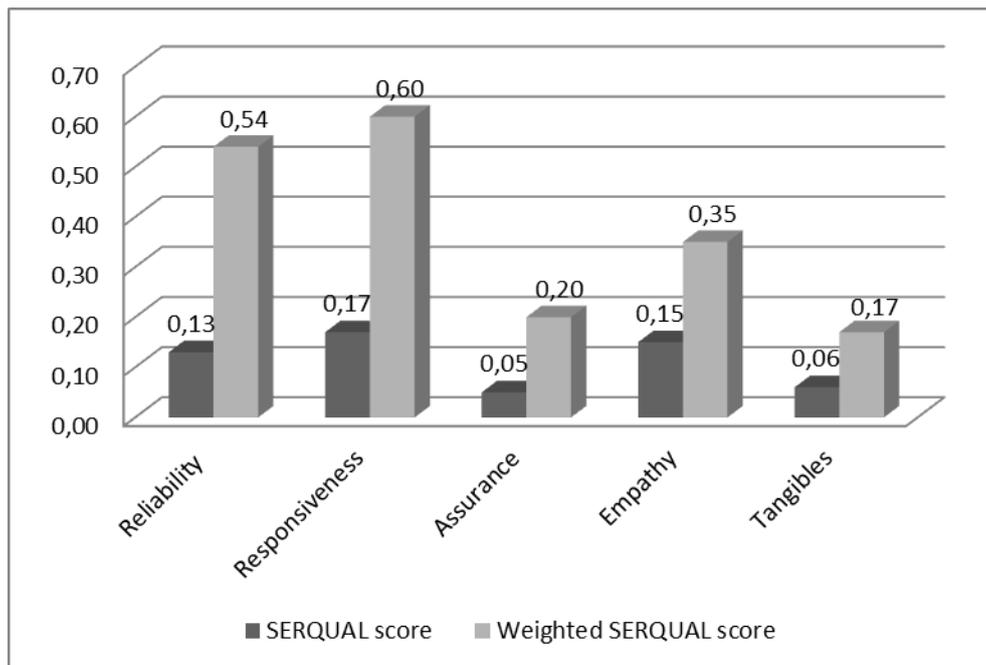


Figure 2: The results of evaluating TIC quality in the selected regions in the Czech Republic by means of the SERVQUAL score (source: adapted according to Crhová, 2015)

Table 1: The values of the weighted SERVQUAL score for the partial factors of TIC quality

Number	Factor	Weighted SERVQUAL score
1.	Signposts guiding to IC	-1.63
2.	Suitability of IC location	0.24
3.	Overall impression of the IC environment (the appearance of indoor premises, cleanness...)	1.50
4.	Free accessible promotion materials (amount, quality)	-0.21
5.	Souvenirs, postcards, regional products sold (amount, quality)	0.17
6.	Staff trimness	1.26
7.	Providing other activities not related to tourism (e.g. refreshments, WC...)	-0.12
8.	Meeting all your requirements	-0.14
9.	Providing additional advice, recommendations and other information	1.23
10.	Good staff's knowledge of the region and their professional qualification	-0.13
11.	Professional behaviour and performance of the staff	0.36
12.	Communication and verbal skills of the staff	0.37
13.	Empathy, the staff's ability to empathize with your situation	1.12
14.	Obliging approach to the customer	-0.41
15.	Gaining the staff's immediate attention on your arrival	1.37
16.	Speed and readiness of the staff	0.31
17.	Ability to give advice	0.11

For the consideration of the dimensions importance the resulting order changes, i.e. that for example the dimension of reliability comes to the second place and empathy to the third. For better understanding of the stated results it is also good to explore the values of the weighted score for each quality factor (see table 1).

In case of factors 1, 14 and 4 (table 1, figure 1) the big difference in evaluating quality by means of various methods can be seen. All these factors that are important for the client were evaluated by rather a high performance during the IPA implementation (see figure 1) but at the same time they did not meet the client's high expectations, which leads to the contradiction/dissatisfaction with the given factor (see table 1). Nevertheless, this important information is not provided by the IPA analysis.

The advantage of SERVQUAL lies in including expectations that are not considered by IPA. It is seen at first sight which attributes do not meet the customer's expectations. The weakness of this method is especially its realization stage related to demanding data collection due to the complexity and length of the questionnaire. The biggest contradiction emerges between the supporters of the opinion who see measuring the quality of services as the contradiction between the customer's expectation and the provided services – this opinion is presented by Parasuraman, Zeithaml and Berry (1988) by means of SERVQUAL – and the critics of this method who recommend using the evaluation of performance only. Cronin and Taylor (1992) and Brown, Churchill and Peter (1993) rank among the strongest critics of SERVQUAL with their opinion that performance is the measurement method which explains the customer's service quality perception in the best way, so expectation should not be included in measurements. The authors Augustyn, Seakhoa-King (2004) are critical about the potential and limitations of the SERVQUAL scale in measuring the quality of services in tourism and they state that the SERVQUAL scale is necessary but insufficient for quality measurement.

The mentioned results presented the possibility to evaluate the quality of tourist information centres by means of the IPA analysis the utilization of which can be recommended especially with regard to the easy accessibility of input data and the possibility to express the results illustratively in a graphic way. For more detailed analysis of results with regard to the specific impact in quality management it seems more sensible to use SERVQUAL for determining the weighted gap score for individual quality factors; or to use the differential score only on condition that only the factors that are important for the client enter the research. For the practical usage it would be also interesting to follow the dependency of the results on a specific region, or the type of an information centre (private/contributory) and the type of a client (home/foreign) – this is a part of other planned analyses. The results that are related to the specific IC are then important for the information centre management – nevertheless, this is not the part of the research.

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Freelance Work and Retirement: Does Czech System Need a Nudge?

Jan Řezáč¹

¹Department of Public Economics, Masaryk university, Faculty of Economics and Administration, in Brno, Lipová 41a, 602 00, Czech Republic, e-mail: jrezac@mail.muni.cz

Abstract

Under the Czech pension system employees with an average salary get a net replacement rate of around 50%. The self-employed (OSVC) are subject to different rules and with the same disposable incomes are than eligible to a lower replacement rate. Even though this difference stems from lower taxation and is partially intended, Czech OSVC lack experience and may expect their pensions to be comparable with their employed peers. This paper analyses the structure among self-employed, assesses reasons motivating citizens to become self-employed, and examines how steep is the decrease of income for self-employed in retirement.

Keywords: pensions, self-employed, replacement rate

1. Introduction

1.1. Motivation

There is a considerable body of research concerning retirement of employees, but retirement behavior of self-employed received comparably less attention (Parker, Bruce). Increased understanding of self-employed retirement behavior might be needed for setting efficient institutions and regulations which will have two conflicting goals. Laws have to provide retirement entitlements which self-employed deem sufficient (Dawson, 2009) and do not encourage self-employed to quit their economic activity due to high taxation (Haigner, 2013, Gurley-Calvez, 2013). Sociological research in the Czech Republic (Večerník, 2011, Vidovičová, 2014) suggests current framework for self-employment might not be succeeding in its first goal.

1.2. Historical Background

Since the second half of the 20th century a majority of Czech workers did not have to do any choices regarding their retirement. State mandated tax on employee earnings provided funds which in a Pay-As-You-Go system were redistributed to the people who

reached retirement age. Due to a favorable demographic situation, the state was for a long period of communist rule able to maintain very advantageous rules, pushing the retirement age below 60, with even better conditions for women. After 1989, democratic government focused its attention on privatization and reforms necessary for EU entrance, and left pension system largely alone, with some minor adjustments such as retirement age postponement. This development gives the Czech Republic a legacy of very egalitarian pensions. According to the OECD (2014), only 3.7% of those over 65 are at the risk of poverty¹, one of the lowest in the world.

The only development in pensions that caught public attention was the introduction of the second, capital based pillar. There were no comparable information campaign regarding significant changes introduced since the 1991 (there were in total 105 changes to laws regarding the self-employed), which include infinite raising of the retirement age (under current legislature, people born this year go to retirement at the age of 73, and there is no limit on increasing, or retirement calculation differences for freelance workers).

The current trends make it unlikely there will be a decrease in the number of self-employed. This paper presents current numbers of self-employed and European trends regarding the potential changes in the numbers of self-employed. Besides this, it uses OECD methodology to assess financial resources for the self-employed people in the Czech Republic available to them in their retirement.

2. Material and Methods

2.1. Definition of a Freelance Worker

As Večerník (2011) puts it, there is no uniform definition of the self-employed in the Czech Republic: tax legislation, social legislation, statistical evidence and industrial policy treat this category differently. In this paper, terms “freelance worker”, “self-employed” and “OSVC” are used interchangeably. Czech regulators define who is an OSVC in the law 155/1995.² According to the law, OSVC is a person who has finished compulsory school attendance, reached a statutory age of 15 years and carries out economic activity. The law also distinguishes between main and side economic activity. Since the goal of this paper is to discuss retirement planning and self-employed with only side economic activity may likely have another source of retirement benefits (such as regular employment or maternity leave), only self-employed with the self-employment as their main source of income will be involved in the following analysis.

2.2. Calculation of Retirement Income

There are many aspects influencing retirement benefits, and this paper used simplified methodology to compare employees with self-employed. It used calculations based on individual with no special conditions, 40 years of work and different income levels and assessed how much was she supposed to pay in social insurance and how the contributions reflect her retirement benefits and replacement rate.

¹ An income less than 50% of median equivalised household disposable income (OECD definition)

² Further information whether a person fits a description of a freelance worker is available in Income Tax Law, § 7 and 8.

For exact numbers were used databases available from the Czech Social Security Administration (CSSA). An important difference between employee and self-employed is that a self-employed person is entitled to use half of the income as the basis for social security calculation (up to a minimum and a maximum), while an employee must use the full income, resulting in a higher basis for social security calculation.

2.3. Freelance Workers Statistics

In the Czech Republic it is CSSA which collects social insurance and administers distribution of retirement benefits. It is therefore in position to collect relevant statistics regarding the numbers of the self-employed contributing to the PAYG system. The CSSA is however reluctant to provide the data it collects, even aggregates. The data regarding the self-employed had to be collected also from different sources such as Labour Force Survey (2013) or EU-SILC.

For data about European countries collects Eurostat information from national agencies, including NACE activities classification. International comparisons might also be done by using OECD and World Bank statistics (Holzmann, 2008). United Kingdom has the most thorough and accessible statistics and research based on them (Bell, 2013, Parker, 2007) can serve as a framework. UK sources also studied tradeoff between low taxes entrepreneurial activity and high taxes for good retirement benefits (Bruce, 2002). CEE countries were studied and compared in e.g. Dutz (2013).

3. Results

3.1. Numbers of Self-Employed

Table 1: Number of Freelance Workers in the Czech Republic. Source: Author, based on CSSA data

Year	Self-employed (Main Economic Activity)	Paying social insurance	Paying social insurance voluntarily
2005	651 205	651 205	8 407
2006	631 657	631 657	8 219
2007	632 963	632 963	7 680
2008	638 369	638 369	6 835
2009	648 941	648 941	5 094
2010	640 406	640 406	4 807
2011	649 990	649 990	4 479
2012	627 596	627 596	5 166
2013	602 395	602 395	4 828

The number of self-employed remained stable during the last decade. Vast majority of self-employed pays social insurance. Only a small percentage of OSVC for who is social contribution not mandatory pays social insurance.

In the most representative and up to date survey on the status of Czech self-employed the participants showed three quarter of OSVC keep their contributions at a law required minimum. It is probable the percentages are not cumulative and those who have one additional form of savings are likelier to have another, leaving a large segment of self-employed population dependent on the PAYG pension. There was also a stark decline in every form of additional insurance product since 2006.

Table 2: Self-Employment in the Visegrad Countries (thousands). Source: Eurostat

	2008	2009	2010	2011	2012	2013
Total – All NACE activities						
Czech Republic	752	771	808	826	843	802
Hungary	447	445	441	429	421	407
Poland	2 854	2 863	2 842	2 864	2 830	2 775
Slovakia	330	365	365	365	356	358
NACE_R2 Manufacturing						
Czech Republic	86	79	89	99	95	93
Hungary	40	41	43	37	33	35
Poland	169	170	166	161	165	177
Slovakia	36	36	41	43	40	42
NACE_R2 Construction						
Czech Republic	179	186	179	172	173	163
Hungary	62	58	57	54	48	46
Poland	240	271	279	272	272	270
Slovakia	99	114	112	109	104	96
NACE_R2 Wholesale and retail trade; repair of motor vehicles and motorcycles						
Czech Republic	139	135	127	132	141	133
Hungary	98	94	89	84	85	80
Poland	493	475	477	480	464	455
Slovakia	50	59	59	58	54	54
NACE_R2 Arts, entertainment and recreation						
Czech Republic	18	18	18	20	20	17
Hungary	11	9	11	10	11	10
Poland	21	18	21	21	16	19
Slovakia	5	5	4	4	5	6
WSTATUS Self-employed persons with employees (employers)						
Czech Republic	175	180	173	170	160	159
Hungary	195	197	204	196	196	196
Poland	629	637	637	637	629	632
Slovakia	77	80	82	81	69	72

There is undoubtedly a difference between entrepreneurs who use self-employment as an advantageous, bureaucracy limiting form of business, and lowly qualified workers who move into self-employment in order to reduce their tax burden. The Czech Republic has roughly the same population-to-self-employment ratio as Poland and Slovakia. It has also much higher proportion of self-employed workers in wholesale, manufacturing and especially construction, and lower proportion of self-employed persons with employees.

3.2. Retirement Income

As there is no separate statistics on the pensions of self-employed, Figure 1 displays newly admitted pensions for self-employed and employees (there are no differences regarding the source of income. Even though the median pension in the Czech Republic was 10 851 Kč and average 11 498 Kč according to CSSA, newly admitted pensions are

higher. The median is 12 512 Kč and the average 13 620 Kč. The increase reflects higher salaries of those currently retiring, which made their basis for benefits and tax calculation go up.

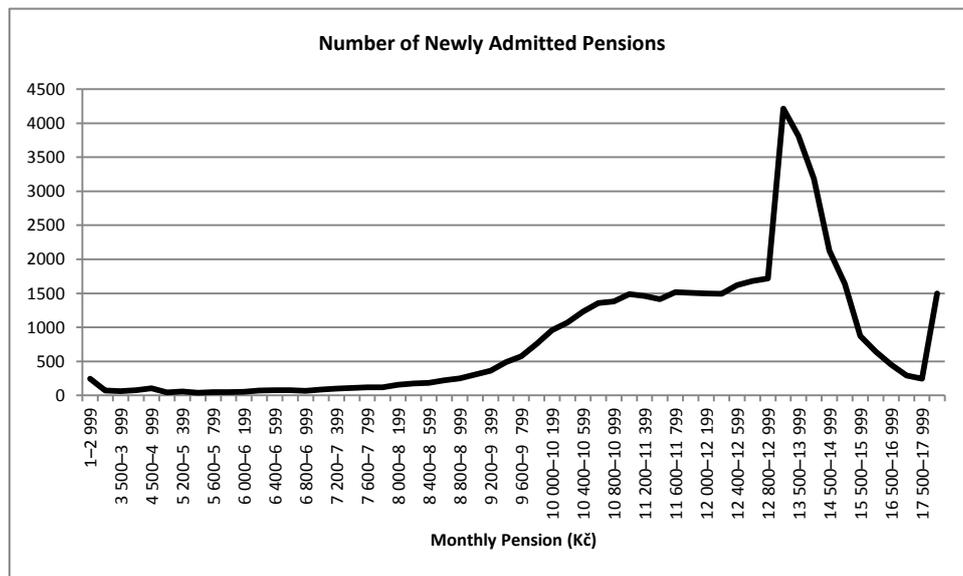


Figure 1: Newly Admitted Pensions, source: CSSA

OECD provided data on replacement rate show a decreasing replacement rate for different groups of earners. The replacement rate remains however high compared to other European countries, the number even for high earners is above 50%.

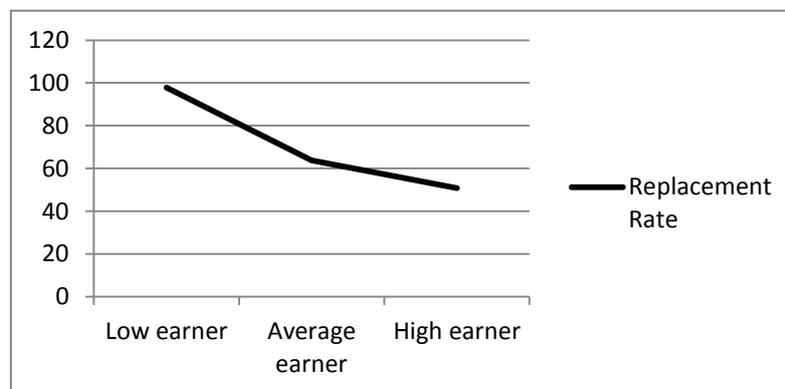


Figure 2: Net Replacement Rates (%), source: OECD

Persons on the same line, whether self-employed or employees, have the same living standard, as the column “monthly salary” equals self-employed yearly income divided by twelve. The difference between their expected retirement incomes can be traced back to basis for retirement calculation, as self-employed are able to subject only half of their before tax income to social security. Due to this there is a clear difference between replacement rates of a self-employed and an employee.³

³ Replacement rates are lower in Table 4 than in Figure 2. OECD used net replacement, whereas in Table 3 are gross replacement rates.

Table 3: Expected Retirement Income (simplified calculations). Source: Author

Self-Employed Yearly Income (Gross)	Basis for Retirement Calculation	Self-Employed Monthly Pension	Replacement Rate	Employee Monthly salary (Gross)	Employee Monthly Pension	Replacement Rate
100 000 Kč	6 285 Kč	6 101 Kč	73%	8 333 Kč	7 404 Kč	101%
200 000 Kč	8 333 Kč	7 330 Kč	44%	16 667 Kč	10 200 Kč	75%
300 000 Kč	12 500 Kč	9 344 Kč	37%	25 000 Kč	11 499 Kč	60%
400 000 Kč	16 667 Kč	10 019 Kč	30%	33 333 Kč	12 800 Kč	51%
500 000 Kč	20 833 Kč	10 694 Kč	26%	41 667 Kč	14 100 Kč	46%
600 000 Kč	25 000 Kč	11 369 Kč	23%	50 000 Kč	15 339 Kč	42%
700 000 Kč	29 167 Kč	12 044 Kč	21%	58 333 Kč	16 700 Kč	40%
1 000 000 Kč	41 667 Kč	13 510 Kč	16%	83 333 Kč	20 600 Kč	35%

4. Discussion and Conclusions

A biggest asset to research on self-employment and their retirement behavior would be a more thorough statistics, which would separate their pension payments from those of the employees. As such data is not yet available, this paper summarized up to date research to answer the question stated at the beginning: Can freelance workers expect lower pensions than employees?

In the text were provided two arguments which increase the likelihood of yes answer. First, there is a large part of self-employed who are in NACE classified industries with low salaries such as construction. This ratio is almost two times higher than in other Visegrad countries. Low income and low social security payments result in low pensions. Again, an exact income is difficult to calculate because possible sources (Vlach, 2012, EU – SILC) produce different results due to methodology differences.

Second, persons with the same disposable income have different basis for retirement calculation. Calculations in Table 4 are only approximates, as it disregarded individual differences which might cause different pension levels and replacement rates. However the difference caused by a lower basis remains clear.

It is possible that self-employed underreport their earnings. Some studies suggest they underreport their earnings by numbers as high as 30% (Hurst, 2010). There is however no guarantee that possible underreported income is saved in order to provide an efficient source of savings. Survey conducted by Vlach (2012) observes a substantial decrease in most forms of savings. One likely cause is that households reduced their savings to keep their standards of living during crisis years.

The goal of this paper was to gather available data to come to a preliminary answer and further research is needed. A last hint that the topic is important: the private sector is already realizing the self-employed are in worse position than employees. Search on “OSVC” + “retirement” returns dozens of websites with claims of extremely low pensions for self-employed with links to high returns investment options. Better information and data could improve the chances of self-employed to prepare for their retirement adequately.

Acknowledgements

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This paper is based on data from Eurostat, EU Labour Force Survey and EU Statistics on Income and Living Conditions (2013):. The responsibility for all conclusions drawn from the data lies entirely with the author.

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Loan Amortization and Linear Difference Equations

Dana Říhová¹ and Lenka Viskotová²

¹*Department of Statistics and Operation Analysis, Faculty of Business and Economics,
Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic,
e-mail: dana.rihova@mendelu.cz*

²*Department of Statistics and Operation Analysis, Faculty of Business and Economics,
Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic,
e-mail: lenka.viskotova@mendelu.cz*

Abstract

The contribution deals with the application of difference equations in financial mathematics and shows mathematical approach to problem solving in the fields of loan repayment and simple and compound interest. The example of loan amortization is demonstrated. The computational scheme for this problem leads to the first order linear nonhomogeneous difference equation with constant coefficients. Using mathematical procedure for solving difference equations the loan repayment formula is derived. An illustrative example is given and solved in this manner. The corresponding mathematical computations are also performed through the Maple software and the online service Wolfram|Alpha. The capabilities of both computer algebra systems for computing the mentioned problem are compared. The main aim is to show the use of mathematical theoretical knowledge for deriving certain formulas of financial topics.

Keywords: loan amortization, compound interest, linear difference equation, computer algebra system

1. Introduction

Difference equations and their applications frequently occur in many areas in economics (see Pražák (2013)). Especially in financial mathematics, their use concern simple and compound interest calculation and loan amortization. In our further considerations, we will deal with the case of loan amortization.

2. The Loan Repayment Formula

Amortization is a method of repaying a debt by a sequence of periodic payments consisting of payment of interest and payment to reduce the outstanding principal.

2.1. Derivation

Let y_n represent the outstanding principal after the n th payment for each n . Suppose that compound interest at a rate r % is charged on the outstanding debt. The payment period is the fraction of a year and is denoted by p . The periodic repayments are constant over time and equal to M . Let us assume that the debt to be repaid is D .

The formulation of our model is based on the following accounting rule

$$y_{n+1} = y_n + p \frac{r}{100} y_n - M = \left(1 + p \frac{r}{100}\right) y_n - M, \quad n = 0, 1, 2, \dots$$

where $p \frac{r}{100} y_n$ is the interest incurred during $(n+1)$ st period (for further details see Fulford (1997)). This formula arrives at

$$y_{n+1} - y_n \left(1 + \frac{pr}{100}\right) = -M. \quad (1)$$

The equation (1) constitutes the first order nonhomogeneous linear difference equation with constant coefficients whose general form is

$$y_{n+1} + ay_n = f(n), \quad a \in \mathbb{R}, \quad a \neq 0, \quad (2)$$

where $f(n)$ is a sequence.

In addition, the initial debt at the beginning is D , i.e.

$$y_0 = D, \quad (3)$$

which represents the initial condition.

Our approach to the problem (1), (3) will be different contrary to Elaydi (2004), Goldberger (2010) and Neusser (2012) that use the properties of geometric sequence. To solve a nonhomogeneous difference equation (2) we have to consider the corresponding homogeneous difference equation

$$y_{n+1} + ay_n = 0. \quad (4)$$

The superposition principle (see Neusser (2012)) implies that the general solution of the nonhomogeneous linear difference equation (2) is the sum of the general solution to the homogeneous equation (4) \bar{y}_n and a particular solution to the nonhomogeneous equation (2) Y_n , i.e.

$$y_n = \bar{y}_n + Y_n.$$

In our case the corresponding homogeneous difference equation takes form

$$y_{n+1} - y_n \left(1 + \frac{pr}{100}\right) = 0 \quad (5)$$

with the characteristic equation

$$z - \left(1 + \frac{pr}{100}\right) = 0,$$

which is a linear equation with the real root

$$z = 1 + \frac{pr}{100}.$$

Hence we can see according to Mařík (2005), Moučka (2010) that the general solution of (5) is an arbitrary geometric sequence

$$\bar{y}_n = C \left(1 + \frac{pr}{100}\right)^n, \quad C \in \mathbb{R}.$$

As the right-hand side of the equation (1) is the polynomial of degree zero, a particular solution can be estimated according to it. Let us remind that the first order linear difference equation with special right-hand side

$$y_{n+1} + ay_n = \rho^n P_s(n)$$

($P_s(n)$ is a polynomial of degree s and $\rho \in \mathbb{R}$) has a particular solution

$$Y_n = \rho^n Q_s(n) n^k,$$

where $Q_s(n)$ is the appropriate polynomial of the same degree s and $k = 1$ if the number ρ is the root of the characteristic equation and $k = 0$ if ρ is not the root of the characteristic equation. Because the right-hand side of (1) can be written in the form

$$\rho^n P_s(n) = 1^n(-M),$$

we have $s = 0$ and $\rho = 1$. Number $\rho = 1$ is not the root of the characteristic equation. Thus $k = 0$ and we can estimate a particular solution of (1) by the polynomial of degree 0:

$$Y_n = 1^n b n^0 = b. \quad (6)$$

To compute b we use the method of undetermined coefficients, more details can be found in Mařík (2005), Moučka (2010). We substitute (6) in (1)

$$b - b \left(1 + \frac{pr}{100}\right) = -M$$

and solve for b

$$b = \frac{100M}{pr}.$$

Therefore the particular solution (6) takes form

$$Y_n = \frac{100M}{pr}$$

and hence we can express the general solution of (1)

$$y_n = Y_n + \bar{y}_n = \frac{100M}{pr} + C \left(1 + \frac{pr}{100}\right)^n.$$

This solution depends on a constant C that can be specified from the initial condition (3) for the period $n = 0$:

$$D = \frac{100M}{pr} + C \left(1 + \frac{pr}{100}\right)^0.$$

The above equation gives

$$C = D - \frac{100M}{pr}$$

and thus the general solution of (1) has the form

$$y_n = \frac{100M}{pr} + \left(D - \frac{100M}{pr}\right) \left(1 + \frac{pr}{100}\right)^n, \quad (7)$$

which represents the loan repayment formula. It can be also written as

$$y_n = D \left(1 + \frac{pr}{100}\right)^n - \frac{100M}{pr} \left[\left(1 + \frac{pr}{100}\right)^n - 1\right]. \quad (8)$$

2.2. Computation of Periodic Repayments

To determine the constant periodic repayment M from the above equation we set $y_n = 0$ supposing that the debt must be repaid in exactly n payments. Hence from (8) we have

$$D \left(1 + \frac{pr}{100}\right)^n = \frac{100M}{pr} \left[\left(1 + \frac{pr}{100}\right)^n - 1\right]$$

and solving for M we get the expression

$$M = \frac{pr}{100} \frac{D \left(1 + \frac{pr}{100}\right)^n}{\left(1 + \frac{pr}{100}\right)^n - 1}. \quad (9)$$

In financial mathematics, it is common to use the following form of this formula (compare with Šoba (2013), Šoba (2006))

$$M = D \frac{\frac{pr}{100}}{1 - \left(1 + \frac{pr}{100}\right)^{-n}},$$

which can be obtained dividing (9) by the expression $\left(1 + \frac{pr}{100}\right)^n$. Let us note that the number

$$\frac{1 - \left(1 + \frac{pr}{100}\right)^{-n}}{\frac{pr}{100}}$$

is called the amortization factor (see Goldberg (2010)).

2.3. An Illustrative Example

The following example demonstrates the previous obtained formulas. We will calculate the monthly payment needed to repay a loan of 650 000 CZK in 7 years. The interest rate is 8.3% compounded monthly.

We use the formula (9). In our case we have $p = 1/12$, $r = 8.3$, $D = 650\,000$ and $n = 84$. Thus the monthly repayment is calculated as follows

$$M = \frac{1}{12} \cdot \frac{8.3}{100} \cdot \frac{650000 \left(1 + \frac{1}{12} \cdot \frac{8.3}{100}\right)^{84}}{\left(1 + \frac{1}{12} \cdot \frac{8.3}{100}\right)^{84} - 1} \doteq 10228.5$$

3. Solving with Computer Algebra Systems (CAS)

3.1. Maple

Maple is a commercial and one of the major general purpose CAS. There are two basic modes (Document and Worksheet), with the command completion, for performing computations, manipulating mathematical expressions and describing the problem-solving process. There is support for numeric computations, to arbitrary precision, as well as symbolic computation and visualization.

We show the computation of our problem and illustrative example. There is a command `rsolve(eqns, fcn)`, which solves among others the first order linear difference equations with constant coefficients (see Kříž (2011)). A single recurrence relation (or a set of recurrence relations) and a boundary condition have to be the first argument. The second argument `fcn` indicates the function that `rsolve` must solve for. Indexes are written in parentheses.

We assign the recurrence relation (1) to the name `REq`:

```
> REq := y(n+1) - y(n) * (1+p*r/100) = -M;
```

Maple returns the output:

$$REq := y(n + 1) - y(n) \left(1 + \frac{1}{100}pr\right) = -M$$

Then we make the assignment of the initial condition (3) to the name `IC` (the statement is terminated with a colon so the result is not displayed):

```
> IC := y(0) = D;
```

Now we execute the command `rsolve` with appropriate arguments:

```
> rsolve({REq, IC}, y(n));
```

$$D \left(1 + \frac{1}{100}pr\right)^n - \frac{100M \left(1 + \frac{1}{100}pr\right)^n}{pr} + \frac{100M}{pr}$$

The obtained expression corresponds to the loan repayment formula (7).

For determining the periodic payment M we type following (the operator `%` refers to a previously computed result in Maple):

```
> isolate(%=0, M);
```

$$M = - \frac{D \left(1 + \frac{1}{100}pr\right)^n}{- \frac{100 \left(1 + \frac{1}{100}pr\right)^n}{pr} + \frac{100}{pr}}$$

Simplification of the previous result gives formula (9):

```
> simplify(%)
```

$$M = \frac{1}{100} \frac{D \left(1 + \frac{1}{100}pr\right)^n pr}{\left(1 + \frac{1}{100}pr\right)^n - 1}$$

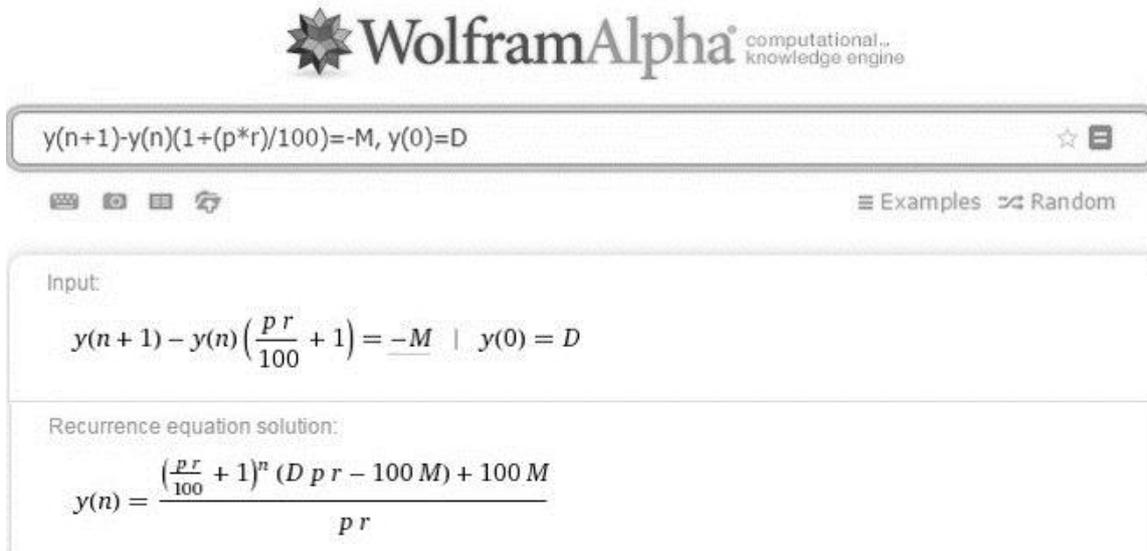
Finally, we make the calculation of the corresponding illustrative example (the command `subs` substitutes subexpressions into an expression):

```
> subs(p=1/12, r=8.3, D=650000, n=84, %);
```

$$M = 10228.46357$$

3.2. Wolfram|Alpha

Now we demonstrate the computation of the formulas (7) and (9) with free online service Wolfram|Alpha which is available through any web browser at the web address

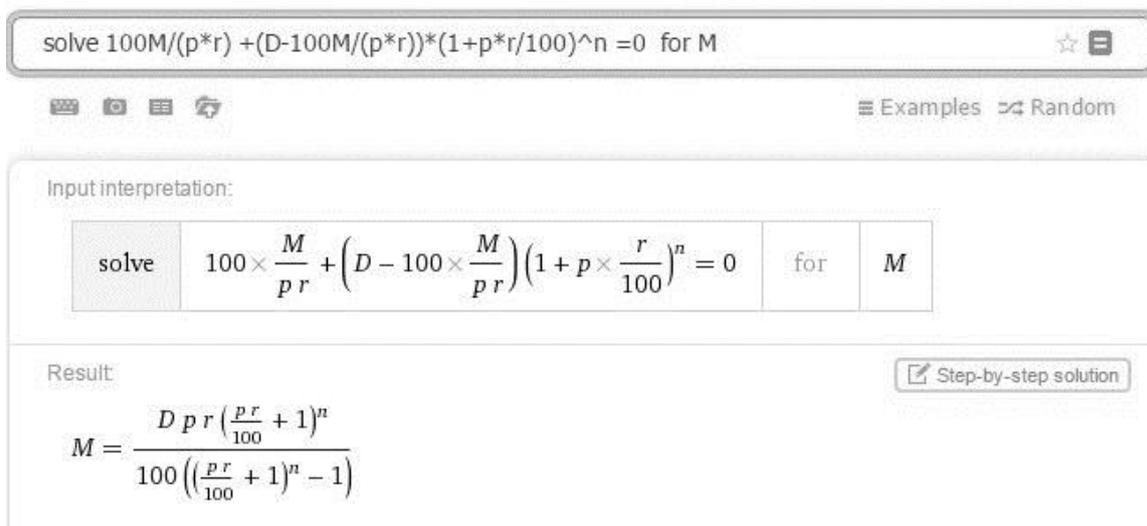


The screenshot shows the Wolfram|Alpha interface. The input field contains the equation $y(n+1) - y(n)(1 + (p \cdot r)/100) = -M$, $y(0) = D$. Below the input field, the input is interpreted as $y(n+1) - y(n) \left(\frac{pr}{100} + 1 \right) = -M \mid y(0) = D$. The recurrence equation solution is given as $y(n) = \frac{\left(\frac{pr}{100} + 1 \right)^n (Dpr - 100M) + 100M}{pr}$.

Figure 1: General solution of difference equation

<http://wolframalpha.com>. This tool provides mathematical computations based on software Mathematica and accepts completely free-form input. Commands are specified by the name of operation in English.

To solve the difference equation (1) with the initial condition (3) we type both equations into an input field writing indexes in parentheses. The general solution is shown in Figure 1 and has the form of (7). As Wolfram|Alpha does not allow to save subresults we have to write again the previous obtained solution into the input field. For computation of the monthly repayment formula we enter the command **solve**. Setting $y_n = 0$ in (7) and using the word **for M** we get with Wolfram|Alpha the formula (9) as you can see in Figure 2.



The screenshot shows the Wolfram|Alpha interface. The input field contains the command `solve 100M/(p*r) + (D-100M/(p*r))*(1+p*r/100)^n = 0 for M`. Below the input field, the input interpretation is shown as `solve` $100 \times \frac{M}{pr} + \left(D - 100 \times \frac{M}{pr} \right) \left(1 + p \times \frac{r}{100} \right)^n = 0$ `for` M . The result is $M = \frac{Dpr \left(\frac{pr}{100} + 1 \right)^n}{100 \left(\left(\frac{pr}{100} + 1 \right)^n - 1 \right)}$. A button for "Step-by-step solution" is visible.

Figure 2: Formula for periodic payment

Finally, Figure 3 shows calculation of the monthly repayment M of the mentioned example using the formula (9).

The screenshot shows a Wolfram|Alpha search bar with the input: $(p*r/100)*(D*(1+p*r/100)^n)/((1+p*r/100)^n - 1)$ where $p=1/12, r=8.3, D=650000, n=84$. Below the search bar, the input interpretation is shown as: $(p \times \frac{r}{100}) \times \frac{D(1 + p \times \frac{r}{100})^n}{(1 + p \times \frac{r}{100})^n - 1}$ where $p = \frac{1}{12}, r = 8.3, D = 650\,000, n = 84$. The result is 10228.5.

Figure 3: Calculation of monthly payment

3.3. Comparison of Systems

Maple is very powerful tool incorporating a dynamically typed imperative-style programming language which resembles Pascal. There are possibilities to make new procedures and modules, save and read them or together with other data store in a library. One of the interesting tools is so-called Maplet application which gives a user point-and-click access to the power of Maple. On the other hand, all these additional features of Maple require certain programming skills.

In comparison with Maple, Wolfram|Alpha is not possible to save and reload the results of computations and make own procedures. Also computation performance can be considered rather slow. This computational service also does not offer such a wide range of commands as professional Maple. But the significant advantage of Wolfram|Alpha is the fact that its use is very simple and is free online. Moreover, it provides a variety of computations from other fields such as money and finance and also offers mortgage calculator with amortization schedule.

4. Conclusions

In this contribution we have processed a common issue of financial mathematics – loan amortization, and a mathematical theory of the first order linear difference equations. We have focused on derivation of the loan repayment formula using knowledge of solving difference equations and have made corresponding computations with the chosen computer algebra systems.

Our main aim was to show that mathematics is somehow hidden in some formulas of financial topics and mathematical knowledge is important for better understanding of a number of problems occurring in economics. We are in the conviction that the awareness of this mathematical background is very helpful in many branches of economical research.

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How to avoid the usual price rule

Pavel Semerád¹

¹Department of Accounting and Taxation, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: pavel.semerad@atlas.cz

Abstract

In the carousel frauds there are missing traders who fail to meet their tax obligations. Their business strategy is based on quick sales at unusually low prices which do not allow honest parties to compete. Tax administrators should focus on unusual prices which constitute a higher probability of tax evasions. This paper aims to verify whether or not there is a way to evade the measure, focusing specifically on applying methods which could help achieve lower sales prices while avoiding the possibility to require unpaid tax from the recipients of taxable supply.

Keywords: carousel fraud, usual price rule, value added tax

1. Introduction

Tax fraud is an extremely considerable issue in all states in the long term, affecting not only public budgets, but even the taxpayer conduct: once the person sees the tax authority's inability to reduce fraud by legal means or the legislator adopting burdensome, but ineffective measures, they may give up their inner reluctance against fraudulence. Working out between compliance and non-compliance with tax duties is subject to several factors, such as aversion of the tax entity to risk, the maximum amount of profit from fraud or the maximum sentence for the same; how this behaviour is perceived by the society as such may also be considered (Le Bon, 1896; Slemrod and Yitzhaki, 2002; Torgler and Schaltegger, 2005).

As regards value added tax, authorities face “carousel fraud” in particular (Brederode, 2008; FATF, 2007; Podlipník, 2012). Sophisticated and generally known techniques, they abuse the basic principles of tax administration that apply to trading with other states. Typical of this behaviour is an occurrence of a “missing trader” in the chain of payers; this refers to a person who is the first entity (owner) in the state in which the fraud is to happen. The payer is required to declare and pay tax using a means referred to as self-assessment. The fraudulent action is based on the fact that such a trader provides the deliverable to another payer while failing to pay an output tax. Upon receipt of the payment and putting all the liquid assets beyond the reach of the company, the entity – risky in terms of tax – ends up in insolvency or without sufficient funding to

pay the tax (Pfeiffer and Semerád, 2013). Consequently, the fact that the other entity is entitled to deduction creates enormous losses at the expense of the state budget. This confirms the finding (Tanzi, 1999) that some frauds are simply committed as part of tax returns rather than being associated with activities in the underground economy. Every state has a problem with its specific subject matter of taxable supply. Yet the responsibility for fighting tax fraud is left to the individual Member States, although it usually involves fraudulent activities in cross-border trading (Lazăr, 2013).

2. Methodology and Data

The Czech Republic has implemented a measure into its domestic Value Added Tax Act that relates to the recipient of taxable supply. The recipient is liable for unpaid tax if the payment for such transaction is clearly diverging from a usual price while there are no economical grounds for the same. Although the rule entered in force in April 2011, it has not been applied by tax authorities to a satisfactory extent since there are cases of subject matters of taxable supply for which there is a lack of a sufficient database of transactions that enable comparing the price paid as part of a suspicious-looking trade.

This paper aims to verify whether or not there is a way to evade the measure, focusing specifically on applying methods which could help achieve lower sales prices while avoiding the possibility to require unpaid tax from the recipients of taxable supply.

Fuel was selected for the purpose of the paper, as a commodity that is significantly affected by carousel fraud. Annual losses in the Czech Republic are estimated to equal 8 billions CZK (ČAPPO, 2012). The first entity of the chain in the Czech Republic can take this opportunity to make a profit (in the form of tax evasion) of even more than 6 CZK per litre while the usual distributor's margin is 0.20 CZK per litre approximately (Semerád and David, 2014). Fraudulent companies can afford selling fuel much cheaper than their fair competitors. Such an attractive price helps them increase sales and generate more profit. Not infrequently, even a fair operator must desperately resort to purchasing an untaxed tank to survive the tough competition (Petlachová and Ležatka, 2014). Yet there has not been a case of applying the "usual price" principle.

An overall analysis of the fuel market can be considered one of the key activities in preparing the paper. Data collection and analysis are essential for producing an objective and systematic examination of the current state of the topic in question. Without carrying out the analysis, any identifying and understanding the laws of the market, its differences and components, ways of competitor struggles, opportunities that the market / distribution chain enables would be impossible; the same applies to revealing some of the tax fraud models and the impact they have on sales and conduct of other entities. The scope of the analysis is subject to the availability of data whilst depending on the extent of readiness of each entity to share their knowledge and lessons learned.

The analysis was based on sourcing primary data through surveying. The communication was underway via personal interviews. The respondents were randomly chosen from the community of distributors, operators of gas stations and representatives of tax authorities, e.g. General Financial Directorate, General Directorate of Customs, and Ministry of Finance of the Czech Republic. It was an unstructured survey and enabled directing the interview based on the respondent' feedback (Kotler et al, 2007).

While the analysis was used for dissecting the issue to form rather simple and better-to-understand segments, synthesis was subsequently employed to produce a complex through integrating the sub-parts, which ensured clarity and a greater extent of objective knowledge.

General conclusions were drawn from partial findings by means of induction, the conclusions being probabilistic in nature. Some sort of uncertainty is stemming from the limits of human understanding and limited availability of certain knowledge and facts, e.g. the lacking background data on pricing. The conclusions are therefore based only on those resources available that can be gathered. Prediction was giving rise to estimates of expected scenarios, impacts and results when using the proposed solutions.

3. Results

While surveying the respondents, fundamental processes were found that are underway on the fuel market. The entities can be split into groups that involve tax warehouses and refineries, fuel distributors and gas stations. Placing orders for fuel takes place under agreed rules between businesses; terms of payment are also not uniform with every entity allowed to use their own methods of payment. Although elements applicable for defining risk factors may include these (e.g. Semerád and David, 2014), the facts were not utilised for the purposes of the paper.

Fuel distributors buy fuel from either tax warehouses or other distributors. As a rule, market prices are not to differ to a significant extent. However, as respondents said, they stand face to face to unfair price competitors who set their prices in the long term following the “ČEPRO base price – CZK 1” model. Since however the tax authority still has not made use of the liability for unpaid tax due to the sale for unusual prices, no reduction of such sales occurs. To this end, the distributor’s deposit amounting to CZK 20 millions introduced in 2013 is considered a major breakthrough. Without giving the amount or securing it in the form of a bank guarantee, trading in fuel outside gas stations is not permitted. Even this action, however, based on respondents’ experience, failed to help remove at least suspect traders from the market; the deposit even considerably reduced the total number of distributors of whose just under 10% remained against the former number of 1950 operators.

The issue covered by this paper is thus based on an alternative way of fighting tax fraud. But even if there was any methodology for experts and the tax authority to accept, the ways of doing business that enable circumventing the “usual price” principle will be necessary to cope with. An alternative was studied: the “Cash Back” method.

A service “Cash Back” used for holders of certain payment cards, it allows cash collection at cash desks / checkouts in selected shops. Merchants alter the ATM provided the shopper makes a purchase for a minimum amount and pays for it by card. A similar principle can be applied to evade the proposed methodology.

If a price is set at which there is still no risk of recourse under Value Added Tax Act, this very amount forms the minimum price at which the carousel fraud is carried out. A question arise about how can those committing fraud be discerned from a competitor that sells for the same price?

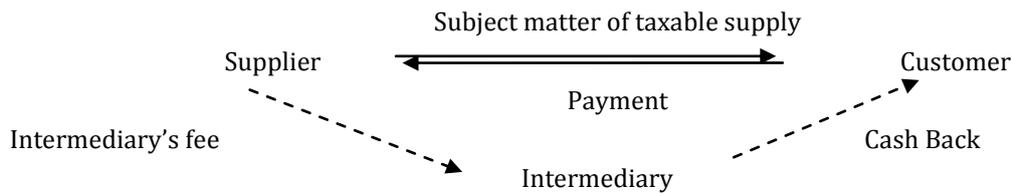


Figure 1: The “Cash Back” method when used in tax fraud

Assumed is the participation of another entity to be pulled directly into the fraudulent action, such as a gas station operator. It is required to receive and pay for taxable supply. After the receipt of the payment, the fraudulent seller makes use of the “Cash Back” method, paying a proportion of the price back to the Customer. At that moment, the Customer gets fuel below the set minimum price although the tax document has been issued for a legally accepted usual price. Such existence of two separate transactions is reducing the clarity and the ability to inspect. As part of this step, the money can be transferred via another entity (labelled as “Intermediary” on Fig. 1). The entity releases an invoice for the Supplier which covers brokering a deal or a service, paying the money to the Customer as a separate supply. While the financial & analysis department might be able to trace back the transactions via cash flow of all the entities mentioned above, revealing the entity of the Intermediary will be difficult or even impossible.

The money may even not be paid through any third party. The Supplier may pay it in cash to the Customer without any proof. Such steps are impossible to detect if none of the entities notifies law enforcement authorities; doing so might result in the entity convicting itself of tax fraud, money laundering or legalisation of proceeds from crime.

4. Discussion and Conclusions

Any legal action that has the potential to reduce tax fraud is of great importance. In preparing it, however, testing its robustness in a comprehensive manner is essential. Tax entities are nowadays very well prepared and able, either alone or through consulting companies, to hide their illegal activity. The factor of inadvertent error in meeting tax obligations due to e.g. incorrect interpretation (misunderstanding) of the act can be ignored to some extent, although even this may produce difficulties. Much more dangerous and serious are however fraudulent activities committed by organised groups that form compound structures which are difficult to uncover for the tax authority.

Although the measure to transfer the liability for unpaid tax onto the recipient of the supply is a fully legal instrument (Council Directive 2006/112/EC), it is difficult to apply, especially where a sufficient basis for objective comparison is missing. Overall, this measure is not fully resistant to an innovative entity.

Although no exhaustive listing of all alternatives is possible, the paper presents a model of fraud which could be used for evading usual prices – the method of “Cash Back”. Using the “Cash Back” approach, the recipient of taxable supply obtains the deliverable for a legally accepted usual price. The providing entity, however, gives some extent of the funds back, either in cash without any receipt, or through an intermediary.

In addition, there is still the possibility of challenging the data *ex post*. While tax entities trade in real time, the tax authority can use data that it receives and processes with delay. Unlike the merchants, it has enough information on market prices. A state of uncertainty arises on the part of taxpayers in that they are going to be exposed to

liability for unpaid tax although they had taken all the measures that can be realistically required from them. It should be noted here that legal certainty is an important principle of EU law system.

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Efficiency evaluation of hospitals in the environment of the Czech and Slovak Republic

Stanislav Sendek¹, Zuzana Svitálková² and Katarína Angelovičová³

¹*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: stansend@gmail.com*

²*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: z.svitalkova@gmail.com*

³*Institute of Health Sciences, St. Elisabeth University of Health and Social Sciences in Bratislava, Námestie 1. mája č. 1, 810 00 Bratislava, doctorate studies, e-mail: katka.angelovicova@gmail.com*

Abstract

The paper applies the Data Envelopment Analysis as a deterministic non-parametric method based on the linear programming, to measure the efficiency of Czech and Slovak hospitals based on input and output performance. Managing physician or hospital practice patterns is an important tool to reduce health care costs. State-run hospitals, as decision-making units working in an operating healthcare system, might have some excess resources in the process of providing care. E-health tools are expected to contribute to the cost containment in them, enhancing finally the quality of patient care in the overall assessment.

Keywords: Data Envelopment Analysis, radial BCC model, e-health, input-output analysis, hospital efficiency assessment, decreasing returns to scale

1. Introduction

Efficiency measurement of decision-making units (DMUs) with identification of inefficiencies of the sources being examined is a key prerequisite for performance improvements in a competitive setting. A DMU might be generally understood as a unit producing any inputs or outputs.

Evaluating the performance of institutions of public sector such as a hospital is a task which has been of great interest to health care managers, administrators and government, even though measuring efficiency of the banking sector is a dominant area in the literature. (JABLONSKÝ, DLOUHÝ, 2004) It is not only in the wake of the recent financial crisis and associated budgetary constraints but a general pressure on cost

containment and resource constraints in the health care sector and hospital network in the recent decade which also do contribute to an ever-increasing drive for optimal resource utilization in both urban and rural areas. (WHO, 2005)

This paper presents a Data Envelopment Analysis (DEA) analysis measuring only the technical selected input-output efficiency, i.e. not the financial or overall efficiency, on selected acute care university hospitals and other hospitals in the Czech and Slovak Rep.

2. Methodology of elaboration

Modelling and the comparative method have been applied. Based on the common technique applied in similar underlying studies (HARRISON, et al., 2004, and recently by BARNUM, et al., 2011), we have identified basic inputs and outputs for selected acute care hospitals in Slovakia and the Czech Rep. in order to carry out the DEA.

The efficient scores (first applied by BANKER, et al., 1984) are counted to design a 'CZ-SK model' using decreasing returns to scale (the variable BCC DEA model) which is better adjusted for healthcare sector (JABLONSKÝ, J., DLOUHÝ, M., 2004).

Simultaneously, we have identified potential savings, based on GARNTER, 2009, EMPRIRICA, et al. 2005, if selected e-health tools were hypothetically fully implemented in the Czech and Slovak hospitals¹ in two years 2009 and 2012 in those of 19 hospitals for 2009 and 18 hospitals for 2012 which did not reach efficiency scores of 1. These two abstract models are referred to as *e-2009* and *e-2012* respectively.

Afterwards, selected hospitals in our abstract models were added as new separate DMUs to simulate the potential of the technical efficiency improvement of these hospitals. The method of induction had to be applied as our e-health savings are derived from outcomes of various independent clinical trials on e-health around the world. (GARTNER, 2009, SHEKELLE, et al., 2013, SHOJANIA, KG, et al., 2001).

3. Data and methodology

Apart from some partial methods for efficiency measurement such as productivity, average return on equity or profitability, with DEA we are producing the empirical production function. The DEA is based on methods of linear programming which came into use in the 1970s. (BITRAN, G.R., VALOR-SEBATER, J., 1987).

The technical efficiency, on which the variable input-output BCC model is based and employed in this paper, is defined as an ability of a DMU to produce the maximum output with the inputs available. The DEA is based on the measure in which a DMU (a hospital) is able to realize too few inputs or too many outputs. This is why the positive values represent the measure in which a variable contributes to the overall score of efficiency. Thus Ozcan, et al (OZCAN, Y.A., et al., 1992) interpreted the measure which finds out which factor (input or output) is to be considered when seeking to increase the efficiency. (BANNICK, R.R., and OZCAN, Y.A., 1995, OZCAN, Y.A., et al., 1992). Algebraically expressed:

¹ Electronic healthcare is being implemented under the Programme of Implementation of e-health (PieH) in the Slovak Rep. in the period of 2008-2018. For more, refer to URL: <<http://www.ezdravotnictvo.sk/en/Pages/default.aspx>>. As for the Czech Rep., the e-health implementation was underway most notably through the IZIP project (implementing an integrated electronic health record with other e-health tools) until 2012 when it was stopped. Subsequently, a new national strategy for e-health was developed.

$$Eff(u, v) = \frac{\sum_{i=1}^{\#outputy} v_i y_i}{\sum_{j=1}^{\#inputy} u_j x_j} = \frac{\sum_{i=1}^n v^T y_i}{\sum_{j=1}^m u^T x_j} \leq 1 \quad (1)$$

Eff (u,v) – efficiency of a DMU

y – outputs (e.g. number of hospitalizations, number of clinical tests, etc.)

x – inputs (e.g. number of staff working hours, salaries, cost of medicines used, etc.)

v = (v₁,...,v_n)^T – pricing of inputs through vectors

u = (u₁,...,u_m)^T – pricing of outputs through vectors

MaxDea Basic 6.3 software, beta version, was used for estimation of the efficiency. For a more detailed concept on the theoretical and graphical representation compare COELLI, et al. 2005; or an earlier study by CHILINGERIAN, SHERMAN, 1990.

1.1. e-Health benefits assumptions

To simulate the potential of e-health implementation in hospitals, we are drawing on results from clinical studies of GARTNER, 2009, SHOJANIA, et al., 2001, and its revised version by SHEKELLE, et al., 2013, AMERICAN THORACIC SOCIETY Documents, 2005 and HEALTHCARE INFORMATICS, 2007, as well as on random samples and data mining-based analyses of all the three Slovak insurance companies² to make some estimations as to the potential of e-health tools to improve the hospital's technical efficiency in decreasing selected inputs and increasing outputs. Only conservative estimations have been applied in this paper.³ There are several e-health tools which are intimately linked with the improvement of a hospital's technical efficiency. For instance, unnecessary bed-days may be prevented if the patient had the optimal medication, further it is a reduction of adverse drug events (ADE) (BATES, et al., 1997, AAHERN, et al., 2006, BABELA, et al., 2008, SHEKELLE, et al., 2013), a 1.8% reduction in hospitalisations due to ADE, or 55% decrease of medication errors and 17% decrease in preventable errors (SHOJANIA, K.G., et al., 2001, BATES, 1995), or a 22% reduction in clinical staff productivity (measured as FTEs) (BLACK, et al., 2011) through electronic health record, and not least 10% savings in medicines prescribed during a hospitalisation (GARTNER, 2009).

4. Results

We collected data from Czech and Slovak acute care hospitals ($n=38$), out of which 23 are state university or teaching hospitals and 15 other hospitals or specialized hospitals. (NCZI, 2014).

Input measures: The inputs used in this study were number of beds (*Beds (n)*), full time equivalents representing working hours and overtime hours of physicians and nurses (*FTEs (h)*), bed-days (*B-Day (n)*), cost of medicines and medicinal products in

² A complex non-public cost-benefit analysis had to be assembled, some data of which cited in this paper are based on data inputs from three Slovak health insurance companies. The whole CBA is available to the authors of the paper. The analysis is being continuously updated during the life cycle of the project from the start of the e-health implementation in Slovakia in 2009. Partially, some pieces of aggregated data and summary information are available on the Slovak official e-health information portal on URL:

< <http://www.ezdravotnictvo.sk/Documents/NZIS.pdf> > or on the portal of the Ministry of Finance of the Slovak Rep. on URL:

< http://informatizacia.sk/index/open_file.php?ext_dok=13237 >.

³ It means that if a study proved e.g. a direct reduction of hospital-acquired infections between 5–10% of all admissions the lower conservative value of 5% was applied for our calculations.

EUR (MMD (€)). In general, number of beds of a hospital is considered a measure of a hospital's size. Bed days are counted as days during which a patient received all services which are provided by the institution.

Output measures: In our models, the output measures are represented by the number of hospitalizations (*Hosp* (*n*)) and outpatient visits (*OutVis* (*n*)).

The Table 1 represents development of efficiency scores in our four input/two output BCC model.

Table 1: Efficiency scores development of Czech (No. 1-19) and Slovak (No. 20-38) hospitals in 2009-2012 without and with some e-health tools hypothetically implemented in all previously inefficient DMU's in 2009 and 2012. The university hospitals (UH) are marked in grey.

No	SK-CZ HOSPITALS (n=38) / YEAR	2009	e- 2009	2010	2011	201 2	e-2012
1	UH_FN Praha	1	1	1	1	1	1
2	UH_FN Královské Vinohrady	0.93	1	0.9	0.9	1	1
3	UH and Clinics_FN Thomayerova	1	1	1	1	1	1
4	UH_FN Motol	1	1	1	1	1	1
5	UH_FN Na Bulovce	1	1	1	1	1	1
6	UH_FN Olomouc	0.87	1	0.8	0.9	0.7	0.95
7	UH_FN u sv.Anny	0.95	1	0.9	0.9	0.8	1
8	UH_FN Hradec Kralove	0.72	0.78	0.7	0.7	0.9	1
9	UH_FN Plzen	1	1	1	1	1	1
10	UH_FN Ostrava	0.94	1	0.9	0.9	0.9	1
11	MH_Ústřední vojenská nemocnice Praha	0.84	0.91	0.8	0.8	1	0.95
12	Institute of clinical and experimental medicine	0.73	0.95	0.7	0.8	0.7	0.93
13	Institute for the Care of Mother and Child	1	1	1	1	1	1
14	Institute of Rheumatology	1	1	1	1	1	1
15	Institute of Hematology and Blood Transfusion	1	1	1	1	1	1
16	Prague Psychiatric center	1	1	1	1	1	1
17	H_ Nemocnice Na Homolce	1	1	1	1	1	1
18	Centrum kardiovas. and transp. surgery	0.74	0.98	0.7	0.7	0.6	0.87
19	Masaryk cancer institute	1	1	1	1	0.9	1
20	UH_UN Bratislava	1	1	1	1	1	1
21	UH_UN L.Pasteura Košice	0.97	1	0.9	1	0.9	1
22	UH_UN Martin	0.81	0.97	0.7	0.6	0.6	0.76
23	Children's UH and Clinics_DFNsP Košice	0.69	0.88	0.7	0.6	0.7	0.98
24	Children's UH and Clinics_FNsP Banská Bystrica	1	1	1	1	1	1
25	Children's UH and Clinics_FNsP Bratislava-Nové mesto	0.84	1	1	0.8	0.7	1
26	UH_FN Nitra	1	1	1	1	1	1
27	UH and Clinics_FNsP F.D.Roosevelta Banská Bystrica	0.89	1	1	1	1	1
28	UH and Clinics_FNsP J. A. Reimana Prešov	0.90	1	0.7	0.8	0.6	0.79
29	H and Clinics_NsP Skalica	1	1	1	0.7	0.7	1

					7	5	
30	UH and Clinics_FNsP Žilina	0.84	0.93	0.7	0.6	0.5	0.66
31	UH and Clinics_FNsP Nové Zámky	0.83	0.98	0.7	0.6	0.6	0.78
32	UH and Clinics_FNsP Trenčín	0.74	0.97	0.7	0.6	0.6	0.78
33	UH and Clinics_FNsP Trnava, so sídlom Andreja Žarnova 11	0.90	1	0.8	0.6	0.6	0.79
34	H and Clinics_NsP Spišská Nová Ves	1	1	1	1	1	1
35	H and Clinics_NsP sv. Barbory Rožňava	1	1	1	1	0.9	1
36	H and Clinics_NsP Sv. Jakuba Bardejov	0.79	1	1	1	1	1
37	Specialized H for Ortopedic Protetics_ŠNOP Bratislava	1	1	1	1	1	1
38	National Institute of Cardiovascular Diseases_NÚSCH	0.95	1	1	1	1	1

In Table 1, we see that in 2009 through 2012 in all 6 models, there are altogether efficient Czech and Slovak hospitals in the number of 18 (11 CZ, 7 SK), 29 (15, 14), 22 (11, 11), 21 (11, 10), 20 (12, 8) and 27 (15, 12) respectively. If we run similar 6 models with 48 Slovak hospitals only in the old model, we find a lower number of efficient Slovak hospitals, namely 7, 12, 8, 9, 8 and 8 respectively (compare SENDEK, 2014). This is attributable to the change of weights in the models since there are no Czech hospitals incorporated in the old model. The efficiency of Slovak hospitals is compared in the pool of 48 Slovak hospitals only. These obviously perform worse in an international comparison.⁴

The average inputs of technically efficient hospitals are higher than those of inefficient hospitals. These hospitals do count higher number of hospitalizations too. This might prove that the concentration of healthcare occurs in bigger hospitals in urban areas. This is primarily attributable to the economies of scale.

Table 2: Input and output data of efficient vs. inefficient hospitals for CZ-SK model “e-2012” and “2012” (in brackets). The MMD/Hosp ratio counted separately for Czech and Slovak hospitals (:).

<i>All facilities</i> <i>n=38</i>	Bed s (n)	FTEs (h)	B-Day (n)	B-Day /Hosp (ratio)	MMD (€)	MMD/ Hosp (ratio)	Hosp (n)	OutVis (n)
<i>Real Mean</i>	728 (72 8)	1 752 610 (1 945 548)	163 384 (191 088)	6.38 (7.40)	3 539 525 (3 735 019)	1.61;219 (1.67; 231)	27 364 (27 599)	518 72 8 (518 72 8)
<i>Real SD</i>	605 (60 5)	1 626 559 (1 675 142)	143 064 (157 987)	5.23 (5.10)	6 345 935 (6 523 273)	8.58; 372 (8.61; 371)	22 739 (22 885)	478 78 2 (478 78 2)
Mean with virtual inputs	676 (63 8)	1 659 625 (1 650 335)	156 800 (167 754)	6.05 (6.37)	3 070 193 (2 584 383)	1.59; 186 (1.55; 146)	27 364 (27 599)	599 40 7 (659 07 9)

Efficient n=27 (18)

⁴ There was a slight difference in this old model though (Chyba! Nenalezen zdroj odkazů.), the e-health tools in “e-2009” and “e-2012” were implemented only in the previously inefficient university hospitals in the “2009” and “2012” models, not in all inefficient hospitals (out of 48) as in this new research of CZ-SK model.

<i>Real Mean</i>	744 (67 8)	1 896 801 (2 030 263)	175 221 (177 109)	6.50 (7.1 8)	3 346 031 (3 382 158)	1.42; 202 (1.57; 211)	29 416 (27 585)	617 63 1 (641 22 3)
<i>Real SD</i>	678 (65 1)	1 859 343 (2 039 918)	162 339 (171 782)	6.11 (6.8 5)	7 087 496 (7 672 953)	9.44; 460 (10.4; 549)	25 710 (25 271)	528 18 6 (601 34 0)
<i>Inefficient n=11 (20)</i>								
<i>Real Mean</i>	689 (78 3)	1 398 689 (1 851 420)	134 329 (206 621)	6.09 (7.6 6)	4 014 466 (4 127 086)	2.62; 252 (1.85; 246)	22 327 (27 615)	275 96 5 (382 26 1)
<i>Real SD</i>	364 (54 3)	691 110 (1 132 928)	69 498 (139 451)	1.18 (1.5 5)	3 937 248 (4 911 870)	3.91; 95 (3.62; 110)	11 318 (19 901)	155 49 7 (216 67 7)

Table 2 presents some basic statistical outputs for a semi-hypothetical model of 38 Czech and Slovak hospitals in 2012. E-Health was hypothetically not implemented in the efficient hospitals, even though this would not be true in practice, in order not to affect the overall weights of the model used in computations by the software and make the consequences thereof in our abstract models appear more clearly. The result scores of other hospitals are almost unaffected. After electrification, 9 hospitals out of 20 previously inefficient got the efficiency score 1.

By the results of the Table 2 we see that the average numbers of FTEs, bed days and MMD input measures, all of the inputs affected by the implementation of e-health tools, decreased when compared to the “2012” model, which proves that electronic health care contributes to higher technical efficiencies of hospitals as proved by many studies and clinical trials, some of which are mentioned throughout this paper. Mean with virtual inputs, referred to as efficient targets, is a projection computed by software, which denotes the desired amount of inputs needed to be realized in hospitals in order that each hospital may be identified as technically efficient and reach the efficiency frontier. Comparing virtual inputs of all facilities in “2012” with real mean of all facilities in the e-health model “e-2012”, we can assume that e-health tools lead to the optimization of resources in hospitals and higher levels of efficiencies are reached.

Figure 1 illustrates a graphic representation of the efficiency scores in hospitals in 2009 and 2012 in Slovakia and the Czech Rep. The average real efficiency score of university hospitals in the model “2009” is equal to 0.92 for all hospitals and 0.91 (0.93 CZ, 0.89 SK) for university hospitals only, whereas in the real model “2012” the value is equal to 0.89 for all hospitals and 0.85 (0.95 CZ, 0.77 SK) for university hospitals only. As for Slovakia, this is attributable to the reduced funding of state hospitals which finally led to the financial turmoil caused by ever-increasing debts and negative cash-flows in some hospitals which in turn had to be bailed-out by Slovak government in 2011, but it still did not stop their course. Refer to the HEALTH POLICY INSTITUTE, 2013. By contrast, the Czech university hospitals performed better in 2012 than in 2009 which is to explain by structural reforms conducted continuously over time, affected i.a. by the decreasing long-term trend of the number of beds and, simultaneously, the increasing trend in net occupancy rates of bed places at the same time. The overall average length of stay decreased, too. The use of the to-be-more-just diagnosis-related group (DRG) payment mechanism in the Czech Rep., in contrast to Slovakia, most probably also weighs in. Compare ÚZIS ČR, 2012.

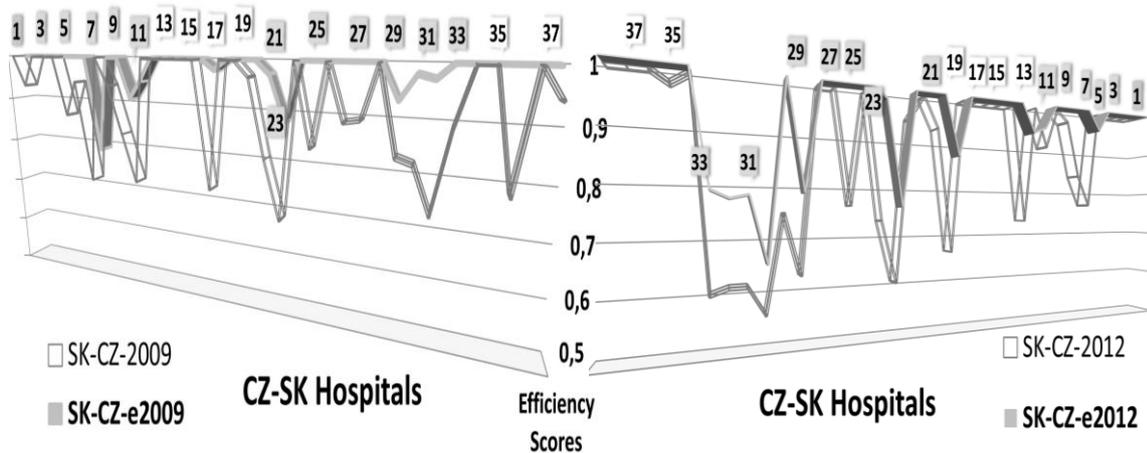


Figure 1: Efficiency scores in Czech (No. 1-19) and Slovak (No. 20-38) hospitals ($n=38$) in 2009 (left) and 2012 (right) with and without e-health tools implemented based on Table 1. University hospitals highlighted red. Source: Self-assembly.

2. 5. Discussion and Conclusions

There are two most significant theoretical findings of our analysis. The first is associated with generally accepted assumption pertaining to achieving returns to scale in larger hospitals with higher number of beds, providing more services, and concentrating highly-qualified working capacities. The second finding also proves the results of several studies that e-health tools, when fully implemented, do contribute to higher efficiency performance and allocation of resources in hospitals in providing health care services. Improvements in availability of health care could also be increased thanks to the multiplier effect if resources released from the reduction of costs were reallocated to treat more patients, increase the throughput and reduce waiting time.

On the other hand, this paper does not deal with assessments of a more thorough analysis aiming at the DEA-super-efficiency of hospitals branded as efficient, or “weakly efficient”, the concept elaborated by Farrell, Pareto-Koopmans and in the research studies to follow (see TONE, TSUTSUI, 2013). This could include the robust efficiency model being taken into account due to outliers which “can reduce the goodness of the estimator for efficiency”. (KUOSMANEN, POST, 1999) The presented paper, however, fills the gap of an international comparison as referred to in SENDEK, 2014, in incorporating 19 Czech hospitals in the combined Czech-Slovak model.

In addition, a windows DEA analysis on the efficiency separately in small, medium and large hospitals as presented by KAZLEY, OZSCAN, 2008 is possible and could be examined in further studies. Efficiency of separate, and not all e-health applications, is discussed in several studies with significant positive effects (KORST, 2003; TERRY, 2002) or with no statistically significant effects on the efficiency of hospitals (KAZLEY, OZCAN, 2008). Only a holistic approach can bring about desired synergic effects expected from the e-health tools (DANSKY, et al., 2009) and complex use of IT in providing healthcare (DEVARA, KOHLI, 2003; ANAP, 2010, ch. 4, CROLL, et al, 2007).

3. 5. Summary

Thirty-eight Czech and Slovak hospitals, out of which twenty-three are university hospitals, were analysed to measure the real yearly hospital technical efficiency in 2009–2012 and a hypothetical hospital technical efficiency with basic selected e-health tools implemented in 2009 and 2012. Smaller hospitals showed better efficiency scores in all models than larger university hospitals which can be explained by several factors discussed throughout the paper. Six DEA BCC models were run together. If all hospitals were electrified in 2009 by means of functioning e-health tools, 29 hospitals would be efficient compared to 18 hospitals in 2009 with real historical efficiency. Out of 22 university hospitals, wherein most healthcare expenses are allocated, 9 (4 CZ, 5 SK) of them would obtain the efficiency frontier and the remaining ones would come nearer to it. With well-functioning electronic healthcare in 2012, 18 hospitals would be efficient equally as without e-health tools, but their individual performance scores would be significantly higher. Some differences in the development of the efficiency scores in both countries are also suggested and explained.

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Application of modified Log-logistic function for forecasting economic growth

Rafał Siedlecki¹ and Daniel Papla²

¹Department of Corporate Finance and Value Management, Wrocław University of Economics, Wrocław, Poland, email: rafal.siedlecki@ue.wroc.pl

²Department of Financial Investments and Risk Management, Wrocław University of Economics, Wrocław, Poland, email: daniel.papla@ue.wroc.pl

Abstract

In our article is shown that no matter how good is economy situation, sooner or later some difficulties will appear. Hence, the idea of assigning the analytical form of the logistic law based on selected financial data, enabling the determination of the cycle phases and their changes has appeared. The presented proposal of determining the business cycle and the model of forecasting using the modified logistic function (loglogistic function) and its estimation method has been tested on GDP of chosen countries.

Key words: law of growth, forecasting, business cycle, time series analysis, warning signals
JEL: C130, C220, C530, E320

1. Introduction

In our article is shown proposition of determining the business cycle and the model of forecasting using the modified logistic function (loglogistic function) and its estimation method (based on logistic law (Kuznets 1971)) which has been tested on GDP of Greece as an example of troubled economy and Germany as an example of strong economy.

In theory of economy there is a view that each manufacturing activity is subjected to the logistic growth law, its forms are e.g. the law of decreasing income from farming or the law of relatively decreasing efficiency of expenditure. The above mentioned laws are based on experience and empirical research and lead to the conclusion that each manufacturing activity depends on the quantity of expenditures and the technological process used. You can say that in a given technological process after the beginning, which is characterized by a slow growth, the increase of expenditures causes the dynamic growth of effects to the maximum. From that moment on the growth of effects is smaller and smaller until its total disappearance. After that period, a rapid decrease can happen in some cases. Similar relations can be found in sciences concerning enterprises, where we talk about a limited growth of interest and the sale of a given product (product life cycle), or a limited growth of a market share. In each case we deal

with the phases of growth that can be identified (Kuznets 1971, Metcalfe 2001, Mar-Molinero 1980).

In case of the economy, we can say that their development is identified with the GDP intensification. The cycles phases are also visible (noticeable) in GDP. According to e.g. J. Grodinsky (Grodinsky 1953), when a new business appears on the market, many enterprises try to enter it in its early and quick stage of development. Next stage is the time of domination of the strongest country economies and elimination of the weakest ones. Strong (rapid) increase is characteristic of that stage, though it's slower than in its early stage. According to Grodinsky's proposal first stage is a pioneering stage (i.e. after political transformation like in post-communist countries) and the second is an expansion stage. In the final stage the economy is expected to stop growing and remain stable for some time.

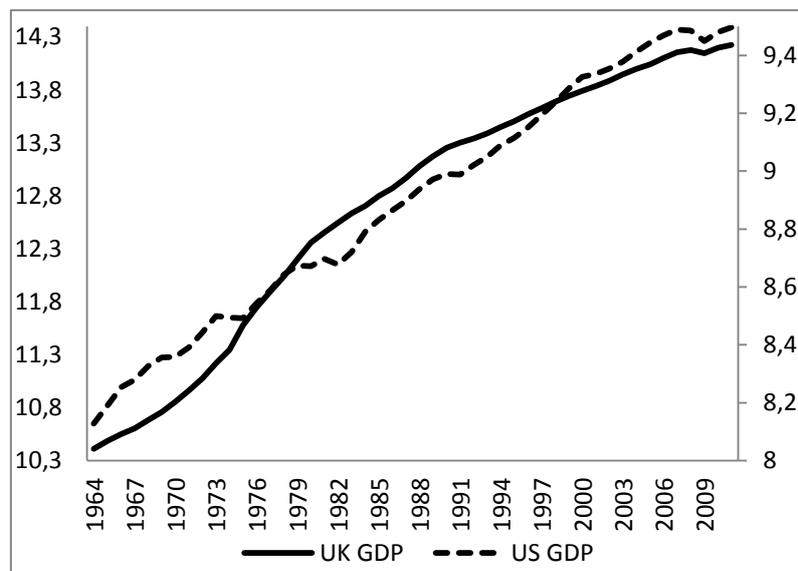


Figure 1: GDP shaped in time on selected countries example

To identify the stages of market and economy development we need for example economic indicators like GDP or stock market indexes of prices.

We can say that the values of the above mentioned financial parameters are linked with markets. Depending on the cycle phase, the growth of those data is different. In the early stage the value of the above mentioned data is not big and their growth rate is little. After some time the markets or economy enters the phase of crisis or enters the phase of intensive growth. At this stage exponential data growth such as GDP or indexes appears. The growth in time is smaller and smaller and the market enters the stability stage. We can notice that if the market is stable the shape of the index takes usually the form of logistic curve. On Fig. 1 example of GDP is shown. All data used in this paper were changed to log values.

Phases of market and economy cycle can be isolated in all those examples. All of them have undergone the early and intensive growth stage. All of them have also undergone slight growth retardation.

The aim of a warning forecast is to signal "early enough" unfavourable changes in selected business activity areas, described by time series. A warning forecast is, by nature, a long-term forecast; its characteristic feature is the fact that it does not give values of forecasted variables but only a warning against the possibility of unfavourable changes occurring.

Warning forecasting consists in forecasting a decrease in business activity. On one hand, enterprises should be recipients of such forecasts, especially when they are preparing

strategic targets of their activity. At the same time they should thoroughly assess the financial rates.

The warning forecast is constructed for any time series, whose correct trend is increasing. In practice, it rarely happens that financial quantities, describing a financial activity constantly increase, the growth period is followed by a stable or a decrease period. The warning forecasting's task is to predict occurrence of a phase of decreasing values in the series. This is why the warning forecast is defined as follows Siedlecki (2006):

“The warning forecast is a formulated assumption based on the information given by time series, that in the next moment T_0 the state of the analysed financial phenomenon will be lower than in $T_0 - 1$ moment.

The warning forecast formulated in $T = n$ moment is true, when time series terms meet the condition:

$$T_0 > n \quad (1)$$

where T – future real series value”.

The truth of the warning forecast should be formed not on the basis of raw time series burdened with random errors, but on the basis of a smoothing function. The choice of the correct smoothing function $f(T)$ has significant meaning in the warning forecast. In such case the condition of the truth of the warning forecast is as follows:

$$f(T_0) - f(T_0 - 1) < 0. \quad (2)$$

Inequalities are the basic determination of the truth of the warning forecast. The warning forecast is de facto a quality forecast.

T_0 moment is called a warning forecast horizon. Too short a warning forecast horizon leads to low usability because there is not enough time for repairing the process performance.

In practice, the analysis and the warning forecast are not usually based on one time series, but on the whole series bundle, describing a selected fragment of the examined phenomenon.

In a company, the horizon of the warning forecast, which is the beginning of an unfavourable situation is the change in the sign of second differences of a trend function of a selected series – signalling devices.

A sign sequent of its first differences can be created for any function in $[1, n]$ period. In a similar way a sign sequent of (t) function second differences can be created. Let „+” mean positive (non-negative) and ‘-’ means negative first (or second) difference of such $f(t)$ function. A warning occurs when in a smoothing function's growth, its second differences show the change of the sign from ‘+’ into ‘-’, the warning disappears when the differences change the sign from ‘-’ into ‘+’.

The warning is permanent in time interval, starting from the point of inflection, via a maximum to a minimal point of smoothing function. A very rough analysis of the graph allows us to think that in the near future a decreasing growth of the series will be maintained.

2. Methodology

2.1. Logistic and log-logistic functions

Logistic function is mathematic expression of logistic growth law. It has for the first time been put forward by P.F. Verhulst (Verhulst 1838). This function is most frequently used to describe economic or natural phenomena. It's the only solution of a differential equation

called, in economy, the Robertson's, Prescott's, Kuznets' (Robertson 1923, Prescott 1922, Kuznets 1971) law:

$$\frac{dy}{dt} = \frac{c}{a} y(a - y), \quad (3)$$

on initial condition:

$$y(0) = \frac{a}{1 + e^b}. \quad (4)$$

And is expressed by following formula:

$$f(t) = \frac{a}{1 + e^{b-ct}}. \quad (5)$$

Where: $a > 0, b > 0, c > 0$

Logistic curve is a simple and universal, universally used and tolerably reliable tool of constructing the distant economic forecasts (Davis 1941). At the same time it is also the way of measuring, observing and analyzing the efficiency and great complexity technical devices effectiveness or large scale economic systems.

This function has two asymptotes $y = 0$ and $y = a$, assigning the interval of variability of a given process. The upper determines the saturation level. The function has one inflexion point separating the phase of accelerated growth from the phase of decreasing growth rate. Another important characteristic of logistic function is its great flexibility, which allows for very good approximation of the empirical data. The function is perfect for identifying the early stages of company development, i.e. from the origin phase through the intensive growth phase to the stagnation phase. However it has one serious defect, which is the horizontal asymptote limiting the growth.

It is a well-known fact that after the intensive growth of the values of financial data mentioned above we have either collapse or slow increase.

In many economic and financial cases it turns out that the logistic function doesn't work, it concerns mainly "unlimited growth" phenomenon. As we know, quantities such as GDP, stock market indexes, salaries in enterprises, sales or company value (it is well known that the aim of a company is to maximize its value in a long term) cannot be limited. If their value does not decrease rapidly after the intensive growth phase, then it is followed by a slow increase (its rate should fall to zero)

The way to eliminate the logistic function limited growth defect is to modify the function by introducing the $\ln(t)$ factor. The modified function is called log-logistic function (logarithmic-logistic). The function was proposed by Z. Hellwig (Hellwig, Siedlecki 1989) and is expressed by the following formula:

$$f(t) = \frac{a \ln t}{1 + e^{b-ct}}, \quad (6)$$

where $a > 0, b > 0, c > 0$.

When examining the function variability graph, we can show its basic properties

$$\lim_{t \rightarrow \infty} \frac{a \ln t}{1 + e^{b-ct}} = \infty, \quad (7)$$

$$\lim_{t \rightarrow 0} \frac{a \ln t}{1 + e^{b-ct}} = -\infty \quad (8)$$

and for $t_1 < t_2$

$$\frac{a \ln t_2}{1 + e^{b-ct_2}} > \frac{a \ln t_1}{1 + e^{b-ct_1}} \quad (9)$$

$$\frac{dy}{dt} > 0, \text{ for } t \geq 1 \quad (10)$$

As we can see log-logistic function is the function growing constantly. It doesn't have extreme points and is always negative.

$$\frac{dy}{dt} > 0, \text{ for } t \geq 1. \quad (11)$$

Log-logistic and logistic functions allow for far extrapolation of time series. It has significant meaning in forecasting of market phases of development using the logistic growth law e.g. value of index or turnover.

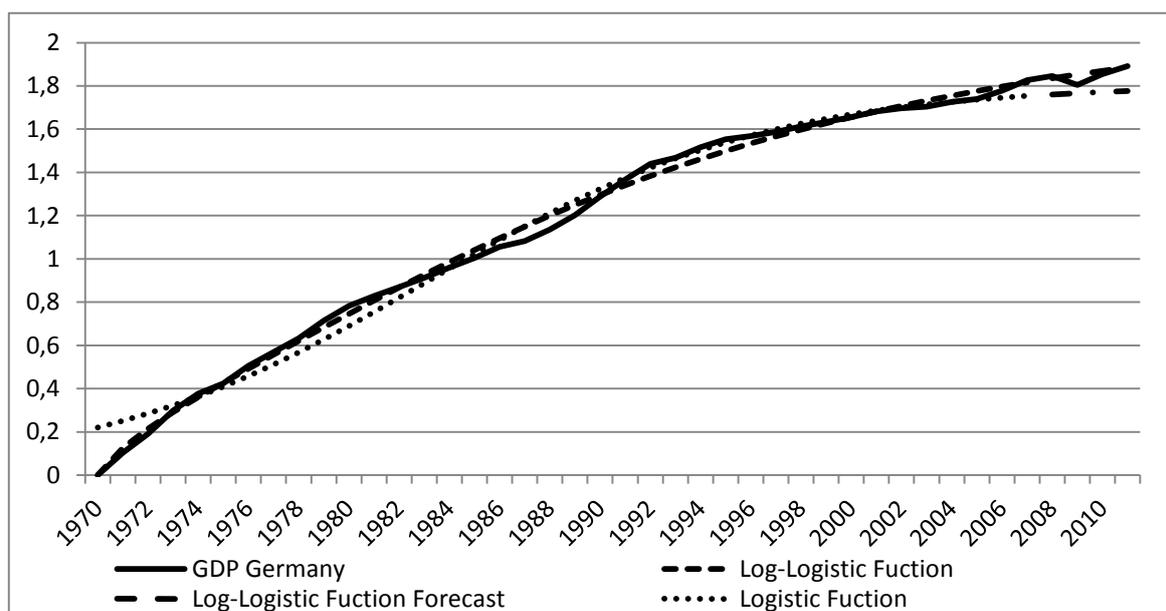


Figure 2: GDP Germany 1973–2007 estimation and forecast for 2008–2011 using logistic and loglogistic functions

On fig. 2 we can see a comparison between logistic and loglogistic functions. Because logistic function has a horizontal asymptote values of GDP forecast are underestimated.

The logistic function has one point of inflection which is often close to the middle of intensive growth phase. The log-logistic phase has usually two points of inflection, where first point is of a less importance in shaping the growth cycle, and the second point, just like in logistic phase, usually indicates the middle of the intensive growth phase. Points of inflection in both functions indicate the change of function convexity (from convex into concave) which is the change of growth rate. To determine the points of inflection we should determine zero points in the second derivative by solving the following equation:

- For logistic function

$$\frac{3ac^2e^{2b}}{(e^{ct} + e^b)^2} - \frac{2ac^2e^{3b}}{(e^{ct} + e^b)^3} - \frac{ac^2e^b}{(e^{ct} + e^b)} = 0, \quad (12)$$

- For log-logistic function

$$a \frac{c^2 t^2 e^{b-ct} (e^{b-ct} - 1) \ln t - 2cte^{b-ct} (1 + e^{b-ct}) - (1 + e^{b-ct})^2}{t^2 (1 + e^{b-ct})^3} = 0. \quad (13)$$

As we can see, the forms of these derivatives do not allow for easy determination of zero points depending on b and c parameters. a parameter does not have influence on zero point.

When the economists determine the moment of transition to the intensive growth phase, they can try to match the logistic or log-logistic functions to the data they have. The moment is significant because misjudgment of the situation can cause a lot of errors. Matching the function is extremely difficult, we do not know how a market will behave in the future. Some historical data can be helpful and useful in many cases. Knowing the analytical form of one of some functions (screenplay method), and (using the expert method) the market moment of transition into the intensive growth phase, we can also determine the moment of transition into the stagnation stage.

First derivatives of logistic and log-logistic functions are as follows:

- logistic function:

$$\frac{d}{dt} = \frac{ace^{b+ct}}{(e^b + e^{ct})^2}, \quad (14)$$

- log-logistic function:

$$\frac{d}{dt} = a \frac{1 + e^{b-ct} + cte^{b-ct} \ln t}{t(1 + e^{b-ct})^2}. \quad (15)$$

As we can see that the first and second derivative of loglogistic function is very complex and it seems that it is impossible to estimate parameters with analytical methods. It is very difficult to convert this function to linear form.

2.2. Numerical estimation of log-logistic function

Parameters of the logistic function can be found by analytical methods (see for example Kuznets (1971) and Davids (1941)), but parameters of log-logistic function cannot be estimated by this method, because the forms of the first and second derivatives are too complicated. In this paper is shown estimation of log-logistic function by iterative method.

Initial values of the parameters:

$$a = (\max(x_t) + \min(x_t))/2 \text{ or } 1, \\ b = 1, \\ c = 0,1.$$

In each iteration values of the parameters are like this:

$$a_i = a + \alpha * (2 * \text{Rnd} - 1), \\ b_i = b + \beta * (2 * \text{Rnd} - 1), \\ c_i = c + \eta * (2 * \text{Rnd} - 1).$$

Where $\alpha > \beta > \eta$ and Rnd is random number. In each iteration we check estimation with $Z = \left[\sum_{j=1}^k (x_j - f(t))^2 \right]$.

Table 1: Estimation for UK GDP 1964-2011

iteration	10	50	100	1000	10000	100000	1000000	10000000
a	0.8657	0.9876	1.0500	1.0067	0.9822	0.9683	0.9680	0.9671
b	0.9355	1.0139	0.8559	1.1813	1.6858	2.0133	1.9922	2.0003
c	0.1297	0.0907	0.0746	0.1059	0.1333	0.1558	0.1554	0.1562
Z	3.9836	1.6178	1.7360	0.8316	0.3399	0.2662	0.2650	0.2649
RMSE	0.2880	0.1835	0.1901	0.1316	0.0841	0.0744	0.0743	0.0742

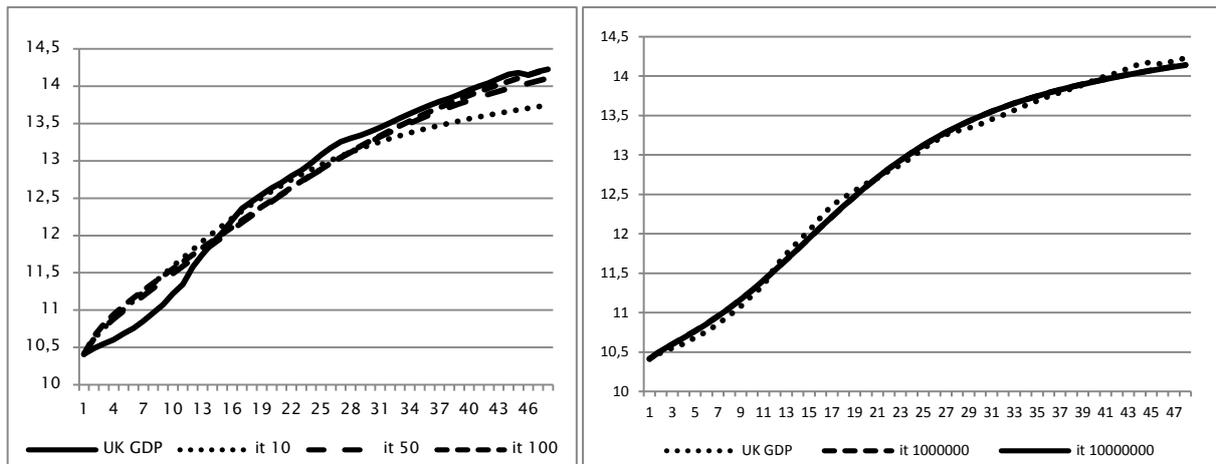


Figure 3: Example of estimation of loglogistic function

On figure 3 and table 1 are shown estimations of loglogistic function for GDP of United Kingdom for increasing number of iterations. As we can see that after one million iterations fit of the function is very high.

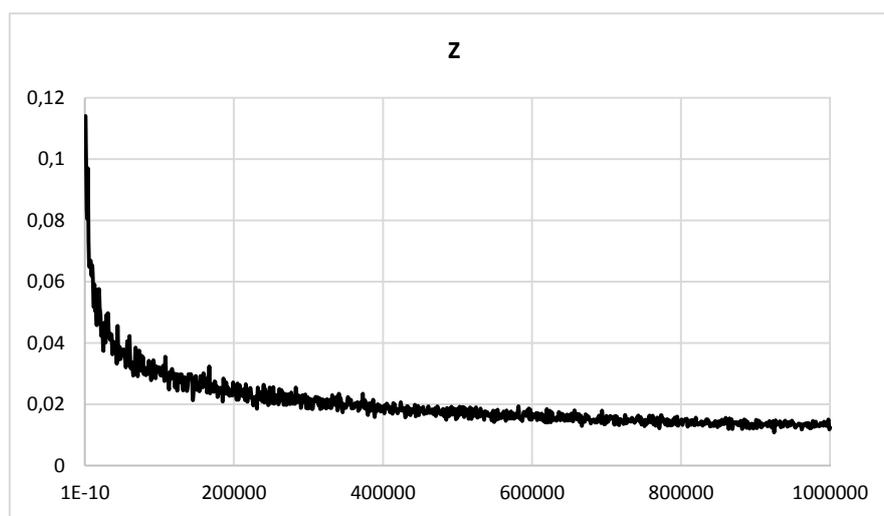


Figure 4: Z as a function of number of iterations

As we can see the error of estimation Z is a decreasing function of iteration number. As number of iteration approaches 1 000 000, value of Z is almost constant, which means that we probably achieved optimal results, optimal fit.

2.3. Method of warning signals tracing in a GDP on strategic bands

Warning signals tracing, using financial cycle of economy life should include: selection of suitable financial data, suitable function for its forecast and variation and stability of increment analysis. One of the most important task in this case is financial data selection and matching of a suitable function.

One of the ways of financial warning signals analysis, based on economic growth, is increment stability and variation of selected financial parameters analysis. Based on the analysis two kinds of warning signals can be determined on decreases or increases exceeding the trend (logistic or loglogistic) function deviation, traced by strategic bands.

Strategic bands are the intervals determining the assumed development trajectory deviation, determining the following phases of a economic growth. The analysis is rather widespread in testing the quality of products (*TQM*), where so called control cards are used, or in financial markets in technical analysis (e.g. Bollinger's or percentage band).

Popular econometric and statistical methods, such as e.g. interval estimation and interval forecast, which can be used to determine intervals of RSME, can be used to determine the strategic bands. The strategic bands in this article have been determined for selected, described GDP's.

3. Empirical results for chosen European countries

3.1. Smoothing

Loglogistic functions have been estimated for the GDP of selected countries. The analysis has been based on logarithms of annual data from period 1970-2007. We convert data by subtracting value of first observation to estimate loglogistic function (without intercept). The parameters of loglogistic function have been presented in Table 2. We tested the stationarity of residuals of estimated functions using augmented Dickey-Fuller. For both loglogistic models we can reject hypothesis of unit root with 0,05 level of significance. For model of GDP Germany asymptotic p-value is 0,000378 and for Greece is 0,00005635.

Table 2: Loglogistic function parameters

	GDP Germany	GDP Greece
Parameters	a = 0,5141	a = 1,4726
	b = 0,8295	b = 1,6606
	c = 0,1143	c = 0,1530
	R ² = 0,9967	R ² = 0,9995
	RMSE = 0,0309	RMSE = 0,03803

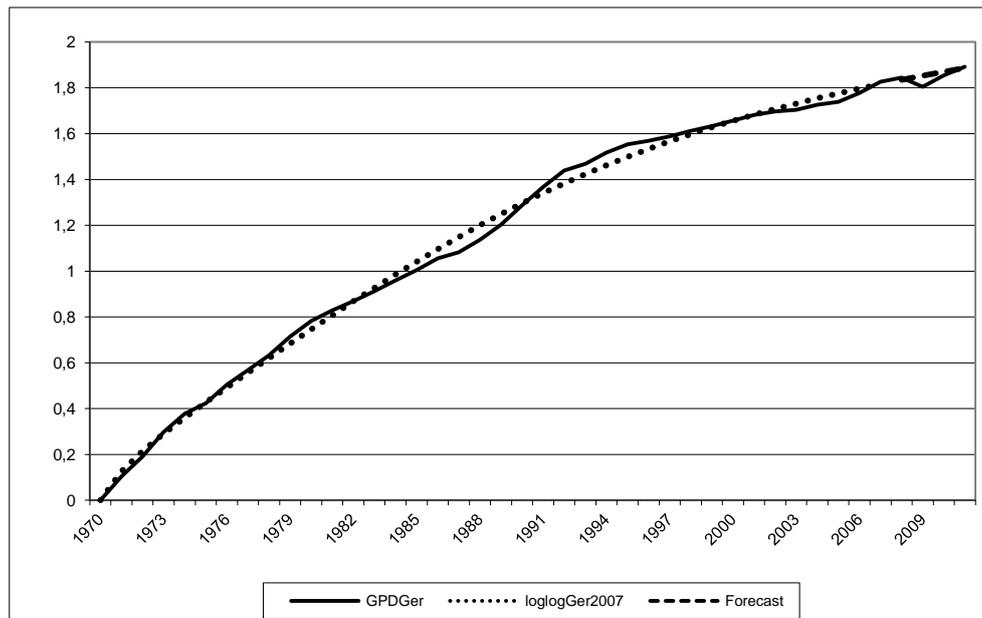


Figure 5: Logarithm of GDP of Germany and loglogistic function

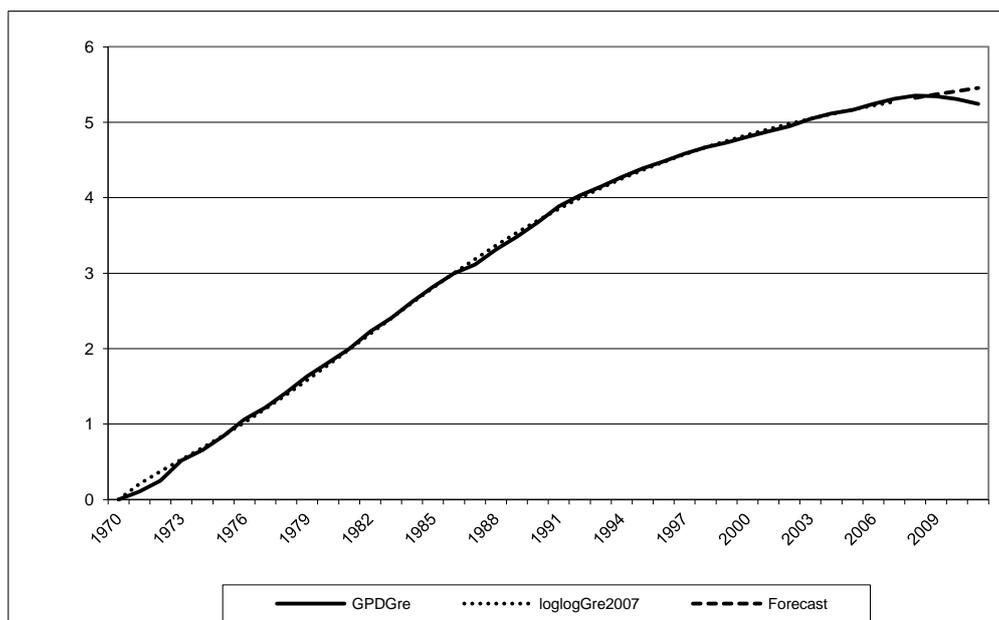


Figure 6: Logarithm of GDP of Greece and loglogistic function

4. Conclusion

In our paper we successfully show how to use the modified logistic function (loglogistic function) and its estimation method (based on logistic law (Kuznets 1971)) to determine the business cycle and to model warning forecast. We also have presented new method of estimation of loglogistic function which allowed us to test this function on GDP of Greece as an example of troubled economy and Germany as an example of strong economy. This estimation method can be used also for other functions that cannot be presented in simpler, linear form.

From presented examples we can derive some concluding remarks:

- log-logistic function is very good tool to smoothing time series because is monotonic and flexible,
- log-logistic function allows for far extrapolation of economic and finance time series,
- it is important in forecasting of economy and phases of financial development when using the logistic growth law,
- it is very good tool to estimate the warning signals.

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E-shop as a new distribution channel of wine business enterprises

Eva Skálová¹, Martin Prokeš² and Kateřina Rýglová³

¹*Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: xskalov1@node.mendelu.cz*

²*Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: martin.prokes.umo@mendelu.cz*

³*Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: katerina.ryglova@mendelu.cz*

Abstract

This paper is focused on contemporary trends of distribution in wine business. The paper examines above other aspects use of e-shops in wineries as part of the sales channels and its influence on inner economic performance – turnover. Research was conducted via a case study located in the area of South Moravia as an example of a traditional wine producing region. The results are presented and discussed based on questionnaire responses addressed to a sample of quote selected wine enterprises in the Czech Republic. The research shows significant increase of e-shops in the wine industry in past 5 years however the main part of the turnover is secured by another “traditional” distribution channels. As a partial aim of the paper it is uncovered the importance of the e-shops in marketing communication of the wineries and wine producers. This fact supports the statement that even an e-shop usually does not contribute to the gross turnover within higher shares; it serves as an intermediate of information between the firm and its customers.

Keywords: wine distribution, e-shop, turnover, marketing communication

1. Introduction

Wine business in the globalized world where Internet plays its irreplaceable role has gone through a fast changes in terms of distribution in past few years. Sun et. all. (2014) claim that the main challenge of marketing decisions for winemaking enterprises is the correct selection of distribution channels. The importance of wine industry for agriculture is furthermore seen is its ability to be the source of development because

they affect positively other related industries – namely tourism and hospitality and can bring an added value to both by intermediating new vacancies, business opportunities, etc. (Carlsen, 2004). Above stated facts played their role as being motivators for wineries to take an active part in wine tourism. Many of the wine producers saw an economical benefit in direct “on-door” sales – they have been able to sale their products for the highest margin by saving any additional costs (transport, wholesale discounts, etc.) when the end customers visit their cellars in order to purchase wine. However times have changed since 1990’s. This paper is focused on the wine distribution challenges under specific conditions of the Czech Republic – however being a traditional wine region, the modern form of wine market has been developing since 1990 and so tends to be perceived as a relatively new in comparison to the old European wine regions such as France, Spain, Italy, Germany or Austria. In the contemporary high competitive environment also Czech wine enterprises need to seek for a new opportunities not only to attract new customers but how to maintain the relationships alive and interactive, how to make the purchase for the end customers as convenient as possible and by that activities to be able to stay competitive to the “great” wine regions and wineries. Schamel (2009) argued that a winery's long-term success depends not only on demand for and the reputation of its products but also on the operator's ability to develop relationships with customers and distributors. E-shop as a new distribution channel is one of the ways how to achieve above mentioned objectives. This paper explores the importance of e-shops for wineries in the Czech Republic not only from the sales/turnover side but also its influence on wine tourism.

2. Methodology and Data

For purposes of this paper the primary research was undertaken. An online questionnaire has been used as a quantitative method. Its distribution took part between 29th January 2015 and 10th February 2015 among 566 wineries and wine makers operating in the Czech Republic – both South Moravia and Bohemia regions. 74 respondents of the questionnaire were selected on a basis of a quota allocation – according to a size of the winery (liters of wine produced per annum) reflecting actual situation on the Czech wine market. In these terms the wineries are divided into¹:

- micro size producers (annual production up to 10 000 l)
- small size producers (annual production between 11 000 and 50 000 l)
- medium size producers (annual production between 51 000 and 250 000 l)
- large size producers (annual production more than 250 000 l)

The research in question took place in the South Moravia and Bohemia wine regions (the Czech Republic) in the beginning of year 2015. Its goal was to:

- identify mostly used distribution channels of wineries in both regions
- specify e-shop usage and its contribution to the overall turnover of the responding wineries

A supportive goal was set as following:

- to confirm or reject existing connection between using and e-shop and willingness of the enterprises to take an active part as a provider of wine tourism services

The results published in this paper are part of the ongoing research focused on factors of service quality in wine tourism (case study of the South Moravia region) and provide

a basis insight in to the motivation of the wine enterprises to take an active part in wine tourism (as providers of the services).

In regards to the set goal of this partial research the data gained were analysed using a contingency table in order to confirm or reject whether there exists a relation between using an e-shop as a distribution channel (YES – NO) and willingness of the wineries to provide services of wine tourism (YES – NO). A null hypothesis was introduced and tested by Pearson's chi-squared test.

H₀: "A winery distributing via e-shop does not participate on wine tourism."

3. Results

The respondents were asked to categorise themselves in terms of the size of annual wine production to allow authors to divide the respondents on a quote basis as shows Table 1. The numbers show that a majority (80%) of responding wine enterprises are micro and small size producers which in fact reflect the actual situation on the Czech wine market. Further 33% of responders claim they do operate own e-shop as one of currently used distribution channels (Figure 1).

Respondents who operate an e-shop were asked to state how sales via e-shop contribute to an overall turnover – illustrated in Table 2 and how the year-to-year sales via e-shop changed between 2013 and 2014 (Table 3). Here is vital to underpin that none of the respondents claim sales share to be higher than 20%, moreover the majority of e-shops – 64% – contribute by less than 5% to the total turnover of the wineries. Also, the responding wineries had to say for how long they operate the e-shop to uncover whether there rises the number of this distribution channel or not.

Respondents were further asked to answer whether they actively participate on wine tourism as providers of services – 77% of the wineries replied positively (Figure 2).

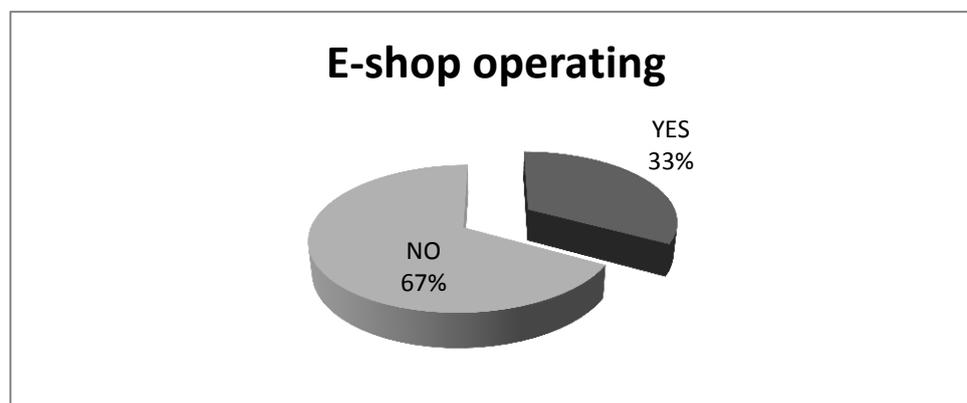


Figure 1: Usage of an e-shop as a distribution channel in wineries

Table 1: Categories of responding wine producers

Average annual production of wine	% of producers in the category
Up to 10 000 l	39
(11 000 – 50 000 l)	39
(51 000 – 250 000 l)	15
more than 250 000 l	7

Table 2: E-shop sales contribution to an overall turnover

E-shop sales share on an overall turnover	
Less than 2%	32%
<25%	32%
<6–10%	27%
<11–20%	9%
more than 20%	0

Table 3: Year-to-year changes in wine sales via e-shop

The sales via e-shop	
did not change	56%
rised by 31–50%	11%
rised by 10–20%	11%
rised by 21–30%	7%
rised by more than 50%	7%
dropped by 31–50%	4%
dropped by 10–20%	4%

Table 4: E-shop in operation

E-shop is used	
less than 1 year	33%
1–2 years	37%
3–5 years	22%
more than 5 years	8%

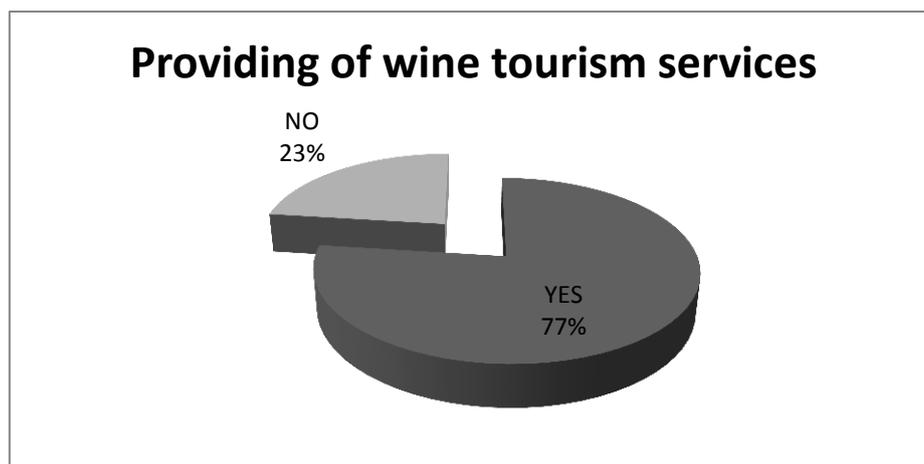


Figure 2: Active participating in wine tourism as service providers

To decide whether there exist a relation between willingness to participate on wine tourism and usage of e-shop as a distribution channel a hypothesis has been introduced:

H_0 : "Wineries distributing via e-shop do participate on wine tourism."

The data were tested by Pearson's chi-squared test:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^s \frac{(n_{ij} - m_{ij})^2}{m_{ij}}$$

- where in this case $\alpha = 10\%$, than value of statistic test is:

$$\chi^2 = 0.025;$$

and critical value:

$$\chi(1-\alpha); df = 2.706.$$

We can state that we do not reject the null hypothesis, in other words we cannot say that those wineries who distribute their wine via e-shop do not participate on wine tourism.

4. Discussion and Conclusions

On the basis of the results the authors can claim that the number of wine producers using an e-shop as one of the distribution channels has been growing for past two years as the age of the e-shops in average is 0–2 years. At the same time more than 56% wineries state that the sales via e-shop have not changed from year to year and also in most cases e-shop sales contribution to the overall turnover is lower than 10%. Further the respondents explained their attitude to e-shop sales as “vital in these days”, “a competitive advantage” and “additional to other distribution channels”. From the side of a producer there exist customers who prefer to buy wine via an e-shop however the nature of targeted segments of market (wholesales, retail chains, corporate clients with special terms of purchase, etc.) does not allow the e-shop to be an appropriate distribution channel in all cases. Hsiao and Chen (2013) state that in this Internet era, there is still a significant portion of retailers that focus exclusively on the physical channels, and a number of leading manufacturers insist on selling through the direct channels and list a food and drink industry to be one of such examples. The results of this paper supports this fact however cannot exactly answer the question why is it so. . On the other side, seen from the perspective of the end customer, the lack of an interaction at the time of selection in an intermediated distribution channels are now available in modern ways of distribution (Pomarici, 2011). As the wine e-shop are relatively new to the business in the Czech Republic (as the research has shown) the customers could tend to be more conservative and as the above mentioned authors claimed there still could be lower interaction between the wine producer and the customer than on other types of sale. This statement in fact is supported by Flamik (2013) study on modern forms of wine tourism where the author still sees the vital function of wine tourism for “on-door” sale that is for a majority of wine producers in the region still most important distribution channel securing highest margins and so not affected by other/modern ways of wine distribution, e.g. e-shop sales., moreover many of later sales (in retails, specialist shops, e-shops) are, according to Flamik, realized after the visit to the wine producer. Therefore the fact proved by this paper (wineries who operate e-shops can still participate on wine tourism at the same time) is in accord with Flamik’s approach.

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European Sugar Market – Quo Vadis?

Luboš Smutka¹, Irena Benešová² and Karel Tomšík³

¹Department of Economics, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamýcká 129, Prague 6 – Suchbátka, Czech Republic, e-mail: smutka@pef.czu.cz

²Department of Economics, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamýcká 129, Prague 6 – Suchbátka, Czech Republic, e-mail: benesova@pef.czu.cz

³Department of Economics, Faculty of Economics and Management, Czech University of Life Sciences in Prague, Kamýcká 129, Prague 6 – Suchbátka, Czech Republic, e-mail: tomsik@pef.czu.cz

Abstract

Recent years have witnessed significant changes in the European sugar market. An effort on the part of the European Commission has brought significant changes. During the last two decades these changes have been applied to all member states and third countries as well. The ownership structure has changed substantially. This also has an impact on market concentration and production capacities. This paper deals with one aspect of the sugar market – sugar quotas and how they influence the market. The article focuses on the analysis of the current distribution and control of production capacities across the EU. Market concentration has been measured by the Herfindahl – Hirschman Index. This indicator helps us to identify the real power and position of countries and firms operating in the European quota sugar market. The second measure used is the “Four – firm (Five – firm) concentration ratio”, which express the partial share in quota beet sugar production.

Recently, there have been about 130 companies operating in the EU – Single Market. Approximately 75% of them are specialized only in sugar beet production. Although we can consider the number of companies operating in the EU to be quite high and would expect a high level of competition, the reality is different. The European market has been dominated by six large multinational alliances that control not just their own production capacities but also the capacities of subsidiaries.

The situation in original quota A is even more complicated. Just 19 member states currently produce beet sugar. France has the dominant position in terms of quota size (22.2%), followed by Germany (21.4%) and Poland (10.4%). In the case of this market we can talk about a typical oligopoly. However, the quota sugar market within the EU is primarily controlled by companies (alliances) operating in individual countries. It is therefore necessary to liberalize the European market; otherwise the power and influence of the largest European companies will grow. This situation is especially

critical in, for example, Finland, Lithuania, Hungary and Sweden, where the allocated quota is controlled by two, or even one subject.

Keywords: Quota, market concentration, multinational alliance, sugar beet, sugar cane

1. Introduction

Agriculture in Europe has been treated very differently than any other sector of the economy. Special attention within agriculture is devoted to the sugar market. The European Union has regulated the sugar market since 1968 (Poonyth, et al., 2000). It is a heavily subsidized sector under the Common Agricultural Policy (Gohin & Bureau, 2005). The sugar market is considered very controversial due to the complex system of market protection measures (Busse & Jerosch, 2006) (Šustrová, 2014). Another aspect of the current structure of the market is its negative impact on developing countries (Gotor & Tsigas, 2011). Development of the sugar market has been highly dynamic in recent decades. During the last 20 years we have witnessed significant changes. Of great importance in this case was a reform which took place in 2006 and brought a simplification to the quota regime (Swinbank, 2009). These changes have influenced the present form and structure of the market. Another step in the reform initiative seems to be the final abolishment of the common market organization which is (again) expected in two years (2017). However, even after such a huge step in the reform process there will still exist access restrictions for producers from third countries (Nolte, et al., 2011). This corresponds with a statement from the International Sugar Organization, which concluded that it is unlikely to import more than 3.0 million tonnes in any given year (International Sugar Organization, 2014). Nolte et al. argues that even greater restructuring of the sugar market will take place after the abolition of the quota system (Nolte, et al., 2012).

On account of sugar beet production, the European sugar market has a very special position which differs from any other region of the world (Řezbová, et al., 2013). This production is protected from sugar cane imports. The European Union also protects its own producers from its own production within the EU. Along with this protection also comes the specialization of sugar mills – with most of them processing sugar beet (Gohin & Bureau, 2006).

Of course, such market conditions have a negative impact on the structure of the market. There exist only a limited number of factories or multinational alliances. This system is supported by the fact that the market is protected by high tariffs (Elobeid & Beghin, 2006), even though some producers have access through preferential trading agreements (Gotor, 2009).

2. Methodology and Data

The aim of the paper is to analyse the structure of the sugar market in the European Union. The analysis will identify the main actors in the market and determine the level of market concentration in quota beet sugar using the Herfindahl-Hirschman Index. There are two levels of analysis: market concentration in both beet and cane, and separately for just sugar beet.

The analysis follows these steps:

1. Geographical location of sugar mills in EU member states
2. Identification of the companies controlling the EU market
3. Identification of alliances controlling sugar production in Europe
4. Market concentration at the European level

We analyse the current distribution and control of production across the European Union during the campaign 2013/2014. The data comes from the International Sugar Organization, F.O. Licht, CEFS Sugar Statistics 2013, and the European Commission DG Agri.

There are three types of sugar mills: 1) sugar mills specialized in sugar beet; 2) sugar mills which process sugar cane, and 3) combined.

Market concentration is analysed by the Herfindahl-Hirschman Index (HHI) and takes into consideration only the original quota A, which dominates the EU single market supply.

HHI is used to measure market concentration and monitor anti-monopoly policies. The index ranges from 0 (no concentration and a highly competitive market) to 10,000 (pure monopoly) (Hirschman, 1964). The index is calculated by squaring the market share of each firm competing in the market and summing the resulting numbers:

$$HHI = \sum_{i=1}^N s_i^2 = s_1^2 + s_2^2 + \dots + s_n^2 \quad (1)$$

where s_i is the market share of firm/alliance „i“ in the market and N represents the number of firms/alliances in the market. HHI is also used by offices for the protection of competition; it is used to measure the impacts of mergers and acquisitions. According to HHI, proving market concentration is stricter in Europe, where moderate concentration starts at 1,000, whereas in the USA the figure is 1,500. Classification of market concentration in Europe and the USA is presented in Table 1:

Table 1: Market concentration

	Highly competitive	Un-concentrated	Moderate concentration	High concentration
European Commission	x	x	> 1,000	> 2,000
U.S. Department of Justice	< 100	< 1,500	> 1,500	> 2,500

Source: European Commission, 2010, U.S. Department of Justice and Federal Trade Commission, 2010

This article uses the HHI classification defined by the U.S. Department of Justice. If the HHI is lower than 0.01 (respectively 100), the market is highly competitive. HHI ranging from 0.01 to 0.15 (respectively 100 and 1,500) indicate an un-concentrated market where several companies have significant positions. Values of HHI from 0.15 to 0.25 (respectively 1,500 and 2,500) reveal a significant market concentration (mostly monopolistic competition), and HHI above 0.25 (respectively 2,500) indicate a highly concentrated market (mostly oligopolistic). HHI close to 1, respectively 10,000, suggest a monopoly. The methodology is used to identify the real power and position of countries and firms operating in the European quota sugar market.

The “Four-firm (Five-firm) concentration ratio” was applied as the additional indicator to the HHI. The indicator is computed as follows:

$$CR_n = \sum_{i=1}^n s_i = s_1 + s_2 + \dots + s_n \quad (2)$$

where s_i is the market share of firm “i” and n represents the number of surveyed subjects within a given sector. The share of firms/alliances was expressed as their partial share in the quota beet sugar production.

Classification of the CR_n index given by London Economics (London Economics, 2012) results in three categories:

- a) Low concentration (0 – 50%) – from perfect competitiveness to oligopoly
- b) Moderate concentration (50 – 80%) – pure oligopoly
- c) High concentration (80 – 100%) – from oligopoly to monopoly

3. Results

As was already mentioned above, there are some specifics in the European sugar markets which are given by the existence of the Common Market Organization and are associated with high protectionism. The European Union is considered one of the most important producers of sugar. In the year 2013/2014, we can point to annual production of about 17 million tonnes, with exports of 6.7 million tonnes. As a result of this position, the European sugar market is also influenced by many external factors (Dillen, et al., 2008) (Svatoš, et al., 2013) (Cali, et al., 2013).

3.1. Sugar beet and sugar cane market concentration

The structure of sugar-processing factories shows that nearly 78% of the total number of sugar mills can proceed only sugar beet.

The rest are specialized in sugar cane or can combine both cane and beet. Their locations are spread across Europe (Table 2). In general, there are three countries with a huge allocation of sugar factories: France, Germany and Poland. Together, they account for nearly 50% of sugar-producing factories.

Our analysis shows that approximately 53 differently-sized companies of various structures and business strategies currently operate in the EU market. If we take into consideration only those which operate more than five processing factories, we come up with the following list: AB Sugar, operating in Spain and the UK (8 factories); Cristal Union/CristalCo. – 10 factories in France; Krajowa Spolka Cukrowa S.A. (7 factories in Poland); and Nordic Sugar, which is part of Nordzucker AG – together this alliance operates 12 factories in Germany, Poland, Denmark, Sweden and Lithuania. Other big players include Pfeifer & Langen (10 factories in Germany, Poland and Romania), Saint Louis Sucre S.N.C. (5 factories in France), Suedzucker AG (9 factories in Germany) and Suedzucker Polska S.A. (5 factories in Poland).

Some of these companies are represented by individual private sugar factories, while others are represented by alliances operating within national markets; but there are also companies operating in markets on an international basis. This basis does not mean only the EU single market, as some companies have broader links to sugar markets outside of the EU. It is worth noting that many sugar factories, operating within national or international structures, are not specialised only in sugar production, but rather sugar production and trading represent only a part of their activities, for example Suedzucker and Nordzucker či Tereos.

Table 2: Structure of processing factories across Europe

Country	Sugar beet factories	Combined factories	Cane-processing factories	Total
Austria	2	0	0	2
Belgium	5	0	0	5
Bulgaria	0	4	2	6
Croatia	1	2	0	3
Czech Republic	7	0	0	7
Denmark	1	1	0	2
Finland	1	0	1	2
France	25	0	1	26
Germany	20	0	0	20
Greece	4	0	0	4
Hungary	1	0	0	1
Italy	3	2	1	6
Lithuania	2	0	0	2
Poland	16	2	0	18
Portugal	0	1	3	4
Romania	4	1	3	8
Slovakia	2	0	0	2
Spain	3	2	0	5
Sweden	1	0	1	2
UK	3	1	1	5
Totals	101	16	13	130

Source: F.O. Licht Sugar (2014)

The sugar market in Europe is currently being controlled by six large multinational alliances: „Nordzucker Alliance“, „Suedzucker Alliance“, „Tereos Group Alliance“, „Pfeifer & Langen Alliance“, „Associated British Food Alliance“ and „Tate & Lyle Alliance“. The problem with the European market is that these alliances are very often vertically integrated and control not just their own production but also the production of their own suppliers. Another problem is the ownership structure, as there are a lot of mutual cooperation agreements, exchanging of shares and purchasing of shares. We can use Nordzucker as an example. This alliance controls the production capacities of the following companies: Nordzucker Germany, Nordzucker Polska, Danish Sugar (Denmark), Danisco Sugar (Lithuania, Finland and Sweden), Matra Cukar (Hungary), Povážský cukor (Slovakia) and Cukrovary TTD (Czech Republic – one-third share); furthermore, it disposes of the production capacities of the already defunct alliance „Eurosugar“. The same can be applied to all the above-mentioned companies.

Based on the previous facts, we can state that the alliance controls a much higher market share than is apparent. During the last year (2014), there were some rulings from the German antitrust authorities indicating that cartel agreements exist. Figure 1 illustrates the producers which control the EU sugar market.

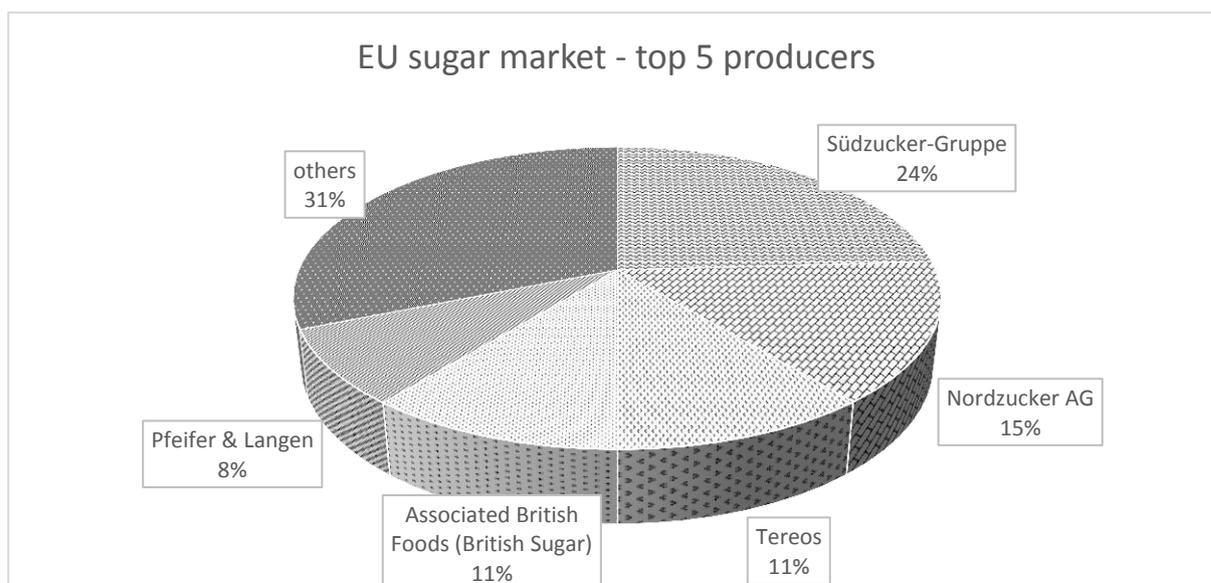


Figure 1: EU sugar market – top 5 producers

In recent decades, most sugar-producing factories have changed their owners. This is connected with the loss of national influence over sugar production and also with its shift to multinational corporations. The top 10 producers control nearly 93% of the market (Figure 2).

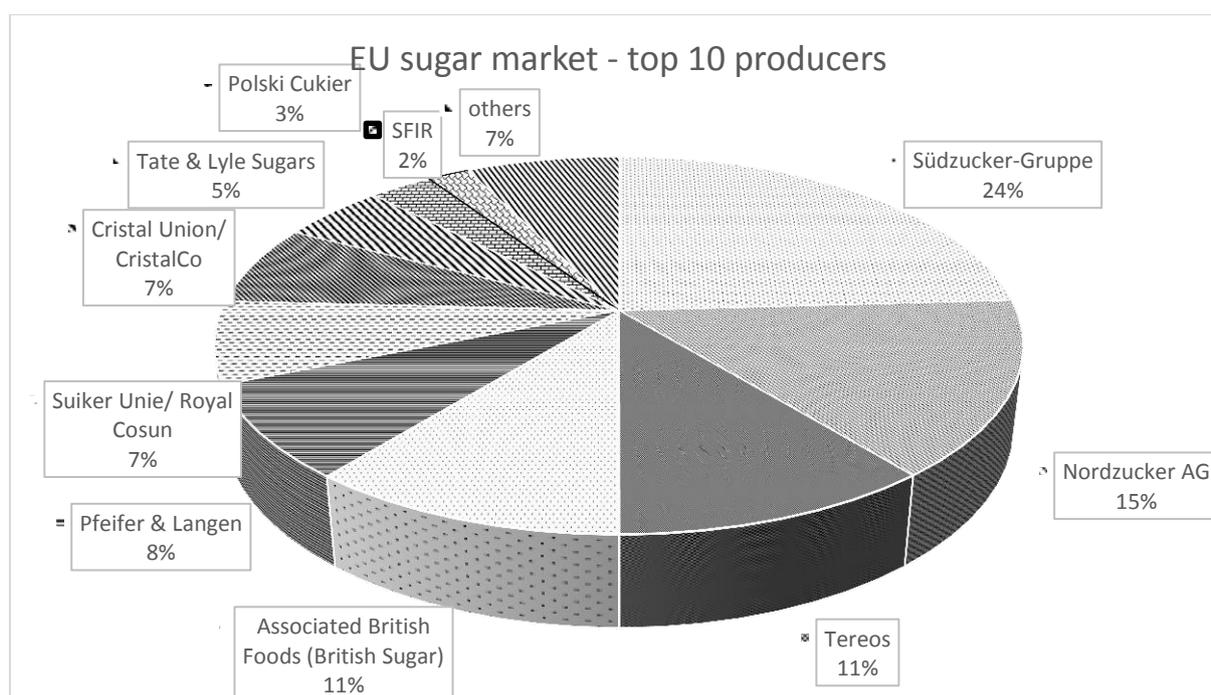


Figure 2: EU sugar market – top 10 producers

If we look at the structure of the producers and countries we find that, for example, Südzucker-Gruppe, whose largest market share is 24%, operates factories in the Czech Republic, Slovakia, Germany, Poland, France, Romania, Austria and Belgium. Together, this alliance controls about 35 producing factories. The same (just with a lower share and numbers) can be applied to other alliances. The European market is controlled mostly by German and French companies. In this case, the German share is nearly 47%

and the French share 17%. These two are followed by British companies – 16% and Dutch – 7%. If we look at it from the perspective of ownership structure, we can say that 87% of production capacities are controlled by headquarters located in just four countries. Based on these facts, we can conclude that the ownership structure is quite limited and the market is concentrated. In lights of these facts, we cannot talk about a fully competitive market.

3.2. Quota – sugar market concentration

The production of sugar beet currently takes place in 19 countries. This analysis takes into consideration just the 27 EU member states (we exclude Croatia due to lack of data). French overseas departments and the Azores Islands are also excluded. The following Figure 3 visualizes the share of quotas assigned to EU member states by the European Commission. The situation is similar to the previous part of the paper. France, Germany, Poland and the UK operate 67 sugar factories and account for 61.8% of the EU sugar quota. This situation leads to oligopoly in the market. The quotas are assigned to member states; however, as already mentioned above, in reality they are operated by multinational corporations.

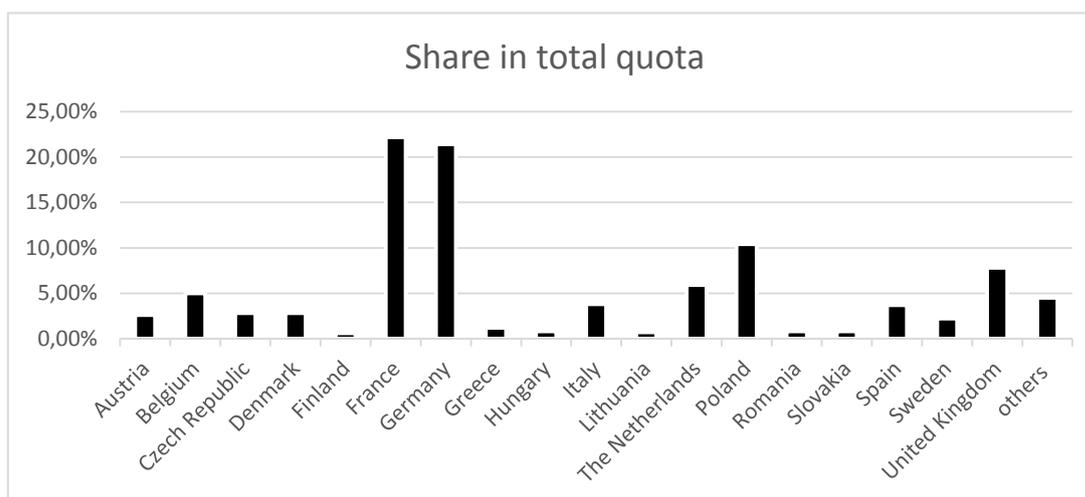


Figure 3: Share in original total quota A

Note: Croatia, French overseas departments and the Azores Islands are excluded.

In many countries, there is a serious problem because the quota is being controlled by one or two producers. As examples of single quota owners we can name Finland, Lithuania, Hungary, Sweden, Denmark, the Netherlands, Slovakia and the UK.

In the Baltic region (Denmark, Sweden, Finland and Lithuania), the quota is fully controlled by the Nordzucker alliance. As evident from the aforementioned fact, there is an unequal distribution of the production quota. Nearly 75% (10 million tonnes) of the quota is held by five multinational companies (Suedzucker, Nordzucker, ABF, Tereos and Pfeifer & Langen). This means that France and Germany control the overall European sugar market and have a major impact on policy.

When we apply the Herfindahl-Hirschman Index (HHI) to the European sugar market, the results show that the market is quite concentrated in all member states. If we apply the methodology presented by the European Commission, all the countries would have a high concentration. In the case of the U.S. classification of market concentration, a moderate concentration would exist only in the Czech Republic and Poland (Table 3).

Table 3: Sugar market concentration according to allocated production quotas in EU member states

HH >6,000	6,000>HH>4,000	HH<4,000
UK	Belgium	France
Netherlands	Italy	Germany
Denmark	Slovakia	Poland
Austria		Czech Republic
Sweden		Romania
Greece		
Hungary		
Lithuania		
Finland		
Spain		

Source: CEFS, F.O. Licht Sugar, EU DG Agri, own calculation (2014)

Based on the Herfindahl-Hirschman Index, we can say that there are three groups of countries. The first group consist of countries with a very high level of HHI. In this group of countries, only Spain is a bit different as its HHI is 6,152. For all of these countries, there is monopoly power in the sugar market. The second group consists of Belgium, Italy. . In this case, we can talk about an oligopolistic market passing into monopoly. The last group is the most competitive one.

The calculation of HHI for the whole EU creates a paradox with the above-mentioned finding. In this case the HHI is 1,444. The HHI reflecting the quota distribution according to national allocation indicates a low level of concentration as well (1,364). These data show a huge discrepancy between political efforts to distribute equitable A-sugar quotas among countries and the reality. While the EU market does not indicate an extreme concentration (HHI 1,364.8; un-concentrated market), if an analysis is performed according to the location of headquarters and allocated quotas to owners of production capacities, the market will appear extremely concentrated (HHI 3,222; oligopoly).

4. Discussion and Conclusions

The European sugar market has developed dramatically in recent decades. Compared to other agricultural markets, the sugar market appears to be quite concentrated. The highest production capacities are located in just a few countries (Germany, France and Poland). Compared to these findings, the sugar market is controlled by companies or alliances headquartered in Germany, France, the UK and the Netherlands. This market has been dominated by a few multinational corporations: Suedzucker, Nordzucker, Tereos, ABF, Pfeifer & Langen, Royal Cosun, Cristal Union and Tate & Lyle.

It is nearly impossible for new companies to penetrate the market because the quota has already been divided and there is no spare amount. The situation in the European sugar market is also very difficult for producers from third countries. Even if the EU abolished all quotas by October 2017, some protection measures would still be taken at the border level. Imports (also including raw cane sugar) are hindered by high duties – EUR 339 per tonne of raw cane sugar and EUR 419 per tonne of white sugar.

Sugar companies operating in the EU market are mutually linked by property and contracts. The market is therefore much more concentrated than it seems at first glance.

The players who now dominate the European market are quite safe in the current system.

It is highly likely that the situation will not change for another few years. Even if the quota is abolished, the building of new factories is improbable. The only possible way to reach the market is to buy some of the producers. However, the market can become even more concentrated through a new acquisition than it is right now.

Abolishing the quota must be just the first step in the process of liberalization of the European sugar market and European agricultural markets in general. However, only eliminating the quota would not bring about an overall effect. It is necessary to reduce import duties. This is just more political debate, since the reduction of import duties would probably lead to a reduction in production as well. Perhaps more than any other sector of agriculture, the current sugar regime proves that it cannot be reformed just inside of the European Union, but also needs to be reformed outside of it. Decisions taken in Brussels would have an impact on the entire world sugar market. The future of the European market would be based on a political decision.

Acknowledgements

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Environmental tax revenue in the Czech Republic

Veronika Solilová¹, Danuše Nerudová²

¹Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: veronika.solilova@mendelu.cz

²Department of Accounting and Taxes, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: d.nerudova@seznam.cz

Abstract

The European Union committed to reduce their greenhouse gas emissions by 20% until 2020 or 40% until 2030 compared to 1990 levels of the Kyoto Protocol. In case of the Czech Republic, the commitment is in the amount of 8% until 2030. The environmental taxes represent one of tools of the European environmental policy how this commitment perform. As, all environmental policy decisions related to the greenhouse gas emissions need to be made on the base of timely and reliable information and environment statistics, this article provides a detailed analysis of environmental taxes in the Czech Republic, where the European Union is used as a comparable unit. The paper provides facts that the environmental tax revenue of the Czech Republic constitutes 1.15% of total EU28 environmental tax revenue in 2012 and its tendency is increasing compared to 2004 as well as the implicit tax rate on energy. Further, Czech environmental tax revenue corresponding to 2.35% of gross domestic product and 6.72% of revenue from total taxes and social contributions.

Keywords: greenhouse gas emissions, Czech Republic, environmental tax revenue

1. Introduction

In the respect of climate and energy policies the European Union is very active. It signed Kyoto Protocol in 1997 with the commitment of the industrialized countries to limit or reduce their greenhouse gas emissions at least 5% from the 1990 levels in the period 2008–2012, and subsequently based on the Doha Amendment from 2012 for the second period 2013–2020 with at least 20% reduction's target from the 1990 levels. Further, the EU increased its commitment from 5% reduction's target to at least 8%. In addition, the EU founded both the European Climate Change Programme in 2001 with the aim to develop the European policy that will achieve the international obligation related to the

reduction of greenhouse gas emissions, and the EU Emissions Trading Systems in 2005, as the cost-effective tools for cutting greenhouse gas emissions. Moreover, the EU adopted the Europe 2020 strategy on 17 June 2010 as a way to smart, sustainable, greener and inclusive growth. However, as states (European Commission, 2014) currently the EU is well on track to meet the 2020 targets. Therefore, the EU made a new commitment to reduce European greenhouse gases emission at least 20% in 2020 and 40% in 2030 compared to 1990 levels.

Currently, a variety of economic tools for the environment are available to the EU, however, only a few are used to adopt of environmentally friendly behaviour. The most commonly applied economic tools for the environment protection are environmental taxes and EU Emissions Trading Systems.

In the respect of tax theory, environmental tax is defined as a tax which tax base is a physical unit of something that has a proven, specific negative impact on the environment, and which is identified in ESA95 as a tax. Further, the preservation of the environment and control of externalities can be considered as one of the goals of selective taxes as states (Hines, 2007). However, due to the fact that the externalities are not covered in the valuation of products, it is rationale to impose energy or carbon taxation to reflect the externalities (Pigou, 1920). Furthermore, on the base of the assumption that there is no substitute of the taxable selective product, it is expected that the imposition of a tax on the selective products, which are harmful to the environment or which generates CO₂ emissions, can contribute to the change in consumer behaviour, i.e. reduction in consumption of these products (Kubátová, 2010, Sandmo, 1975). Moreover, this assumption is supported by the fact that the demand for energy is inelastic (Kilian, 2007, Bernstein and Griffin, 2006).

In this respect, environmental taxes are considered as a cost-effective instrument to influence consumers and producers behaviour. Through them, they are motivated to use natural resources responsibly and to limit or avoid environmental pollution (Eurostat, 2010). Moreover, EU Member States welcomed the introduction of the general environmental taxes, because they receive other tax revenues that can be used for environmental protection. However, on the level of EU current Directive 2003/96/EC on taxation of energy products and electricity (hereinafter ETD) does not reflect the energy content or the CO₂ emissions of the taxed energy products. Due to this fact, the European Commission proposed revision of the ETD on 13 April 2011, which introduces CO₂-related taxation. Several EU member states welcome the revision of the current ETD and have already introduced taxation based on CO₂ emissions (Ekins and Speck, 2011). In this case they have received another tool how to decrease CO₂ emissions in their country.

The Czech Republic is situated in the Eastern Europe where usually agriculture or/and heavy industries prevail over other sectors than is usual in the West Europe, where is visible the shift to the low-carbon industries. In 2011, the level of greenhouse gas emission in the Czech Republic was 68.42 according to Kyoto base year emission from 1990. Based on the EU commitment of the 20% and 40% reduction's target, the Czech Republic has already reached the 20% reduction's target and is also going to reach the 40% reduction's target (its commitment is in the amount of 8% until 2030). Further, according to the actual 2014 report from the Yale Center for Environmental Law and Policy, the Czech Republic improved its position in the terms of its environmental performance from 6th position to 5th position out of 178 countries. The environmental performance is measured through environmental performance index (hereinafter EPI) which ranks how well countries perform environmental issues,

specifically protection of human health from environmental harm and protection of ecosystems. However in the respect of emissions, it is important to mention partial results of that report. Specifically, air pollution is worse by 16% up to 35%. Further, the Czech Republic is worse by 15% in the terms of the trend in CO₂ emissions per KWH in comparison with the European region peer set.

All environmental policy decisions related to the greenhouse gas emissions need to be made on the base of timely and reliable information and environment statistics, therefore this article focuses on environmental taxes in the Czech Republic and European Union as a comparable unit. When each kind of environmental taxes was reached from the view of its absolute amount, percentage of gross value added, percentage of taxes and social contributions, main contributors to tax revenues and finally from the view of the development of the real burden of taxation.

2. Methodology and Data

The paper is focused on the Czech environmental tax revenue/taxes, which are divided into four categories: energy taxes (including CO₂ taxes), transport taxes, pollution and resource taxes. For the purpose of the research, two last categories are analyzed together due to their small share on the total tax revenue. Eurostat collects this data from the national tax lists as part of the ESA95 transmission programme.

Environmental tax revenues from all four categories are scrutinized from the different point of view i.e. as an absolute amount in Million EUR (from 1.1.1999), as a percentage of taxes and social contributions (hereinafter TSC) and as a percentage of GDP. Data was gained from Eurostat (online data code env_ac_tax) and the last available year (2012) was compared with 2004 when the Czech Republic entered in to the European Union. EU28 was used as a comparable unit. Furthermore, the energy taxes as the largest category of the environmental tax revenue are researched based on economic activity using NACE classification. The analyzed NACE (economic activity units) were selected as sectors with the highest greenhouse gas emissions – specifically NACE A, B, C, D, F, G, H and the households. The primary data was gained from Eurostat, online data code env_ac_taxind2. The reference year is 2011 and measured unit Million EUR (from 1.1.1999). In addition, energy taxes, transport taxes pollution taxes were evaluated based on the tax payers using NACE classification.

At the end, the development of the implicit tax rate (hereinafter ITR) on energy was considered. Data was gained from Eurostat, online data code tsdcc300. This indicator is defined as the ratio between energy tax revenues and final energy consumption calculated for a calendar year, and represents a Sustainable Development Indicator of the EU Sustainable Development Strategy.

$$\text{ITR} = \frac{\text{energy tax revenue}}{\text{final energy consumption}} \text{ [EUR per TOE]} \quad (1)$$

where, energy tax revenues are measured in 1000 EUR (deflated with the final demand deflator) and the final energy consumption in 1000 TOE (tonnes of oil equivalent). The final energy consumption covers energy consumed in the transport, industrial, commercial, agricultural, public and households sectors, but exclude deliveries to the energy transformation sector and to the energy industries themselves. This Indicator ITR on energy measures the development of the burden of taxes on energy consumption.

It treats equally all kinds of energy consumption, regardless of their environmental impact.

3. Results

Environmental tax revenue of the EU28 amounted to EUR 311,682 million in 2012, the share of the Czech Republic on it is 1.15% or EUR 3,595 million (compared to 0.84% in 2004). Energy taxes amounted to 93% of this amount (compared to 91% in 2004), followed by transport taxes (5.78% compared to 7.37% in 2004) and taxes on pollutions/resources (1.05% compared to 1.24% in 2004). Based on the results, the share of transport taxes and taxes on pollutions/resources decreased in comparison with 2004 level. For more details see Table 1 below.

Furthermore, in 2012, the Czech environmental tax revenue as a percentage of GDP reached almost the average of the EU28 (2.4% of GDP), specifically 2.35% of GDP. Further, only energy taxes exceed the average of EU28. It reached 2.19% of GDP (compared to 1.8% GDP for EU28), however, in the respect of the transport taxes and pollutions/resources, taxes, the average of the EU28 was not touched.

In the respect of shares of the environmental tax revenue on taxes and social contributions (TSC), as well as energy taxes, the Czech Republic also exceeded the average of EU28, specifically 6.72% of TSC and 6.26% of TSC respectively, in 2012. However, in the respect of transport taxes and pollutions/resources taxes the level on TSC was deeply below the average of EU28. For more details see Table 1 below.

Table 1: Environmental tax revenues, 2004–2012

GEO/TIME	Million EUR	2004			2012			
		total	% TSC	% GDP	Million EUR	% total	% TSC	% GDP
EU28 Total environmental taxes	276,557.18	100	6.66	2.59	311,682.78	100	6.05	2.40
Energy taxes	211,400.18	76	5.09	1.98	233,762.16	75	4.53	1.80
Transport taxes	56,149.05	20	1.35	0.53	64,582.72	21	1.25	0.50
Taxes on pollutions/resources	9,007.95	3	0.22	0.08	13,337.89	4	0.26	0.10
CZ Total environmental taxes	2,332.70	100	7.07	2.54	3,595.61	100	6.72	2.35
Energy taxes	2,131.45	91	6.46	2.32	3,349.00	93	6.26	2.19
Transport taxes	172.12	7	0.52	0.19	208.56	6	0.39	0.14
Taxes on pollutions/resources	29.13	1	0.09	0.03	38.05	1	0.07	0.02

Source: Eurostat, online data code: env_ac_tax, own processing.

As regard to the largest share of energy tax revenue on the total environmental tax revenue, it is interesting to consider it in the form of the breakdown by economic activity. The breakdown by economic activity was made for A, B, C, D, F, G, H NACE classification, households and group of other NACE classification. As can be seen in table 2 below, the largest share of energy tax revenue is paid by NACE sector C – Manufacturing (EUR 744 million, 21.85%), then by households (EUR 727 million, 21.35%). Other NACE sectors with larger share on it are H – Transportation and storage (EUR 590 million, 17.33%) and G – Wholesale and retail trade, repair of motor vehicles and motorcycles (EUR 477 million, 14.01%). In addition, the largest change (205.82% compared to 2008 level) was recorded in NACE sector D – Electricity, gas, steam and air

conditioning supply, which was caused by the implementation of the new environmental/energy taxes in the Czech Republic in 2008.

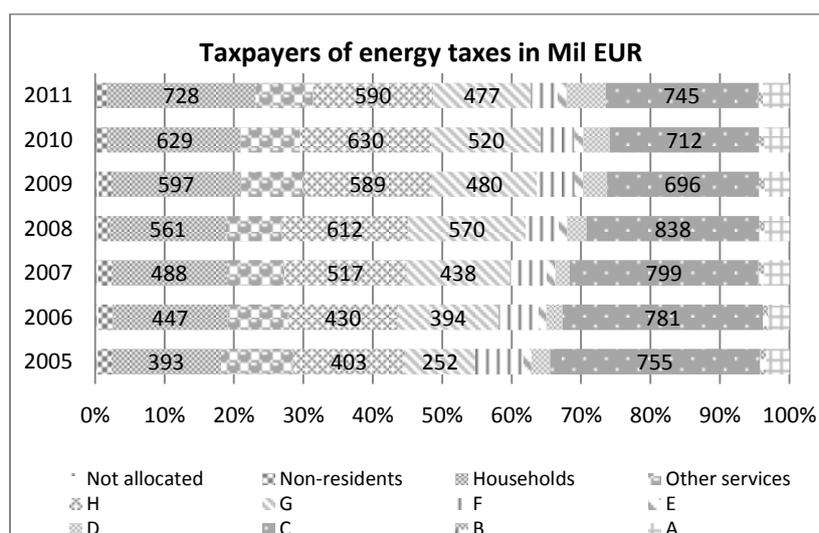
Table 2: Czech Republic, Energy tax revenue by economic activity, 2008–2011, in million EUR

NACE*	2008	2009	2010	2011	Change 2011/2008 in %
A	119.98	113.26	119.21	130.01	108.36
B	25.86	27.90	26.89	26.19	101.28
C	838.17	696.01	711.95	744.90	88.87
D	93.52	110.08	126.32	192.48	205.82
F	159.83	173.18	159.15	131.03	81.98
G	570.23	480.05	520.25	477.39	83.72
H	611.60	588.80	629.92	590.16	96.49
Households	560.61	596.63	629.21	727.98	129.85
Other NACE	383.79	396.16	392.08	384.13	100.09
Total	3,363.59	3,182.07	3,314.98	3,404.27	101.21

*NACE code: A – Agriculture, forestry and fishing; B- Mining and quarrying; C – Manufacturing; D – Electricity, gas, steam and air conditioning supply; F – Construction; G – Wholesale and retail trade, repair of motor vehicles and motorcycles; H – Transportation and storage.

Source: Eurostat, online data code: env_ac_taxind2, own processing.

In the respect of tax payers of environmental taxes, the main contributors to energy tax revenue in 2011 were NACE sector C – Manufacturing (EUR 744 million, 21.85%), then by households (EUR 727 million, 21.35%). In case of transport taxes, the main contributors were NACE sector H – Transportation and storage (EUR 80 million, 37.20%) and other NACE sectors (EUR 33 million, 15.34%). In case of pollution taxes, the main contributors until 2011 were households. However, in 2011 it was NACE sector D – Electricity, gas, steam and air conditioning supply (EUR 179 million, 82.87%). For details see fig. 1 below.



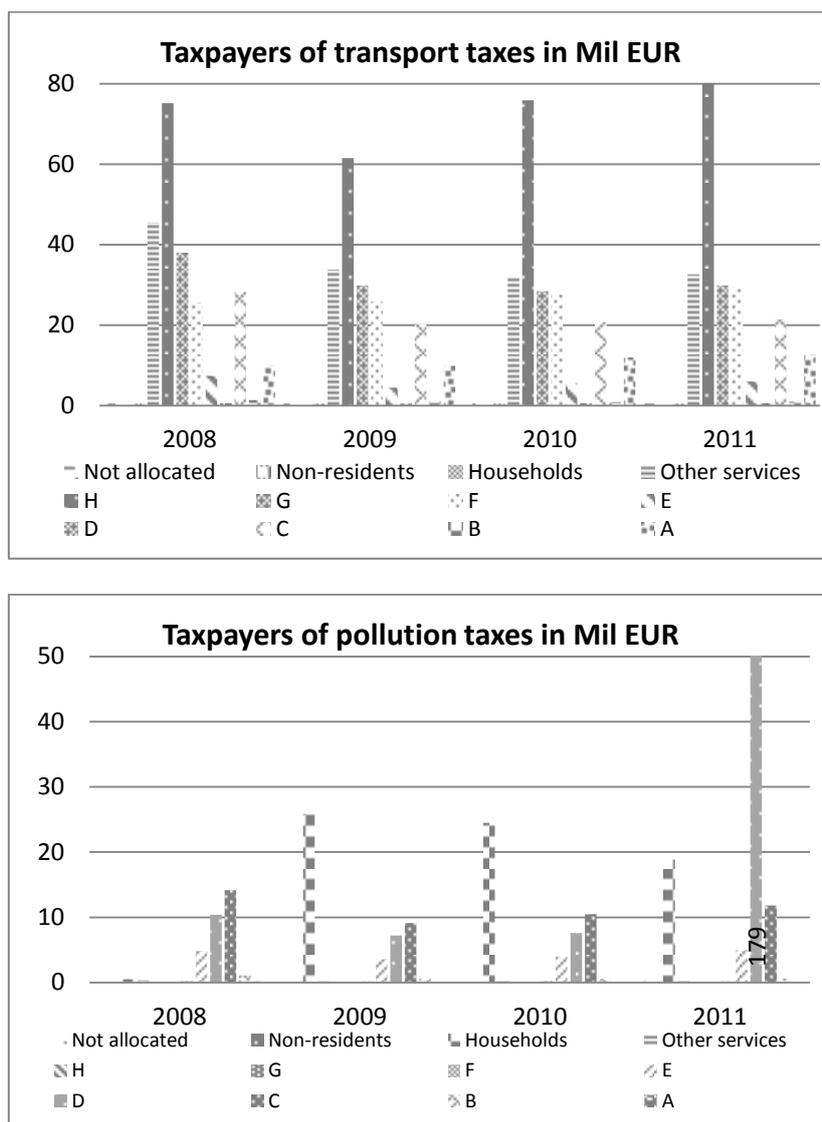


Figure 1: Environmental tax revenue by economic activity, 2011 (%)*

*NACE code: A – Agriculture, forestry and fishing; B- Mining and quarrying; C – Manufacturing; D – Electricity, gas, steam and air conditioning supply; F – Construction; G – Wholesale and retail trade, repair of motor vehicles and motorcycles; H – Transportation and storage.

Source: Eurostat, online data code: env_ac_taxind2, own processing.

Given to the implicit tax rate on energy as a Sustainable Development Indicator, the average EU28 (EUR 172.78 per TOE, in 2012) was not reached by the Czech Republic (its level is EUR 79.08 per TOE, in 2012). Due to the fact that ITR measures energy tax revenues and final energy consumption calculated for a calendar year (i.e. the taxes levied on the use of energy), it represents whether states use energy taxes for decreasing of the use of energy. In this case, it contributes to foster energy efficiency. Based on the development of ITR in the Czech Republic, it can be concluded, that the real burden of taxation on energy was increasing from 1995 to 2009 (from EUR 49.2 to 80.14 per TOE). However, from 2009 the ITR fluctuated i.e. in 2011 its level was EUR 83.09 per TOE and EUR 79.08 per TOE in 2012. Therefore, it cannot be decided whether energy taxes levied in the Czech Republic decrease the use of energy. Notwithstanding, after

detail review of energy tax revenues and final energy consumption, can be concluded that after the implementation of energy taxes in 2008 based on the ETD, the final energy consumption has been decreasing (except in 2010) and energy tax revenues have been increasing. Thus, the Czech Republic decreases the use of energy through energy taxes. For more details see tab. 3 below.

Table 3: Implicit tax rate on energy (EUR per TOE)

GEO/Time	1995	2000	2004	2007	2008	2009	2010	2011	2012
EU28	n.a.	n.a.	167.60	164.25	159.94	172.44	165.61	173.99	172.78
CZ	49.2	53.29	66.70	77.28	76.76	80.14	76.84	83.09	79.08

Source: Eurostat, online data code: tsdcc360.

4. Discussion and Conclusions

Based on the Kyoto targets and EU commitment, the Czech Republic has already reached the 20% reduction's target and is also going to reach the 40% reduction's target (its current commitment is in the amount of 8% until 2030).

All environmental policy decisions related to the greenhouse gas emissions need to be made on the base of timely and reliable information and environment statistics. This article provided a detailed analysis of environmental taxes in the Czech Republic. Based on the employed analysis the environmental tax revenue of the Czech Republic constitutes 1.15% of total EU28 environmental tax revenue in 2012 and its tendency is increasing compared to 2004. Further, Czech environmental tax revenue is corresponding to 2.35% of gross domestic product and 6.72% of revenue from total taxes and social contributions. In addition, in the respect of transport taxes and pollutions/resources taxes, its levels are deeply below the average of the EU28.

As regard the breakdown of the environmental tax revenue by economic activity, the main contributors as a taxpayer to energy tax revenue in 2011 were NACE sector C – Manufacturing (paying 21.85%), then households (paying 21.35%). In case of transport taxes, the main contributors were NACE sector H – Transportation and storage (paying 37.20%) and other NACE sectors (paying 15.34%). In case of pollution taxes, the main contributors had been households until 2011, however, in 2011 it was NACE sector D – Electricity, gas, steam and air conditioning supply (paying 82.87%).

Furthermore, in respect of implicit tax rates on energy, the Czech Republic did not reach the average of EU28 (EUR 172.78 per TOE, in 2012). Based on its development, the real burden of taxation on energy was increasing from 1995 to 2009 (from EUR 49.2 to 80.14 per TOE). However, from 2009 the ITR is fluctuating i.e. in 2011 its level was EUR 83.09 per TOE and in 2012 EUR 79.08 per TOE. Despite of the fact, after detail review can be concluded that after the implementation of energy taxes based on the ETD, the final energy consumption has been decreasing and the Czech Republic decreases the use of energy through the energy taxes.

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Changes in the VAT burden on expenses of selected households in the Czech Republic (2007–2013)

Regína Strílková¹ and Jan Široký²

¹*Department of Accounting, Faculty of Economics, VŠB – Technical University of Ostrava, 17. listopadu 2172/15, 708 00 Ostrava, Czech Republic, e-mail: jan.siroky@vsb.cz*

²*Department of Accounting, Faculty of Economics, VŠB – Technical University of Ostrava, 17. listopadu 2172/15, 708 00 Ostrava, Czech Republic, e-mail: regina.strilkova@vsb.cz*

Abstract

The Member States of the European Union in the analyzed period 2007-2013 increased several times the rate of value added tax in an effort to consolidate public budgets. Czech Republic is a typical representative of the State which changed VAT rate several times. These changes are naturally reflected in households spending, which were analyzed by the consumer basket, whose composition is also undergoing changes. Another factor that has an impact on household expenditures is the transfer of commodities between the reduced and standard rate. Finally, it is important to differentiate households according to their income levels.

The aim of this paper to determine how these changes took effect in the Czech Republic in the share of consumption of commodities included in the standard and reduced VAT rates and in the exempt transactions according to household income groups and to determine the impact of these changes on the tax burden on selected households by value added tax and finally, confirmation of the hypothesis of VAT regressivity.

Keywords: VAT, VAT rates, household expenditures, consumer basket, tax burden, VAT regressivity

1. Introduction

Value added tax was introduced in the Czech Republic on 1 January 1993. In the EU, VAT is the only permitted general tax on consumption and it is characterized as a general indirect non-duplicate turnover tax imposed on the final consumption of goods and services. Its development is significantly specific and it is very difficult to compare it with the history of other taxes, for more detail see Tait (1988) or Cnossen (1998).

Although VAT is the most harmonized tax in the EU, it gives the Member States sufficient flexibility in certain areas after imposing barriers, see Zodrow (2006). Especially in the case of amount of rates, the Member States have relatively large freedom beginning with Article 93 to Article 129 of the Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax, there are defined only basic rules of VAT rates application. They determine that the services and goods are normally a subject to the standard rate of VAT which must not be lower than 15%. The Member States may also select either one or two reduced rates which must not be lower than 5% and these reduced rates can be applied only to a limited set of goods and services listed in Annex III of the VAT Directive, Eur-lex (2006). The possibility of increasing the tax rate resulting from the existence of only lower rate limit was applied also in the Czech Republic.

The issue of the amount of VAT rates is not a clearly resolved topic even in the theory, eg. Schenk, Oldman (2007). In the practice of the EU, after complex discussions, for more details see Bogetić, Hassan (1993), there was determined the basic VAT model, which was the model with two types of tax rates: standard and reduced, whereas Denmark is the only Member State not applying the reduced rate aside from the standard VAT rate.

One of the aims of this paper is the finding how these changes have manifested in the Czech Republic in the share of consumption of commodities included in the standard and reduced VAT rates and in the exempt transactions according to household income groups. Other goals are to determine the impact of these changes on the tax burden on selected households by value added tax and confirmation of the hypothesis of VAT regressivity. Every mentioned objectives will be analyzed for the period of years 2007–2013, when the upper limit was chosen due to the interim absence of consumer spendings in 2014.

2. The development of basic factors affecting the research

2.1. The development of VAT rates

Most countries chose a method of increasing the VAT rates when solving the consequences of the economic crisis and striving to increase the revenue side of state budget.

During the analyzed period 2007–2013, a total of 27 changes in the standard VAT rate were realized and a total of 15 changes in the reduced VAT rate were realized. The largest increase in the analyzed period was recorded in the Czech Republic, namely by 10% (from 5% in 2007 to 15% in 2013).

2.2. Development of the consumer basket composition

Consumer basket is composed to express the structure of “hypothetical” household expenditures which cannot exist in practice because it would have to consume just the average expenditures of all households in the Czech Republic. Consumption expenditures are classified according to the CZ-COICOP “Classification of individual consumption by purpose”. The aim of the classification is to classify all kinds of individual consumption (expenditures on goods and services) by purpose, when the first 12 divisions of the classification is used for monitoring household consumption.

The consumer basket according to Czech Statistical Office (2014a) includes food goods, non-food goods and services in the international classification into the following basic items: (01) Food and non-alcoholic beverages, (02) Alcoholic beverages, tobacco, (03) Clothing and Footwear, (04) Housing, water, electricity, gas and other fuels, (05) Furnishings, household equipment and routine household maintenance, (06) Health, (07) Transport, (08) Communication, (09) Recreation and Culture, (10) Education, (11) Restaurants and hotels, (12) Miscellaneous goods and services.

During the examined period, the consumer basket in the Czech Republic had three compositions. For the years 2007–2009 it was based on data from Household Budget Survey (HBS) 2005, in the years 2010–2011 it was based on data from HBS 2008 and in the years 2012–2013 it was based on data from HBS 2011. The weights of individual items in the consumer basket are illustrated in Table 1.

Table 1: Composition of the consumer basket in the period 2007–2013

COICOP classification	The categories of the consumer basket	Weight 2007–2009	Weight 2010–2011	Weight 2012–2013
01	Food and non-alcoholic beverages	162,63	170,33	149,82
02	Alcoholic beverages, tobacco	81,72	85,99	96,01
03	Clothing and Footwear	52,43	47,21	35,93
04	Housing, water, electricity, gas and other fuels	248,29	253,40	280,35
05	Furnishings, household equipment and routine household maintenance	58,06	55,19	57,97
06	Health	17,86	25,00	23,07
07	Transport	114,10	114,89	105,01
08	Communication	38,73	39,88	36,08
09	Recreation and Culture	98,66	93,68	90,38
10	Education	6,18	7,77	7,78
11	Restaurants and hotels	58,39	44,26	48,56
12	Miscellaneous goods and services	62,96	62,40	69,03

2.3. Development of household expenditures

To achieve the research objective it was also needed to determine the development of the hypothetical household expenditures and expenditures of households in classification according to the level of net income which, of course, includes expenses including VAT.

2.3.1. Development of the hypothetical household expenditures

Development of total annual expenditures of person that is a part of hypothetical household in the analyzed period is shown in Table 2.

Table 2: Development of the hypothetical household expenditures (in CZK per person)

Year	Expenditures	Year	Expenditures
2007	104 017	2011	117 882
2008	112 256	2012	118 819
2009	115 309	2013	120 827
2010	116 244		

2.3.2. Development of the household expenditures by net income level

Development of the total annual expenditures of households classified by net income level (so-called deciles) in 10 categories is illustrated by Table 3. Columns represent expenditures from lowest 10% to the highest 10% of households in the Czech Republic for the seven-year period. Each data in Table 3 is recalculated to show the average per person. So it does not represent expenditures of whole household for the reason that different number of household members would not misrepresent data.

Table 3: Development of the household expenditures by net income level (in CZK per person)

	1	2	3	4	5
2007	62 775	75 845	85 053	94 728	93 719
2008	67 344	83 522	93 244	99 651	105 893
2009	68 046	86 358	94 045	103 300	107280
2010	69 761	87 588	99 756	104 584	109 387
2011	64 518	87 847	99 414	107 554	116 493
2012	69 284	88 673	100 005	109 855	113 652
2013	70 332	89 724	100 486	110 538	118 864
	6	7	8	9	10
2007	108 629	115 564	131 294	143 713	183 048
2008	112 248	123 723	136 015	159 070	198 964
2009	117 742	122 601	140 265	166 338	211 486
2010	117 444	127 907	143 121	160 882	206 350
2011	120 927	136 701	145 572	165 165	212 950
2012	122 850	134 386	148 446	163 690	203 601
2013	124 922	133 952	150 298	166 494	217 291

3. Methodology and Data

Authors work with the research assumption that the government in attempt to reduce public budget deficits deepened by economic crisis uses as a tool *inter alia*, the VAT rates. This increase must thereafter necessarily be reflected in household spending. When determining the absolute household expenditures on VAT, it is necessary to include not only the changes in the VAT rate in analyses, but also the changes in the individual segments of the consumer basket in terms of the proportion of the burden by the standard rate, reduced rate and transactions exempt from VAT, potential shift of commodities and other relevant factors, particularly a revision of the consumer basket itself.

The methodology of the research can be represented by equation (1).

$$\Delta CE_{VAT} = f(\Delta R_{VAT}, \Delta Ch_{VAT}, \Delta C, \Delta CB, \Delta O), \quad (1)$$

where ΔCE_{VAT} is the change of the selected household expenditures on VAT in the analyzed period, ΔR_{VAT} is the change of tax rates, ΔCh_{VAT} is the change arising from the transfer of commodities between the reduced and standard rate, ΔC is the change of cash expenditures, ΔCB is the change of the consumer basket and ΔO is the change of other factors (e.g. the marginal propensity to savings) from which the authors abstract.

To achieve objectives, the analytic-synthetic methods were used. In the introductory part of the research a descriptive method was used, which was used in the study of the legislation of the EU and the Czech Republic, in the next part the effects of changes in tax expenditures were evaluated using the comparison, deduction and following synthesis.

All data necessary for research (sorted in Tables 1 to 3) were obtained from HBS which monitors management of private households and provides information on expenditure and consumption structure of a range of household types, see Czech Statistical Office (2014b). Information about differences in consumption of households classified by various aspects or on impacts of various factors on expenditure structure and consumption behaviour of households cannot be received from other sources than from HBS obtained by Czech Statistical Office.

The composition of reporting sample of HBS is flexibly changing to cover current changes of basic household attributes, like its composition, economic activity, income level, etc. HBS is the only trustworthy source of information on household expenditures in relation to household incomes.

The HBS reporting households (3000) are selected by purposive quota sampling, when the sample unit and a reporting unit is a private household, that means a group of people living together on a common budget (food, routine maintenance costs, housekeeping, etc.). Every reporting household of HBS keeps detailed records of expenditures on food and non-alcoholic beverages of the period of 2 months per year and in the remaining 10 months only the total expenditure on purchasing these stuff is reported.

For classification of consumption expenditures in the HBS, classification CZ-COICOP has been used for already seventeen years.

All calculations were performed in the Excel spreadsheet. Due to the required extent of paper, it is not possible to indicate here the summary tables with calculations (for each of the analyzed 7-year period the authors worked with eleven tables describing household expenditures on items of the consumer basket, which includes 730 items). Detailed calculations can be sent at request at the authors' email addresses, methodology is also described in more details in the previous authors' research, see Široký, Střílková, Bánociová, Zlaczka (2014) and Široký, Střílková (2015).

4. Results

To determine a ratio of individual items according to the criteria for their inclusion in the standard tax rate, reduced tax rate and in the tax exempt of the total consumer

basket, it was needed to assign the applicable VAT rates to the individual items of the consumer basket.

This procedure is shown by equations (2) to (4).

$$RR_{\%} = 01 + 04_r + 05_r + 06_r + 07_r + 09_r + 11_r + 12_r \quad (2)$$

$$SR_{\%} = 02 + 03 + 04_s + 05_s + 06_s + 07_s + 08_s + 09_s + 11_s + 12_s \quad (3)$$

$$EXM_{\%} = 04_{1-(r+s)} + 06_{1-(r+s)} + 07_{1-(r+s)} + 08_{1-(r+s)} + 09_{1-(r+s)} + 10 + 12_{1-(r+s)}, \quad (4)$$

where $RR_{\%}$ represents the proportion of commodities in the consumer basket subjected to the reduced tax rate, $SR_{\%}$ illustrates the ratio of commodities in the consumer basket subjected to the standard tax rate. $EXM_{\%}$ reflects the proportion of consumer basket items that are exempt, r is the reduced rate of tax, s is the standard rate of tax, and numbers 1 to 12 are the corresponding items of the consumer basket according to commodity classification by purpose explained in chapter 2.2.

Results obtained by equations (2) to (4) for each year of the analyzed period are illustrated in the Table 4.

Table 4: Percentage composition of the consumer basket according to the VAT rate

	2007	2008	2009	2010	2011	2012	2013
VAT exempt	17,39	17,39	17,39	18,74	18,74	19,83	19,83
Reduced VAT rate	28,35	28,42	28,84	29,21	29,21	27,63	27,37
Standard VAT rate	54,26	54,19	53,77	52,05	52,05	52,54	52,78

Table 4 shows that the largest share of hypothetical household expenditures belongs to the commodities taxed at the standard rate and that the lowest share of expenditures belongs to goods and services exempt from VAT. This fact is constant practically throughout the whole period, values expressed in a percentage achieve the maximum difference of 2%. Surprisingly, the ratio of expenditures on transactions exempt from VAT is relatively high.

In the next step, absolute values of a hypothetical household expenditures and expenditures of households according to their net income with a definite type of VAT rate (RR, SR, EXM) were calculated, which is illustrated by Figure 1, Figure 2 and Figure 3.

Figure 1 illustrates the development of household expenditures of 10 types of household according to net income and a hypothetical household expenditures on goods and services taxed by the reduced VAT rate. The first and the tenth decile and a hypothetical household as an imaginary centre are more expressively marked. Figure 1 indicates that the growth of expenditures on goods and services loaded with reduced rate of VAT is more appreciable at higher income groups of households. Due to the short analyzed period, this trend is not so noticeable.

Figure 2 shows the development of household expenditures of 10 types of household according to net income and a hypothetical household expenditures on goods and services taxed with the standard VAT rate. The first and the tenth decile and a hypothetical household as an imaginary centre are also more expressively marked here. Figure 2 indicates that the highest income group of households (the tenth decile) shows a greater fluctuation during the monitored period. Therefore it cannot be stated (as with the reduced VAT rate) that the growth of expenditures is more appreciable at a higher income groups of households.

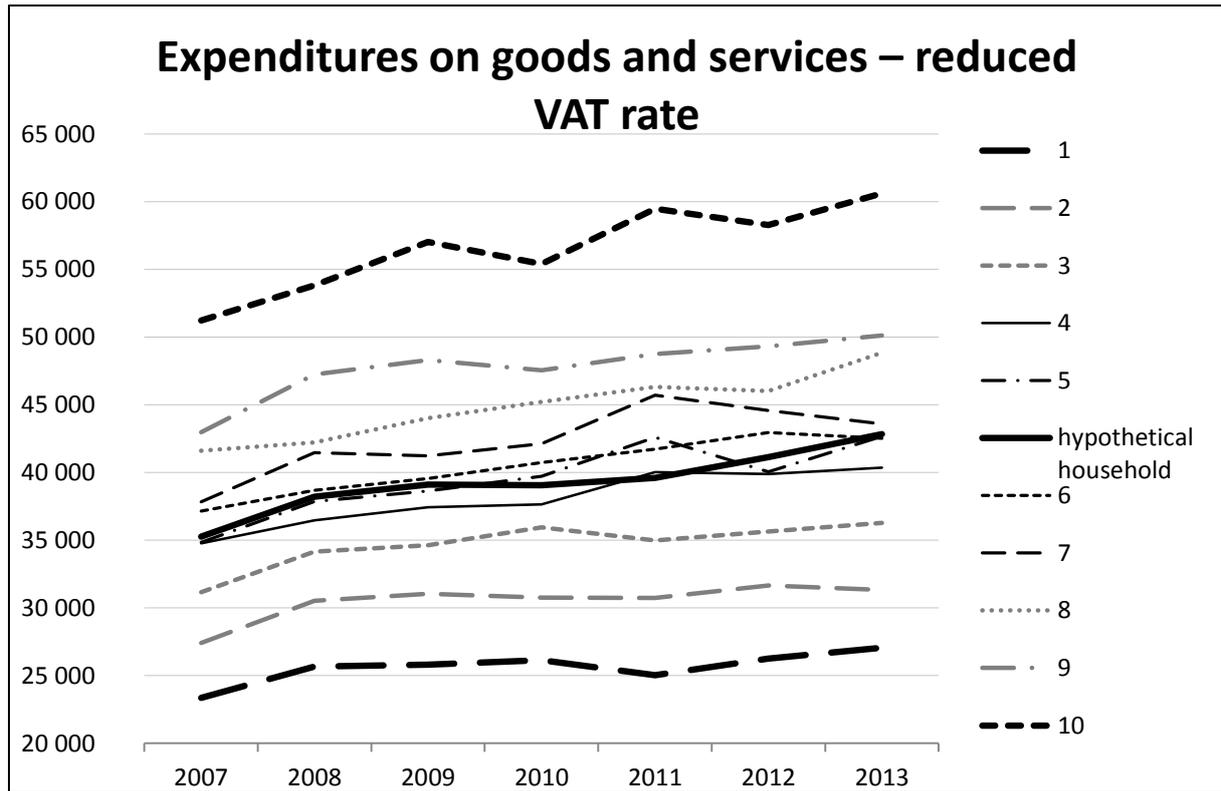


Figure 1: Expenditures on goods and services according to household net income imposed by reduced VAT rate

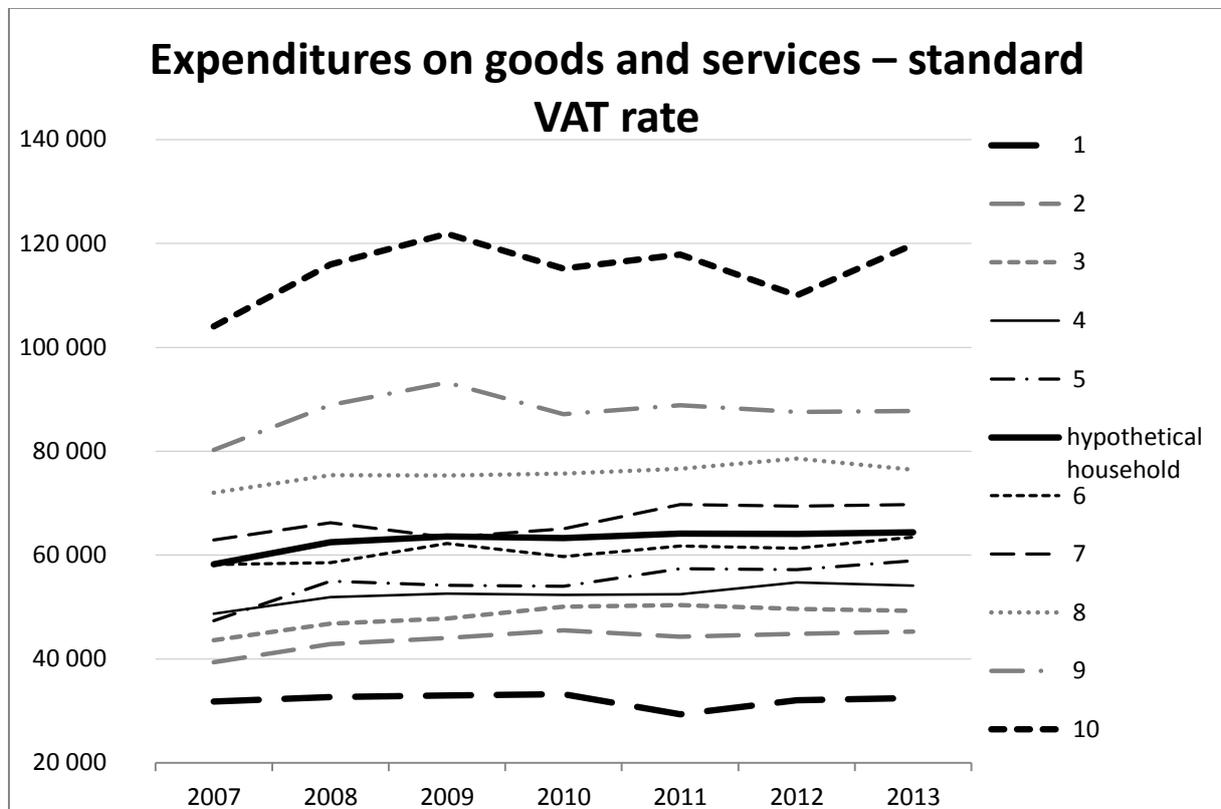


Figure 2: Expenditures on goods and services according to household net income imposed by standard VAT rate

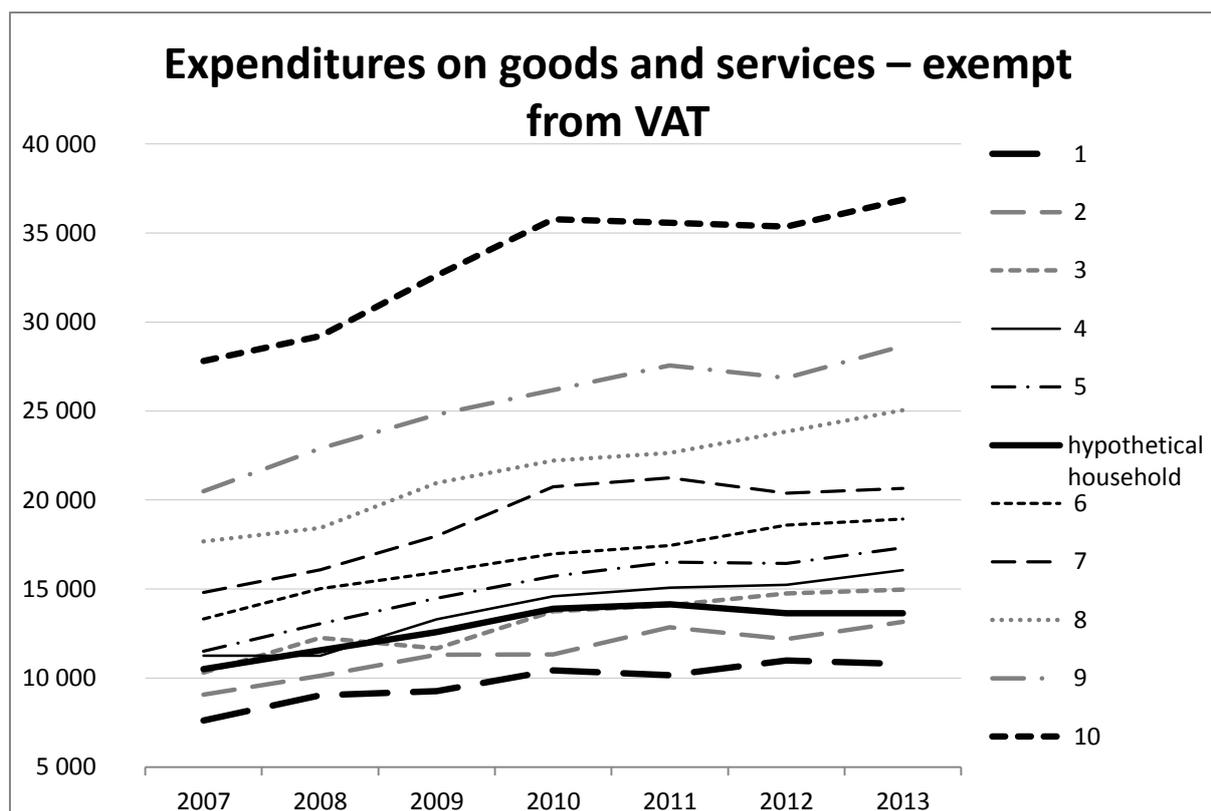


Figure 3: Expenditures on goods and services according to household net income exempt from VAT

Figure 3 shows the development of household expenditures of 10 types of household according to net income and hypothetical household expenditures on goods and services exempt from VAT. The first and the tenth decile and a hypothetical household are marked more expressively even in this figure. Figure 3 indicates that the growth of expenditures on goods and services exempt from VAT is steeper at higher income groups of households. Figure 3 also shows a surprising location of hypothetical household expenditures, as an imaginary centre, when it is not placed between the fifth and the sixth decile as it is assumed.

5. Discussion and Conclusions

Value added tax is in a period of economic crisis used also as a tool of economic policy, when particularly the change of VAT rates is used by the Member States as an instrument helping to the lowering of the public budgets' deficit. During the monitored period, a total of 22 amendments of the Value Added Tax Act were made, Codes of Czech Republic (2013), within which the 6 changes in VAT rates (2 in standard rate and 4 in reduced rate) were made.

Since VAT is included in the price of goods and services purchased by a consumer who pays the tax in the total price of his purchase, this tax burdens also the consumption of goods and services purchased by households, James, Nobes (2010). The impact of changes in VAT rates as a consumption tax is different when compared to changes in direct taxes, for more details see Nerudová, Šíroký (2010).

The assumption of VAT regressivity was confirmed. The households with higher net income spend significantly higher expenditures on purchasing goods and services subjected to the reduced VAT rate and on commodities exempt from VAT in comparison with households with lower income. This fact is not very noticeable with expenditures on commodities subjected to the standard rate of VAT.

Authors are aware of the limitation of their research which lies mainly in the length of seven years of the analyzed period and exclusion of other influences, e.g. Kolář, Vítek, Pavel et al. (2005), nevertheless the obtained results and the expected follow-up research may serve as information for the actors of economic policy as well as a contribution to the theory of tax incidence. Conclusions can also trigger the unceasing debate on current issues of the whole system of VAT, see Eur-lex (2010).

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Pilot analysis of honey consumer behaviour in a competitive environment in the Czech Republic

Petra Šánová¹, Jakub Beránek¹ and Adriana Laputková²

¹Department of Trade and Finance, Faculty of Economics and Management, Czech University of Life Science Prague, Kamýcká 128, 165 21 Prague 6-Suchdol, Czech Republic, e-mail: sanova@pef.czu.cz

²Department of Languages, Faculty of Economics and Management, Czech University of Life Science Prague, Kamýcká 128, 165 21 Prague 6-Suchdol, Czech Republic, e-mail: laputkova@pef.czu.cz

Abstract

Research of consumer behaviour in honey purchasing is not common. The main aim of this paper is to conduct a pilot analysis of behaviour of the consumer when purchasing honey in a competitive environment in the Czech Republic and based on this to discuss market possibilities for the producer, i.e. the beekeeper. It concerns mainly statistical testing in order to prove dependency between the current place of purchase of honey and the size of municipality, to prove dependency between the size of municipality and the conditions under which the consumer was willing to purchase honey via the Internet, and to prove dependency between the way honey is used and its purchasing on expert recommendation. Strong statistical dependence between the place of purchase and municipality size has been confirmed. Therefore direct sale seems to be the best, e.g. at home of beekeepers or their business establishment, at farmer's markets, fairs and so on, mainly in larger towns, because in larger towns these events are more frequented and more popular. These events are also a suitable means of acquiring a stable clientele who would buy honey online. From practice is known, that a cooperation with experts offers a great potential (for example, with general practitioners, beauticians and so on), and this in regard to the recommendation for using honey and the following sale. However, statistical dependence between the way honey is used and purchasing honey on expert recommendation has not been confirmed.

Keywords: honey, consumer, purchasing, preferences, direct sale, consumer behaviour

1. Introduction

The main economic contribution of bee colonies is their pollinating activity, which has been estimated at approximately 153 billion Euros worldwide towards agriculture. According to the estimates, as much as 90% of bee activity contributes towards agriculture and mere 10% towards beekeepers (Švamberka, 2013).

Beekeeping is often associated only with the production of honey. There is however also another and more important economic benefit of beekeeping in the fact that bees not only produce honey, but also pollinate various plants. The pollination activity of bees can very significantly increase the yields of selected crops (Orey, 2011).

Beekeepers' income consists largely of sales of honey. Due to poor profitability of honey production, beekeeping is regarded more as a hobby than a regular business activity in the Czech Republic. The issue of competitiveness of Czech beekeepers depends not only on the economy of production, but also the price of honey, consumer behaviour and the activities of beekeepers on the market.

The economy of honey production has already been researched to a great extent (Akdemir et al., 1993, Habibullah, 1995; Wenning, 2001; Chaudhary, 2001), and likewise, attention has also been paid to consumer behaviour (Steenkamp, 1997; Grunert, 2000; Smith & Riethmuller, 2000; Wilcock et al., 2004; Hes, 2009; Zhang, 2010; Zhang, 2011), no efforts have been made to examine certain practical aspects of purchasing honey and consumer behaviour at the national level of the Czech Republic.

There are a number of distribution paths used in order for honey to reach its ultimate consumer. The most convenient path for both the producer (a beekeeper) and for the ultimate consumer is direct. Honey purchased this way is usually less expensive than on the market, represents higher qualitative parameters and a higher profit for beekeepers. Currently, a wide range of information that is important when purchasing honey from the producer or a retail chain is available to the Czech consumer. Despite all the positives, the direct sale of honey is not the most significant one. Being aware of consumer's behaviour and their preferences when purchasing honey may become an important competitive advantage for the producer.

The consumer behaviour is a dynamic process, and depends on many factors, among which are social pressure, tradition, culture, personal relationships and others (Asp, 1999; Peter & Olson, 2008). Guerrero et al. (2010) indicate that traditional food (on this case the honey) products trigger consumers' emotions and values.

The main aim of this paper is to conduct a pilot analysis of behaviour of the consumer when purchasing honey in a competitive environment in the Czech Republic and based on this to discuss market possibilities for the producer, i.e. the beekeeper. The aim of the conducted questionnaire survey was mainly to find out which preferred distribution paths were currently utilised, willingness to buy honey via the Internet, interest in a free honey tasting, purchasing preferences of honey-related products, required characteristics of honey, such as its origin, type, quality, certification method, its usage as well as the influence of an expert's recommendation on purchasing honey, while taking into consideration the respondent's age, level of education, size of municipality and gender. Further investigation verifies the selected dependencies by means of statistical testing of hypotheses and discusses positive and negative consequences of the findings. It concerns mainly statistical testing in order to prove dependency between the current place of purchase of honey and the size of municipality, to prove dependency between the size of municipality and the conditions under which the

consumer was willing to purchase honey via the Internet, and to prove dependency between the way honey is used and its purchasing on expert recommendation.

2. Methodology and Data

The methodology of the paper itself includes conduction of a quantitative questionnaire survey with a random panel of respondents, evaluation of the results of the survey using statistical software (SPSS), and formulation of recommendations for both beekeepers and sellers.

The questionnaire consisted of 18 questions in total, including identifying questions (4). So called branching was used in the questionnaire, where unanswered questions are deduced from the answered ones. For instance, the question “Where do you mostly buy honey?” follows only after the first question, i.e. “Do you buy honey?”, is answered positively. Only 5 out of the total number of 18 questions were common for all the respondents (the question “Do you buy honey?” and identifying questions).

The questionnaire was distributed to respondents in both electronic and printed forms in order to ensure equal data collection among older and younger age groups of respondents, in the period between June 2014 and October 2014 in the Czech Republic.

After the completion of the survey, all data were consolidated and evaluated quantitatively using Microsoft Excel. When evaluating the data, not only the ratio of each option of responding to a particular question was examined, but also the ratio of other responses to related questions when selecting the given option. Most frequently, the ratio, in terms of age, municipality size, the highest achieved qualification and the respondent’s gender was considered, while in most cases there was an interesting connection mentioned in the change higher than 5% in the respondent structure against the overall respondent structure. Where the change in the respondent structure did not exceed 5%, it was only stated that the respondents are represented at a comparable rate, alternatively this statement was not mentioned at all.

Furthermore, dependence hypotheses were formulated, which might influence consumers’ purchasing behaviour. This concerns verification of the dependence between the place of purchase of honey and municipality size, dependence between online purchasing conditions and municipality size and the potential dependence between using honey and purchasing honey on expert recommendation. Selected contingency tables were compiled, both with empirical frequencies (n_{ij}) and expected frequencies (m_{ij}) in order to conduct statistical analysis of the dependence. The chi-square (χ^2) test criterion was used to analyse this and in case of verification of the dependence, the intensity of dependence was calculated using the contingency coefficient (C) and Cramér’s contingency coefficient (V). Below are the formulas of the indicators mentioned:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^s \frac{(n_{ij} - m_j)^2}{m_{ij}} \quad C = \sqrt{\frac{\chi^2}{n + \chi^2}} \quad V = \sqrt{\frac{\chi^2}{n(q-1)}}$$

Detection of dependence was processed using SPSS. The results of the questionnaire survey and of the analyses of dependence were used to formulate recommendations for beekeepers’ market behaviour.

3. Results

3.1.1. Results of the questionnaire survey

The return rate reached 94.2%. In total, 359 respondents participated in the questionnaire survey, 61% of which were women and 39% men. All the respondents were from the Czech Republic, and most frequently from municipalities with the population lower than 10,000 (45%). The proportion of age was as follows: 15–24 years of age – 19.78%, 25–39 – 32.59%, 40–59 – 30.64% and 60 and more – 16.96%. The aim was to approach age categories at an economically productive age which are expected to have higher purchasing power and on the contrary lower willingness to spend time doing their shopping. The respondents were predominantly university graduates (41%), alternatively graduates from secondary school with Maturita examination (39%).

Out of the total number of 359 respondents, 296 buy honey. Forest (72%) and floral honey (52%) are the most popular. Marginally, respondents are also interested in organic honey (4%). Mainly local honey is preferred (50%), while more than 90% of the respondents demand Czech honey.

Honey is purchased mainly directly from a beekeeper at their home or business establishment (81.76%), furthermore 8.45% at (farmers') markets, in chain stores (4.39%) or in local shops (4.39%). Only 1 respondent, i.e. 0.34%, selected the option of buying honey via the Internet. Examination of the respondents' satisfaction with the place of purchase led to the conclusion that absolute majority of consumers wanted to buy honey directly from a beekeeper (87%). Purchasing online has slightly increased (0.7%).

300 respondents answered under what circumstances they would be willing to shop online. In this question, respondents could select more possibilities (minimum 1 and maximum 3), therefore the sum of answers does not equal the number of the respondents. The numbers of responses are displayed in the following Figure 1.

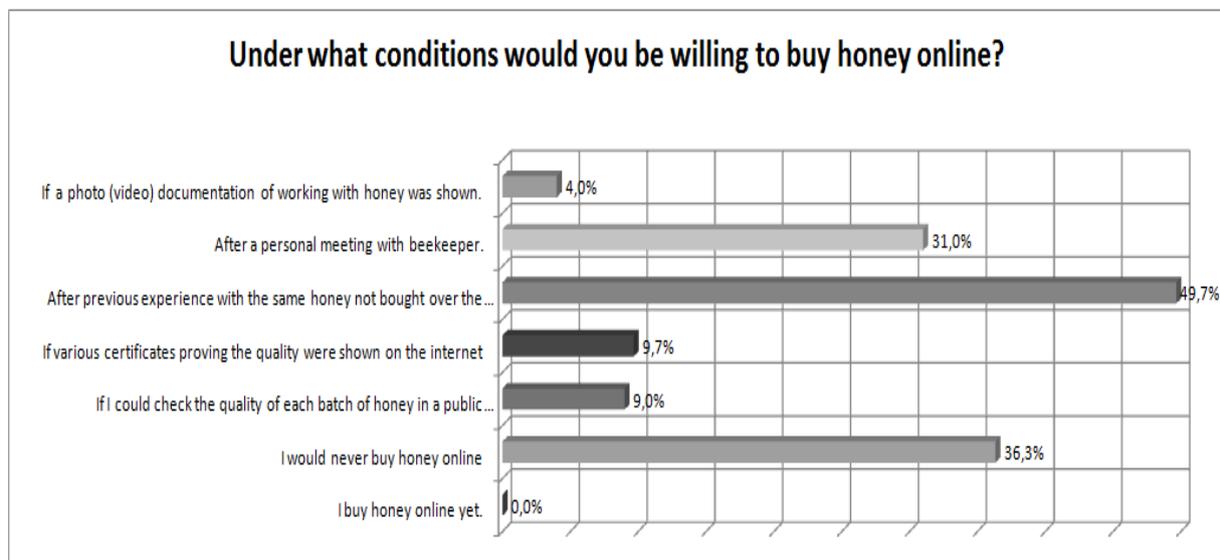


Figure 1: Required conditions to buy honey online

Almost half of the respondents who would like to buy honey, would be willing to buy it online after having previous experience with the same honey, i.e. after having

purchased it in any other way except online (49.7%), alternatively after other parallel conditions have been met, particularly after their personal meeting with the beekeeper (31%).

90% out of 300 respondents would be interested in tasting honey before purchasing it. Out of 216 respondents, 72% would be interested in the sale of additional products at the beekeeper's. Mead (72%) and propolis (59%) were the most interesting items.

More than one quarter of the respondents do not require certified honey, while more than a half of these respondents would never purchase honey online. It is significant that more than a half of the respondents are not aware of the certification and control methods for honey, and this concerns respondents represented at a comparable rate across the identifying categories.

The evaluation of the questions related to the use of honey and the impact of expert recommendation on purchasing honey. In connection with branching of the questionnaire, it is necessary to mention that the number of respondents is different for each question.

Question number 13: "I use honey mainly as:" out of the total number of 359 respondents, the same number of 300 respondents answered as in questions number 4, 5, 6, 7, 9, 10, 11 and 12, while only one answer could be selected. The option "a natural remedy and a food supplement when suffering from a cold" was selected by 60 respondents, i.e. by 20%, the option "food throughout the year" was selected by 233 respondents, i.e. by 77.67%, and the answer "in other ways" was selected by 7 respondents, i.e. by 2.33% (respondents stated the following possibilities: 4× both, 1× as a sweetener, 1× tea sweetener, 1× both and for baking, food preparation).

The question: "Would you buy honey if it was recommended to you by an expert?" was answered by 316 respondents. In this question, the respondents could select one option only. The answers are shown in figure no. 2.

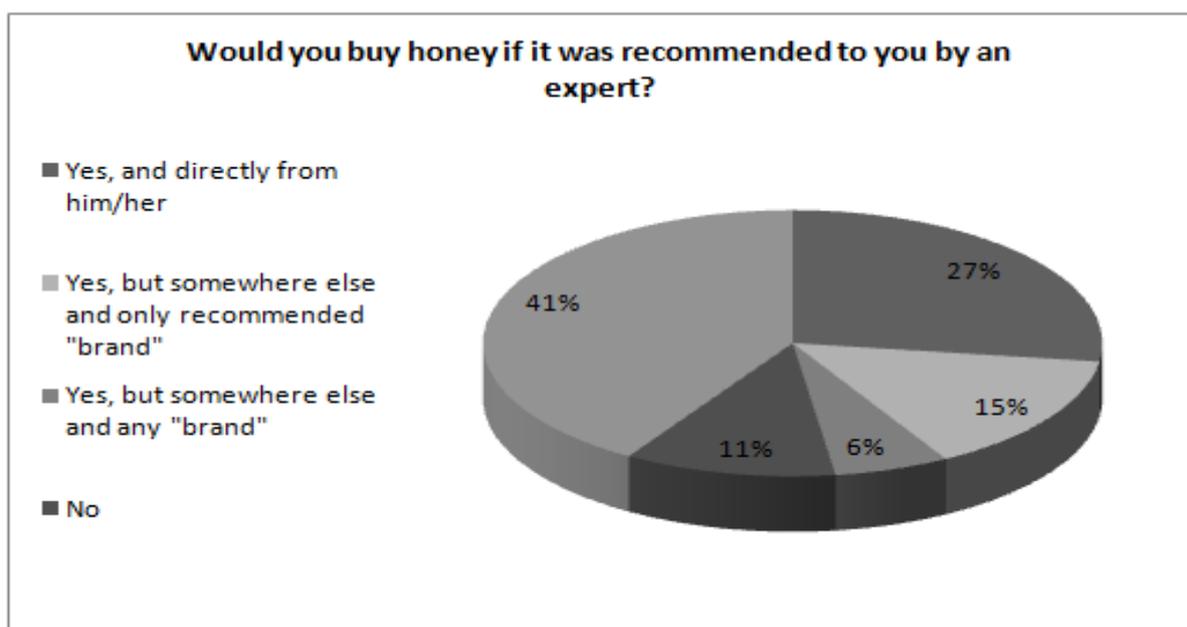


Figure 2: Purchase of honey on expert recommendation

Almost half of the respondents would buy honey provided that it would be recommended to them by an expert, while more than one quarter would buy it directly

from him/her. A considerable number of respondents older than 60 would buy honey directly from an expert and, on the contrary, respondents aged 25–39 to a lesser degree.

Majority of respondents represented across the identifying categories at a comparable rate selected the option maybe. It may be presumed that trustworthiness as well as the way the expert formulates his/her recommendation in order for the consumer to make a decision about purchasing honey were crucial for this option.

3.1.2. Testing the dependence between the place of purchase and municipality size

In order to verify the dependence between the place of purchase and respondents' municipality size the following hypotheses were formulated:

- **H₀: The place of purchase of honey and municipality size are independent.**
- **H₁: H₀ is invalid.**

Empirical and expected frequencies are stated in the table below, see Table 1.

Table 1: The place of purchase with regard to municipality size

What is the size of your municipality?	Frequencies	Where do you mainly buy honey?					Total
		In large chain stores	In local shops	At farmers markets, fairs, etc.	Directly from the beekeeper at home/their business establishment		
Up to 2 000 residents	empirical	3,00	4,00	6,00	55,00	68	
	expected	3,02	3,02	5,80	56,16		
Up to 10 000 residents	empirical	2,00	5,00	3,00	124,00	134	
	expected	5,95	5,95	11,43	110,68		
Up to 50 000 residents	empirical	3,00	2,00	6,00	40,00	51	
	expected	2,26	2,26	4,35	42,12		
Up to 50 000 residents	empirical	5,00	2,00	10,00	23,00	40	
	expected	1,77	1,77	3,41	33,04		
Total		13	13	25	242	293	

From the above values, a testing criterion was calculated, which amounts to: $\chi^2 = 33.599$.

The critical value of the testing criterion for the required number of degrees of freedom ($f = 9$) at the significance level $\alpha = 0.05$ amounts to $\chi^2 = 16.919$. Thus, the testing criterion is higher than the critical value, therefore **H₀** is rejected. Therefore, the statistical dependence between the place of purchase and the respondents' municipality size has been confirmed.

Using the contingency coefficient **C = 0.677** as well as Cramer's contingency coefficient **V = 0.700**, strong dependence has been confirmed.

3.1.3. Testing the dependence between the conditions of online shopping and municipality size

In order to verify the dependence between the municipality size and the conditions under which the consumer would be willing to buy honey online, the following hypotheses were formulated:

- **H₀: The municipality size and the conditions of shopping online are independent.**
- **H₁: H₀ is invalid.**

The table below contains empirical and expected frequencies, see Table 2 Conditions of shopping online with regard to the municipality size. Due to a very low, or rather no number of answers, which would strongly influence the exactness of verification, the answer “I already buy honey online” was taken out of the test.

Table 2: Conditions of buying online with respect to municipality size

What is the size of your municipality?	Frequencies	Under what condition would you be willing to buy honey online?						Total
		If a photo (video) documentation of working with honey was shown	After a personal meeting with beekeeper	After previous experience with the same honey not bought over the internet but somewhere else	If various certificates proving the quality were shown on the internet	If I could check the quality of each batch of honey in a public database on the internet	I would never buy honey online	
Population fewer than 10,000	empirical	3,00	48,00	59,00	11,00	9,00	55,00	185
	expected	5,30	41,06	65,79	12,80	11,92	48,13	
Population fewer 2,000	empirical	4,00	18,00	33,00	8,00	8,00	30,00	101
	expected	2,89	22,42	35,92	6,99	6,51	26,27	
Population fewer than 50,000	empirical	1,00	14,00	28,00	5,00	7,00	17,00	72
	expected	2,06	15,98	25,60	4,98	4,64	18,73	
Population more than 50,000	empirical	4,00	13,00	29,00	5,00	3,00	7,00	61
	expected	1,75	13,54	21,69	4,22	3,93	15,87	
Total		12	93	149	29	27	109	419

From the above mentioned values, a testing criterion was calculated, which amounts to: $\chi^2 = 20.455$

The critical value of the testing criterion for the required number of degrees of freedom ($f = 15$) at the significance level $\alpha = 0.05$ amounts to $\chi^2 = 24.996$. Thus, the testing criterion is lower than the critical value, therefore **H₀** is not rejected. Therefore, the statistical dependence between the municipality size and the conditions under which the consumer would be willing to buy honey online has not been confirmed.

3.1.4. Testing dependence between the use of honey and purchasing honey on expert recommendation

In order to verify the dependence between the way honey is used and purchasing honey on expert recommendation, the following hypotheses were formulated:

- **H₀: Use of honey and purchasing honey on expert recommendation are independent.**
- **H₁: H₀ is invalid.**

The table below shows empirical and expected frequencies of the way honey is used with regard to purchasing honey on expert recommendation. See Table 3 Use of honey with regard to purchasing honey on expert recommendation. In connection with branching of the questionnaire, it is necessary to state that the respondents who were not given an opportunity to answer the question “What is the size of your municipality?” were assigned the answer “other”.

From the values (see Table 3), a testing criterion was calculated, which amounts to: $\chi^2 = 5.128$

The critical value of the testing criterion for the required number of degrees of freedom ($f = 8$) at the significance level $\alpha = 0.05$ amounts to $\chi^2 = 15.507$. Thus the testing criterion is lower than the critical value, therefore **H₀** is not rejected. Therefore, the statistical dependence between the way honey is used and purchasing honey on expert recommendation has not been confirmed.

Table 3: Use of honey with regard to purchasing honey on an expert's recommendation

Use honey as...	Frequencies	Would you buy honey if it was recommended to you by an expert?					Total
		Yes, and directly from him/her	Yes, but somewhere else and only a recommended “brand”	Yes, but somewhere else and any “brand”	No	Maybe	
Food	empirical	59,00	37,00	15,00	26,00	96,00	233
	expected	63,41	33,92	14,75	25,07	95,85	
Remedy	empirical	21,00	7,00	3,00	7,00	22,00	60
	expected	16,33	8,73	3,80	6,46	24,68	
Other	empirical	6,00	2,00	2,00	1,00	12,00	23
	expected	6,26	3,35	1,46	2,47	9,46	
Total		86	46	20	34	130	316

4. Discussion and Conclusions

After the evaluation of all honey marketing possibilities in the Czech Republic, its direct sale seems to be the best, and that at the beekeeper's, at home or their business establishment. Furthermore, it could be sold at farmer's markets, fairs and so on, mainly in larger towns, because in larger towns these events are more frequented and more

popular. Strong statistical dependence between the place of purchase and municipality size has been confirmed.

The above mentioned events are also a suitable means of acquiring a stable clientele who would buy honey online, because this way the customers are willing to buy honey especially after having previous experience with the honey they bought in a different place from the Internet, alternatively after a personal meeting with the beekeeper. However, the statistical dependence between the conditions for shopping online and municipality size has not been confirmed.

Concerning an indirect sale, cooperation with experts offers a great potential (for example, with general practitioners, beauticians and so on), and this in regard to the recommendation for using honey and the following sale. This cooperation, often confirmed through experience, has a great value also when the expert refuses to sell honey but is willing to recommend it only, because this way the customer learns about the benefits of honey. However, statistical dependence between the way honey is used and purchasing honey on expert recommendation has not been confirmed.

An analysis of consumer behaviour is an important tool for obtaining information in order to develop a correct selling strategy. Concerning honey, it is also important in that an interest in honey will lead back to an interest in beekeeping and secondarily to a higher number of bee colonies needed to pollinate strategically important agricultural plants. Research of consumer behaviour in honey purchasing is not common. This pilot analysis is the first part of a complex analysis which will be connected to the analysis of influences on traditional determinants of demand: process and income and with statistical multicriterial analysis of a consumer decision. Only complex results will lead to the above mentioned findings.

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A Tax Shift and its Effect on Economic Development in the European Union

Irena Szarowská¹

¹Department of Finance and Accounting, School of Business Administration, Silesian University, Univerzitní nám. 1934/3, 733 40 Karviná, Czech Republic, e-mail: szarowska@opf.slu.cz

Abstract

The aim of the paper is to examine effects of a tax shift on economic growth and provide a direct empirical evidence in the European Union (EU). It is used the Eurostat's definition to categorize tax burden by economic functions and implicit tax rates of consumption, labour and capital are investigated. Empirical analysis is based on annual panel data of 22 EU Member States in years 1995-2012 (time span is divided into a pre-crisis and a post-crisis period). Explanatory variables are examined using Generalized Method of Moments. For a model specification, Dynamic Panel Data Model Wizard is applied. Results confirm positive and statistically significant impact of consumption taxes and weaker but negative effect of labour taxation on economic growth. In a post-crisis period, findings report increase of labour taxes as the strongest and the only significant variable affecting economic growth. It suggests that harmful effect of labour taxation is enlarging in a time of unfavorable economic conditions. A tax shift on capital taxation has negative but often statistically insignificant impact on economic growth.

Keywords: tax, tax burden, tax shift, implicit tax rates, economic growth

1. Introduction

Formerly, tax policy was largely viewed as an instrument to achieve broader policy goals, above all, sufficient public revenue and redistribution of income. Over the last two decades the environment, in which tax systems operate, changed dramatically. The globalization and digitalization of the economy have also substantially increased the geographic mobility of the tax base and multinational enterprises play an increasingly important role in international trade. The global financial and economic crisis stresses the need for structural reforms and policymakers have to look for a balance between taxation, economic growth and equity. A way for achieving this goal is a shift of tax burden on less harmful taxes for economic growth. As it is known, different types of taxes have dissimilar effect on economic growth. It increases importance of identifying and understanding the key factors affecting economic growth.

The aim of the paper is to examine effects of a tax shift by economic functions on economic growth and to provide direct empirical evidence in the EU. The author uses the Eurostat's definition to categorize tax burden by economic functions and implicit tax rates of consumption, labour and capital are investigated. The paper explores and summarizes main development of a tax shift in a whole EU and followed empirical analysis is based on annual dynamic panel data of 22 EU Member States in a period 1995–2012. Standard descriptive and analytical scientific method and Generalized Method of Moments (GMM) are used as the main methods of research.

2. Theoretical Background

The theoretical effect of taxation on economic performance is not apparent matter. There is voluminous literature on the effects of taxes on the economy and its rate of growth (Barro, 1991; Mendoza *et al.*, 1994; Leibfritz, Thornton and Bibbee, 1997). Myles (2009) reviewed different production functions and effects of taxation on GDP and economic growth. However, using statistical data for comparing levels of taxation and economic performance does not provide unequivocal conclusions (Zipfel and Heinrichs, 2012). Many studies present negative relationships between taxes and economic growth and recommend lowering tax rates. Plosser (1992) found a significant negative correlation between the level of taxes on income and profits (as a share of GDP) and growth of real per capita GDP. King and Rebelo (1990) simulated changes in the income tax by applying an endogenous growth model and find that an increase from 20% to 30% reduces the rate of growth by 2 p.p. Also Romero-Ávila and Strauch (2008) stated that government consumption and direct taxation negatively affect growth rates of GDP per capita in the EU-15 in the last 40 years. Johansson *et al.* (2008) investigated the design of tax structures to promote economic growth. Corporate taxes were found to be most harmful for growth, followed by personal income taxes, and then consumption taxes. Recurrent taxes on immovable property appear to have the least impact.

Lee and Gordon (2005) explored how tax policies in fact affect a country's growth rate, using cross-country data during 1970–1997. They found that statutory corporate tax rates are significantly negatively correlated with cross-sectional differences in average economic growth rates. Karras and Furceri (2009) examined the effects of changes in taxes on economic growth and concluded that the effect of an increase in taxes on real GDP per capita is negative and persistent. Prammer (2011) summarized indications on how taxation might influence growth relevant decisions. Taxes on labour can affect decisions in three major ways by altering: i) the allocation of time between labour and leisure ii) human capital accumulation iii) occupational and entrepreneurial behavior and choices. Labour taxes can also affect labour supply decisions, both concerning the decision to participate in the labour market and the amount of hours worked (García *et al.*, 2011; Szarowská, 2010; Johansson *et al.*, 2008).

Taxes on capital can influence the rate of capital accumulation. By changing the return on capital, they might discourage saving and investment by economic agents; hence capital taxes alter the intertemporal allocation of resources. Lower levels of investment eventually lower the capital stock which in turn impacts on growth. Thus, capital taxation accumulates the distortions over time (Vermeend *et al.*, 2008). Consumption taxes are often regarded as less distortionary than income taxes, as they do not distort intertemporal decisions the way income taxes do. Consumption taxes fall partly on accumulated assets, which are an inelastic tax base. Moreover, as Carey and

Tchilinguirian (2000) present, consumption taxes do not impact on the returns to saving and, usually, do not have a progressive tax structure.

As Szarowská (2013) notices and with respect to literature above, it is possible to summarize that some taxes are more conducive to growth than others. Capital taxes cause very negative on growth. Labour taxes are less growth conducive; strong progressivity of income tax rates is regarded as particularly negative in this context. Consumption taxes are compatible with growth as they have small effect on decisions by economic agents regarding growth factors. Due to the negative growth effect of labour and capital taxes, it can be expected that in a growth-conducive system the tax burden of taxes on these factors should be kept lower in relation to consumption taxes.

Finally, it is worth to mention a fiscal devaluation as a particular form of tax shift towards consumption, which targets a reduction in employers' SSC combined with an increase in the VAT rate. The basic idea is to lower the price of exports and to raise the consumer price of imports, thereby improving net exports in the short-run as well as employment and GDP in the long-run. While the aim of a tax shift is to make the tax system less distortionary and to promote economic growth in the long-term, fiscal devaluation is a tax policy instrument to improve competitiveness in the short-term. Garnier *et al.* (2014) summarizes results of empirical and model based estimations and suggests that a tax shift in the form of a fiscal devaluation is likely to increase net exports in the short-run and to permanently improve employment and GDP. Improvements are, however, small in magnitude.

The potential scope for a tax shift depends on the existing tax structure. High labour taxation together with a relatively low tax burden in one of the three areas: consumption taxes, recurrent property taxes or environmental taxes indicate area to shift taxes away from labour (EC, 2014b). Given the size of the tax base, which is relatively large for consumption taxes, but more limited for property taxation and environmental taxation, consumption taxes are largest in revenue terms. As a tax shift might also effect tax compliance, measures can include the area of VAT.

3. Methodology and Data

Tax burden is possible to analyze using many approaches and criteria. Paper uses the Eurostat's definition to categorize tax burden by economic functions and implicit tax rates of consumption, labour and capital are investigated. A basic descriptive analysis of a tax shift development is performed for all EU Member States except Croatia. Following empirical analysis is based on annual panel data of the EU Member States in a period 1995–2012 (the newest available data are from 2012). The sample selection is limited by the availability of data. That's why, examination is performed for 22 EU countries, namely Austria (AT), Belgium (BE), Czech Republic (CZ), Cyprus (CY), Denmark (DK), Germany (DE), Estonia (EE), Ireland (IE), Spain (ES), Finland (FI), France (FR), Hungary (HU), , Italy (IT), Latvia (LV), Lithuania (LT), Netherlands (NL), Poland (PO), Portugal (PT), Slovak Republic (SK), Slovenia (SI), Sweden (SE) and United Kingdom (UK). The analysis uses data on tax burden by economic functions, namely implicit tax rates of consumption (*ITR_C*), labour (*ITR_L*) and capital (*ITR_K*) from Eurostat. Annual data on GDP growth rate (*GDP_rate*) are also taken from Eurostat and they are based on accrual basis. Explanatory variables are chosen in accordance to Szarowská (2013). They are not examined in individual regressions, but analysis newly uses GMM (Dynamic Panel Data). The basic panel models is defined in (1) and variables are explained above:

$$GDP_{rateit} = \alpha_i^* + \beta_1 \cdot \Delta ITR_{Cit} + \beta_2 \cdot \Delta ITR_{Lit} + \beta_3 \cdot \Delta ITR_{Kit} + u_{it} \quad (1)$$

The constants are specific to the *i*-th unit (country) at time *t*, at the same time but are constant. β' is the vector dimension 1xK constants and α_i^* is a constant representing the effects of those variables, which are characteristic of the *i*-th observation. Unit error component u_{it} represents non-significant effects of variables inherent in the *i*-team observations and a given time interval.

The GMM is a generic method for estimating parameters in statistical models. Usually it is applied in the context of semi parametric models, where the parameter of interest is finite-dimensional, whereas the full shape of the distribution function of the data may not be known. GMM is popular in estimating structural economic models, as it requires much less conditions on model disturbances than Maximum Likelihood and it is easy to obtain parameter estimates that are robust to heteroscedasticity of unknown form (Hansen, 1982). For a model specification, Dynamic Panel Data Model Wizard is applied. The wizard aids in specifying members of the class of dynamic panel data models with fixed effects. These models are designed for panels with a large number of cross-sections and a shorter time series (Arellano and Bond, 1991).

4. Results and Discussion

4.1. Main Trends in a Tax Shift

The total tax burden to GDP ratio includes all taxes and social security contribution receipts. The total tax burden varies widely across Member States, mostly reflecting variations in social preferences for government interventions. This ratio varies in 2014 from 26.9% in Lithuania to 48.9% in Denmark (EC, 2014b). Tax burden and its composition (tax mix) are regularly analysed by Eurostat, so this part is focused mainly on consequences of tax changes and tax shift during the covered period. Next figures depict following groups of taxes: taxes on labour (including personal income tax PIT, corporate income tax CIT and social security contributions SSC), capital (taxes on stocks of capital/wealth and taxes on capital and business income) and consumption (VAT and excise duties). Figure 1 presents structure of a tax mix and share of taxes in total revenues in year 2012 – the latest year for which detailed data are available.

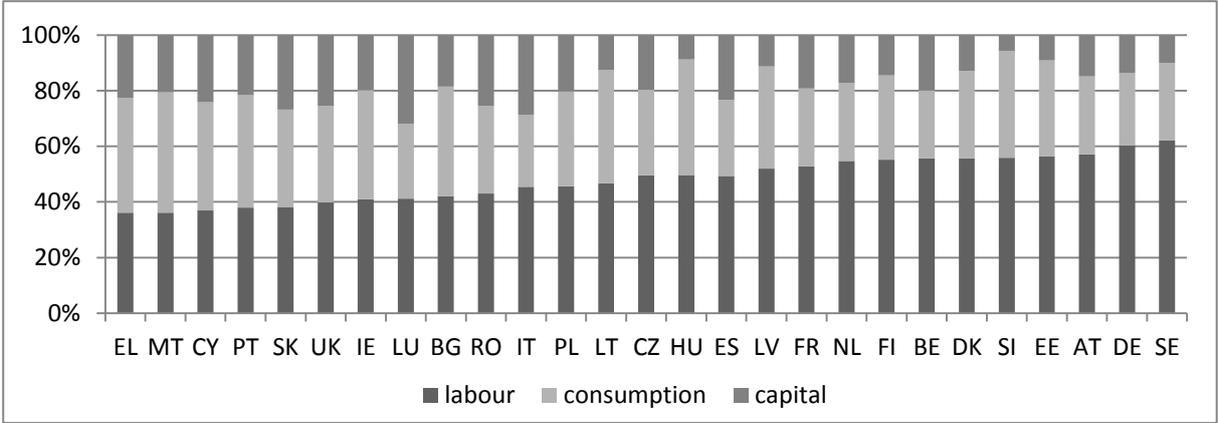


Figure 1: Structure of a tax mix by economic functions in 2012

The structure of a tax burden by economic functions reveals that the eastern EU Member States generate a relatively high share of total revenues henceforward from consumption taxes. In the northern and central European states, revenues come predominantly from labour taxes (for details look at European Commission, 2014c). Especially in central EU Member States such as Czech Republic, Germany, France and the Netherlands this is due to the large share of SSCs. Denmark is a special case as social security revenues there only amount to 1% of GDP (in 2012).

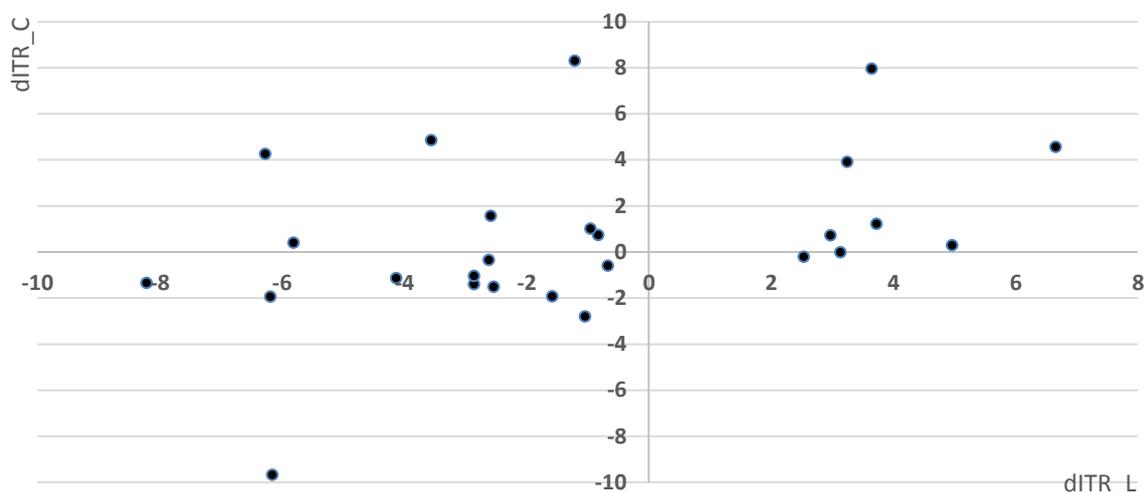


Figure 2: Tax shift between labour and consumption in p.p. (1995–2012)

Figure 2 presents the shift between implicit tax rates on labour and consumption in percentage points in individual EU countries between 1995–2012. It is necessary to point the fact that figure presents changes in implicit tax burden but it does not express a final value of tax burden. In line with recommendations, seven EU Member States (BE, BG, CZ, DE, DK, EE, RO) decreased labour taxes while increased consumption taxes. Average increase of consumption taxes is very low and it is mainly caused by changes of VAT in most countries. A big group of EU countries (FI, FR, HU, IE, LV, LT, PL, SI, SK, SE, UK) decreased labour as well as consumption taxes. This development was mainly connected with the effort to make the tax systems more growth conducive and attractive. Lowering labour taxes is often connected with decreasing SSC and effort to make labour costs more competitive. CITs affect the location of businesses and decrease domestic and foreign direct investment. In addition, statutory CIT affects profit shifting practices as multinationals tend to shift reported profits from high-taxed to low-taxed countries. PITs and SSCs paid by employees affect the decisions of individuals about taking paid work and the number of hours they work, hence impacting labour supply. The tax burden on labour, in particular SSCs paid by employers, also affects the cost of labour for employers and hence the demand for labour. Next group of states (AT, CY, IT, MT, LU, NL) increased both types of taxes, and only Spain and Portugal fractionally increased labour taxes without changes of consumption taxes between 1995–2012.

The implicit tax rate on labour decreased on average from 35.3% in 1995 to 34.2% in 2012 in the EU-27. Average implicit tax rate on consumption increased from 20.7% in 1995 to 21.6% in 2012 in the EU-27. But it is apparent from reports of EC (2014b and 2014c), as well as Garnier *et al.* (2014) note, macro-economic data do not show a shift from labour to less distorting tax bases after adoption Europe 2020 strategy. Unfortunately, ITR on labour and on consumption increased on average in the period

2010-2012. Almost all Member States increased VAT rates and/or excise duties and a majority of reforms aimed at increasing the PIT and/or SSCs. Some of the increase in labour taxation in these years was concentrated on introduction of a new higher income tax brackets, hikes in the top PIT rate (during the period 2010-13, six or seven Member States raised their top PIT rates each year) or increases in the maximum SSC base. Meanwhile, top CIT rates have changed little on average across the EU since 2010. Most countries have stopped reducing corporate rates, in contrast to the more widespread cuts that occurred before the crisis. In other cases, the increase in labour taxation was the result of an overall tax rise (BG, LV) or the removal of some tax allowances without a clear targeting of high income earners. Belgium, France used a fiscal devaluation (a shift from SSCs to consumption taxes in a revenue-neutral way) as a possible instrument to boost competitiveness. By lowering unit labour costs and changing the relative price of imports tried to foster exports and thus to improve the trade balance.

Figure 3 shows changes in a tax burden on capital, which is an objective of a tax competition with a connection to the aggressive tax planning by multinational enterprises and aggressive tax competition by national jurisdictions.

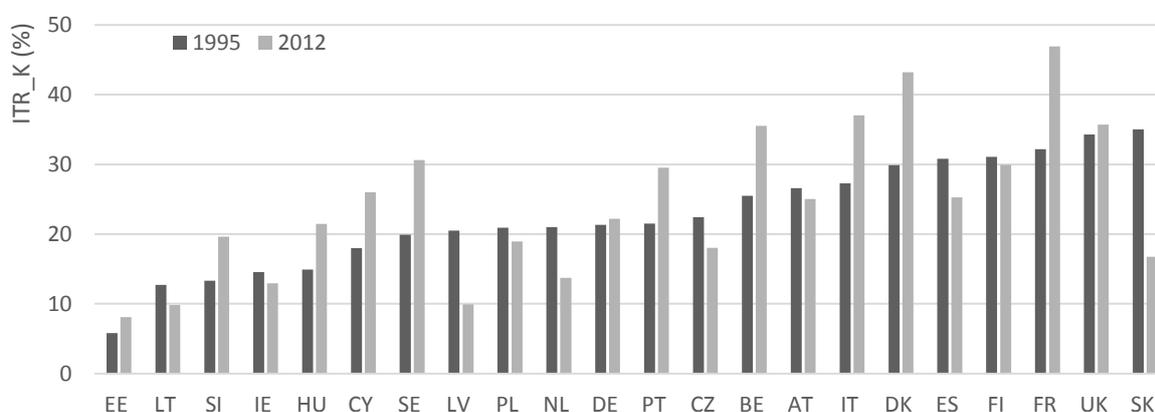


Figure 3: Implicit tax rate on capital in percentage (1995, 2012)

Note: there are used values from 2002 (IE) and 2000 (ES, EE) due unavailability of 1995 data

On-going globalization and digitalization have increased the geographic mobility of the tax base and governments try to attract and gain new tax bases. ITRs on capital are not accessible for all EU Member States. Actual tax burden varies from 8.1% in Estonia to 46.9% in France (in 2012). Average ITR on capital was 23.6% in 1995 (based on data of 19 countries), and it surprisingly increased on 24.4% in 2012 (sample of 22 countries – IE, EE and ES were added). The biggest decrease (–18.3 p. p.) realized Slovakia with the aim to achieve the benefits of tax competition (detailed information about ITRs and structure of ITRs is available in EC, 2014c).

4.2. Tax Shift and its Effect on Economic Growth – Empirical Evidence

In order to test whether a tax shift matters for economic performance, there are estimated econometric models expressed in a basic form for real GDP growth rate in (1). Information criteria (Akaike criterion, Schwarz criterion and Hannan-Quinn criterion) identified as the optimal time lag 1 year. Split of time span into two periods allows deeper analysis of structural changes related to an impact of crises. Period was divided by the year 2008. Models 1 and 4 are focused on a whole period (1995, resp. 1997-2012), models 2 and 5 on pre-crisis period (1995–2007) and models 3 and 6 on post-

crisis period (2008-2012). Table 1 presents the most appropriate specifications of models resulting from GMM (results of other estimations are available on request).

Table 1: Panel Regression Estimations (Generalized Method of Moments / Dynamic Panel Data)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
GDP_RATE ₍₋₁₎	0.46*	0.42*	0.25*	0.46*	0.35*	0.28
ΔITR_C	1.16*	0.65*	0.76*	0.27*	0.80*	-0.19
ΔITR_L	-0.06	-0.15	-0.22	-0.33*	-0.16**	-0.48*
ΔITR_K	-0.08*	0.03	-0.21*	-0.12*	-0.05	-0.10
@LEV "1997"				0.36	-0.22	
@LEV"1998"				1.54*	0.58**	
@LEV "1999"				0.99*	0.04	
@LEV"2000"				0.38	-0.56	
@LEV"2001"				1.66*	0.99*	
@LEV"2002"				-0.13	-0.70*	
@LEV"2003"				0.20	-1.14*	
@LEV"2004"				0.56	-1.07*	
@LEV"2005"				1.76*	-0.20	
@LEV"2006"				1.45*	-0.88*	
@LEV"2007"				2.99	0.47*	
@LEV"2008"				2.85		3.67*
@LEV"2009"				-1.05		-0.53
@LEV"2010"				-7.02*		-7.16*
@LEV"2011"				3.31*		2.25*
@LEV"2012"				1.68*		1.68*
S.E. of reg.	3.03	1.48	4.42	1.91	1.35	2.57
S.D. depend. var	2.83	1.61	4.48	2.83	1.61	4.48
Observations	335	225	110	335	225	110

Note: Symbols *and ** denote statistical significance at the 5% and 10% level

The main results concerning the effect of a shift of tax burden on economic growth indicate the relationship is stronger for consumption taxation than for labour and capital taxation and the most important difference is in a way of influencing the economic development. Table 1 shows that the estimated coefficients of ITR on consumption are positive and statistically significant (except Model 6, in which is negative and statistically insignificant). This finding confirms that increase of ITR on consumption contributes to the economic growth. Contrary, increase of labour taxation seems to have negative influence on economic development, as coefficients are negative and statistically significant with including dummy variables during the reporting period. Tax shift on capital taxation has negative but statistically insignificant impact on economic growth in the observed countries (except Model 2). Period fixed effects play important and statistically significant role, especially in a post-crisis period. Findings in Model 6 report negative effect of tax changes, but influence of labour taxes is not only the strongest but also the only significant variable. It suggests that harmful effect of labour taxation is increasing in a period of unfavorable economic conditions.

Results of panel analysis confirm proposals of European Commission (2010, 2014a) and theoretical conclusions about a tax shift. It is possible to conclude that consumption taxes are less distortive than labour taxes. That is because part of consumption is made from accumulated assets, which are a relatively inelastic tax base. Moreover,

consumption taxes usually do not have a progressive tax structure. Next, consumption taxation includes environmental taxes which can help to internalise externalities and generate at the same time tax revenues. Negative effect of labour taxes on economic growth, especially potential harmful impact of corporate taxes, present many studies such as Myles (2009), Johansson *et al.* (2008), Prammer (2011). However, the exact impact of labour taxes on economics and on a labour market depends on the labour demand elasticity, the degree of centralization of the wage bargaining and the distribution of incomes among different income levels (look at Loretz, 2008). In terms of a tax shift, the results are in line with the findings of other empirical studies on impact of taxes and economic growth, such as Mendoza *et al.* (1994), Carey and Tchilinguirian (2000), Johansson *et al.* (2008), Garcia *et al.* (2011) or Garnier *et al.* (2014), but they partly differ from findings of Romero-Ávila and Strauch (2008), Karras and Furceri (2009) or Zipfel and Heinrichs (2012). The variety is generated due to differences used in econometric models, country samples, observation periods and considered variables.

5. Conclusions

Taxes are still the fundamental public revenue but the globalization and the economic crisis have changed the environment and conditions for the tax policy. Governments have to find the way how to consolidate their budgets while at the same time promoting economic growth. Theory and practice suggest that raising consumption taxes and at the same time lowering taxes on labour and capital can stimulate economic growth.

The aim of the paper was to examine effects of a tax shift by economic functions on economic growth and to provide a direct empirical evidence in the EU. It study uses the Eurostat's definition to categorize tax burden by economic functions and implicit tax rates of consumption, labour and capital are investigated. First, paper summarizes main development of a tax shift in a whole EU till 2014 and followed empirical analysis is based on annual dynamic panel data of 22 EU Member States in a period 1995-2012 (time span is divided into a pre-crisis and a post-crisis period).

Statistics shows that the total tax burden as well as its composition varies widely across Member States, mostly reflecting variations in social preferences. In line with theory and EC proposals, tax systems have been redesigned mainly in the countries of northern and eastern Europe, whereas central Europe has seen little change. The ITR on labour decreased on average from 35.3% in 1995 to 34.2% in 2012 in the EU-27. Average ITR on consumption increased from 20.7% in 1995 to 21.6% in 2012 in the EU-27. Seven EU Member States (BE, BG, CZ, DE, DK, EE, RO) realized a recommended tax shift and decreased labour taxes while increased consumption taxes. But it is apparent from reports of EC (2014b and 2014c) and also macro-economic data do not present a shift from labour to less distorting tax bases in 2011 and 2012 after adoption Europe 2020 strategy. Unfortunately, ITRs of labour and of consumption increased on average over the period 2010-2012 and almost all Member States increased VAT rates and/or excise duties and a majority of reforms aimed at increasing the PIT and/or SSCs in 2013-2014. Some EU Member States (Belgium, France) used a fiscal devaluation (a shift from SSCs to consumption taxes in a revenue-neutral way) as a possible instrument to boost competitiveness. By lowering unit labour costs and changing the relative price of imports (since VAT bears on domestic consumption) tried to foster exports and thus to improve the trade balance.

The following direct empirical evidence tested whether a tax shift matters for economic performance. Explanatory variables were not examined in individual regressions, but the study newly used GMM. For a model specification, Dynamic Panel Data Model Wizard was applied. Results of a panel analysis confirm positive and statistically significant impact of consumption taxes increase and weaker but negative effect of labour taxation on economic growth. It approves an assumption that labour taxes (mainly PIT and CIT) are usually associated with a lower economic growth and consumption taxes such as recurrent property taxes, consumption taxes and environmental taxes are the least detrimental to growth. In a post-crisis period, findings report labour taxation as the strongest and the only significant variable. It suggests that harmful effect of labour taxation is increasing in a period of unfavorable economic conditions. A tax shift on capital taxation has negative but often statistically insignificant impact on economic growth.

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Regional Entrepreneurship Culture and the Business Lifecycle: Patterns from the Moravian-Silesian Region

Jarmila Šebestová¹, Martin Klepek², Šárka Čemerková³ and Pavel Adámek⁴

¹*Department of Business Economics and Management, School of Business Administration in Karvina, Univerzitní náměstí 1934/3, 733 40 Karviná, Czech Republic, e-mail: sebestova@opf.slu.cz*

²*Institute of Interdisciplinary Research, School of Business Administration in Karvina, Univerzitní náměstí 1934/3, 733 40 Karviná, Czech Republic, e-mail: klepek@opf.slu.cz*

³*Department of Business Economics and Management, School of Business Administration in Karvina, Univerzitní náměstí 1934/3, 733 40 Karviná, Czech Republic, e-mail: cemerikova@opf.slu.cz*

⁴*Department of Business Economics and Management, School of Business Administration in Karvina, Univerzitní náměstí 1934/3, 733 40 Karviná, Czech Republic, e-mail: adamek@opf.slu.cz*

Abstract

The main goal of the paper is to reflect on the challenging economic environment. Many of the trends found were less than positive, although there were some new positive trends that could be identified as a source of sustainability in the area of the connection between the sector of small and medium sized enterprises and the local entrepreneurship environment as well as a source of entrepreneurial culture. Moreover, the frequency of co-operational activities with local government was investigated. Questionnaire-based research was undertaken within 194 organizations of various legal forms operating in the area of the Moravian-Silesian Region. The main factors, which had an influence on their current business stage (49.5% in the growth stage, 9.8% in stagnation, 31.96% in decline and the other 0.52% in crisis), were the locality in the region, the quality of the labour force, cooperation with local public bodies and the business relationships between suppliers. Finally, we have defined the current stage of the entrepreneurial culture as the “Sandbox”.

Keywords: business culture, business stage, cooperation, entrepreneurship, Moravian-Silesian region, local government, policy layer

1. Introduction

Locally embedded values and attitudes towards entrepreneurship exert a strong influence on the rate and level of entrepreneurial activity in regions. The concept of the regional entrepreneurship culture aims to capture such a phenomenon, and refers in a general sense to the level of social acceptance and encouragement of entrepreneurs and their activities in a region (Beugelsdijk, 2007, Audretsch, Keilbach, 2004, Westlund, Bolton 2003). A historically rooted social acceptance of entrepreneurship in a region may thus influence entrepreneurship in a direct way, but also in an indirect way through long-term influence on the ‘formal rules of the game’ in the region as well as ‘playing the game’ (Andersson, 2012).

In the past decades, an increase in interest could be found in examining the relationship between entrepreneurship in society and shifting forces coming from local government and public and private organizations. Policy makers place great emphasis on supporting the outcomes of entrepreneurship, because this generates economic development in the examined area. Little is known about the influence of entrepreneurship on economic performance (Wennekers, Thurik, 1999, Toma, Grigore and Marinescu, 2014).

The aim of this paper is to highlight the relationship between the business lifecycle in the sector of small and medium sized entrepreneurs, when their contribution to the economic structure is almost 99% of active business units (CSO, 2015). The paper is divided into three parts. The first part is focused on the relationship between entrepreneurship and the entrepreneurial culture – a two layered model is defined. The second part is presented by own research findings within the Moravian-Silesian Region based on previous literature framework classifications. Finally the type of the regional culture is specified.

2. Entrepreneurship and the Entrepreneurial Culture

This Entrepreneurship based on tradition and the appropriate culture represents the centre of the functioning of market economies (Baum et al., 2007). A country and its entrepreneurial tradition may well identify specific factors, which have an influence on public policy success. Governmental policies are crucial, because they set the rules for “playing” in the market (High, 2009). Entrepreneurial culture affects the political preferences of an entrepreneur, i.e. what the government should do and how it will regulate the market and support SMEs (Guiso et al., 2006). If we adopt not only the classical “behavioral” definition of entrepreneurship (Schumpeter, 1911, Kirzner, 1973), but other viewpoints such as the creative human process, we would be able to find other patterns for the evaluation of the relationship such as chaos, contraindication and confusion (Toma, Grigore and Marinescu, 2014).

For years policy makers have paid great attention to supporting and encouraging entrepreneurship and for this reason they often modify their approach and initiatives according to the economic cycle (Spar, 2001, Wennekers et al., 2002, Petty, Bonardi, 2006) through tax reductions and education (Poterba, 1989, Verheul et al. 2002). Previous studies showed a much broader view in this initiative in the national and regional context (Lundström, Stevenson, 2005, 2008, Zahra, Wright, 2011). The impact of this situation is well documented and reduces the level of uncertainty for entrepreneurs, but the whole connection must produce more entrepreneurial activity

and progress, which predominantly supports start-up stages, but not a transition among the lifecycle stages of businesses (Freytag, Thurik, 2006, Petty, Bonardi, 2006).

We focus on relationships between policy makers as active players in the regional entrepreneurship culture quality and lifecycle stages of business units rather than examining tools promoting entrepreneurial activities. Finally, we are able to evaluate the current stage of the “culture” in the examined region, according to Petty and Bonardi (2006). It reflects five types of environments, basically influenced by traditions, culture, and actual regional policy, where the relationship is compared via the cooperation between an Institution and Policy. These cultures are divided as follows:

- Type A (The Jungle) is characterized by a low level or total absence of institutions reducing market uncertainty as well as a low level or total absence of policies to incentivize entrepreneurship, this will make it difficult to attract entrepreneurs. A low level of growth is typical in this case.
- Type B (The Pitch) could be seen as a developed institutional framework that enables entrepreneurs to exploit opportunities and develop a business but at the same time lacks external incentives to pursue the same, this will be attractive to market driven entrepreneurs. This environment may be perceived as being less favorable to start-up activity, but even though some entrepreneurs may be dissuaded by this somewhat challenging environment this ecosystem is well equipped.
- Type C (The Sandbox). The cultural environment is based on the presence of incentives to pursue entrepreneurship combined with a commercial and financial setting that is supported by a strong institutional framework to attract more entrepreneurs from a wider range of the population. In the short term this ecosystem would be expected to produce an overall above average rate of entrepreneurial activity, over the longer term the strength of the institutional environment should achieve a similar outcome to Type B.
- Type D (The Cliff). The fourth and potentially most counterproductive, institutional context, is one in which governments may attempt to incentivize entrepreneurship within an otherwise weak or underdeveloped institutional setting.
- Type E (The Maze). This setting is the most ambiguous and is in some instances contradictory, in terms of the perceived institutional-policy context. Government will have certainly made an effort to develop policies in order to promote entrepreneurship or reduce the barriers to it but there is little evidence that this environment is overly conducive for business and lacks an overarching logic or objective. Several dimensions of policies that are designed to promote entrepreneurship are ranked above average while an equal number fall below average.

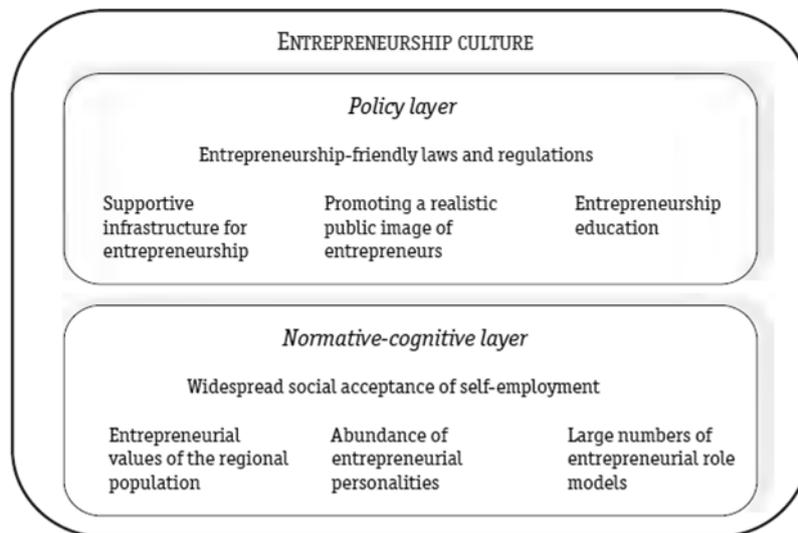
Based on this, we can highlight an examined region in the entrepreneurial ecosystem as well as being able to identify factors, which had an influence on the examined region (Petty, Bonardi, 2006, Vesela, Sebestova, 2013).

2.1. Regional Entrepreneurship Culture and Policy Layer Connection

A regional culture is typically understood “as a positive collective programming of the mind” (Beugelsdijk, 2007, 190), or an “aggregate psychological trait” (Freytag, Thurik, 2007, 123). An entrepreneurship culture may include the regional population being oriented toward entrepreneurial values such as individualism, independence and

achievement, resulting in the social acceptance of entrepreneurs and their activities. As a set of institutions that are mainly informal in character, a culture typically changes only gradually over time and may even survive disruptive changes in economic conditions. We can distinguish two main layers (see fig. 1) in the structure of entrepreneurship culture (Fritsch, Wyrwich, 2012, p. 85).

Figure 1: Layers of Entrepreneurial Culture



The normative-cognitive layer of an entrepreneurship culture encompasses attitudes towards entrepreneurial activity in connection with norms and values such as individualism, autonomy, and achievement or mastery in a specific business area. The models do not only include persons with entrepreneurial characteristics such as extraversion, openness to experience, conscientiousness, and the ability to bear risk. Finally, we can evaluate the dependence on local support or dealing with regional risks.

Contrary to this, the policy layer represents the supportive infrastructure for entrepreneurship such as entrepreneurship-friendly laws and regulations in the area of establishing a business, the existence of supporting services for business founders as well as for established firms, including good access to financial resources for start-ups and small businesses as well as training and consulting services. They also try to encourage entrepreneurs by promoting a positive image of entrepreneurs or by way of an appropriate business education system. The existence of regional entrepreneurship cultures is one theoretically plausible explanation for spatial variations in entrepreneurship activity (Andersson, 2012).

3. Methodology and Data

Entrepreneurs as individual entities in the market, require resources such as labour, information, skills and capital for their businesses. They often use friends or informal contacts to acquire these and to contribute to knowledge generation. During the period of the economic crisis, the role of the entrepreneur has changed. Entrepreneurship is based on decision making in an environment full of uncertainty whilst pushing businesses into an innovative but risky strategy application and finally acquiring new knowledge (Nijkamp, 2003). According to the two layers of entrepreneurial culture, based on previous studies (Andersson, 2012, Fritsch, Wyrwich, 2012) the survey based

research was conducted. The questionnaire consisted of eight main parts, which were to predominantly describe the current stages of entrepreneurial culture.

- Political layer – consists of the evaluation of the business environment and its structure, firstly the main barriers which have an influence on behavior, secondly the relationship with local government and municipalities.
- Normative-cognitive layer – includes the main motivation to start the business, strategic, personal policy, innovations and communication strategy and finally a demographic description of the examined business unit.

The questionnaire survey was conducted with owners and managers of small and medium sized businesses (fewer than 250 employees) in the Moravian-Silesian Region, operating between the years of 2009–2013. The companies fulfilled the criteria of (1) being designated as small and medium sized companies by their number of employees – fewer than 250, (2) operating a business in the area of the Moravian-Silesian Region and (3) agreeing to a personal visit during autumn 2014.

The instrument was validated through the assessment of scale reliability, construct validation and un-dimensionality of the research constructs. Cronbach's Alpha was used to assess the scale reliability of each construct in the research model. The alpha of every factor was greater than the suggested threshold value of acceptable reliability of 0.6. Results were graded using the Likert scale (1–5 for non-numerical data) so as to be comparable with other sections of the questionnaire (41 items). As a supporting analysis, cross-tabs were used to identify significant and non-significant values. In the next stage we provide analysis of data reliability, presented by Cronbach α and with a recommended value above 0.5 (Nunnally, 1978), other items were deleted. The instruments for the constructs were then validated by exploratory factor analysis (i.e., principal components analysis with varimax orthogonal rotation). Unfortunately, for partly performed analysis the the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was applied, but did not achieve the recommended minimum value of 0.6 (Sharma, 1996), so we decided to use cross tabs and forward stepwise regression analysis on a confidence level of 90%. Data obtained from questionnaires (108 companies in the pilot phase, 194 in the final phase) is to be analyzed through the SPSS statistical packet programme.

3.1.1. Sample size description

The data had to be sorted, respondents, who did not meet the criteria (size, operating in the Moravian-Silesian region) were deleted, and finally we obtained 194 valid respondents. In the Moravian-Silesian Region, 250,028 business units were in operation, the growth rate in 2014 was +0.6% regarding the number of start-ups (CSO,2015). The sample size (n) was calculated by using the formula recommended by Olaru, Dinu, Stoleriu, Șandru and Dincă (2010, p.15).

$$n = t^2 \times p \times (1 - p) / \omega^2 \quad (1)$$

where:

t...confidence level, corresponding to probability with which the accuracy of the results will be guaranteed, from the statistical tables of the Student distribution

p....prevalence, probability or proportion of the sample components that will explore the problem.

ωacceptable margin of error.

The sample size corresponds to recommended minimum value in probability of 0.95. The minimum sample size was computed according equation (1) as follows:

- t value in $\alpha = 0.05$ is 1.645,
- p value = 0,1699 is counted as proportion of businesses, which are active in year 2014 in Moravian-Silesian Region (250,028) to whole number businesses in the Czech Republic 1,470, 929(CSO, 2015),
- $\omega = 0.05$ is acceptable error limit of 5%.
- Minimum sample size = $1.6452 \times 0.1699 \times (1 - 0.1699) / 0.052 = 153$ respondents.

The sample size was 194 respondents ($194 > 153$) so the sample was sufficient to provide the study. A data entry spreadsheet and guidelines were established for the student research assistants who entered data subsequent to conducting / receiving interviews. Researchers conducted several random checks for internal consistency in responses.

All the analysis is based on the relationship of the business lifecycle and other variables, which have an influence on regional entrepreneurial culture. As can be seen (Table 1), the sample consists of 194 active business units, where the main group reports growth in the last three years and it is based mostly on sole proprietors (SP) and limited liability companies(LLC).

Table 1: Relationship between Business lifecycle and Legal form

	JSC	COOP	NGO	SP	LLC	SO	GP	Total
Growth	7.22%	0.52%	1.03%	15.98%	23.71%	1.03%	0.00%	49.48%
Stagnation, Maturity	1.03%	0.00%	0.00%	5.15%	3.61%	0.00%	0.00%	9.79%
Decline	2.06%	0.00%	0.00%	15.46%	13.92%	0.00%	0.52%	31.96%
Crisis	0.52%	0.00%	0.00%	0.52%	1.03%	0.00%	0.00%	2.06%
Destruction and decease	0.00%	0.00%	0.00%	0.00%	0.52%	0.00%	0.00%	0.52%
Missing	1.03%	0.00%	0.00%	2.58%	2.58%	0.00%	0.00%	6.19%
Total	11.86%	0.52%	1.03%	39.69%	45.36%	1.03%	0.52%	100%

JSC... joint stock Company, COOP...Cooperative, NGO...non profit, SO...state-ownership, GP...general partnership

The relationship between the current stage and the legal form **was not confirmed** (Cramer's $V = 0.126$, Sig. = 0.987, confidence level 0.95). If we continue in the sample description, in the number of employees, there is quite a similar situation. We may deduce, that the main growth of business units is in those with up to 9 employees and is connected with sole proprietors and limited liability companies (growth stage and size till 9 employees, 21.13%). It may be influenced by the better reputation of the business type of a Limited Liability Company. **The relationship between these factors was not confirmed.** (Cramer's $V = 0.154$, Sig. = 0.545). Finally, the relationship between the current lifecycle stage and annual turnover was examined.

As companies, which stated that they were growing, made up the main percentage share, we were not surprised to discover that given the small size of the companies the turnover of the companies was relatively small (mostly up to CZK 10 million). For the third time, the relationship between **the lifecycle and turnover was not confirmed** (Cramer's $V = 0.133$, Sig. = 0.898). The only positive relationship to be confirmed was between the company size and the turnover, which is connected in the case of the EU definition of Small and Medium sized entrepreneurs (Sperman's coeff. 0.753, sig. = .000).

Table 2: Relationship between Business lifecycle and average annual turnover

	<1 mil.	1–10 mil.	10–100 mil.	100–250 mil.	250 mil.–1 bil.	>1 bil.	Total
Growth	9.79%	17.53%	14.43%	3.09%	3.61%	1.03%	49.48%
Stagnation, Maturity	2.58%	3.61%	1.55%	1.03%	0.52%	0.52%	9.79%
Decline	9.79%	11.34%	9.79%	0.52%	0.52%	0.00%	31.96%
Crisis	1.03%	0.52%	0.52%	0.00%	0.00%	0.00%	2.06%
Destruction and decease	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.52%
Missing	2.58%	1.55%	2.06%	0.00%	0.00%	0.00%	6.19%
Total	25.77%	34.54%	28.7%	4.64%	4.64%	1.55%	100%

4. Results

4.1. Regional Entrepreneurship Culture in the Moravian-Silesian Region

In accordance with the previously mentioned model, we divided our main findings into two layers i.e. the Political layer and the Normative-cognitive layer where the most important factors are summarized in the Table 4 below.

When we used the Likert scale (1 – the worst, 5 – the best), we obtain the first draft of the current state of regional culture. After this principal review, we used a linear regression model (forward stepwise method), when the predictors for entry were chosen by adjusted R^2 and the model includes only factors, with the effect in p value of 0.05. The confidence level of the proposed model is 95%, $R^2 = 0.786$. The description was made according to Fritsch, Wyrwich, (2012) and Andersson (2012).

Table 3: Pattern of regional culture: Case of the Moravian-Silesian region

Policy layer (0.21)			
<i>Factors, which have an influence on the current state</i>	<i>Predictor value</i>	<i>Factors, which could support an entrepreneurial culture</i>	<i>predictor value</i>
B1 – Satisfaction in total	0.05	B3e – [Supply of labour force]	0.07
B2g – [Bureaucracy]	0.06	B3a – [Ample amount of suppliers]	0.04
Total	0.11	Total	0.10
Normative-cognitive layer (0.34)			
<i>Entrepreneurial values</i>	<i>Predictor value</i>	<i>Cooperation – role models</i>	<i>Predictor value</i>
G2 – Interest in local policy	0.04	G6a – satisfaction with municipality services [Purchase real estate into company ownership]	0.08
G5 – Preparation of projects	0.05	G6b – satisfaction with municipality services [Willingness of officials]	0.06
H7 – Average annual turnover	0.05	G6c – satisfaction with municipality services [Support of entrepreneurs]	0.06
Total	0.14	Total	0.20

If we compare these layers, the most important of them came from the side of entrepreneurs and their active participation in business life. The sides of environmental development in the policy layer are quite balanced. As can be seen, the municipalities and their cooperation with local businesses have the main effect on an entrepreneurial culture. This model supports our research issue, that they are existing subcultures within regions, dependent on the region location.

5. Discussion and Conclusions

All of our work is limited by the intervals of company evaluation and the availability of data which is a common problem among other studies (von Stein, Ziegler 1984), but further research must be conducted to improve the quality and predictive power of the presented models to avoid bias and to be able to describe more factors influencing local entrepreneurial culture.

We believe that the presence of positive examples of entrepreneurs in the social environment has a positive influence in culture development and could support types of cooperation. Entrepreneurial role models demonstrate that they may increase social acceptance of an entrepreneurial lifestyle. Entrepreneurs provide opportunities to learn about entrepreneurial tasks and capabilities. In particular, the presence of entrepreneurial role models in the social environment reduces the uncertainty that potential entrepreneurs may feel about starting their own business and may help them acquire the necessary information and entrepreneurial skills (Minniti, 2005).

If diverse municipalities were affected differently, it is conceivable that one would expect that the crisis had an impact on the spatial distribution of start-ups and other types of entrepreneurial units. On the other hand, as previously argued, an entrepreneurship culture should, because of its slow change and historical embeddedness, survive even major changes in the general economic environment (Andersson, 2012). After this we could classify the current state of the entrepreneurial *culture in the Moravian-Silesian Region as a "Sandbox"* (Fritsch, Wyrwich, 2012) when in the region we can find a strong supporting framework, but in the long term it could face problems due to the number of bureaucratic measures undertaken.

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Contribution of foreign trade to the economic growth of economies during economic transition

Marcel Ševela¹

¹Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: sevela@mendelu.cz

Abstract

The paper deals with the impact of foreign trade openness to economic growth. The standard Solow approach is extended for trade openness indicator and for link of trade openness impact based on economic level. Using the panel of European transition economies and panel of other developed economies the specific role of trade openness is tested. The results from four different estimation method of panel data did not offer fully consistent outcome. The estimates for transition economics panel proved the significant role of trade openness but they did confirm statistically the impact of labour and capital. Such results are not consistent with Solow implications. The similar is valid also for the second panel of other developed countries excluding the fixed effect approach.

Keywords: economic growth, foreign trade, economic transition, trade openness, growth accounting

1. Introduction

The positive relation of foreign trade and national product was discussed already by Smith (Haakonssen, 2006). The theoretical attitude of unambiguously positive influence of international trade than prevailed till the emergence of the least developed countries in decolonization waves during the 20th century. Till the widespread of Solow growth model and its extensions after the sixties of 20th century the contribution of international trade to national product was held “static”. The international trade increases the national product in one-shot, there are no repeated contributions to product level. In the static view the trade does not promote the long-run economic growth, it only increases the product in one step.

This is typical for the classical idea of absolute, resp. comparative advantage that describes the possibility of increased return from specialised production and thus the additional static gain for national product. (Roncaglia, 2006). Similar conclusions could be derived from neoclassical period those findings are reflected in Heckher-Ohlin-Vanek

model of international trade (Feenstra, 2004, Marrewijk, 2007, etc.). These models resulted also in static gain for all involved countries.

The interest in dynamic aspects of international trade came from the development of modern growth theory. The renewed focus on growth was initiated by Ramsey (1928), Cobb and Douglas (1928), Keynes (2007), Harrod (1948), Domar (1937) etc. The main changes was caused by models constructed by Solow (1956) and Swan (1956) that were based on classical production function identifying labour, capital and technology as the sources of economic growth. Solow-Swan model advocates the convergence between national economies that should be speeded up by diffusion of technological process mainly through international trade. Other non-traditional sources of economic growth were hidden in “Solow residuum”. It was and still is strongly supposed that international trade plays significant role in so called level effects determining the transition from one steady state to another. (Alfonso, 2001).

Great variety of models emerged to explain the national differences in Solow residuum for individual economies. The role of human capital, economy of scale, knowledge dissemination, institutional framework in general, etc. were empirically tested. All these sources aimed to explain primarily the difference in product level, not the differences in growth rates.

The role of foreign trade were explain in the dynamic way from the very beginning. The international trade do not enable only the more productive allocations of economic sources but continually influences the demand and supply of foreign economies through the market expansion and other mutual flows not only of good, but services, knowledge and other incentives, These truly dynamic factors include economic integration, stronger international competition, economies of scale, knowledge and practise spread, sharing research results, etc. (Rivera-Batiz, 2003).

The empirical studies tested the role of foreign trade extend using different models, they found the evidence for positive role of export and negative impact of import barriers (see Chenery and Syrquin, 1989 for representative overview). At the same time a few empirical studies did not find enough evidence for any role of international trade when economy reaches some not clearly specified limit of development or international trade involvement (Tyler, 1981, Dodaro, 1991).

The next stages in explaining the role of international trade in economic growth is connected with endogenous models based on evolutionary processes. Using the microfoundations and replacing the steady states by path dependency the sustained endogenous factor changes the role of international trade to “medium” managing transmission of impulses (Uzawa, 1965). Lucas (1988) argued that by comparative advantage induces international specialisation that could increase accumulation of human capital and so deepen the growth gains and thus further specialisation. Romer (1986) used similar principle but found the incentive in positive externalities.

Grossman and Helpman (1990) focused on investment in research and development resulting in innovations that are then accessible to all economies in form of public good. Discussion about the limited access to results of research and development immediately followed because the investors try to protect their intellectual property (Romer, 1986). In comparative analysis of growth in closed and open economies the international trade was held responsible for better diffusion of technology, new product varieties, stronger competition, access to wider market, possibility of costless imitation of inventions, etc. (Grosman and Helpman, 1991, Romer 1993, Chang at al., 2009).

The international trade in capital good, mainly the volume of imported capital could play the role of additional source of economic growth. It is empirically proved that the

imported capital is typically more productive than the domestic one (Daumal and Ozyurt, 2011). The role of international trade in economic growth determination cannot be disputed, although the causality is now under scrutiny to distinguish it from standard correlation (Frankel and Romer, 1999).

2. Methodology and Data

As described in the previous sections the empirical analysis of foreign trade contribution to economic growth is still based on Solow approach. Using the standard general formula for economic growth we could write in conventional logarithm form the following:

$$\ln Y_{it} = \alpha_0 + \delta \ln Y_{it-1} + \beta \ln X_{it} + \lambda_i + \mu_t + \varepsilon_{it}, \quad (1)$$

where dependent variable Y_{it} is GDP per capita in constant prices, Y_{it-1} lagged GDP per capita in previous year, X_{it} is matrix of all explanatory variable for all individual and time periods, while λ_i , resp. μ_t are unobserved but constant individual specific effect, resp. time specific effects, ε_{it} standard stochastic error term and α_0 standard intercept. The $i=1, \dots, N$ represents individual countries, while $t=1, \dots, T$ the time periods.

In the general formula (1) the set of explanatory variable traditionally includes the extent of capital and labour sources. For the purpose of the paper this set is extended for foreign trade variables. In our case, the influence of foreign trade is described not only by standard foreign trade openness expressed as value of goods exports with respect to current GDP. The second foreign trade variable, the multiple of trade openness and GDP per capita aims to capture the influence of development level of the economy to the role of simple trade openness. It is believed that the role of foreign openness is not stable at each level of economic development and could change its role. It is supposed, that trade openness is more decisive at initial phases of economic growth where there is a wider gap in competitiveness to foreign trade partner. Thus there are stronger incentives for economic growth not only from spill-over effects but also due to meet the foreign market criteria.

The estimated model focuses only on goods trade, other forms of possible foreign economic relations are omitted. As the panel data are available for estimation, the model could be specified in this way:

$$\ln Y_{it} = \alpha_0 + \delta \ln Y_{it-1} + \beta_0 \ln L_{it} + \beta_1 \ln K_{it} + \beta_2 \ln Openness_{it} + \beta_3 \ln(\ln Openness_{it} * \ln Y_{it-1}) + \lambda_i + \mu_t + \varepsilon_{it}, \quad (2)$$

where L_{it} represents labour inputs, K_{it} capital input and $Openness_{it}$ relative openness in country i at time t . The meaning of remaining terms are the same as in formula (1).

For the estimation panel data are available for years 1990-2013, for 6 countries after economic transition and 17 other developed countries not only EU members including the data for Euro area (18 members). No matter that the panel is unbalanced, consistent estimates are available using the dynamic estimates.

The majority of data is taken from EU AMECO database and OECD.StatExtracts database. The GDP per capita is in USD, constant price of 2005 using the PPPs. Labour

inputs are measured by total hours worked, the capital by net capital stock at 2010 constant prices. The trade openness is calculated as fraction of trade value to GDP at current USD prices.

3. Results

The result for transition countries are presented in the Table 1: Transition economies results. The panel of six countries is estimated by four different methods. The results of between approach is not reliable due to small number countries with respect to the number of explanatory variables and so to the minimal degrees of freedom. The results of remaining methods converge to similar finding of strong influence of openness in transition countries. The second trade variable describing the trade openness did not proved clear explanatory power, it is significant only in fixed effect approach at 10% significance level. It could be concluded, that foreign trade has appropriate role in growth accounting, but the estimates did not give enough evidence for supposed different role of openness with respect do level of development.

Table 1: Transition economies results

	Dependent variable: ln_gdp_per_capita			
	Fixed effects	Between	OLS	Random effects
const	-0.6641 (0.673)	1.8841	1.1520 (0.385)***	1.2440 (0.474)***
ln_gdp_per_capita_-1	0.7519 (0.062)***	0.8239	0.8952 (0.035)***	0.8849 (0.041)***
ln_working_hours	0.3465 (0.083)***	-0.06353	-0.01933 (0.017)	-0.0194 (0.022)
ln_net_capital	0.0597 (0.053)	0.05741	0.02397 (0.020)	0.0207 (0.025)
ln_openness	0.1060 (0.019)***	-0.05353	0.03420 (0.012)***	0.0244 (0.013)*
openness*gdp_per_capita_-1	-5.23e-06 (0.000)*	8.19e-06	-2.02e-06 (0.000)	---
Sum of residuals-squared	0.0856	0.0000	106.72	0.1256
LSDV R-squared	0.9879		0.9915	
Within R-squared	0.9763			
P-value(F)	2.29e-89		4.5e-106	
Akaike criterion	-447.94		319.02	-418.13
Schwarz criterion	-418.34		335.17	-404.67
Hannan-Quinn criterion	-435.94		325.57	-412.67

Note: Robust standard errors are presented in parentheses, signs ***, **, * stand for statistical significance 1%, 5% and 10%.

The individual fixed effects presented in the Table 2: Individual Fixed Effects for Transition Economies show strong variance underpinning the great variety and thus importance of nationally fixed growth circumstances for transition economies. This

panel is highly heterogeneous from this point of view. The individual country heterogeneity probably mirrors in absence of empirically proved influence of capital and labour input in approaches not adapted for strong individual effects (OLS, Random effect).

Table 2: Individual Fixed Effects for Transition Economies

	Country	const
1	Czech Rep.	-0.8567
2	Estonia	-0.0778
3	Hungary	-0.8695
4	Poland	-1.3458
5	Slovak Rep.	-0.5474
6	Slovenia	-0.1330

The second panel of selected developed countries without a significant economic transformation in years 1990-2013 consists of 17 highly developed economies around the world and the Eurozone as a whole is included as well. The estimated results are given in Table 3: Selected developed economies results. Unlike the transition economies panel, the number of individual in this panel resulted in robust estimates of the between approach. The fixed effect and between did not give evidence for trade openness role in economic growth.

Table 3: Selected developed economies results

	Dependent variable: ln_gdp_per_capita			
	Fixed effects	Between	OLS	Random effects
const	-0.0847 (0.340)	0.0287 (0.271)	0.4691 (0.159)***	0.3834 (0.158)**
ln_gdp_per_capita_-1	0.9850 (0.017)***	1.0042 (0.025)***	0.9570 (0.014)***	0.9644 (0.014)***
ln_working_hours	0.1259 (0.027)***	0.0066 (0.006)	0.0027 (0.005)	0.0074 (0.005)
ln_net_capital	-0.1238 (0.019)***	-0.0085 (0.006)	-0.0048 (0.005)	-0.0091 (0.005)
ln_openness	0.0739 (0.161)	0.0754 (0.120)	0.2125 (0.081)***	0.1578 (0.077)**
openness*gdp_per_capita_-1	-0.0046 (0.014)	-0.0071 (0.011)	-0.0204 (0.007)**	-0.0148 (0.007)*
Sum of residuals-squared	0.1794	0.0002	381.61	0.2277
LSDV R-squared	0.9902	0.9995	0.9891	
Within R-squared	0.9896			
P-value(F)	0.0000	1.90e-19	0.0000	
Akaike criterion	-1809.0	-135.47	1099.3	-1751.4
Schwarz criterion	-1718.1	-130.13	1123.0	-1727.7
Hannan-Quinn criterion	-1772.9	-134.74	1108.7	-1742.0

Note: Robust standard errors are presented in parentheses, signs ***, **, * stand for statistical significance 1%, 5% and 10%.

On the contrary the OLS and random estimates resulted in significant role of not only of pure trade openness but also unlike the transition countries panel of openness multiplied by economic level indicator. This indicates the different strength of openness role during the economic development. It is rather surprising while according to theory this influence is more frequent in economies at lower levels of economic development. The negative signs of regress coefficients are compatible with the economic expectations.

No matter that fixed effect approach did not prove the role of trade openness it seems to be the most consistent estimate with the theoretical expectations, while it succeeded in proving the role of capital and labour inputs. But the sign of net capital inputs regress coefficient is negative that is inconsistent with the traditional Solow theory. The possible explanations could be the structure of net capital. The total volume of used capital could be declining, but the rising share of more beneficial forms of capital for example of research intensive capital could prevail the diminishing total extent. The more detailed classification of capital that is more and more heterogeneous should be the challenge for future research.

The individual constants from fixed effect calculation are presented in Table 4: Individual Fixed Effects for Selected developed Economies. In comparison with the similar results for panel of transition countries it is obvious that the relative variability is significantly lower. This indicates the greater homogeneity of the whole panel of 17 countries without any outstanding individuals (like Poland or Estonia in the panel of transition countries).

Table 4: Individual Fixed Effects for Selected developed Economies

	Country	const
1	Austria	-0.0703
2	Belgium	-0.0882
3	Denmark	-0.0779
4	Finland	-0.0859
5	France	-0.0784
6	Germany	-0.0874
7	Greece	-0.0888
8	Ireland	-0.1078
9	Italy	-0.1030
10	Netherlands	-0.0881
11	Norway	0.0096
12	Portugal	-0.1821
13	Spain	-0.1019
14	Sweden	-0.0426
15	Switzerland	0.0497
16	United Kingdom	-0.1085
17	United States	-0.0866
18	Euro area (18 mem.)	-0.0981

Thus it could be supposed that OLS and random effect estimates are more consistent with fixed effect approach. In spite of these facts, none approach to estimation find enough evidence for statistical significance of all theoretically derived factors – labour, capital and trade openness.

4. Discussion and Conclusions

The paper aimed to demonstrate and estimate the role of the foreign trade in economic growth of economies during their economic transition. The panel of a few transition countries was highly limited by data availability in order to the estimates may not be representative enough to correctly and unambiguously indicate the theoretically supposed impact of labour and capital inputs above all. On the other hand the different approaches resulted in statistical demonstrating of trade openness impacts even at the 1% significance level.

The panel for the other developed countries is quite better defined due to 18 individuals and it is also almost balanced. The application of various approaches to estimation resulted in quite different outcome. Fixed effects approach demonstrated the impact of labour and capital, while the OLS and random effects calculation resulted in statistically unconfirmed impact of labour and capital. On the other hand the role of trade openness and the impact of economic level to this role of openness were statistically confirmed.

Summarising the partial results, the estimates did not unambiguously identify the role of foreign trade for economic growth in analyses time period 1990–2013 that consist of a few complete business cycles and deep crisis. May be the period is a bit short for such a type of analysis. The evaluation of the second aim is also very complicated. There are some difference in the role of foreign trade between group of transition economies and group of other developed economies, but again there is not enough evidence to declare the clear difference.

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An Empirical Sector-Specific Gravity Model for Hungarian International Trade

Jana Šimáková¹ and Daniel Stavárek²

¹*Department of Finance and Accounting, School of Business Administration in Karviná, Silesian University in Opava, Univerzitní náměstí 1934/3, 733 40 Karviná, Czech Republic, e-mail: simakova@opf.slu.cz*

²*Department of Finance and Accounting, School of Business Administration in Karviná, Silesian University in Opava, Univerzitní náměstí 1934/3, 733 40 Karviná, Czech Republic, e-mail: stavarek@opf.slu.cz*

Abstract

This paper contributes to the economic literature on the impact of exchange rate volatility on Hungary's foreign trade. Basic gravity model shows that trade volume between a pair of countries is an increasing function of their sizes (GDP) and a decreasing function of the distance between them. Additional factors included in extended model are population, dummy for common border and proxy for exchange rate volatility. The measure of exchange rate volatility is estimated by GARCH model. This paper explores relationship between trade and exchange rate uncertainty using quarterly data over the period 1999:1 – 2014:3. In order to obtain the objective result, we use the panel data regression for 10 sectors of Hungarian international trade based on SITC classification and six major trading partners (Austria, Germany, France, United Kingdom, Italy and Poland). The significant parameters obtained from panel regression demonstrate that bilateral exchange rate volatility leads to a decrease in Hungary's foreign trade.

Keywords: exchange rate volatility, international trade, gravity model

1. Introduction

In the current world economic development, the effects of exchange rate uncertainty on macroeconomic variables, including international trade can hardly be ignored. Either theoretically or empirically, there exists almost no consensus on the effects of exchange rate uncertainty related to its impact on international trade.

While early theoretical studies using partial equilibrium analysis under risk aversion suggested a negative link between trade and exchange rate uncertainty (e.g. Ethier, 1973; Clark, 1973), more recent studies find that the link can be also positive or ambiguous depending on a variety of factors (e.g. Auboin and Ruta, 2013). Some later studies justified mixed results by including market conditions associated with derivative assets and the alternative of foreign direct investment into the models (e.g. Franke, 1991; Viaene and de Vries, 1992; Sercu and Vanhulle, 1992) and some recent studies evidenced this conclusion by taking into the account

the structure of the foreign trade in given country (e.g. Bahmani-Oskooee and Hajilee, 2013; Bahmani-Oskooee et al., 2013).

The trade policy changes in the first half of the 20th century triggered widening in the number of theoretical models concerning the international trade. One of the most important and empirically most successful models is the gravity model of trade, which is at the center of our analysis. Since the seminal work of Tinbergen (1962), basic gravity model has been widely used to explain the volume of trade between two countries or regions. By linking trade flows directly with economic size of countries and inversely with trade costs, usually proxied by geographical distance between them as an indicator of transport costs, the gravity model points some insights in the pattern of international trade and production. Leamer and Levinsohn (1995) have argued that the gravity model has produced some of the clearest and most robust findings in empirical economics.

The aim of this paper is to estimate the effect of Hungarian forint volatility on international trade. For this purpose we follow the recent trend in decomposition of foreign trade to specific sectors on one hand and use the extended gravity equation as a representation of an empirically stable relationship between the size of economies, distance between them and realized trade volume on the other hand. This paper explores relationship between trade and exchange rate uncertainty over the period 1999–2014. In order to obtain the objective result, we use the panel data regression for 10 sectors of Hungarian foreign trade based on SITC classification.

Hungary's strategic position in Europe and its relative lack of natural resources makes this economy dependent on foreign trade. Hungary is a very open country with openness almost 160% in 2014. This contribution thus provides further evidence of the impact of exchange rate uncertainty on trade flows within the post-communist country after its total economic transformation. Market reforms liberalized prices and trade. Another aspect of this transformation was change of the exchange rate regime from fixation of the forint against a basket of currencies to the currency floating. In addition, Hungary is an interesting subject to study, as foreign trade serves the important channel of its economic integration within the European Union.

2. Review of Relevant Literature

As the name of the model suggests, the gravity model of trade derives from the law of universal gravitation formulated in 1687 by Isaac Newton, in which the size of the gravitational interaction is proportional to the multiplication of the weight of the two interacting objects and is inversely proportional to the square of their distance (Postenyi, 2014). The idea for using the gravity models to analyze international trade date back to Tinbergen (1962), Pöyhönen (1963) and Linnemann (1966). Following their works the basic gravity model tries to explain the volume of trade between two countries or regions by their economic size and distance.

The gravity model is a key tool for researchers interested in the effects of trade-related policies. It provides a convenient testing base on which to assess the trade impacts of different additional variables included in the model. Although the gravity model is seems to be an appropriate platform for applied international trade researchers, its use does not come without some potential pitfalls.

Following the initial works based more on the intuition, the theoretical foundations of gravity equations explaining international trade flows have been widely discussed and developed. These foundations mainly base on theories of international trade. Subsequent studies have shown that, far from being a purely econometric tool without a theoretical basis, gravity models can arise out of a range of trade theories. In particular, Bergstrand (1989) confirmed that a gravity model is in accordance of model of trade based on monopolistic competition. In this model, identical countries trade differentiated goods because consumers have a preference for variety. Models with monopolistic competition overcome the undesirable feature of Armington models whereby goods are differentiated by location of production by assumption. Firm location is endogenously

determined and countries are specialized in the production of different sets of goods. Deardorff (1998) contributes that the gravity model can arise from a traditional factor-proportions explanation of trade. Eaton and Kortum (2002) derive a gravity-type equation from a Ricardian type of model, and Helpman et al. (2008) and Chaney (2008) obtained it from a theoretical model of international trade in differentiated goods with firm heterogeneity.

The impact of exchange rate volatility on Hungarian foreign trade was investigated mostly by other techniques than the gravity model. Ozturk and Kalyoncu (2009) investigated empirically the impact of exchange rate volatility on the trade flows of six countries over the quarterly period of 1980–2005. The impact of a volatility term on trade is examined by using an Engle-Granger residual-based cointegrating technique. The major results show that increases in the volatility of the real exchange rate, approximating exchange-rate uncertainty, exert a significant negative effect on trade for South Korea, Pakistan, Poland and South Africa but positive effect for Turkey and Hungary in the long run.

This conclusion is in opposite to findings of previous studies which confirmed indirect relationship between exchange rate volatility and international trade (e.g. Gotur, 1985; Bailey et al. 1987; Chou, 2000). In addition, Tomanová (2013) analyzed impact of exchange rate volatility on the export performance of Central and Eastern European countries. Volatility's impact on export performance is estimated on bilateral export flows of Czech Republic, Slovakia, Hungary and Poland to euro area by using monthly time series data, over the period 1999:01 to 2013:3. For the volatility measurement, G/ARCH models were used. Autoregressive distributed lag and error-correction approach were used to examine the impact of exchange rate volatility on the exports. The results suggest no significant relationship among the exchange rate volatility and export performance in CEE, impact of exchange rate volatility turns out to be ambiguous.

The gravity model approach to this issue in Hungary was realized in Šimáková (2014). This paper employed extended trade gravity model approach which included variables of GDP, population, distance, dummies for common border; membership in EU and proxy for exchange rate volatility. The volatility was estimated by standard deviation. The model was performed on quarterly data of total foreign trade over the period 1997:1 – 2012:2 and included 11 trading partners. The results suggest that nominal exchange rate volatility of Hungarian forint has a significant negative effect on bilateral trade over the sample period (2%).

The empirical literature examining the effect of exchange rate volatility on sectoral trade in Hungary is even rarer. One study was made by Fogarasi (2011). His paper considered question of the effect of exchange rate volatility on international trade flows of transition economies in Central Europe by studying the case of Hungarian agricultural exports to their export destination countries between 1999 and 2008. Based on a gravity model that controls for other factors likely to determine bilateral trade, the results show that nominal exchange rate volatility has had a significant positive effect on agricultural trade over this period.

3. Methodology and Data

The considerations about theoretical foundations of the gravity model for analyzing international trade flows do not generate a proper and unique specification of the gravity equation used in empirical work. In the basic form of the gravity model, it is assumed that the amount of trade between two countries increases with their size measured by their national incomes and decreases with the cost of transport between them, measured by the distance between their economic centers (Tinbergen, 1962).

Linnemann (1966) included population as an additional variable for the size of the country and its economy in the gravity model. This model is sometimes called the augmented gravity model and can be formulated in equation (1):

$$X_{df} = \delta \frac{Y_d^{\beta_1} Y_f^{\beta_2} POP_d^{\beta_3} POP_f^{\beta_4}}{D_{df}^{\theta}} \quad (1)$$

where δ , $\beta_{1(2, 3, 4)}$ and θ are the parameters of the modified equation, X_{df} is the bilateral trade between domestic country d and its foreign partner f , $Y_{d(f)}$ is income of respective country and $POP_{d(f)}$ is its population. D_{df} is the distance between two analyzed countries.

There is supposed the direct relationship between foreign trade and income as the exporter country indicates high level of production which increases the amount of exportable goods. Furthermore, high income in the importer country indicates higher level of import because higher income causes higher demand; therefore, the coefficient is expected to have a positive sign. The coefficient of population is supposed to be positive as well but some estimation can reveal theoretically justified indirect relationship with foreign trade. This is due the fact that big country can either export more than small countries due to economies of scale but either less when the absorption effect prevails and the country consumes what it produced resulting in fewer products to be exported (Martinez-Zarzoso, 2003).

The expected sign of the distance coefficient is negative as distance is a relatively good approximation of trade costs, the time elapsed during shipment, and various transaction and communication costs which are not easy to measure directly (Head, 2003). According to Arvas (2008), the distance can be a considered not only as a proxy for transport costs and an indicator of the time elapsed during shipment; it can be even correlated with the cost of searching for trading opportunities and considered as a proxy for culture differences connected to different consumer patterns.

The gravity equation is frequently extended to incorporate other factors that stimulate or reduce bilateral trade flows. Additional variables may be necessary depending on the purpose of the analysis. For the purpose of this paper, we incorporate exchange rate volatility and the existence of a common border into the model. Exchange rate is widely used as an explanatory variable, especially in panel analyses with long time periods.

There is no doubt about the theoretical explanation of relationship between exchange rate and trade turnover (see Clark, 1973; Hooper and Kolhagen, 1978), but as is evident from the review of the empirical research conducted in support of theoretical models', considerations provides ambiguous evidence on this issue. One can illustrate this lack of consensus by the conclusions formulated in Taglioni (2002) or Ozturk (2006), which hold that if the presumed adverse effect of exchange rate volatility on trade flows exists, it is certainly not large. This finding is shared by Rajan (2004), but he discovered that the exchange rate volatility is more likely to reduce international trade if the research focuses on bilateral trade instead of aggregate trade.

Regarding methodology, we follow Tichý (2007) and Baldwin et al. (2005) and employ the following extended gravity equation (2):

$$\ln X_{p,df} = \alpha + \beta_1 \ln Y_d + \beta_2 \ln Y_f + \beta_3 \ln POP_d + \beta_4 \ln POP_f + \beta_5 \ln D_{df} + \beta_6 \ln V(ER)_f + \beta_6 \ln CB_{df} + u_{ij} \quad (2)$$

where dummy variable CB_{df} represents a common border (it equals 1 if the trading partner shares a common border with a domestic country and 0 if not), $V(ER)_f$ is the exchange rate volatility, α and β_k are the unknown parameters of the model, and u_{ij} is the error term. X_p represents the total trade turnover between the pair of countries in an individual product group.

To measure the exchange rate volatility, we used GARCH model in following form (3):

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^m \alpha_i e_{t-i}^2 + \sum_{j=1}^s \beta_j \sigma_{t-j}^2 \quad (3)$$

where σ_t^2 is the conditional variance, parameter $\alpha_0 > 0$ and the constraints $\alpha_i \geq 0, \beta_j \geq 0$ are needed to ensure σ_t^2 is positive (Campbell et al., 1997). The variance of the disturbance term for each period is modelled as a function of the errors in the previous periods.

As Arvas (2008) states, standard gravity models usually employ cross-sectional data to estimate trade patterns in a given year, or averaged data. We employ a panel data regression to avoid the risk of choosing an unrepresentative year and to monitor unobservable individual effects between trading partners. This can provide additional insight into trading relationships. In addition, the use of panel data is particularly suggested for estimating the relationship between international trade and exchange rate volatility.

All time series used for estimation are on a quarterly frequency and cover the period from 1999:1 to 2014:3. The data of GDP, bilateral exchange rates, population, import and export flows were obtained from Eurostat. The data on the distance between Hungary and its trading partners were taken from the GeoDist database. The bilateral distances are measured using city-level data. The capital city is considered to be the economic center in all trading countries included in the estimations. GDP of each respective country is set in index form to make it unit free (Bahmani-Oskooee, 1991).

The product groups used in estimations are determined on the basis of SITC classification:

- T0: Food and live animals;
- T1: Beverages and tobacco;
- T2: Crude materials, inedible, except fuels;
- T3: Mineral fuels, lubricants and related materials;
- T4: Animal and vegetable oils, fats and waxes;
- T5: Chemicals and related products;
- T6: Manufactured goods;
- T7: Machinery and transport equipment;
- T8: Miscellaneous manufactured articles; and
- T9: Commodities and transactions not classified elsewhere in the SITC.

Table 1 shows the average share of individual product categories on Hungary's total international trade during the period 1999–2014. Table 1 also includes percentage changes of the product groups' shares from 1999 to 2014. The highest share of total trade turnover falls into product categories T7 and T6. Their shares in sum represents more than 50%. In addition, in the share of product category T7 can be observable increasing in time.

Table 1: Commodity structure of Hungary's international trade (in %, 1999–2014)

	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9
Share	9.67	0.56	4.97	10.05	0.86	9.66	21.13	34.37	7.80	0.92
Change	23.39	128.54	-52.86	-30.33	103.73	-27.88	-28.77	24.63	113.75	-30.31

4. Results

The geographical pattern of foreign trade shows Hungary considerably oriented towards European Union. In the empirical estimation, we work with the six largest trading partners of Hungary: Austria (AT), Germany (DE), France (FR), United Kingdom (GB), Italy (IT) and Poland (PL).

In empirical testing was performed logarithmic transformation to reduce skewedness and heteroscedasticity and to stabilize variability. In this study is applied the least squares method for panel data in the extended gravity model estimation. The dependent variable in the model is the total trade turnover between Hungary and its selected trading partners within individual product groups. We have included 6 cross-sections (trading partners) and 63 periods (quarterly data between 1999:1 and 2014:3). The results of the estimation are summarized in Table 2.

Considering Hungary's total trade with major partners, we can observe highly significant parameters which are in accordance with economic theory. Despite, results are more ambiguous when we disaggregate data into particular sectors. Significant parameters of domestic and foreign income (except T5 product group) revealed positive effect on foreign trade. Notably, the estimated influence of the domestic effect seems to be generally larger than the effect of foreign income. The effect of population on particular trade turnovers are mixed and cannot be generalized. The theoretical foundation for positive as well as negative coefficients can be found in study of Martinez-Zarzoso (2003). Despite the significant direction of relationship between

distance between economic centers and common border are in accordance with economic theory, estimated parameters are small, almost without no effect on Hungary's trade turnover. Regarding the effect of exchange rate volatility, our results are similar to results of Šimáková (2014) as the significant parameters demonstrate that bilateral exchange rate volatility leads to a decrease in trade of product groups TT, T2, T3, T5 and T6.

Table 2: Estimated coefficients of gravity model

	TT	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9
Y_d	0.11 ***	0.16 ***	1.13 ***	-0.06	0.11	0.23	-0.13 ***	0.11 ***	0.16 ***	0.01	-0.47
Y_f	0.25 ***	0.30 ***	0.16	0.58 **	0.51	0.62	0.24 **	0.14 ***	0.41 ***	0.30 ***	-0.04
POP_d	1.24 **	3.02 **	-0.95	1.33	-0.56	1.29	-0.23 *	0.40 ***	-0.48	-1.18	-1.7
POP_f	-1.85	0.62	-0.41 *	0.59	-1.13	0.33	-0.51	-2.71	1.13	-1.04 **	-0.86
$V(ER)_f$	-0.19 **	0.00	-0.01	-0.01 **	-0.00 **	-0.00	-0.01 ***	-0.00 ***	-0.00	-0.00	-0.00
D_{df}	-0.00 *	-0.00	0.00	-0.00 **	0.00	-0.01	0.00	0.00	-0.00	-0.00	-0.16
CB_{df}	-0.00	0.00	0.00	-0.00	0.01	0.00	0.00 **	0.00	0.00	0.00	0.02

Note: ***, **, * denote significance level at the 1%, 5% and 10% level, respectively.

5. Conclusion

This paper contributes to the economic literature on the impact of exchange rate volatility on Hungary's foreign trade. For this purpose we followed the recent trend in decomposition of foreign trade to specific sectors on one hand and used the extended gravity equation as a representation of an empirically stable relationship between the size of economies, distance between them and realized trade volume, on the other hand. The volatility of bilateral exchange rates was incorporated into model as estimation of GARCH model.

Generally is assumed, that higher exchange rate volatility leads to higher transaction costs for traders and is followed by decrease of foreign trade. The significant parameters of estimation is in accordance to this statement and demonstrate that bilateral exchange rate volatility leads to a decrease in trade of crude materials, mineral fuels, lubricants, animal and vegetable oils, chemicals and manufactured goods. These sectors represents almost half of the total Hungary's foreign trade.

Usually, international trade tends to be a driver of the economy in countries neighboring with economies with open trade regimes, with high presence of multinational companies and large volume of re-exports. Foreign trade is an integral part of the total development growth and national growth of an economy of Hungary as well. In summary, the results based on disaggregated data clearly demonstrate that the increasing of exchange rate volatility reduces Hungary's foreign trade turnover. Therefore, economic instruments and active policy aimed at reducing exchange rate volatility would stimulate improvement of Hungary's trade.

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Application of the value averaging investment method on the US stock market

Martin Širůček¹, Ivana Škatulárová²

¹*Department of Finance, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: sirucek@gmail.com*

²*Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: skatularoa@seznam.cz*

Abstract

The paper is focused on empirical testing and use of the value averaging investment method on real data of the US stock market in years 1990–2013. The analysis is focused on results obtained by using this investment method from the viewpoint of return and risk on selected investment horizons (short-term 1 year, medium-term 5 years and long-term 10 years). According to the results reached, specific investment recommendations are presented in the conclusion e.g. if this investment method is suitable for a long investment period, if it is better to use value averaging for the growing, sinking or sluggish market, etc.

Keywords: value averaging, investment, yield, risk and profit profile

1. Introduction

Investment into stock markets is suitable for investors who have enough available finance and who require higher yields as well as for those who are ready to suffer a higher level of risk. These markets are characterized by higher volatility (standard deviation) over a short time, but by growth trend for a long investment horizon. Exactly the higher volatility (variation) is the greatest disadvantage for investment on the stock market. Thus, investors search for possibilities how to eliminate the risk of loss. A good way for how to reduce the risk is diversification via stock indices, where many companies cover one investment into one index and the risk is spread in a wide range of stocks. However, this investment style (passive investment strategy) cannot guarantee that the investor does not make a loss, because the index can possibly react very sensitively and e.g. sink in response to economy development and expectations.

This is why investors look for investment methods offering some profit and a possibility to make a gain also through intensive falls or market reductions. The value

averaging investment method works on a simple principle, that the portfolio value grows according to a given value (e.g. 1 000 USD per month). This investment method offers to buy shares when market prices are sinking and to sell them when the prices are growing. Thus, it is possible that this method is profitable also through negative movements and falls.

2. Literature survey

The value averaging investment method combines some characteristics of dollar cost averaging and portfolio rebalancing. This investment strategy was founded by Prof. Michael E. Edleson in 1988. According to Marshall (2000), the main note of this method is a precisely set mathematic process, which consists in the regular investment of a given amount of money for a defined period of time. This is how investors can manage their portfolios so that their value grows by the same amount in regular periods. Thanks to this, value averaging can be considered a type of regular investment although investors do not invest the same sum for e.g. every month as by the dollar cost averaging method.

Varga (2011) mentioned that specific for this investment method is that the portfolio grows every month (if not set otherwise) by a constant amount of money no matter what market developments and fluctuations are. In result, investors buy more shares at the time of downtrend, and the frequency of buying is lower at the time of growth. The mathematic formula is set so, that owned shares are sold at the time of high price. Edleson (2007) states, that in comparison with Dollar cost averaging, investors can not only buy new shares, but they can sell them too, and it is not necessary to invest a fixed and constant amount of money during the whole investment period.

The function of value averaging is described in the following example of investing on the growing stock market. Investor sets an investment target to be 2000 USD in the next five months by initial investment of 400 USD ($2000 : 5$). The market price in the first period (month) is 5 USD per share and the investor buys 400 shares. At a market price of 8 USD in the next period, the target value of the portfolio will be 800 USD. According to the investment target, the investor buys 20 shares, each for 8 USD. Thus, the regular investment in the second period (month) is 160 USD. Since in the third period, the price grew to 10 USD per share and because the target value of the portfolio in that month was 1 200 USD, the investor had to buy 20 shares. In the following month, the price is also 10 USD and according to the target value of 1 600 USD, the investor buys 40 shares. After four investment periods, the investor owns 160 shares. In the last period, the price grew to 16 USD and the portfolio value in this period had to be equal to the target value of 2 000 USD. Thanks to the price increase, the investor can sell a part of the shares (35 pcs) and will own altogether 125 pcs ($125 \cdot 16 = 2000$) at the end of the whole period.

According to this strategy, the investor has to think about the amount that needs to be saved. Before starting to save, the investor determines an investment goal (nominal value) which he wants to accumulate. This value consists of an initial investment and an amount of regular investment. Nevertheless, it is not a “core” regular payment in the sense of how much is invested in each selected period. It is meant as a value, which regularly increases a portfolio (Marshall, 2006).

The level of regular payments is not the same because the regular investment is developing according to the situation on the market in accordance with the value averaging strategy (Varga, 2011). If the market is in recession and prices are low,

investors buy more units depending on the selected amount by which the portfolio is regularly increased. By contrast, there are less purchases of shares at bulls markets (Marshall, 2000).

Table 1: The principle of value averaging investment method

Period	Market price (USD)	Required value (USD)	Owned unions (pcs)	Bought unions (pcs)	Regular investment (USD)
1	5	400	80	80	400
2	8	800	100	20	160
3	10	1,200	120	20	200
4	10	1,600	160	40	400
5	16	2,000	125	-35	-560

This method is suitable for being applied on more volatile markets with bigger spreads in prices, since there is a possibility to reach higher profits (Edleson, 2007). The rate of profit is highest when a big amount of shares is bought at a low price and these shares are sold when prices are high. That is why it is recommended to invest on the stock markets, which are characterized by higher volatility (Hallam, 2013).

Compared to dollar cost averaging, the most important difference is a possibility to sell shares. It is also the most typical and most interesting fact of this strategy. However, it is not possible to eliminate the risk of bad timing; this method provides much more recognizable signals about the phase in which the market is (Edleson, 2007). If the market reaches its top, the value averaging mechanism will induce the investor to sell the shares. In case of an opposite situation, when the market goes down and the shares are cheap, the money obtained from the previous sale is used for purchasing more shares. If the investor follows the mechanism, he will avoid inappropriate withdrawals or deposits at times when markets are reaching extreme values (Markese, 2009). Haiwei, Estes (2009) say that the investor who specifies his or her investing goal which he or she wants to achieve after the termination of saving and follows the rules according to the value averaging method, will reach the goal with very high probability.

The fact that the following fixed mechanism minimizes the risk of bad timing is one of the greatest advantages, which the value averaging strategy offers. Other advantages include its flexibility, since predefined parameters can be modified anytime during the investment process (Edleson, 2007). Regular payments can be of different amounts; therefore, it is not possible to set a standing order. In addition, the risk of loss is increasing because there is no limit for regular payments (Bajkowski, Markese, 2001). A disadvantage of the value averaging method is that it imposes higher requirements on the mathematic knowledge of investors. Another disadvantage is time consumption, as the market development has to be watched in every period. This is not needed by the dollar cost averaging method because there is the same payment in every investing period (Marshall, 2000).

3. Methodology and Data

The aim of this paper is to suggest recommendations to investors who use the value averaging method for making regular investments on the US stock market. Empirical analysis and the comparison of quantified profit rate and risk level of regular investments using the value averaging method with different lengths of investment horizon according to predefined methodological criteria will be used as a basis for suggested recommendations.

The empirical research of the value averaging method makes use of real data from the US stock market, represented by Index S&P 500. The data, which were taken from the Bloomberg terminal, consist of historical monthly closing prices in the form of total return in 1990–2013. In the monitored period, significant speculative bubbles, falls in stock prices and subsequently their growth on selected markets can be observed.

Parameters in table 2 are chosen for the application of the value averaging method.

Table 2: Input variables used in the empirical part

Investment horizon (years)	1	5	10
Nominal investment goal (USD)	12 000	60 000	120 000
Initial investment (USD)	1 000	1 000	1 000
Compounding value of each month (USD)	1 000	1 000	1 000

Evaluating criteria for the choice of stock market and investment horizon are revenue-risk profile and probability of loss after termination of the investment. The revenue-risk profile is a ratio of average annual profit rate measured for each investment by internal rate of return and average annual risk expressed by selective standard deviation (Vlachý, 2006). The probability of loss after termination of the investment is expressed as a percentage ratio of unprofitable investments and total number of observations. The investor with assumed risk aversion will be recommended a market and an investment horizon based on performed calculations, where the application of the value averaging strategy allows investing on average at the highest level of revenue-risk profile and at the lowest percentage of investment termination a loss.

4. Results

As mentioned in the methodology, the analysis of regular investment on the American market was applied by using the value averaging method at 1-, 5- and 10-year investing horizons. In each period, the achieved revenue from the regular investment was considered, respectively its final value in relation to invested amounts and its appreciation. Attention is also given to the level of risk and the ratio of revenue and risk.

Investment held for one year achieved the following results. In Graph 1, which compares the final portfolio value after one year of the investment and the value of physically embedded money, we can see how the value averaging method worked in 1990–2013 and if the embedded money was appreciated. The investment goal was to save the amount of 12 000 USD. It was fulfilled in 63% of cases from 276 simulations. The minimum value was reached in November 2008 when the investor saved only 10,003 USD because of the fall in stock prices towards the end of the investment period, which caused the low value of the portfolio in the last month and its sale for a low price.

The investment was terminated a year later in April 2009 when it reached the maximum value of 13 918 USD because prices were low at the beginning of the investment period and gradually increasing during the year.

If the investment goal was fulfilled or not, or if the investment was terminated with profit or loss we cannot get to know by only looking at the final value of the investment. When we use the value averaging strategy, the more informative value represents a comparison of the portfolio value at the time of termination of the investment and the sum of money paid in during the investing period, respectively the sum of cost for this investment. The already mentioned investment terminated in April 2009 attained 13 918 USD but the cost was 16 575 USD, which is a maximum from the values of embedded money in this monitored period. This phenomenon was caused by a rapid fall of stock prices from April 2007 to April 2008. Whereas the stock shares were bought at the value of 2163 USD in the first month, the index value in the twelfth month was only 1133 USD. The rapid fall caused the portfolio value increase in the first six months since it had contained shares bought for a high price, which rapidly decreased in the second six months.

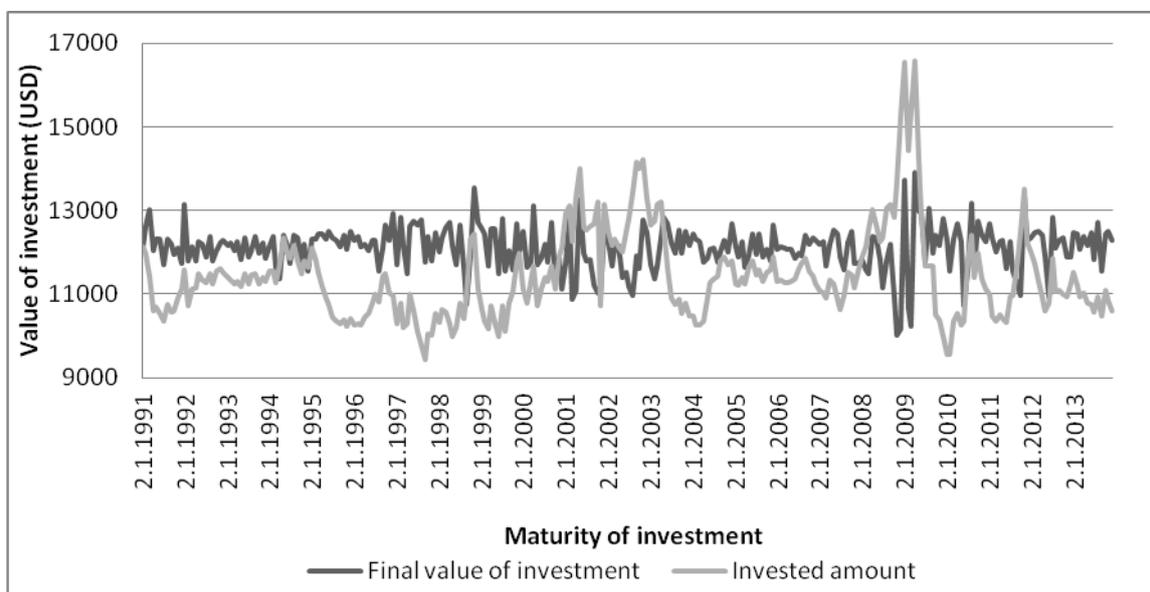


Figure 1: Final value of investment vs. invested capital, one-year investment horizon

An important evaluating factor is the profit rate of the investment. Graph 2 shows the profit rate and the absolute level of profit or loss of a one-year investment with the established term of termination. After the slumps in 2001 and 2009 when the investment had a zero revenue, there was always a growth period. It is caused by principles of the value averaging method, which works on the basis of purchasing at low price and selling at high price which ensures profit.

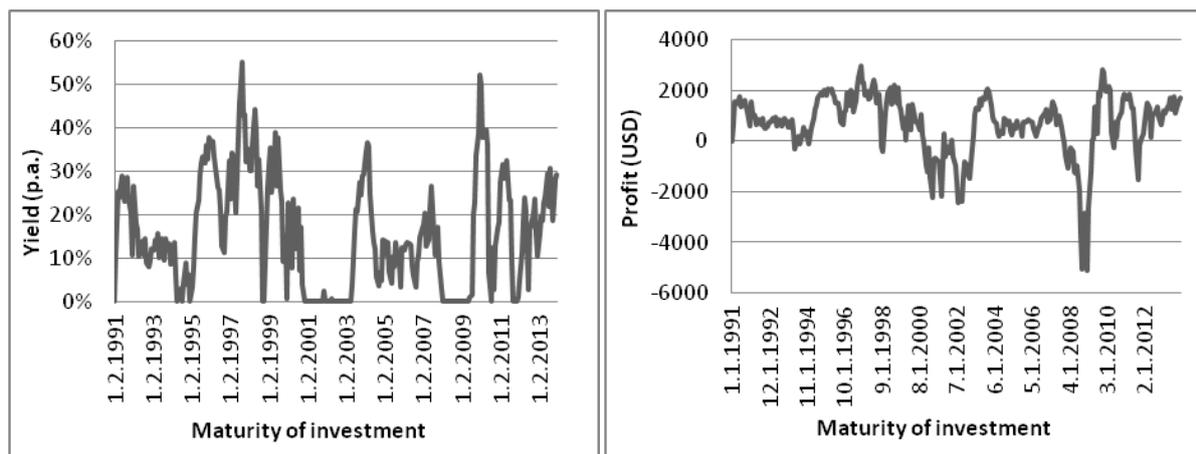


Figure 2: Rate of return and absolute profit/loss, one-year investment horizon

In 1990–2013, the average annual profit rate of a one-year investment was 15.62%; the deviation in revenues achieved the value of 12.96 p. p. due to deep falls, which affected the monitored period. The revenue-risk profile, i.e. the ratio of revenue and risk, was 1.21. The risk was compensated by the adequate level of revenue. However, it is necessary to remind that 20% of investments were terminated with a loss; thus, a big risk existed that the investment would be terminated at inappropriate time. To conclude we can state that one-year investment horizon is not suitable for using the value averaging investment strategy.

In the five-year investment horizon, the target value of the investment was set as 60,000 USD. Graph 3 shows the development of the portfolio target value and expenses during the investment. Contrary to the one-year investments, we can see that the processing of the investment is more stable and it is less fluctuating. It can be explained by the fact that the one-year investment horizon does not offer too much space for the sales of stock shares; moreover, it is not possible to identify major falls and increases during such a short period.

In the five-year investment horizon, the value averaging method brings profit due to purchasing at the time of falls and selling at time of growing prices. Money deposit curve is basically the inversion value of a local stock market development. It is obvious that the value averaging method has not been able to overcome the falls throughout dotcom crisis and mortgage crisis. The most expensive investment was the one initiated in April 2004. Total costs, i.e. the sum of regular investments, were 87,314 USD after five-years of investing. The final value of this investment was 69,593 USD, so as a result, the investor has lost more than a quarter of the embedded money. In 2004–2009, the American stock market grew so that the money accumulated in the form of regular investments was rather high in this period. Nevertheless in the last few months of the investment period, the stock prices fell deeply and with them also the portfolio value. Before January 2010, no five-year investment was terminated in the black. Equally, the value averaging method was unable to overcome deep falls of stocks within the dotcom bubble, which affected the investments terminated in 2001–2004. The method reaches its worst results in a situation of price growth followed by a sharp fall, because the portfolio value is sold at actual market price in the last month. If the investment is terminated at a time when the dotcom bubble bursts and the price is much lower as compared with the previous ones, the money accumulated in the investment period is depreciated and the investment can be terminated with a loss (like it was in the critical years from 2001 to 2004 and from 2008 to 2010).

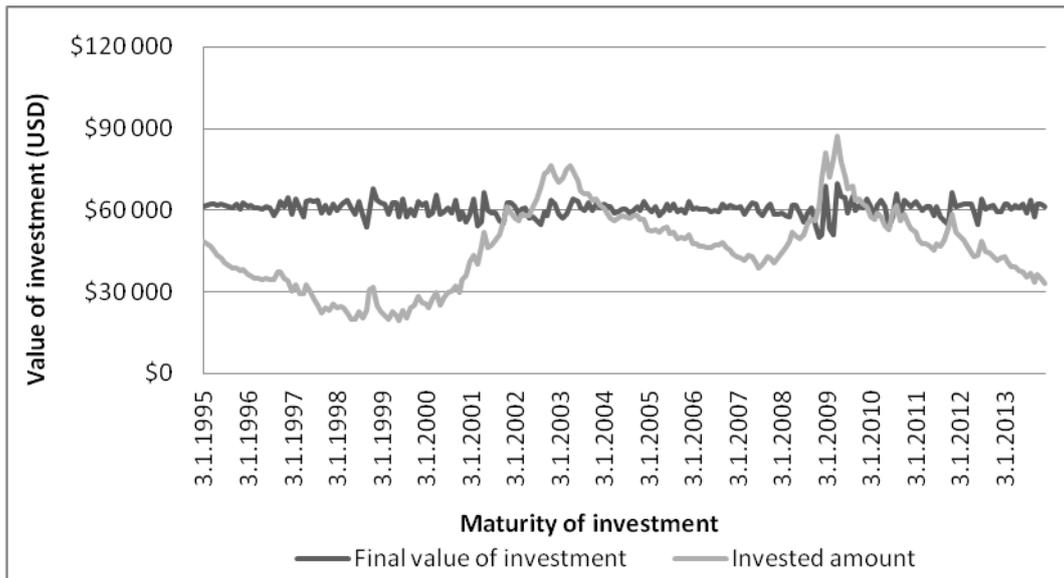


Figure 3: Final value of investment vs. invested capital, five-year investment horizon

Although the investments with the five-year investment horizon did not reach a revenue in the critical years 2001–2004 and 2008–2010, compared to the one-year investments, there was 84% of the investments terminated in the black for the whole period. Fig. 4 illustrates the profit rate and the absolute profit or loss.

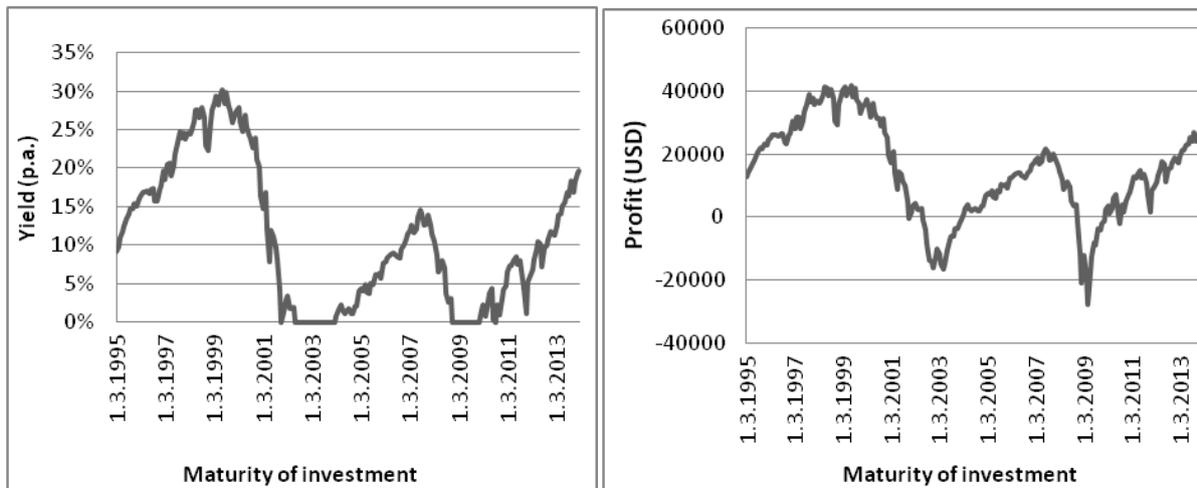


Figure 4: Rate of return and absolute profit/loss, five-year investment horizon

Even though it was not possible to overcome the falls and terminate the investment in the black while using the value averaging strategy at the times of falls at stock markets, the average annual rate of return was generally 10.95% in the monitored period. While measuring the average rate of return with an average risk of 9.11 p. p., the revenue-risk profile achieved was 1.2. As a conclusion for the five-year investments, we can say that using this method is suitable for markets with stable growth and also for markets with the high dispersion in stock prices if the investment horizon is at least 5 years.

Target level for a ten-year investment horizon was set at 120,000 USD. During the analysis of results gained by the testing value averaging method in the ten-year investment horizon it was found that in 95% of cases the investment attained positive indexing. However, similarly as with the short-term investments, it was not possible to terminate the investment in the black in 2008–2009 by using this strategy. Considering

a big difference in stock prices in the first decade of the analysed period, there was a possibility to achieve high profits, because it was allowed to sell the equity shares already kept in the portfolio. The algorithm dispatched many signals to sell the already kept equity shares in the portfolio, which was implemented thanks to the active administration of the portfolio. While having a look at the investment terminated in July 2000, we can observe that this investment was terminated nearly at zero costs. These costs represent a sum of regular monthly payments. Since many sales of shares were effectuated in this period, especially in its other half, which had been purchased at very low prices at the beginning of the investment period, the investor accumulated some extra profits to the portfolio due to more sells of shares. In this case, there is an obvious difference compared to classic saving where a certain amount is embedded every month in the market and spent for shares of an asset. In this particular investment (from July 1990 to July 2000), there were 40% cases when the investor sold the shares – thus gaining other funds, and only 60% of months when he purchased (saved). Therefore, we can claim that with the increasing length of the investment horizon, there is a higher probability of the equity shares sell-off.

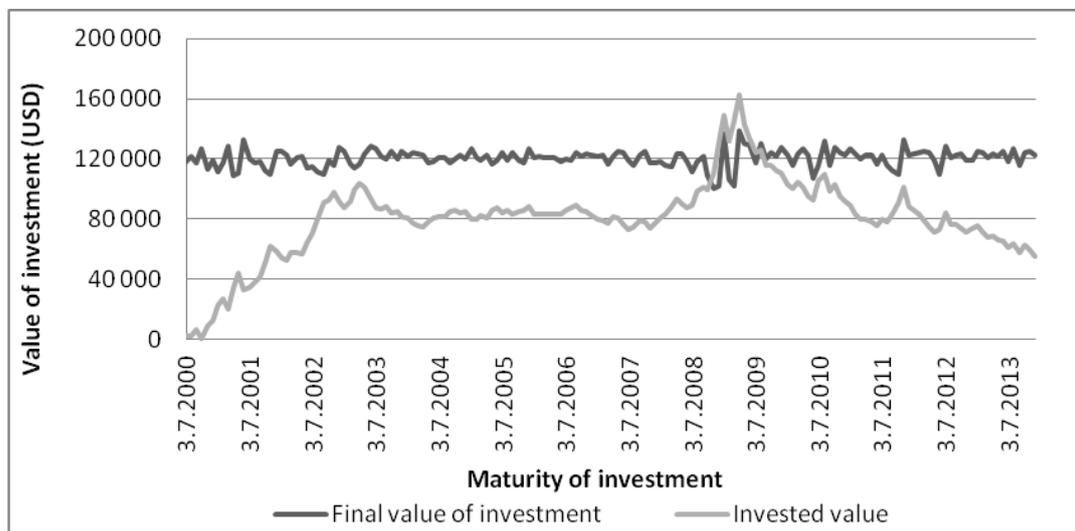


Figure 5: Final value of investment vs. invested capital, ten-year investment horizon

It was possible to achieve the highest rate of return at the level of 20.7% with the investment terminated in August 2000. By contrast, the investments from November 2008 to July 2009 were not profitable. Compared to the previous investment horizons, the ten-year investments were more profitable. Considering the revenue, an at least ten-year investment horizon can be recommended. Fig. 5 illustrates the development of the rate of revenue, respectively the absolute profit or loss.

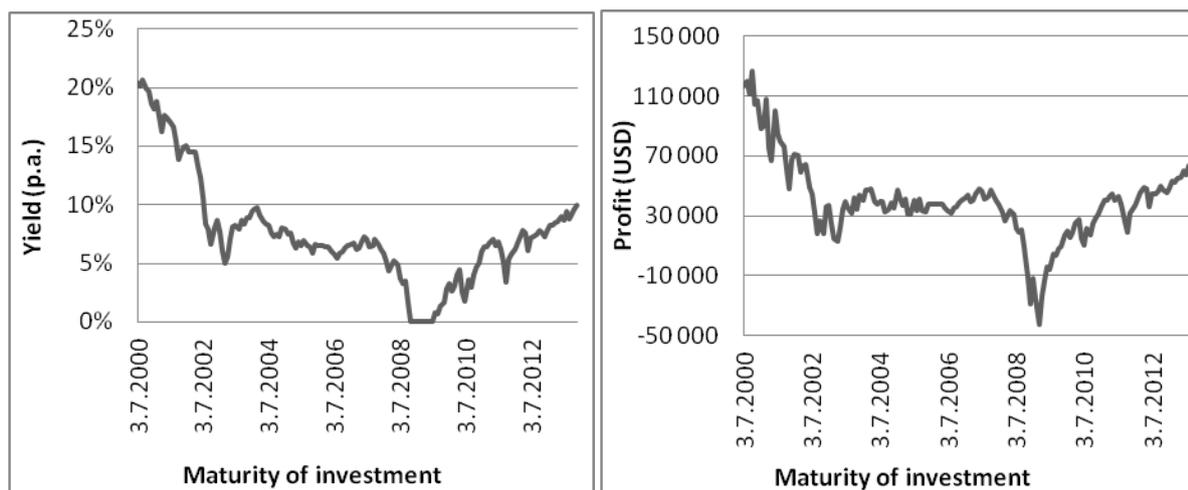


Figure 6: Rate of return and absolute profit/loss, ten-year investment horizon

5. Discussion and Conclusions

Table 3 presents a final evaluation of the value averaging method on the American market for 1-, 5- and 10-year investment horizons in view of an average revenue, risk and revenue-risk profile of the investment. To conclude it can be advised to choose at least a ten-year investment horizon. The revenue-risk profile of the ten-year investment reached 1.67, i.e. the average revenue from the investment was higher than the average risk, which was compensated by the revenue. The level of the revenue-risk profile by five-year and one-year investments represents a compensation of the risk by the revenue; nevertheless, there is a risk of bad-timing of the investment in these cases, because the value averaging method was not able to overcome the falls surrounding the dotcom crisis and the recent mortgage crisis. In the ten-year investment, the final value of the portfolio exceeded the embedded money in 95% of cases, the investment in the five-year investment horizon reached positive indexing in 84% of cases.

Table 3: Investment parameters and results

	Investment horizon		
	1 year	5 years	10 years
Average yield (% p.a.)	15.62	10.95	7.53
Average risk (p. b.) per year	12.96	9.11	4.51
Risk and profit profile	1.21	1.2	1.67

In the table, we can observe a decreasing trend in the values of average annual return and average annual risk. If we consider a very short investment period, in this case the one-year investment period, there is no space for fluctuations in share prices and the trend is mostly only increasing or only decreasing. Thus, it is possible to achieve as high profits as high losses. That is why it can be noticed that there is a significant volatility in revenues for the one-year investment horizon, which has not been compensated by additional profit. On the contrary, it was possible to identify falls and growths within one investment for a long-term investment horizon, which can be profitable for the tested investment strategy. For this reason, the profits were not much significant; nevertheless,

dramatic losses did not occur either. This is why we can see a more stable development of revenue and risk for the long-term investment.

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Opportunities of Establishment of Destination Management and Marketing Organizations in Bulgaria

Venelin Terziev¹ and Ekaterina Arabska²

1Department of Business Management and Logistics, Land Forces Faculty, Vasil Levski National Military University, 76 Bulgaria Blvd., Veliko Tarnovo 5006, Bulgaria, e-mail: terziev@skmat.com

2Department of Agribusiness, University of Agribusiness and Rural development, 78 Dunav Blvd., Plovdiv 2003, Bulgaria, e-mail: katya_arabska@abv.bg

Abstract

The paper examines tourism sector development in the Republic of Bulgaria in the context of the country's strategic priorities till 2020 of knowledge-based economy, sustainable growth and smart specialization, the opportunities for its integration with agri-food sector and potential contribution to balanced rural development. The principles and roles of destination management and marketing organizations are discussed and the opportunities for their application in the national conditions are explored. A framework for of establishment, management and functioning of such organizations is proposed based on integrated and participatory approaches, planning, coordination and communication activities, permanent monitoring and controlling.

Key words: marketing, tourism, rural development, smart specialization

1. Introduction

Challenges before humanity in XXI century connected to climatic changes, insufficiency of resources, pollution of environment, dynamics in international business and uncertainty in economic and political sphere lead to a number of questions regarding sustainable development not only in the sense of “protecting nature for future generations” but also of development of steady in economic, ecological and social relation productions and first of all in internationally oriented knowledge-based economies – a difficult task which in fact includes different elements as: institutional environment for entrepreneurship encouragement, human resources, material and information structure, uniting link in which is the establishment of innovation systems on regional and national levels (Terziev and Arabska, 2014).

Sustainable rural development is one of the key priorities for future development of Bulgaria considering rural areas with their significant natural, human, economic and cultural potential and contribution to sustainable development. In Bulgaria rural areas are 81% of the whole territory (National strategic rural development plan 2007–2013, January 2008) and regional growth is the main target in a number of strategic documents. Sustainable forms of the alternative tourism is one of the key sectors in the processes of diversification of rural economy and it is a leading and a fast growing sector of Bulgarian economy regarding incomes, share in GDP and opportunities of creating employment (Shopova and Arabska, 2013).

In principle, the development of a sector is influenced by the political system of a country, its socio-economic environment and the policy framework and tourism policy has been discussed and defined by many authors as a statement of intent of a set course of action agreed upon by public body or agency such as the government or a private organization (Kamble and Bouchon, 2014).

The analyses of national strategic documents showing state policies and measures for sustainable tourism development conclude that despite the great potential for tourism development in the country the problems prevail and impede sector development outlining the following: predomination of mass seasonable tourism in sea and winter resorts giving the image of the country and the marketing shortcomings in alternative tourism connected to the absence of advertisement and trade marks as well as worsening the quality of tourist services offered, bad infrastructure and overbuilding of mass tourism resorts (Shopova and Arabska, 2013). The same study points out that tourist organizations have no good interactions and coordination and all year load is very low which has a negative impact on the incomes and sustainability of tourist products as well as on the qualified staff assurance. The following recommendations are given: national resources to be reassessed from the point of sustainable development of agriculture, processing industry and tourism as sectors which could not be developed separately of each other, the most important obstacles for sustainable tourism development to be identified, a national policy for sustainable tourism development to be elaborated based on the integrated approach and embracing all the stakeholders in the tourism sector as well as of other connected sectors. On the other hand, it is concluded that there is a need of diversification in national tourist product and improving the quality of tourist services and tourists' rights and safety assurance; effective marketing campaign of Bulgaria and Bulgarian regions as tourist destinations of alternative type; creating a common system for employment in the sector which will provide all year employment and a quality control of qualifications in the sector; creation of marketing cooperatives / associations / networks in the sector (Shopova and Arabska, 2013).

Sustainability of tourism (environmental protection and promotion, natural and other resources preservation, cultural values and integrity of local communities) implies extensive cooperation between tourist business and authorities in order to cover a wide group of challenges and at the same time to remain competitive (Angelkova et al., 2012). The competitiveness abilities of tourist destinations in an explicit way show the level of socio-economic development of tourist destination with a special review to quality of life and preservation of natural heritage for future generations (Angelkova et al., 2012).

In the discussion of competitiveness' issues, it should be noticed that Travel and Tourism Competitiveness Report 2013 points out Travel & Tourism competitiveness enablers and change drivers (Fig. 1) among which prioritization of tourism and human resources development are underlined in the current study.

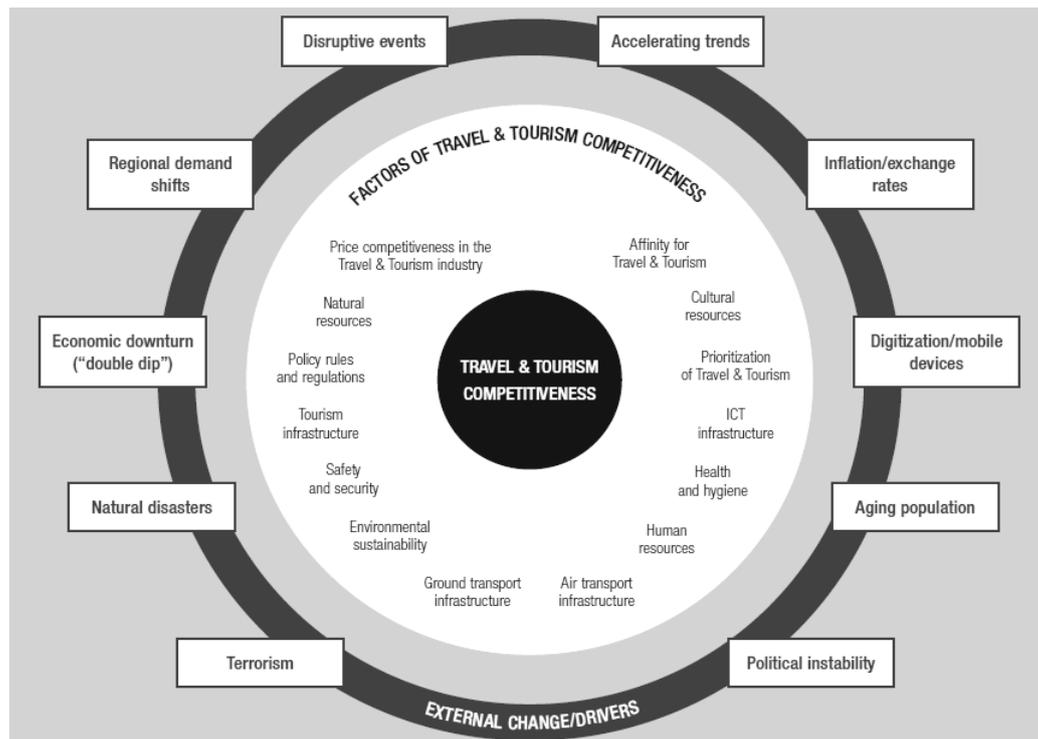


Figure 1: Travel & Tourism competitiveness enablers and change drivers (Source: The Travel & Tourism Competitiveness Report 2013)

A study points out that there is a need for the formation of destination management and marketing organisations (DMMOs) in rural tourism destinations and identify its management and marketing roles (Adeyinka-Ojo et al., 2014) summarized as follows: network management organisations, organiser, advocate, catalyst, tourism product developer, community brand builder, convener and facilitator, funding agent, information provider, partner and team builder.

Destination marketing organizations are defined by the Destination Marketing Association International as organizations “charged with representing a specific destination and helping the long-term development of communities through a travel and tourism strategy” regarding the organizations as valuable for visitors, business travelers or planners especially because of the information provided and saved time and energy and they are viewed as “a one-stop shop for local tourism interests”. The most important point is the networking opportunities and realities bearing great benefits for all involved.

Destination management and marketing organizations are considered from the context of rural tourism and their roles are concluded for performance in collaboration with rural tourism destination stakeholders in achieving mutual benefits in management of resources, marketing of tourism products, positioning, host community well-being, brand building and tourism loyalty to rural destinations (Adeyinka-Ojo et al., 2014). Roles of destination and marketing organizations could be divided in two groups (Table 1) underlying the framework of such organizations and the need of good management.

Table 1: Roles of destination and marketing organizations (Source: Adeyinka-Ojo et al., 2014)

Destination management roles	Destination marketing roles
Human resource development	Destination marketing communication
Finance and budgeting management	Destination positioning and branding
Safety, security and crisis	Management of tourism assets, attractions management and sustainability
Politics (government, non-governmental organizations, community relations and industrial relationships), policy and destination strategy	Service quality, tourist experience and customer's relationship management
Monitoring service quality, standards and destination performance management	Tourism product development and management

On the other hand, the development of the sector is interlinked to development of infrastructure, transport, communications, agri-food sector, etc. Different synergy effects from the interaction of tourism and other local industries are categorized (Holmefjord, 2000): product synergy – local food industries offer tourist products based on existing buildings, competence, etc.; market synergy – marketing effects of tourists visiting and tasting products, and joint advertising of the place. Tourists are considered as a part of a larger public opinion. The synergy effects to regional resources are underlined too.

The diversification of agricultural producers' activities including agritourism is an opportunity for stabilization of incomes and more. There are numerous benefits from the development of agritourism: it may strengthen local economy, create job opportunities and new businesses; develop and promote training and certification programs to introduce young people to agriculture and environment (Privitera, 2010).

The hard competition on global markets for agricultural produce on one hand and the unattractiveness of rural areas for young people on the other impose the need of seeking for new ways, approaches, technology, products, services, etc. to foster rural development. The process is influenced both by the EU, state and other policies and support and by people's motivation too (Arabska, 2013). EU policies till 2020 have an accent on organic production as a way of achieving sustainable development.

Organic farming and processing and alternative tourism are key sectors in the rural development and the integrated approach to sustainable rural development through these two sectors will bring economic and social benefits (Arabska, 2014). Organic production is economically effective, ecologically compatible and socially responsible and it occurs to be "an innovative solution for creating entrepreneurial initiatives in rural regions" (Nikolova, 2012) aiming at increase in competitiveness by applying an ecological technology using a new approach – planning, management and control over the production process.

Organic agritourism is a branch with great potentials for development in future in connection to rural development. The evolution of tourists' demand towards nature and its conservation, as well as social and cultural interactions imposes changes on tourist industry in relation to its competitiveness and sustainability. Organic farms offering additional services are a good example in development of sustainable ('green') local tourist products (Arabska, 2014).

The project of the Innovation strategy for intelligent (smart) specialization in the Republic of Bulgaria 2014–2020 from 09.09.2014, being in accordance to the Strategy of smart, sustainable and inclusive growth Europe 2020, puts in the agenda the solution of the problems of sectoral specialization and sustainable economic development. The

underlined in its vision “managing social challenges in the fields of demography, sustainable development, intellectual capital and health of the nation” turns into expression through two operational goals embracing innovations in priority thematic fields and innovations for effectiveness of resources and information and communication technology (ICT). In that sense, in their essence as main economic sectors, agriculture and food industry will continue being in the focus of a great number of strategic and program documents in the new period 2014–2020 which is based on the traditional national competitive advantages and image (Terziev and Arabska, 2014).

The historical development of agricultural sector and the market pressure to provide produce in sufficient quantities at reasonable and acceptable prices lead to the mass application of unsustainable production methods and as results today many debates are being conducted about ecological and social impacts of agriculture. The trends are that the population on the planet will continue growing in next years, and mostly in urban areas, which means that the food demand will increase too. The establishment of a qualitatively new relation between two opposite parties – urban and rural, is inevitable which will be mutually beneficial, will care of environment and will improve the well-being of both (Terziev and Arabska, 2014).

The above-described considerations about huge opportunities and great challenges to integrated development of tourism and agri-food sector in rural areas in Bulgaria underline the need of search of new ways and approaches involving stakeholders and local communities and providing support in management and marketing activities in destinations through networking for innovation transfer, capacity building and promotion.

2. Methodology and Data

The study reviews the literature discussing roles of destination management and marketing organizations and makes an analysis of the main national strategic documents in the Republic of Bulgaria considering European and national priorities set as establishment of knowledge-based economy and smart specialization for sustainable development. In addition a SWOT-analysis (evaluations of statements in the scale from 1 – the lowest, to 10 – the highest score, which are then averaged) of the opportunities for development of tourism and agri-food sector development in rural regions in the country is made in an experts’ focus group. Conclusions are made about the most important roles in establishment and functioning of DMMOs in the country and a framework is proposed.

3. Results

As the leading strategic and program document in the country the National development program Bulgaria 2020 puts the main priorities among which are the achievement of sustainable and integrated regional development and use of local potential and development of the agrarian sector for provision of food security and production with high added value in conditions of sustainable management of natural resources. The opportunities of rural regions to contribute to the priorities and goals are connected to competitiveness of agriculture, attractiveness, networking and risk management, organic farming, qualification, tourism, marketing in tourism, etc. National strategy for

sustainable tourism development 2014–2030 (putting special accents on semi-mountain and mountain regions) aims at the durable competitiveness of the country as a tourist destination and contribution to sustainable tourism development and underlines once more the unused potential of mountain regions for rural and ecotourism development and the need of combined tourist products, incl. mountain, pilgrim, cultural, spa and rehabilitation, etc. The project of the Concept for tourism zoning in Bulgaria state that the Tourism law of the country determines the zones as marketing tourist regions which management is connected to activities in three directions: creation of regional tourist products; regional marketing and advertisement; coordination and management of tourism on regional level; creation of tourist zones and organizations for their management – improving marketing, effective use of resources and coordinated activities. The concept provides some proposals about main and extended specialization of tourist zones. The project of the National Innovation strategy for smart specialization also considers tourism and agriculture as traditional sectors, and especially in connection to the good conditions for organic agriculture development.

In some previous analyses of national strategic documents on different levels concerning tourism and agri-food sector development in the country (Arabska, 2013; Shopova and Arabska, 2013) main conclusions are focused on the need of finding the right ways of implementation of strategic goals. Bearing in mind the opportunities and roles of DMMOs, the opportunities of application of DMMOs according to national conditions are explored through making a SWOT-analysis.

Table 2: SWOT-analysis of the opportunities for development of tourism and agri-food sector development in rural regions through DMMOs

Strengths		Weaknesses	
Natural resources	9.00	Infrastructure	4.60
Environmental and climatic conditions	8.40	Age structure	4.40
Strategies for sustainable development	7.40	Living and labor conditions	5.20
Historical and cultural heritage	9.00	Ineffective use of national and EU funding	4.80
Personal motivation for development	7.40	Training and education, information	6.80
Opportunities		Threats	
Local investments	5.80	Abandonment / replacement processes	5.60
SME establishment	5.00	Negative impacts of globalization and climatic change	4.80
EU funding	6.20	Political instability	5.20
Increasing demand	6.60	Financial instability	6.00
Values and mentality	6.20	Communication	4.40

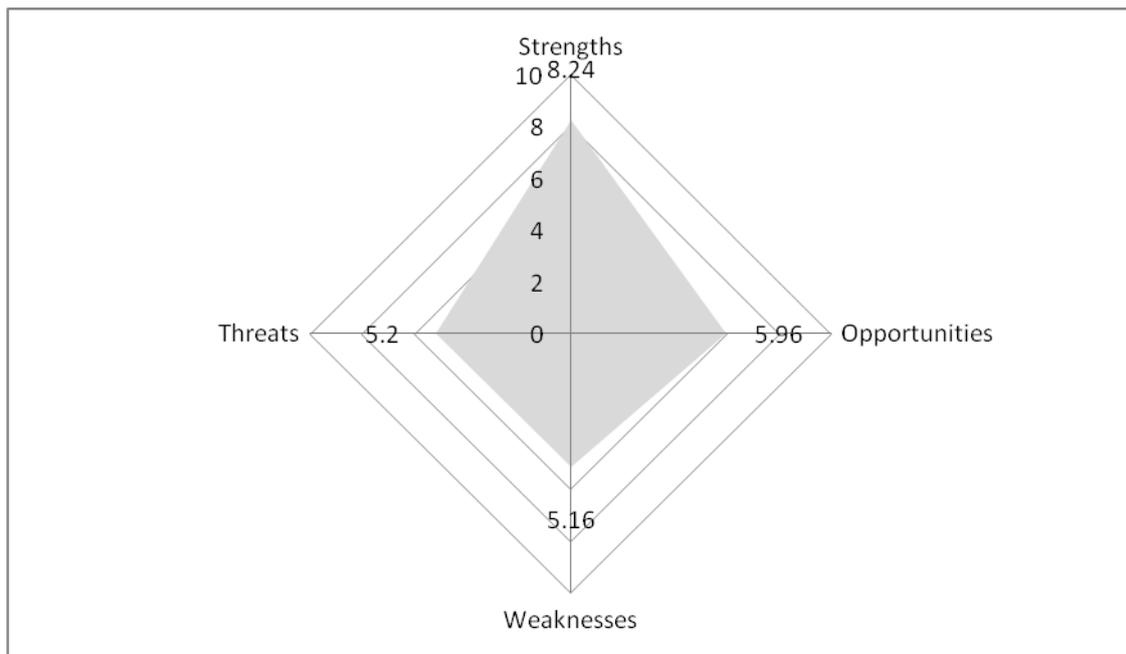


Figure 2: SWOT-analysis' summarized results

The SWOT-analysis shows very good evaluations for strengths, especially for natural resources, historical and cultural heritage, environmental and climatic conditions (Table 2, Figure 2). Among the weaknesses training, education and provision of information are underlined which shows the need of new approaches towards capacity building in rural regions. The biggest opportunity is defined to be increasing demand, as well as EU funding opportunities and values and mentality. Financial instability is the greatest threat along with abandonment and replacement processes (Table 2, Figure 2).

The analysis give insights that the strengths should be properly treated in the use of opportunities and overcoming threats and fighting weaknesses. The need of provision of information and training impose the use of new integrated approaches as networking and common development goals' achievement. An opportunity for that is the establishment of DMMOs in rural regions.

4. Discussion and Conclusions

Discussing the role of DMMOs for rural development in the examined country some of the roles are underlined as networking and those connected to development of products and building community brands in rural regions in connection to preparation and management of projects assuring funding (Fig. 3). The vision of country's development is substantiated by the potential of integrated tourism and agriculture activities for overcoming uneven regional development, rural regions' abandonment and low economic growth and assuring sustainable development and well-being of local communities.

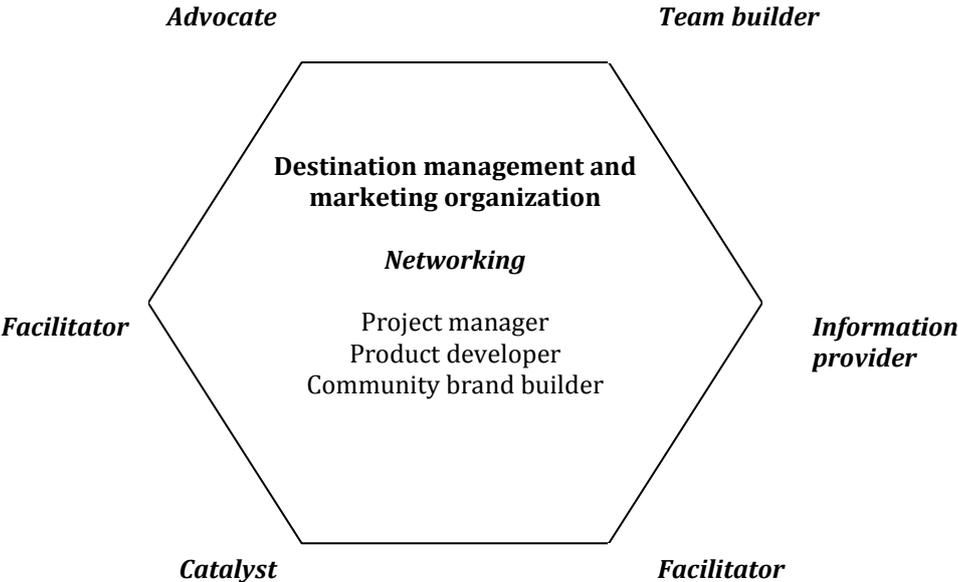


Figure 3: Framework of the roles of destination management and marketing organizations (Adapted from Adeyinka-Ojo et al., 2014, with modifications)

The framework for establishment, management and functioning of DMMOs as set in the course of the study (Fig. 4) provides the following implications: DMMOs are responsible for network management, management and marketing of destination; stakeholders and local community should be actively involved and motivated through a strategy for inclusion and participation and activities aiming at capacity building. All that would influence destination performance which management should include purposeful activities of planning, organization, implementation, coordination and communication, as well as monitoring and control.

DMMOs' roles	DMMOs' activities
Network management	Strategy for motivation & inclusion
Management of destination	Capacity development
Marketing of destination	Stakeholders & Local community participation
Destination performance management	
Planning	Organization
Implementation	Coordination
Communication	Monitoring & control

Figure 4: Framework for of establishment, management and functioning of DMMOs

The need of diversification of activities could be answered by the functioning of DMMOs and their contribution to promotion activities, provision of information, capacity building, entrepreneurship encouragement and project implementation, particularly for good practices and innovation transfer.

The establishment of DMMOs is also important because of another point of view – the need of establishment of an effective system of monitoring and control of destination performance in its various aspects and concerning different levels, incl. policies, strategies, programs and plans development, as well as making assessments and recommendations.

The strategic priorities for next-year development as given to increase economic, social and territorial cohesion for sustainable balanced regional and municipal development are in regard to the new interrelations and interactions between urban and rural regions based on the use of strengths of both and joint development of mutual benefit through encouragement of sectors having the best potentials in connection to available resources and market realities. The establishment of DMMOs is an opportunity to assure the needed networking and synergy in interactions and activities of the stakeholders and local communities putting the accent on provision of information and rendering assistance in management and marketing of destinations. The study underlines the importance of DMMOs in destination performance management through smart specialization and capacity building.

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Impact of accruals on cost of debt of Slovak companies

Miloš Tumpach¹, Zuzana Juhászová² and Adriana Stanková³

¹*Department of Accounting and Auditing, Faculty of Economic Informatics, the University of Economics in Bratislava, Dolnozemská cesta 1, 852 35 Bratislava, Slovakia, e-mail: milos.tumpach@euba.sk*

²*Department of Accounting and Auditing, Faculty of Economic Informatics, the University of Economics in Bratislava, Dolnozemská cesta 1, 852 35 Bratislava, Slovakia, e-mail: zuzana.juhaszova@euba.sk*

³*Department of Accounting and Auditing, Faculty of Economic Informatics, the University of Economics in Bratislava, Dolnozemská cesta 1, 852 35 Bratislava, Slovakia, e-mail: adriana.stankova@euba.sk*

Abstract

It is almost general agreement that there is only a single *raison d'être* of accounting – provision of information to various groups of stakeholders. Considering the cost of such information and the existence of different interested parties, there is a risk of suboptimal performance if the accounting system is too rigid. Historically, Slovakia has applied rigorous accounting rules for a long time, and we have selected its reporting system for examination of a relevance. Because Slovak companies are funded by borrowings rather than by investors, we have investigated the validity of the hypothesis, that their costs of debts align with accounting data (more specifically, accruals). Following prior studies, the logistic regression model have been built with accounting data covering three years' periods results of 1 687 Slovak companies. Though we were able to confirm the relation between the costs of debts and some of accounting data, no between the accruals and cost of debt has been identified.

Keywords: financial reporting, cost of debt, financial statements, accruals

1. Introduction

Even though the first accounting regulation in Slovakia have been introduced by Charles III in 1723 (Kardos and Madarasi-Szirmai, 2013), comprehensive accounting rules come into their existence only after the WWII. Around that period, the introduction of unified accounting rules was quite common in European countries. As early as in 1937, Germany had introduced Reichskontenrahmen (Imperial Chart of Accounts). Briefly after the WWII, uniform chart of accounts have been introduced in Poland

(Jaruga and Szychta, 1997), France (Fortin, 1992), Hungary (Kardos and Madarasi-Szirmai, 2013) and other European countries to provide necessary information for macroeconomic purposes. The situation in Czechoslovakia was, however, unique. Unlike its neighboring countries, including those under the similarly strict communist rule (Griffin and Wallach, 1991), the country totally lacked private businesses for almost half of the century. Though we cannot establish the direct relation of the said fact to the scope and content of financial statements, it speaks a lot about the underlying environment of accounting regulation. At that period, the government even delegates the authority over such regulation to statisticians, stripping of the power from the ministry of finance. Sixty years after, negative remnants of the past are still present – though only a few accounting information is still used for the macroeconomic purposes (Pošta, 2013). For example, with a notable exception of the small and micro entities, the amount of line items which have to be presented in the financial statements in Slovakia is up to four time higher than is ordinarily presented by big business in the USA (see Table 1 below).

Table 1: Comparison of amount of line items presented in balance-sheets by large U.S. and Slovak businesses

U.S. Generally Accepted Accounting Principles (GAAP)		Compulsory presentation under the Slovak Accounting Regulation (SAR)				
Microsoft Corp. ⁽³⁾	Google Corp. ⁽³⁾	2003–2006	2007–2008	2009–2010	2011–2014	2015–
38	43	120	118	123	125	145

It is a general understanding that the excess of the information is not always coming hand in hand with its enhanced relevance. As a result, we have decided to examine whether at least data provided by in financial statements of Slovak companies are relevant for at least some of their apparent users. Because the credits and loans are the primary sources of financing of companies in Slovakia (Morvay et al., 2013), we have focused on the creditors as one of the principal groups of stakeholders. More specifically, we would concentrate on the ability of creditors to recognize the *accruals* of Slovak debtors as one of the significant indicators of earnings management. If so, with higher amount of accruals the interest rates are deemed to be higher.

2. Review of the related literature

There are several approaches for considering the relevance of accounting information. First of all, there is a more general approach, based on an assessment of the usefulness of accounting for decisions per se (for example Francis and Schipper, 1999). On the other hand, several papers have been focused on more narrow issues. Schweikart (1986), Johnson and Kaplan (1987), Pizzini (2006) and Richardson (2012) have been considering the relevance of cost and management information for increasing the effectiveness of a company. Gassen and Schwedler (2010) analyzed the suitability of accounting measurement concepts for various types of decisions. Hung (2000) has been considering the overall relevance of national financial accounting for external users in 21 countries. Simga-Mugan (1995) made research similar to Hung's for Turkey, Al-Akra et al. (2009) for Jordan, Hassan, (2008) for Egypt, Lam et al (2013) for China and Hellström (2006) for Czech Republic. More recently, the paradigm of relevance examination has been shifted to the relation between accounting and valuation. Jun Lin

and Chen (2005) have examined the relevance of international financial reporting standards for valuation purposes. Barth et al (1996), Seow et al. (2002), Mozes (2002), Wang et al. (2005) and Hodder et al. (2006) were considering the usefulness of fair value for the valuation of businesses. Application and interpretation of fair value measurement have been also a major issue of several studies, both because its inherent risks and potential to provide more accurate information for decision makers. Barth and Landsman, (1995), Carroll et al. (2003), Landsman (2007), Hitz (2007) and Fiechter (2011) consider the general usefulness of fair value for various decisions. Consequently, as an follow-up of the recent financial crisis, Véron, (2008), Magnan (2009), Pozen (2009), Laux and Leuz (2010), Badertscher et al. (2012) and Kubaščíková and Stanley (2013) were examining the fair value measurement as one of its culprits.

Research related to the importance of *accruals* for business decisions started some twenty years ago, with influential Dechow's (1994) paper on their use for improved measurement of the firm's performance. In this context, accruals represented such changes in net earnings, which are not attributable to cash-flows. Later, Subramanyam (1996) provided the evidence, that the recognition of accruals could improve prediction of the future profitability and the dividend change. Finally Dechow and Dichev (2002), Richardson et al. (2005) and recently Lev et al. (2010) were focused on the (mis)use of discretionary accruals for the purposes of the earnings management. Through the management of earnings, the company can report the net income in a manner that is better suitable for its purposes (e. g. approval of a credit, tax fillings, raise of a capital). Therefore, in our study we will assess if there is a relation between the cost of debt of Slovak enterprises and accruals reported in their financial statements (being one of the indicators of earnings management).

3. Methodology

Following the inspiring studies of Biddle and Hilary (2006) and Ball et al. (2008), we observe the relevance of accounting data of Slovak companies by examining their relation to credit interest rates. Though the lack of such relation is not a conclusive proof of the irrelevance of the data, the opposite could support the claim of the relevance of (at least) some of the accounting data for creditors. In accordance with the aim of this paper, we will focus predominantly on accruals. However, in order to assess the validity of the model, we will also need to assess other accounting data as well. Following the results of previous studies, summarized by Hajek (2010), we consider *indebtedness*, *return on assets* and *liquidity* to be the most common financial ratios used by the creditors for the prediction of financial stress of its debtors. Consequently, we will apply these ratios as the additional control variables.

For the purpose of our research, the accounting data have been selected from the financial statements of Slovak companies, prepared under the Slovak statutory accounting regulation and covering years 2010 through 2012. The time span was intentionally limited because of a risk that pre-2010 data could be vastly distorted due to the impact of the financial crisis. We also assume that the credit market in Slovakia is truly effective. In other words, provided that the company is going concern, it will be able to find a source of funding even if its financial performance is not outstanding – most likely in exchange for higher interest rate. To maintain the viability of this hypothesis, we have also have to assume, that apart from banks the credit market is also created by other interested parties. Also, feasibility of this assumptions requires a

supporting evidence for a going concern assumption. Therefore, we have decided to use only the financial statements of *audited* companies in Slovakia with a clean auditor's report. Though we are aware that this limits the extent of the available data, we consider that it will not only lessens the need for data which are not disclosed in the financial statements (such as the amount and the quality of assets available for collateral), but also increase the reliability of the accounting data. In addition, clean auditor's report is an independent verification of the going concern assumption.

To avoid errors resulting from transformation of financial statements into electronic form, we have used implicit validation mechanism. In Slovakia, all financial statements, except for those covering their first year of existence of a company, shall contain data for precisely two consecutive years. The data for year "n" are presented both in year "n" (as current year data) and year "n+1" (as comparables). If the same data presented in both years do not equal, the financial statements of the said company would have been excluded from the analysis. After this step, the final set of the data contains data from balance sheets and income statements of 1 687 audited companies.

By definition, accruals (in a broad sense of term) represent those changes of net earnings for a period, which are not attributable to cash-flows to that period. Unlike the cash-flows, which are prone to almost any attempts for their artificial increase, the accruals could be manipulated quite easily. For example, revenues could be increased through the recognition of fictitious sales – but it almost impossible to recognize inflated cash-flows. Thus, though the existence of accruals by itself is not an overwhelming evidence of the *management of earnings*, there is an associated risk that need to be considered. Consequently, to assess whether the creditors are taking into account (at least) those risks of earnings management which are related to accruals, we opt for examination the relation between the mean interest rates and the accruals for all companies in our sample of 1 687 businesses. Because there are many ways of determining the accruals, we will apply Sloan's (1996) concept of net earnings' *implied cash component* as their complement. The formula for *implied cash component* of the net earnings is as follows (Equation 1):

$$CC = \text{net earnings} \pm \Delta(TCA - \text{cash} - \text{cash equivalents} - TCL + STDB) \quad (1)$$

Legend:

CC is implied cash component;

TCA stands for total current assets;

TCL stands for total current liabilities;

COL are current operating liabilities;

STDB are short-term debts (including income taxes payable).

Because its value is determined as a change of certain accounting figures between two periods, and we would take into accounting data for years 2010 and 2011, the implied cash component would be determined for the year 2011 only. In addition, because the companies in the sample have different size, they have to be normalized. As a result, instead of the amount of *implied cash component* we use *return on assets adjusted for accruals* which is the determined as a ratio of the *implied cash component* (numerator) and the *total assets* (denominator). In addition, *return on assets adjusted for accruals* is directly comparable with *unadjusted* return on assets – and the same applies to the assessment of the creditors' reaction to them.

Following the studies of Houghton (1983) and Niemi and Sundgren (2012), which had examined the impact of the accounting data on the availability of credits for companies, we have evaluated the impact of the debtors' accounting data on the interest rates

determined by the creditors. For the rejected credit applications, there is no data available in financial statements. However, we assume that the credit market (containing both financial institutions and other lenders) is effective and elastic. In other words, even a company with poor financial results will be able to secure some form of a debt financing, alas in exchange for excessive interest rates. For assessment, we use binary logistic regression model which contains favorable decisions of creditors as a dependent variable and dummy financial ratios as independent categorical variables. In our analysis, the creditors' decisions would be considered favorable (and the value of dependent variable would be equal to 1), if the average of interest rates for a company for the year 2012 would be lower than a median of the mean of interest rates for the total sample of 1 687 businesses for that year. Dummy financial ratios would have the value of 1 if the financial ratio has a value that is better (or equal) than the median for respective ratio for a whole sample of companies for years 2011 and 2010 respectively. For opposite cases, the value of variables would be 0.

The regression coefficients of the model will link the likelihood of the interest rates for a given company in a year 2012 to be lower than the median of mean interest rates for all companies, depending on the value of dummy financial ratios for years 2011 and 2010 respectively. Subsequently we will use the *logit* link function for transposition of the logistic regression into the odds ratios. The general form of the regression equation describes the probability of the incurrance of the favorable decisions of the creditors as follows (Equation 2):

$$P(INCENT = 1) = \frac{e^{(Y')}}{1 + e^{(Y')}} \quad (2)$$

where (Equation 3):

$$Y' = x_0 + x_1IL_{11} + x_2IL_{10} + x_3ID_{11} + x_4ID_{10} + x_5IR_{11} + x_6IR_{10} + x_7CCR_{11} \quad (2)$$

Legend:

- IL_{year} is a dummy variable, which equals to 1 if the *liquidity* ratio for a company in a given year (either is higher than its median for a whole sample of companies in the same year and 0 if the opposite is true;
- ID_{year} is a dummy variable, which is equal to 1 if the *indebtedness* for a given year and company is lower than its median for a whole sample in the same year and 0 if the opposite is true;
- IR_{year} is a dummy variable, which is equal to 1 if the *return on assets* for a given year and company is higher than its median for a whole sample in the same year and 0 if the opposite is true;
- CCR_{11} is dummy variable, which is equal to 1 if the *return on assets adjusted for accruals* for a given company is higher than its median for a whole sample in the same year and 0 if the opposite is true;
- $INCENT$ is a dependent variable for year 2012, which takes the value of 1, provided that the mean interest rate for a given given company is lower than its median for a whole sample and 0 if the opposite is true; our model explains the probability of occurrence $INCENT$ with a value of 1, depending on the regression coefficients and the value of dummy variables;
- x_i are regression coefficients.

4. Results and discussion

Our model aims at examination of the relevance of the accounting data (and predominantly, accruals) from the point of view of creditors. The information provided by the company is deemed to be relevant for them if there is a correlation with its value and the mean interest rate of such company (taking into accounting interests for all types of debt financing). To meet the goal, we have selected a couple financial ratios (determined for each of the 1 687 businesses for years 2010 and 2011) and transform them to binary (dummy) variables. These variables (*Ili*, *Idi*, *Iri*, *CCri*, see previous chapter) are initially included in the binary logistic regression model and subsequently backward eliminated if such elimination would improve the precision of the model. The resulting equation presents the link between the dummy variables (for a given company) and the likelihood that mean interest rate for that company would be lower than the median of mean interest rates for all companies. The equation providing link between the probability of a favourable interest rates and dummy variables takes a general form (Equation 4), in which the parameter (Y') have been established in the following form (before backward elimination of variables which are not considered to be explanatory):

$$Y' = -0,9483 + 0,575 IL_{11} + 0,541IL_{10} + 0,328IR_{11} + 0,476IR_{10} - 0,008ID_{10} - 0,012ID_{11} - 0,060CCR$$

In the second step, *ID11*, *ID10* and *CCR* which are not considered explanatory (see Table 2; $\alpha = 0.05$) were excluded from the model. In other words, out of four selected financial ratios (*liquidity*, *return on assets*, *indebtedness*, *return on assets adjusted for accruals*), regression coefficients have been determined for *liquidity ratio* and *return on assets* for both years 2011 and 2010.

Table 2: P-Values for categorical predictors

Categorical predictors	P-Value
IL₁₁	0.000
IL₁₀	0.000
IR₁₁	0.011
IR₁₀	0.000
ID₁₁	0.962
ID₁₀	0.943
CCR	0.591

As a result, regression coefficients for determination of Y' have been adjusted to a final form:

$$Y' = -0,9483 + 0,582 IL_{11} + 0,531IL_{10} + 0,313IR_{11} + 0,466IR_{10}$$

By using LOGIT link function, we can present the odds ratios for remaining categorical predictors *IL11*, *IL10*, *IR11*, and *IR10* (see Table 3).

Table 3: Odds ratios for categorical predictors

Categorical Predictors (Level A / Level B)		Odds Ratio (X : Y)	95% Confidential Interval
IL ₁₁ =1	IL ₁₁ =0	1.7887 : 1	(1.3377; 2.3919)
IL ₁₀ =1	IL ₁₀ =0	1.7000 : 1	(1.2735; 2.2695)
IR ₁₁ =1	IR ₁₁ =0	1.3676 : 1	(1.0688; 1.7498)
IR ₁₀ =1	IR ₁₀ =0	1.5939 : 1	(1.2441; 2.0421)

The odds ratio could be interpreted as the likelihood that mean of interest rates of a company is lower than the median of mean interest rates of a whole sample is X times higher if the value of categorical predictor is 1 rather than 0. To consider the validity of the model, we have applied tests of good fitness (Table 4).

Table 4: Tests of good fitness

TEST	DF	Chi-Square	P-Value
Deviance	1 683	2 143.15	0.000
Pearson	1 683	1 687.34	0.466

Test of good fitness has not provide enough evidence for rejecting the hypothesis of the relevance of selected accounting data for at least one group of their apparent users.

5. Conclusions

We can interpret results of the test of good fitness (see Table 4) as a lack of evidence for rejection for the statement arising from the outcome of the logit link function (see Table 3). Other things being the same, the odds that mean interest rate of any given company would be lower than the median of it for all companies in population are increasing if the selected accounting variable for that company has also better values than the median of the respective variable for the whole population". On the other hand, unlike the liquidity and return on assets, the creditors seems to pay virtually no attention to indebtedness and implied cash component of the net income (in the form of *return on assets adjusted for accruals*). Thought the first conclusion could be explained to a certain degree because the sample covers only the audited companies only (for which the going concern assumption has been confirmed by an independent auditor), the second conclusion seems to be quite surprising – mainly in the light of an evidence, that the creditors are taking into account *unadjusted* return on assets.

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Integrated reporting – the next step ahead for a sustainable society

Radu-Dan Turcu¹

¹Department of Accounting and Audit, Faculty of Accounting and Management Information Systems, The Bucharest University of Economic Studies, 010374 Bucharest, Romania, e-mail: radu.turcu@cig.ase.ro

Abstract

The recent global developments have emphasized the limits of the actual corporate reporting system. Today's organizations experience a growing pressure exercised by various types of stakeholders as a result of the increasingly public concern regarding environmental and social issues. Accordingly, the concept of integrated reporting is founded. Despite its necessity and adequacy, differences among countries regarding the adoption of integrated reporting exist. This paper aims to analyze the relation between the number of integrated reports issued by companies inside a country in relation with its economic, social and environmental performances. The results found that there is a higher commitment from companies, belonging to more developed countries, to make their contribution towards the development of integrated reporting concept and practice.

Keywords: integrated reporting, sustainable development, sustainability

1. Introduction

Environmental issues have come into public attention since the 1950s as a result of the deterioration of social, economic and environmental condition (Quental et al., 2009). The term sustainable development was first mentioned at the Biosphere Conference in Paris in 1968 (Bolcárová and Kološta, 2014). Our Common Future (1987) report, also known as the Brundland report, issued by United Nations World Commission on Environment and Development defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The growing pressure exercised by investors and other interested parties as a result of increasing public concern about environment and social issues have increased companies preoccupation regarding their responsibility and contributions for the improvement of the environment and society in which they function (Gillan, 2013; Richens, 2012).

Going further and reviewing the recent events such as the recent financial crisis, environmental disasters like the extreme droughts, earthquakes, hurricanes and tsunamis, diseases, and the deplorable phenomenon of child labor, we could state that sustainability must play a fundamental role in a business life (Ackers, 2009; De Villiers, 2004; Engelbrecht, 2010; Ernst & Young 2008a, 2008b; Institute of Directors (hereafter IoD), 2009; KPMG, 2008; Piketh, 2010; Terry, 2008; Trialogue, 2009 cited in Marx and van Dyk, 2011).

The remainder of this article is divided in two parts, the first one presents a review of the accounting literature concerning the concept of integrated reporting, emphasizing its potential in meeting the actual information needs. The second part develops an empirical study regarding the differences among countries in the adoption of integrated reporting, which creates the bases for sustaining the ideas expressed within the literature review as well as for drawing conclusions.

2. Literature review

Filling the gaps left by the actual financial reporting system in sustaining financial performance and risk management represents a real preoccupation. The main objective is not to simply increase the amount of information provided inside the annual report to cover the deficient areas, but to increase their relevance through a new comprehensive and condensed reporting practice that responds to the diverse and continuous changing needs of different types of stakeholders. Consequently the concept of Integrated Reporting is founded having as main goal to clarify and harmonize the relationship between financial and nonfinancial data sustained by the newest technological possibilities (Devi, 2014).

In 2010, The International Integrated Reporting Council (IIRC) was created as a result of the collaboration between International Federation of Accountants IFAC (IFAC), Global Reporting Initiative (GRI), and the Prince's Accounting for Sustainability, having as main objective to develop a "globally acceptable framework for Accounting for Sustainability ... which brings together financial, environmental, social and governance information in a clear, consistent and comparable format – put briefly, in an "integrated" format" (Prince of Wales, 2010 cited in James, 2013:22).

On the 9th of December 2013, IIRC released the first Integrated Reporting Framework "following extensive consultation and testing by businesses and investors in all regions of the world, including the 140 businesses and investors from 26 countries that participate in the IIRC Pilot Programme. The Consultation Draft, lunched on 16 April 2013, had been developed based on the analysis of the responses to the 2011 Discussion Paper "Towards Integrated Reporting – Communicating Value in the 21st Century" the publication of a draft outline in July 2012, and a Prototype Framework in November 2012" (IIRC, n.d.).

In Eccles and Krzus's view (2010:10) "one report means producing a single report that combines the financial and narrative information found in a company's annual report with the nonfinancial (such as environmental, social, and governance issues) and narrative information found in a company's "Corporate Social Responsibility" or "Sustainability" report. But the integration of financial and nonfinancial reporting is much more than simply issuing a combined paper document. It involves using the internet to provide integrated reporting in ways that cannot be done on paper, such as through analytical tools that enable the user to do his or her own analysis of financial

and nonfinancial information. It also involves providing information that is of particular interest to different stakeholders.”

IIRC Framework (2013:34) defines integrated reporting as “the process founded on integrated thinking that results in a periodic integrated report by an organization about value creation over time and related communications regarding aspects of value creation. An integrated report, as defined by the same source, represents a concise communication regarding the way in which an organization’s strategy, governance, performance and prospects, in the context of its external environment, lead to the creation of value over the short, medium and long term”.

Integrated reporting goes beyond disclosing information related to a company’s strategy, governance and financial performance, by covering aspects related to a company’s social, environmental and economic context (Healey, 2013). Hence, integrated reporting makes its contribution in evaluating and monitoring internal performance as well as supporting financial capital attraction (Druckman, 2014).

An integrated report should draw the features of a sustainable company as an integral part of a sustainable world, while emphasizing an entity’s contributions to achieving sustainability as well as its unsustainable actions as a result of the interactions between the company and the social, environmental and economic context within which it operates (Gray, 2010, cited in Thomson, 2014).

According to Eccles et al. (2014) only 1% of the 46,000 listed companies all over the world issued a self-declared integrated report in 2012. As concerning sustainability reporting, 3,704 companies, as compared to just 11 companies for 1999, produced a sustainability report using GRI Guidelines in 2012. Additionally, the Corporate Sustainability Assessment, a study analyzing the annual reports for 2011 and 2012 of the 2000 world’s largest companies, issued by RobecoSAM, the preparer of the Dow Jones Sustainability Indices (DJSI), shows that only 12% of the analyzed entities for 2012 (respectively 8% for 2011) had provided data regarding the measure in which environmental and social initiatives lead to cost saving or increased revenues (Eccles et al., 2014).

3. Methodology and Data

The present paper regards the analysis of the correlation between the numbers of integrated reports published by companies inside one country in relation with its social, environmental and economic performances.

Based on Matten and Moon (2008) framework explaining differences in Corporate Social Responsibility determined by different institutional context which was extended with the economic system, Jensen and Berg (2011) analyzed the similarities and differences between companies using traditional sustainability reporting and those that publish integrated reports by reference to the political, financial, educational, labor, cultural and economic systems (Jensen and Berg, 2011). Frías-Aceituno et al. (2013) investigated the influence of one of the most significant institutional factors, the legal system, on the issuance of integrated reports.

The sample embedded consists of two main sources, namely the self-declared integrated reports published on the GRI Sustainability Disclosure Database during the year 2013 and the integrated reports issued by the companies included in The International Integrated Reporting Council (IIRC) Pilot Program. According to Eccles et al. (2014:61) “Global Reporting Initiative’s Sustainability Disclosure Database for the

period 2010–2013 provides a useful indicator of the rise in the number of integrated reporting companies, based on self-declared integrated reports”.

Our study is conducted by reference to two sets of data, the first one regards a worldwide analysis while the second one is concentrated at the European Union level. The worldwide analysis is founded on Jensen and Berg (2011) model and examines the correlation between the number of integrated reports issued in relation with a country's cultural and economic system.

“One important aspect of a country's culture consists in the extent to which companies are seen as responsibility bearing parts of society” (Jensen and Berg, 2011:304). As measure for a country's cultural system, the national corporate responsibility index (NCRI) is used. NCRI is the world's first assessment of the state of corporate responsibility at a global level. The index assesses over 80 countries on criteria including corruption, civic freedom, corporate governance and environmental management to establish a global ranking. The NCRI takes values from 0 to 100, with 100 representing the highest development status (AccountAbility, 2005).

For a deeper analysis concerning the cultural system, the environmental responsibility and social development of a country are taken into consideration. The environmental responsibility is measured by The Environmental Performance Index (EPI). EPI ranks how well countries perform on high-priority environmental issues in two broad policy areas: protection of human health from environmental harm and protection of ecosystems, taking values from 0 to 100, the higher the value of the indicator, the lowest the environmental impact and implicitly the higher development status (Esty et al., 2008 cited in Jensen and Berg, 2011).

The Human Development Index (HDI) issued by UNDP is used as a proxy for the social development of a country (Globerman and Shapiro, 2002 cited in Jensen and Berg, 2011). HDI is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living and represents the geometric mean of normalized indices for each of the three dimensions (UNDP, 2013). The indicator ranges from 0 to 1, the values close to 1 denoting the highest status of human development.

The economic system of a country is measured by per-capita GNI based on purchasing power parity. For a more detailed analysis the level of state intervention in economic activities is considered, quantified by the Economic Freedom Index (EFI). EFI documents the positive relationship between economic freedom and a variety of positive social and economic goals. The ideals of economic freedom are strongly associated with healthier societies, cleaner environments, greater per capita wealth, human development, democracy, and poverty elimination (The Wall Street Journal and The Heritage Foundation, 2014). The Economic Freedom Index takes values between 0 and 100, the upper value corresponding to the highest degree of economic freedom (Jensen and Berg, 2011).

The study conducted at the European Union level regards the analysis of the relation between the number of integrated reports issued by each country and the position held according to the aggregate index of sustainable development developed by Bolcárová and Kološta (2014) based on the European Union set of headlines sustainability indicators.

The variables embedded were obtained from various sources, for more accurate results the data used, if available, refers to the year 2012 which corresponds to the year of the analyzed annual integrated reports. In order to quantify the correlation between the analyzed indicators, two correlation coefficients are applied: Pearson correlation

coefficient for the worldwide analysis and Spearman's rank correlation coefficient concerning the study conducted at the European Union level.

Table 1: Summary of analyzed indicators

Indicator	Issuer	Reference year
Cultural system		
NCRI	AccountAbility	2005
EPI	YCELP & CIESIN	2012
HDI	UNDP	2012
Economic system		
GNI per-capita	The World Bank	2012
EFI	The Wall Street Journal & The Heritage Foundation	2012
Sustainable development index	Bolcárová and Kološta (2014)	2011

4. Results

Integrated reporting raised a great interest among the European Union members, seven of the first fifteen countries around the world as regards the number of integrated reports published are members of the European Union. Also, the number of reports published by these countries represents almost 30% of the total of top 15 and approximately 55% if we are excluding South Africa. South Africa detains a special status as a result of the King III (The King Code of Governance Principles for South Africa 2009) report and its requirement that all South African listed companies on the country's stock exchange publish an integrated report starting with 2010 under the governance of "apply or explain" approach.

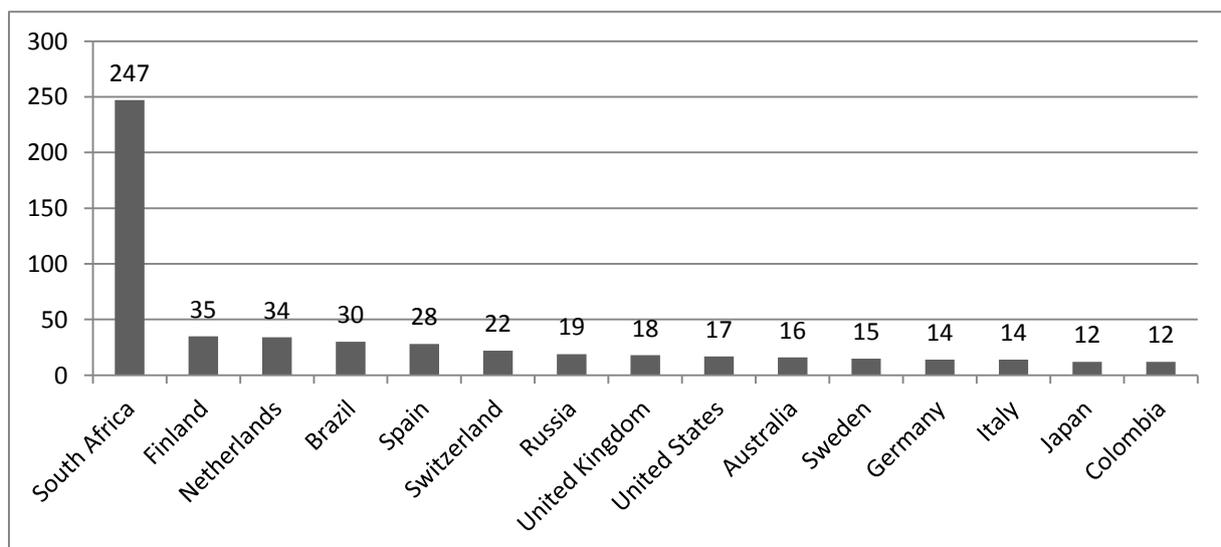


Figure 1: Top 15 countries by the number of integrated reports issued

The highest number of integrated reports published inside the European Union is attributed to Finland (35, approx. 18% of total), followed by Netherlands (34, approx. 17% of total) and Spain (28, approx. 14% of total). Despite the overall interest showed

by the European Union as a whole, integrated reporting does not represent an actual interest for all the state members, roughly 89% of the total reports being published by the first 10 performers. Therefore, companies from countries such as Czech Republic, Estonia, Ireland, Cyprus, Lithuania, Luxembourg, Malta, Romania or Slovakia have not published any integrated report during the analyzed year.

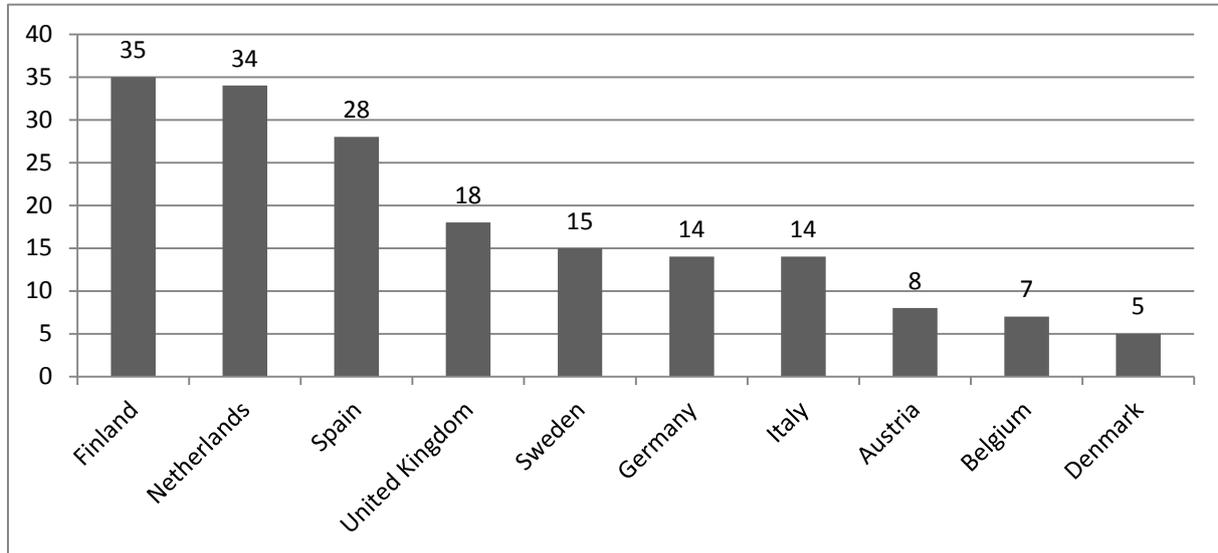


Figure 2: Top 10 countries from European Union by number of integrated reports issued

There is a positive correlation between the number of integrated reports issued and a country's social, environmental and economic development, the three pillars of the sustainable development (Drexhage and Murphy, 2010). The highest correlation level was registered by the National Corporate Responsibility Index (0.47) followed by Environmental Performance Index, Human Development Index and Gross National Income, indicators for which very close values were obtained, around 0.38.

Table 2: Correlation between the number of integrated reports issued and social, environmental and economic indicators

Indicator	Pearson correlation coefficient (r)	t computed	t critic (df= 40, $\alpha=0.05$)
EPI	0.38582	2.805	
HDI	0.38484	2.797	
NCRI	0.47526	3.583	1.684
GNI	0.38154	2.738	
EFI	0.28374	1.984	

More than 64% of the total number of integrated reports issued all over the world is published by companies from countries registering higher values than the average for the analyzed indicators. Going deeper, 73.89% of the total integrated reports are published from countries registering a Human development index over 0.8, 70.93% pertain to countries having an Environmental Performance Index higher than 63.97 and 70.44% are issued from countries recording an Economic Freedom Index above 65.54.

Table 3: Number of integrated reports issued by reference to a country's social, environmental and economic performances

Indicator	Average value	Number of reports published in countries which are above the average	Number of reports published in countries which are below the average
EPI	63.79	70.93%	29.07%
HDI	0.804	73.89%	26.11%
NCRI	58.63	64.75%	35.25%
GNI	27,243	69.62%	30.38%
EFI	65.54	70.44%	29.56%

The results obtained are consistent with the ones presented by Jensen and Berg (2011) who claim that companies from countries registering a higher national corporate responsibility and level of and economic development are more likely to publish integrated reports.

As our results show, the correlation between the number of integrated reports published inside one country and its sustainable development performances is a strong and positive one. The value of 0.60 obtained for the correlation coefficient indicates that the results are significant for a significance level lower than 0.05, supporting the idea according to which countries registering higher values for the sustainable development indicators are the ones that issue more integrated reports.

Table 4: Correlation between the number of integrated reports issued and sustainable development index

Indicator	Spearman's rank correlation coefficient (r_s)	t computed	t critic (df=25, $\alpha=0.0005$)
Sustainable development index	0.60747	3.823	3,725

Out of the total integrated reports issued at the European Union's level, over 90% were published from countries placed in the first half of the ranking. Moreover, 86 out of the total 198 integrated reports issued for the financial year 2012 belong to the top five countries.

Table 5. Number of integrated reports issued by reference to the sustainable development index ranking

Indicator	Number of reports published by the first half of the ranking	Number of reports published by the second half of the ranking
Sustainable development index	90.90%	9.10%

5. Discussion and Conclusions

As annual reports remains the most valuable source of information when making investment decisions (ACCA, 2013), integrated reporting may represent a viable solution for meeting the actual information demands through the use of a comprehensive and intuitive language in accordance with each user's needs.

Companies from different countries tend to react differently to the adoption of integrated reporting. The results obtained which are consistent with the ones presented

by Jensen and Berg (2011) indicate that companies attitude towards the adoption of integrated reporting is influenced by a country's sustainability performances, other significant country-level determinants may include investor protection, the degree of market coordination, ownership dispersion, private expenditure for tertiary education, trade union density (Jensen and Berg, 2011) or the legal system (Frías-Aceituno et al., 2012).

The present paper reveals that there is a positive correlation between the number of integrated reports issued by companies inside one country and the values registered for the sustainable development indicators. Consequently, companies from countries registering a higher status of social, economic and environmental development, the three pillars of sustainability development, are the ones that publish more integrated reports.

It is sure that integrated reporting does not directly influence the macro indicators level but, as we have seen, there is a bigger commitment from companies, belonging to more developed countries, to make their contribution for the improvement and development of integrated reporting concept and practice.

Future research may attempt to investigate the relationship between a company's decision to publish an integrated report by reference to its financial, social and environmental performances.

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Social and environmental reporting as a part of the integrated reporting

Mihaela Turturea¹

¹Department of Accounting and Audit, Faculty of Accounting and Management Information Systems, Bucharest University of Economic Studies, 010374 Bucharest, Romania, e-mail: mihaela.turturea@cig.ase.ro

Abstract

Social and environmental aspects, considered valuable factors in decision making process, play an important role within the nowadays complex business environment. Recent accounting literature reveals that the need for disclosing non-financial information is widely debated based on the fact that considerable decisions cannot be supported only by referring to past financial performances. This paper, organized as an empirical study, aims to provide an overall image upon social and environmental disclosures inside the integrated reports of the companies which have taken part for three consecutive years in the International Integrated Reporting Council (IIRC) Pilot Programme Business Network. The research is conducted among the integrated reports issued by companies belonging to various industries, coming from France, Germany and United Kingdom. The results achieved show that companies fail to present a complete picture regarding their social and environmental performances and implicitly fail to achieve the intended purpose of the IIRC in promoting the accounting for sustainability.

Keywords: integrated reporting, sustainability, social reporting, environmental reporting, complexity, IR Framework, information disclosure

1. Introduction

Today's financial and nonfinancial reporting complexity are widely argued based on the fact that considerable decisions cannot be supported only by referring to past financial performance of a company (King and Roberts, 2013: 15), there have to be taken into consideration also issues regarding environmental, social and governance matters (Eccles and Krzus, 2010: 83; Frias-Aceituno et al., 2013). The current financial reporting which represents a communication tool addressing the company's financial position and performance background to different stakeholders, is too narrow and too simplistic (Eccles and Krzus, 2010: 59).

The starting point of our research is represented by the results achieved by Van Zyl (2013) regarding environmental and social sustainability which determined a very low integration of social and environmental aspects within integrated reports.

This paper aims to provide an overall image upon social and environmental reporting part of the integrated reporting based on recent accounting literature review. The first section frames the scientific context regarding integrated reporting, as well as social and environmental disclosures and reporting, covering the legislation in force within France, Germany and the United Kingdom. The last section provides evidence regarding the way British, French and German entities include social and environmental aspects within their integrated reports based on a content analysis of their latest integrated reports issued.

2. Literature review: Integrated Reporting, Social and Environmental Reporting

To date, integrated reporting (IR) has met various definitions, the latest one, presented within the Framework (2013: 33), observes IR as „a process founded on integrated thinking that results in a periodic integrated report by an organization about value creation over time and related communications regarding aspects of value creation”.

Being only four years old, IR is debated among researchers (Flower, 2014; Thomson, 2014; Adams, 2014) on the basis that it does not meet anymore the objectives stated in its conceptual phase regarding social and environmental aspects. One of the reasons sustainability accounting seems to be abandoned within the IR Framework is based on the fact that the IIRC board is dominated by “the accountancy profession and multinational companies which are determined to control the initiative that threatened their established position” (Flower, 2014: XX). In addition, Flower (2014) analyzes the content of the main IR pillars (the Press Release of 2010, the IIRC’s Discussion Paper of 2011 and the IIRC’s Framework of 2013) with respect to the inclusion of the words “sustainability, sustainable or sustain” within these documents and observes a decreasing trend. In the last document, the word “sustainability” is mentioned only a single time showing another proof for sustainability abandonment within the integrated reports. However, Adams (2014, pp: XX) argues that IR should not be confused with sustainability reporting and provides evidence regarding the differences between the two forms of reporting, as follows: “sustainability reporting targets a wider stakeholder audience than does <IR>, which focuses primarily on providers of financial capital, particularly those with a long term view and focuses on impacts on the environment, society and the economy, rather than on the effects of the capitals on value creation over time, as in <IR>”.

Social and environmental accounting and reporting, part of the integrated reporting, is observed through accounting literature to date back more than 40 years (Gray, 2001 cited by Gurvitch and Sidorova, 2012; Lungu et al., 2011). Social accounting can be distinguished back in the 1970s as being debated at a large scale in the accounting field, while in the 1980s the concept has not received attention at all as per Gray (2001) cited by Gurvitch and Sidorova (2012). In the mid 1990s, social accounting aspects gathered attention, more and more companies have started to understand their own responsibility towards the society, aiming at developing sustainable businesses (Hahn and Kühnen, 2013). Furthermore, environmental disclosures are presented within the accounting literature beginning with 1990s when investors have started to attach importance to environmental aspects (De Villiers & Van Staden, 2010; Deegan & Rankin, 1997; Epstein & Freedman, 1994; Goodwin, Goodwin, & Konieczny, 1996 in Barbu et al.,

2014). Milne and Chan (1999), Solomon and Solomon (2006) cited in Barbu et al. (2014) underline that until the 1980s there was no need for environmental disclosures.

Implications on the assessment of environmental, social and governance (ESG) aspects can be observed at a global level through legislative initiatives on this topic. While UK publicly listed companies are required to publish an annual operating and financial review including the corporate impacts on the environment according to *Companies Act 1985*, large non-listed UK companies are asked to present key performance indicators in their annual reports, in the Business Review section as per *Companies Act 2006* (Barbu et al., 2014). Also, UK listed companies at the London Stock Exchange have to report on greenhouse gas emissions beginning with 2013 as per KPMG (2013). Environmental and social disclosures in France have been compulsory based on the *Nouvelles Régulations Economiques* or *New Economic Regulations* since 2002 which imply that all listed companies to present environmental information in their annual reports (Eccles et al., 2010; Barbu et al., 2014; KPMG, 2013). Also, the *Grenelle II Act* of 2009 applicable from 2011 asks all companies with polluting activities and more than 500 employees to present non-financial indicators referring to their impact on the environment and society within their annual reports (Barbu et al., 2014; Berndt et al., 2014; KPMG, 2013; Eccles and Armbruster, 2011). In the case of German companies there is no specific regulation on mandatory disclosure of social and environmental aspects. Even so, there was issued at a national level a *Leitfaden für Umweltberichte* *Guidelines for Environmental Reports* which established the minimum amount of nonfinancial information to be included in the annual reports, being later revoked (Barbu et al., 2014).

Frias-Aceituno et al. (2013) has analysed a large sample of international companies (Anglo-Saxon, Germanic and Latin) and has demonstrated that the company's size, gender diversity, management structure and growth opportunities are the most important factors which determine an integrated approach to business.

3. Methodology and Data

This study examines the way social and environmental disclosures are presented within annual reports based on the IR Framework requirements.

Following Van Zyl (2013) empirical study, we intend to determine the viability of their statement regarding a very low integration of social and environmental aspects within integrated reports.

We have analyzed the 2013 integrated reports of 18 companies coming from France, Germany and United Kingdom with regard to the disclosure of social and environmental aspects within the content elements required by the IR Framework.

In order to demonstrate this inquiry we have elaborated an evaluation scheme based on Van Zyl (2013) matrix for sustainability disclosures. The evaluation scheme links sustainability disclosures to the content elements presented within IR Framework. We have observed that within the Framework, there are two possibilities for identifying sustainability issues through the content elements: either within *Organizational overview and external environment*, or within *Strategy and resource allocation*. After having established the area of disclosure we have allotted the questions presented within Van Zyl research paper to the identified content elements.

In order to have comparable outcomes, the analysis of the results is based on Likert Scale (see Table 1), each resultant measure or scale coming from Van Zyl (2013)

empirical study. Schrauf and Navarro (2005) cited within Saunders et al. (2009) emphasize the fact that it is better to use or adapt existing scales rather than creating brand new scales.

Table 1: Likert scale's interpretation

Scale 1: No Disclosure – This topic is not mentioned in the report
Scale 2: Disclosure to a lesser extent – The topic is only mentioned briefly in the report (which might include measured results) with little or no context provided.
Scale 3: Disclosure to some extent – The topic and measured results are discussed and a measurable target is provided for the current and/or future.
Scale 4: Disclosure to a large extent – The current year performance is discussed against the target and mitigation is provided to improve performance.
Scale 5: Significant disclosure – Full integration is achieved by linking the risk, target, and mitigation with the financial aspects.

(Source: Van Zyl, 2013: 215)

Considerable interest regarding the research of sustainability aspects within annual reports is demonstrated by similar research papers, as follows: Van Zyl (2013), GRI (2013), Gurvitsh and Sidorova (2012).

Table 2: Sample summary

Companies	Country	Sustainability pages	Total pages	%	Country average
ARM Holdings plc	UK	18	64	28.13%	18.13%
Association of Chartered Certified Accountants	UK	29	68	42.65%	
BASF SE	Germany	33	252	13.10%	20.38%
Chartered Institute of Management Accountants, The	UK	6	46	13.04%	
Danone	France	26	53	49.06%	18.94%
Deutsche Bank	Germany	7	84	8.33%	
Deutsche Börse Group	Germany	62	321	19.31%	
EnBW Energie Baden-Württemberg AG	Germany	31	162	19.14%	
Flughafen München GmbH	Germany	74	224	33.04%	
HSBC Holdings plc	UK	14	219	6.39%	
Interserve Plc	UK	12	166	7.23%	
Marks and Spencer Group plc	UK	33	116	28.45%	
NHS London	UK	27	172	15.70%	
Sainsbury's	UK	16	128	12.50%	
SAP	Germany	69	311	22.19%	
The Crown Estate	UK	46	120	38.33%	
Unilever	UK	26	153	16.99%	
Vivendi	France	56	380	14.74%	
Average				19.25%	

The companies considered within our empirical study come from various industries and are presented in Table 2. Based on the integrated reports, for the year ended 2013, available on the companies websites, we have wholly covered them and have responded primarily in terms of identification of the allocated number of pages of sustainability disclosures within the reports, followed by a content analysis regarding the coverage of sustainability concern through the content elements presented within the IR Framework.

We have observed that companies in their annual reports include separate sections with regard to sustainability disclosures and we have accounted for all of them. Gurvitch and Sidorova (2012) state that there are no uniform places within the annual report for social accounting disclosures, companies choosing to place these disclosures “randomly” which may be different from one year to another in the case of the same company.

4. Results

The coverage of sustainability disclosures within integrated reports is represented by an average of 19.25%, reflecting the way corporate reporting includes social and environmental aspects for the year ended at December, 2013 as per Table 2. As confirmed by Gurvitch and Sidorova (2012:32), the integration of sustainability aspects within integrated reports has become “good practice and not an exception”.

Hanks and Gardiner (2012) cited by Van Zyl (2013) affirm that there are a few companies which have started to issue environmental and social aspects of their business and correlate these disclosures with their achievement of long term success. Within our study, all analysed companies issue integrated reports based on the IR Framework and have to comply with the guiding principles and content elements imposed by the Framework. The compliance requirement is not official, but as these companies have been voluntarily members of the IIRC Pilot Programme Business Network over a three years period, they have to issue integrated reports by complying with the Framework. Being members of the IIRC Pilot Programme, these companies have contributed significantly to the development of the IR Framework, launched at December 2013.

Disclosures of sustainability aspects within the integrated reports are presented within Table 3. First, taking a closer look to the Organizational overview and external environment content element, we can observe that a few companies are able to disclose to a large extent specific aspects regarding social and environmental impacts (11.11%), commitments to community development (5.56%), information about fines and non-compliance areas (5.56%), commitments to reduce reliance on renewable or non-renewable resources (5.56%), measurement of waste and pollution associated with specific operations (5.56%), regulatory environment practices (5.56%).

The majority part of the analysed companies offer disclosures with regard to their vision in which sustainability challenges are addressed to a lesser extent, meaning that this topic is only mentioned in the report and not specifically linked to strategic targets or described with a fully impact on company’s ability to create value. For example, 72% of the companies in our sample present their commitment to sustainable development as captured in their mission and vision statements through delivering high quality products or services at fair prices, improving people’s lives and helping the world run better.

By comparing the average scores obtained, we can note that the highest score on average is attributed to measurable targets relating to greenhouse gas emissions linked to actual reductions achieved (2.61). This means that this topic is the most referenced one within integrated reports, 16.67% out of the total number of companies being able to significantly emphasize it and integrate company's risks, reduction targets with financial aspects. A possible argument for achieving this result could be the legislation in force presented within the literature review. At the opposite direction it stands the incapacity of the companies included in our sample to present through their integrated reports aspects such as labour relations relating to strikes and labour disputes followed by aspects regarding human rights and labour practices, non-compliance issues, social impacts of major suppliers or negative environmental impacts on local communities.

Table 3: Disclosure of sustainability aspects within the integrated reports

Disclosure of the sustainability aspects within the Integrated Reports	1	2	3	4	5	Average score
A. Organizational overview and external environment						
<i>IR What does the organization do and what are the circumstances under which it operates?</i>						
1. Organization's mission and vision(culture, ethics and values)	1 (5.56%)	15 (83.33%)	1 (5.56%)	1 (5.56%)	-	2.11
2. Vision for the future addressing relevant sustainability challenges	3 (16.67%)	13 (72.22%)	1 (5.56%)	1 (5.56%)	-	2.00
<i>Significant factors affecting the external environment and the organization's response</i>						
<i>Aspects of the social context, that affect the organization's ability to create value in the short, medium or long term</i>						
3. Employee turnover	8 (44.44%)	6 (33.33%)	4 (22.22%)	-	-	1.78
4. Strikes and labour disputes during the year under review(context, mitigation procedures)	17 (94.44%)	-	1 (5.56%)	-	-	1.11
5. Occupational health and safety information (context, linkage to strategic objectives)	9 (50.00%)	7 (38.89%)	1 (5.56%)	-	1 (5.56%)	1.72
6. Description of human and indigenous rights and labour practices in the supply chain	12 (66.67%)	5 (27.78%)	1 (5.56%)	-	-	1.39
7. Social impacts of their major suppliers	11 (61.11%)	4 (22.22%)	1 (5.56%)	2 (11.11%)	-	1.67
8. Equal opportunities and transformation in the workforce	1 (5.56%)	12 (66.67%)	5 (27.78%)	-	-	2.22

9. Employees programs for skills management and lifelong learning that support continued employability of employees	6 (33.33%)	9 (50.00%)	3 (16.67%)	-	-	1.83
10. Commitment to community development and upliftment	4 (22.22%)	5 (27.78%)	7 (38.89%)	1 (5.56%)	1 (5.56%)	2.44
11. Disclosure of non-compliance, fines or prosecutions	11 (61.11%)	5 (27.78%)	1 (5.56%)	1 (5.56%)	-	1.56
<i>Aspects of the environmental context, that affect the organization's ability to create value in the short, medium or long term</i>						
12. Environmental impacts;	5 (27.78%)	9 (50.00%)	3 (16.67%)	1 (5.56%)	-	2.00
13. Measurable targets relating to greenhouse gas emissions;	6 (33.33%)	2 (11.11%)	6 (33.33%)	1 (5.56%)	3 (16.67%)	2.61
14. Commitments to reduce reliance on renewable and non-renewable resources;	5 (27.78%)	7 (38.89%)	5 (27.78%)	1 (5.56%)	-	2.11
15. Waste and pollution associated with operations accounted for and measured;	7 (38.89%)	7 (38.89%)	3 (16.67%)	1 (5.56%)	-	1.89
16. Significant impacts of transporting products, goods and materials;	15 (83.33%)	3 (16.67%)	-	-	-	1.17
17. Environmental impacts of their major suppliers;	8 (44.44%)	7 (38.89%)	1 (5.56%)	2 (11.11%)	-	1.83
18. Health and safety concerns, on local communities;	7 (38.89%)	2 (11.11%)	1 (5.56%)	-	-	1.28
19. Disclosures of legislative and regulatory environment;	5 (27.78%)	3 (16.67%)	1 (5.56%)	1 (5.56%)	-	1.61
20. Discussions about societal issues (population and demographic changes, human rights, health, poverty, education)	8 (44.44%)	8 (44.44%)	2 (11.11%)	-	-	1.67
B. Strategy and resource allocation						
<i>IR Where does the organization want to go and how does it intend to get there?</i>						
21. Resource allocation plans;	16 (88.89%)	1 (5.56%)	1 (5.56%)	-	-	1.17
22. Explanation of how the company will measure achievements and target outcomes.	11 (61.11%)	3 (16.67%)	4 (22.22%)	-	-	1.61

Table 4 reveal the fact that the most debated topic within integrated reports is represented by the organization's mission and vision addressing future sustainability challenges, most of the companies being able to disclose this type of information to a lesser extent (72%) and to some extent (5.56%). As compared to the results obtained by Van Zyl (2013) we can notice an increase regarding this concept, which at that time was attributed the lowest score. The aspects covering resource allocation and measurement are presented at a lower extent within integrated reports, most of the companies not presenting any of the two issues (75%), while 11.11% are revealing at a lower extent, meaning that the topic is only mentioned within the report, not specifically providing any context and 13.88% disclosing these topics to some extent, measured results being discussed in relation to actual or future targets.

Table 4: Average total result regarding sustainability disclosures within IR

Disclosure of the sustainability aspects within the Integrated Reports	Average
Organization's mission and vision	2.056
Aspects of the social context, that affect the organization's ability to create value in the short, medium or long term	1.747
Aspects of the environmental context, that affect the organization's ability to create value in the short, medium or long term	1.796
Resource allocation and measurement	1.389

In addition, the content analysis helps at revealing if the companies declare the type of report issued within the publication title as referring to integrated reports. Only two companies recognize their report as an integrated one (e.g.: Association of Chartered Certified Accountants, The Crown Estate), while the others present the analyzed reports as annual reports or economic and social reports.

In terms of compliance with GRI Guidelines, relating to sustainability disclosures, only two out of 18 companies present at the end of their integrated report a statement with the GRI application level check (A+). The application level check refers to the extent to which integrated reports present part of GRI Guidelines requirements, in our case G3.1. This check does not refer to the quality of information presented in the report and it does not assess the sustainability performance of the organization. Being qualified as A+ reports, this means that parts of the reports are externally assured.

Based on the fact that we have analyzed only the integrated reports aiming to identify the social and environmental disclosures presented, there are also possibilities for companies to include these aspects to a larger extent within standalone corporate social responsibility reports or sustainability reports as presented in the literature review section.

An overall result shows that companies coming from Germany tend to disclose slightly more social and environmental aspects within integrated reports as compared to British and French organizations. This may be due to the national regulatory constraints where countries like France and United Kingdom have a more strictly legislation for publicly listed and large non-listed companies while Germany has no specific regulation on mandatory disclosure of social and environmental aspects as presented also in the literature review section. Thus, companies coming from countries with low regulatory pressure are likely to disclose more on these aspects.

5. Discussion and Conclusions

The results achieved show that companies fail to present a complete picture regarding their social and environmental performances and implicitly fail to achieve the intended purpose of the IIRC in promoting the accounting for sustainability.

Previous studies show that there is a growing commitment among companies to include sustainability issues within their annual reports, more and more companies being able to measure and report economic, environmental, social and governance aspects in accordance with the GRI Guidelines (Gurvitsh and Sidorova, 2012). Moreover, KPMG (2013) observes that 82% of the largest 250 companies in the world issue sustainability reports in accordance with the GRI Guidelines. Gurvitsh and Sidorova (2012) present the way companies tend to report only the positive impacts on society and the environment and show that entities use sustainability reporting to achieve competitive advantages or as a public relations (PR) tool in order to demonstrate to stakeholders a good practice or to obtain financial benefits (Gurvitsh and Sidorova, 2012).

As confirmed by the Van Zyl (2013) empirical study, we can notice that it is a very low level of integration of sustainability issues within integrated reports of the analyzed companies. Also, positive impacts prevail the negative ones, demonstrating the Gurvitsh and Sidorova's (2012) perception upon sustainability disclosures within annual reports.

Future research should emphasize whether companies issuing integrated reports follow all the principles and content elements presented within the IR Framework in disclosing pieces of information and whether entities behaviour regarding ESG aspects differ in various jurisdictions.

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Key Factors of Foreign Trade Competitiveness of the EU and BRICS

Bohdan Vahalík¹, Michaela Staníčková², Lenka Fojtíková³

¹ *Department of European Integration, Faculty of Economics, VSB-Technical University of Ostrava, Sokolská třída 33, 701 21 Ostrava, Czech Republic, e-mail: bohdan.vahalik.st@vsb.cz*

² *Department of European Integration, Faculty of Economics, VSB-Technical University of Ostrava, Sokolská třída 33, 701 21 Ostrava, Czech Republic, e-mail: michaela.stanickova@vsb.cz*

³ *Department of European Integration, Faculty of Economics, VSB-Technical University of Ostrava, Sokolská třída 33, 701 21 Ostrava, Czech Republic, e-mail: lenka.fojtikova@vsb.cz*

Abstract

International competitiveness is influenced by globalization processes in the world economy in recent decades. This process changes the comparative advantages of each country and the share of individual countries in world trade is transformed. BRICS countries strength quickly its influence in international trade, and thus the European Union must face new pressure in competitiveness from their side. The aim of this paper is to define key factors of foreign trade competitiveness of evaluated economies by an application of factor analysis. Factor analysis contains indicators of foreign trade which describe driving forces of competitiveness, also in terms of long-term potentiality, and those which are direct or indirect outcomes of a competitive society and economy. Based on factor analysis results, it is possible to classify evaluated territories through according to level of foreign trade advancement.

Keywords: BRICS, international trade, competitiveness, EU, factor analysis

1. Introduction

Modern macroeconomics deals very often with two new phenomena: globalization and competitiveness, which dominate today's global economy. Both phenomena exist in the world economy for long times, although in different forms. The world economy has changed rapidly since the last wave of globalization. International economic relations have deepened due to technology changes, investments and financial market and finally international trade. However the concept of competitiveness is very young, its essence lies in the beginnings of classical economics. Early stages of international trade were

based on comparative advantages of individual countries that came out of the division of labor and productivity. Development of international environment for the centuries then changed the perspective on the role of competitiveness in the world economy. Contemporary international relations are based on economies of scale, industry specialization, innovations, technologies and knowledge, size and openness of market etc. The driving forces of competitiveness have expanded from pure price-cost factors on broad scale of specialized economic as well as non-economic factors.

The competitiveness of countries is relatively new topic that has enjoyed economic interest in last decades. Although there is no uniform definition of competitiveness, the process of evaluation efficiency and effectiveness begun at the microeconomic level (companies or industries). Later, the interest of evaluation of competitiveness shifted also at level of individual countries. While it said that international trade takes place between states, in fact, the companies are the true members of international business relations. Individual countries then provide and improve the environment in which businesses operate. Behind this shift is precisely the effect of globalization that brings the comparative advantages of economies globally and thus the rapid development increases demands on their competitiveness. From the view of international trade, the globalization also changes the comparative advantages of each country and the share of individual countries in world trade is transformed. Developed countries, under the pressure of globalization and increased competitiveness of developing countries, decline their share of international events. BRICS countries strength quickly its influence in international trade, and thus the European Union must face new pressure in competitiveness from their side.

The concept of international competitiveness of nations makes sense only within a national economic context because it is characterized by the country's outside performance in international environment. In the international trade can be applied that the country has become more competitive, if improves its position in international markets as a result of various factors. Countries accept economic and trade policies that affect the ability of enterprises and industries succeed in international trade. Also the international environment supports stronger business relations and allows easier access to foreign markets and increased competition. The World Trade Organization (WTO) rules force domestic markets to open up and liberalized trade for mobilization of untapped business potential. The analysis of macroeconomic performance provides information about characteristic economic features of each country that can explain modern international trade trends. In this context and with respect to topic's actuality, the main aim of this paper is to define key factors of foreign trade competitiveness of evaluated economies. This aim is processed with help of using factor analysis method.

2. Methodology and Data

The empirical analysis starts from building database based on foreign trade competitiveness which are grouped according to the different dimensions (input versus output aspects) of competitiveness they describe. The terms 'inputs' and 'outputs' are meant to classify pillars into those which describe driving forces of competitiveness, also in terms of long-term potentiality, and those which are direct or indirect outcomes of a competitive society and economy. FA begins from creating a database of indicators ordinarily used to evaluate trade efficiency and flows of economy. The main source for creating indicators were the European Statistical Office (Eurostat) – International Trade

Statistics, database of United Nations Conference on Trade and Development (UNCTAD) – UNCTAD statistics, and database of the World Bank (WB). The most crucial issue to build a model for international competitiveness' evaluation is the identification of convenient indicators of inputs and outputs. In this paper, database consists of 38 indicators – 21 inputs and 17 outputs; see Table 1. The indicators of inputs and outputs were chosen from general indicators which are used in general for analysis of international trade efficiency, trade flows and general description of the position of the country in the world economy.

Table 1: Database of Input/Output Indicators

Input indicators	Output indicators
Share of import on GDP	Share of export on GDP
Country's share on world imports	Country's share on world exports
Import concentration index	Export concentration index
Import diversification index	Export diversification index
Number of imported products by SITC 3-digit level	Trade complementarity
Raw intensity of exports	Intra-industry trade
Working intensity of exports	Trade specialization index
Technological intensity of exports	Number of exported products by SITC 3-digit level
Capital intensity of exports	Gross domestic product
Share of the population at 15-64 ages	Gross domestic product per capita
Income per capita in PPP	Primary products for export
Demand	Resource based manufactures for export
FDI inflows as % of GDP	Low-tech manufactures for export
Inflation rate	Medium-tech manufactures for export
Exchange rate of national currency/USD	High-tech manufactures for export
Political stability	Terms of trade
Government effectiveness	Trade balance
Public expenditure on education % of GDP	
Fixed broadband internet per 100 people	
The number of cars per 100 inhabitants	
Railways in kilometres	
Total number = 21	Total number = 17
38 input/output indicators for the FA	

The indicators of input represent sources of productivity to create outputs. In the case of evaluation of international trade competitiveness of selected countries, the indicators on the side of inputs were chosen as the representatives of driving forces of competitiveness in international trade. As the first group of input indicators was chosen different indexes of import, because one part of import enters production and the other part satisfies that part of the demand, which is not a recipient country's able to meet its resources. We classified in this group indicators as: share of import on GDP, country's share on world imports, import concentration index, import diversification index and number of imported products by SITC 3-digit level. The second group is formed from indicators by factor intensity of exports. This classification is based on the fact that every economy is made up of some resources that make producing export products. The amount, type and quality of these sources give each economy some comparative advantage on international markets. Breakdown by factor intensity of exports was reposted and adjusted from Jandová (2008) on: raw intensity of exports, working intensity of exports, technological intensity of exports, and capital intensity of exports. The next group is created by indicators generally used in national competitiveness evaluation as the sources of competitiveness and they can be divided into two sub-categories. First sub-category is formed by quantitative indicators as: share of the

population at 15–64 ages, income per capita in PPP, demand, FDI inflows as % of GDP, inflation rate, exchange rate against USD and railways in kilometres. These indicators are revealing about the possibility and size of consumption, business environment, economic stability etc. Second sub-category includes qualitative indicators of the economy: political stability, government effectiveness, and public expenditure on education % of GDP, fixed broadband internet per 100 people, the number of cars per 100 inhabitants; as representatives of infrastructure, quality and wealth of society.

The indicators of output represent direct or indirect results of economy's competitiveness. The result of input factors that are shaping by the internal and external influences is external economic performance, which is reflected in the export side of the foreign trade. The first group includes indicators of export efficiency as: share of export on GDP, country's share on world exports, export concentration index, export diversification index, trade complementarity, intra-industry trade, trade specialization index, number of exported products by SITC 3-digit level and trade balance. The second group of indicators is formed by the degree of technological intensity of exports. This classification is based on Lall (2000) technological classification of export which was actualized by SITC 3-digit, revision 3. This classification contains groups as: primary products for export, resource based manufactures for export, low-tech manufactures for export, medium-tech manufactures for export, and high-tech manufactures for export. The last group of indicators consists of gross domestic product, gross domestic product per capita and terms of trade. These indicators were chosen as representatives of the classic way for competitiveness evaluation of international trade because they are influenced by the final form of foreign trade.

Many scientific studies are featured by the fact that numerous variables are used to characterize objects, e.g. Martin (2003) or Melecký (2012). Because of these big numbers of variables that are into play, the study can become rather complicated. Besides, it could well be that some of the variables measure different aspects of a same underlying variable. For situations such as these, Factor Analysis (FA) has been invented. FA is the statistical approach that can be used to analyse interrelationships among a large number of variables and to explain these variables in terms of their common underlying dimensions, i. e. factors. The main applications of FA are thus – to reduce the number of variables by grouping them into a smaller set of factors and to detect structure in the relationships between variables – for this purpose is FA applied in the paper. FA is a collection of methods for investigating whether a number of variables of interest Y_1, Y_2, \dots, Y_n , are linearly related to a smaller number of unobservable factors F_1, F_2, \dots, F_k . If we suggest that one measured variable Y_1 , is function of two underlying factors, F_1 and F_2 , then it is assumed that Y variable is linearly related to the two factors F , as follows (1) (Hair, 2009). The error terms e_1 , serves to indicate that the hypothesized relationships are not exact. In the special vocabulary of FA, the parameters β_{ij} is referred to as loadings, e.g. β_{12} is called the loading of variable Y_1 on factor F_2 .

$$Y_1 = \beta_{10} + \beta_{11}F_1 + \beta_{12}F_2 + e_1. \quad (1)$$

Why carry out factor analyses? If we can summarise a multitude of measurements with a smaller number of factors without losing too much information, we have achieved some economy of description, which is one of the goals of scientific investigation. It is also possible that FA will allow us to test theories involving variables which are hard to measure directly. Finally, at a more prosaic level, FA can help us establish that sets of questionnaire items (observed variables) are in fact all measuring the same underlying factor (perhaps with varying reliability) and so can be combined to form a more reliable

measure of that factor. There are a number of different varieties of FA (Stevens 1986). Because indicators are constructed for ‘inputs’ – driving forces of competitiveness and ‘outputs’ – direct or indirect outcomes of a competitive society and economy, policy and activities; also empirical analysis by FA is calculated separately for ‘inputs’ and ‘outputs’ aspects through IBM SPSS Statistics 22 software. For calculation the input and output factors of competitiveness by FA is used: Principal Component Analysis as extraction method; Varimax with Kaiser Normalization as rotation method.

FA is in following chapter applied for the EU Member States (EU 28), i.e. (in alphabetical order) – Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherland (NL), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK) and Slovenia (SI), Spain (ES), Sweden (SE), United Kingdom (UK) and for BRICS countries – Brazil (BR), Russia (RU), India (IN), China (CH), South Africa (SA). Reference period covers all years within 2004-2013, i.e. ten years. The period 2004-2013 was chosen because of the data availability at national level (year 2013) and year 2004 can be considered as year when all EU 28 were already somehow integrated in the EU. In this year, EU 15 were the EU Member States, and EU 13 were already either candidate or potential candidate countries for the EU membership. Integration process meant and means elimination or better reduction and progressive elimination of obstacles to the Single European Market (SEM) freedoms’, and thus to foreign trade and higher international competitiveness in comparison with other non EU countries or integration groups. Measuring the EU and BRICS key factors of foreign trade competitiveness is thus based on procedure in Table 2.

Table 2: Scheme of Analysis

Pre-processing phase	
Collection of indicators » Analysis of indicators » Groups of input/output indicators	
Data analysis	
Descriptive statistics of input/output indicators » Data standardization: Z-score matrix	
Factor analysis	
Principal component analysis » Varimax with Kaiser Normalization » Input/output factors description	

3. Results

What is the background of foreign trade competitiveness within EU 28 and BRICS countries? What are the key factors having impact on competitive advantages and disadvantages on these countries? These questions motivate to empirical study of aspects of foreign trade competitiveness. By knowledge factors of competitiveness, the policy makers can better understand the potential development options and limitations for territories and thus plot a development trajectory towards a desired end state.

Driven forces of competitiveness are divided into factors that are crucial for EU and BRICS economies as well. In the paper, six dominating factors for inputs explained 78,038% of total variability in reference period (see Table 3), what can be considered as satisfactory result. Table 3 also shows 21 input indicators and their belonging to relevant input factors of competitiveness, which are classified with respect to their importance, i.e. from the most significant to less significant.

Table 3: Input factors and total variance explained

Total Variance Explained							
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	6,273	29,872	29,872	5,812	27,676	27,676	
2	3,827	18,224	48,096	2,936	13,979	41,654	
3	2,130	10,143	58,238	2,839	13,519	55,173	
4	1,781	8,483	66,721	1,724	8,209	63,382	
5	1,221	5,816	72,537	1,559	7,425	70,808	
6	1,155	5,501	78,038	1,518	7,231	78,038	
Rotated Component Matrix							
Factors	Indicators	Component (Factor Loadings)					
		1	2	3	4	5	6
Factor 1 Economic Performance	Zscore(EVS)	,883					
	Zscore(INC)	,843					
	Zscore(PS)	,816	-,418				
	Zscore(INT)	,784					
	Zscore(TN)	,759					-,341
	Zscore(AUT)	,739					,309
	Zscore(VVV)	,685		-,362			
Factor 2 Economy Scope	Zscore(INF)	-,684					
	Zscore(SWI)		,942				
	Zscore(D)		,940				
Factor 3 Import Sophistication	Zscore(Z)	-,407	,646				
	Zscore(KI)			,858			
	Zscore(DI)			,845			
Factor 4 Input Scope	Zscore(IP)		,413	-,721			
	Zscore(KN)			-,681	,455		
	Zscore(PZI)				,754		
Factor 5 Production Intensity	Zscore(IMP)	,413	-,428		,602		
	Zscore(PN)					-,823	
Factor 6 Additional Trade Aspects	Zscore(SN)	-,526				,709	
	Zscore(PP)						-,750
	Zscore(SK)	,429			,362		,611

Output factors represent direct or indirect outcomes of a competitive society and economy. In the paper, six dominating factors for outputs explained 84,368% of total variability in reference period (see Table 4), what can be considered as very satisfactory result. Table 4 also shows 17 output indicators and their belonging to relevant output factors of competitiveness, which are classified based on their importance as above.

Table 4: Output factors and total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,729	33,698	33,698	4,900	28,825	28,825
2	2,680	15,762	49,460	2,249	13,227	42,052
3	2,074	12,198	61,658	1,952	11,485	53,537
4	1,630	9,590	71,247	1,817	10,688	64,225
5	1,214	7,140	78,387	1,775	10,439	74,664
6	1,017	5,981	84,368	1,650	9,704	84,368
Rotated Component Matrix						
Factors	Indicators	Component (Factor Loadings)				

		1	2	3	4	5	6
Factor 1 Export Sophistication	Zscore(OK)	,894	,356				
	Zscore(DE)	-,881	-,333				
	Zscore(GLI)	,858			,323		
	Zscore(MT)	,855					
	Zscore(KE)	-,776					,415
	Zscore(RB)	-,526		,309		-,513	,306
	Zscore(SR)	-,448		,336	-,380	,301	,404
Factor 2 Economy Scope	Zscore(HDP)		,963				
	Zscore(SWE)		,952				
Factor 3 Export Structure	Zscore(HT)			-,836			
	Zscore(PEP)	,600		,632			
	Zscore(PP)	-,444		,614			,395
Factor 4 Standard of Living	Zscore(HDPpp)				,860		
	Zscore(EXP)				,764		
Factor 5 Standard of Trade	Zscore(B)					,806	
	Zscore(TSI)					,759	
Factor 6 Low- Technology Export	Zscore(LT)						-,955

4. Discussion and Conclusions

The factor analysis of inputs extracted six dominating factors for inputs which explain 78,038% of total variability in reference period 2004–2013. The result of factor analysis for a set of input indicators were obtained as rotated component matrix which can be interpreted as correlation coefficients between the indexes and firmly specified number of factors. The Factor 1 – Economic Performance contains eight variables (government effectiveness, income per capita in PPP, political stability, fixed broadband internet per 100 people, technological intensity of exports, the number of cars per 100 inhabitants, public expenditure on education % of GDP and inflation rate) which explain 27,676% of total variability. The largest and most important factor does not include any purely foreign trade indicator. Instead, it includes indicators which testify about the domestic market development and its readiness to create and maintain business relationships with the external environment. This factor captures the importance of the institutional background functioning of each economy, standard of living, macroeconomic stability and the level of technology and education. These inputs then create the most important factor for foreign trade. The Factor 2 – Economy Scope consists of three variables as country's share on world imports, demand and railways in kilometres. This factor explains 13,979% of variance. These variables indicate the size of economy which is important for foreign trade not only in terms of final consumption, but also for the ability to transform inputs into outputs. Greater integration into the global economy brings new opportunities for further development. The size and quality of infrastructure is crucial for international trade. The Factor 3 – Import Sophistication is created by 4 variables which explain additional 13,519% of variance. The indicators of this factor are: import concentration index, import diversification index, number of imported products by SITC 3-digit level and capital intensity of exports. This factor explains the

sophistication inputs entering the economy, which indicate the quality and quantity of resources for further production. The concentration and diversification index shows the structure and stability of input channel of economy's foreign trade. The number of groups of imported products captures the intensity of consumption and production. The amount of capital in the economy is very important input for investment, research and technological development, which creates a driving force of foreign trade relations. The Factor 4 – Input Scope contains two other indicators (FDI inflows as % of GDP and Share of import on GDP) which explain 8,209% of variability. This is purely quantitative factor illustrating the magnitude of the involvement of the economy to international trade and capital flows on the input side. The Factor 5 – Production Intensity which clarifies 7,425% of total variability is made by two another indicators testifying intensity of production. The raw intensity of exports and working intensity of exports shows the amount of natural resources and human work as a need of the economy to create exports. The more the economy is dependent on natural inputs and labour; it tends to be less capital and technology intensive. Input structure is then reflected in the structure of foreign trade outputs, i.e. into the structure of exports. The last factor of inputs, Factor 6 – Additional Trade Aspects contains another two indicators: share of the population at 15-64 ages and exchange rate of national currency/USD. Most of world trade is negotiated in US dollars. This also applies to prices of production inputs. Energy and mineral resources, which are traded on world markets, are traded in US dollars. Many banking transactions are conducted in US dollars. Development of the national currency against the US dollar is therefore crucial and determines the size of inputs into production and overall economic performance. The size, structure and quality of the working age population have a significant impact on the size of foreign trade.

The factor analysis of outputs reached also six dominating factors for outputs which explain 84,368% of total variability in reference period 2004-2013. The result of factor analysis for a set of output indicators were obtained from another rotated component matrix. The Factor 1 – Export Sophistication consists of seven variables (trade complementarity, export diversification index, intra-industry trade, medium-tech manufactures for export, export concentration index, resource based manufactures for export and terms of trade) which explain 28,825% of total variability. Unlike the biggest factor in the input group, all indicators of this factor relates to foreign trade resp., export. This factor explains the sophistication of outputs extending from the economy that indicate the quality and quantity of export. Trade complementarity and intra-industry trade shows the alignment of export structure with the main trade partners. The concentration and diversification index shows the structure and stability of output channel of an economy. Resource based and medium-tech manufactures for export represent the quality of export and they are included in Factor 1, because they have reached the major share of exports of selected countries. Terms of trade fundamentally affect the size of foreign trade because capture efficiency of the economy in relation to other countries. Terms of trade essentially express the relationship between the movement of export and import prices. The Factor 2 – Economy Scope contains two variables: gross domestic product and share of export on GDP, which explain 13,227% of variance. The gross domestic product indicator is fully acceptable because the result of foreign trade enters and influences the GDP of each country. The second indicator explains the joining of the country's output side in the world economy. The Factor 3 – Export Structure is created by three indicators and explains 11,485% of total variability. There is indicator of high-tech manufactures for export, number of exported products by SITC 3-digit level and primary products for export. The first and last indicator is

included in this factor because they express the share on the export structure and the second indicator means the amount of export's structure. The Factor 4 – Standard of Living consists of two variables which explain additional 10,688% of total variability. The gross domestic product per capita and share of export on GDP shows the standard of living. Export is for most of economies the main source of income which enters living conditions, productivity and wealth being. The Factor 5 – Standard of Trade which explains 10,439% of variability consist of trade balance and trade specialization index. The trade balance indicator is absolutely obvious indicator of international trade. Trade specialization index which measures the degree of specialization in the production/consumption of goods through trade is closely related with trade balance because it is counted as net flow of goods to the total flow of goods by product. The last factor, Factor 6 – Low-Technology Export, has only one variable. It is low-tech manufactures for export which explains 9,704% of variance what indicate that in many countries is export still dependent on low level of technologies and primary sector.

Competitiveness of territory resides not only in competitiveness of its constituent individual entities and their interactions, but also in the wider assets and social, economic, institutional and public attributes of the country itself. The notion of competitiveness is as much about qualitative factors and conditions (e.g. untraded networks of informal knowledge, trust, social capital, etc.) as it is about quantifiable attributes and processes (e.g. inter-firm trading, patenting rates, labour supply, etc.). Sources of competitiveness may also originate at a variety of geographical scales, from the local, through regional, to national and even international (Martin, 2003). The emergence of new perspectives in creating competitive advantages at regional level clearly emphasizes the role of local factors and initiative in the general economic development. This is starting point for further studying the role of efficiency regarding economic governance of resources utilization (inputs) for achieving objectives of increasing of competitiveness (output) by the Data Envelopment Analysis approach (Melecký, 2013) and for making classification on countries exactly according to the values of factor scores for each country within all evaluated years having thus differences among countries.

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High-Growth Enterprises and Policy Implications

Katarína Valenteová¹ and Ladislav Bažó²

¹Department of Services and Tourism, Faculty of Commerce, University of Economics in Bratislava, Dolnozemska cesta 1, 852 35 Bratislava, Slovak Republic, e-mail: katarina.valenteova@euba.sk

²Department of Services and Tourism, Faculty of Commerce, University of Economics in Bratislava, Dolnozemska cesta 1, 852 35 Bratislava, Slovak Republic, e-mail: ladislav.bazo@euba.sk

Abstract

Prior studies indicate that high-growth enterprises significantly contribute to the economic growth and to creating new jobs. Indicating such a key driver of growth and employment, especially in the times of overcoming the global impact of financial and economic crisis, high-growth enterprises experience an increased interest of policy makers, although compared to the US and some Asian economies, Europe has performed poorly in generating high-growth enterprises. The purpose of this paper is to assess current developments in policies for high-growth enterprises in the EU and to provide an overview of recent studies on this issue.

Keywords: high-growth enterprises, SMEs, policies, implications.

1. Introduction

Evidence of available literature on high-growth enterprises shows significantly positive impact of their performance on various economic indicators what attracts attention of policy makers around the globe. It must be stated, that policy attention for high-growth enterprises in Europe is limited. Among other reasons it is a result of absence of comparable data on European as well as on national level.

The aim of this paper is to characterize recent developments in policies for high-growth enterprises (with emphasis on SMEs) in the EU and to provide an overview of recent studies on this issue.

2. Methodology and Data

The methodology embraced for purposes of paper was a multi-method research approach. The majority of studies use a quantitative approach towards measuring the number and characteristics of high-growth enterprises, with only a minority adopting a qualitative approach to gain a richer appreciation of the entrepreneurs, business activities, strategies and success factors. These approaches need to be seen as being complementary to one another. Hence, in order to fully capture the complexities of high-growth firms this paper has adopted a multi-method research approach involving both quantitative and qualitative elements.

There were four main elements to the study:

- Literature review
- Secondary data analysis
- Secondary information analysis
- Secondary questionnaire research

All the secondary data and information are excerpted from major relevant journal articles and publications of major organizations (OECD). Quantitative data on prevalence of high-growth enterprises are used from the database of Entrepreneurship Indicators Programme (EIP). We use also the results of secondary questionnaire research of S. Lilischkis et al. (2013).

3. EU Policies and Initiatives Fostering High-Growth Enterprises

3.1. Characteristics and Occurrence of High Growth Enterprises

For more than several decades the researchers have not reached an agreement on a standard definition of high growth enterprises. The most popular definitions were presented by the works of Birch et al. (1995) and Schreyer (2000) in his OECD study.

David Birch uses measurement of absolute and negative changes in growth to overcome the bias within measuring company growth rate as shown in (1) below (Petersen, Ahmad 2007):

$$Growth = (x_{t_1} - x_{t_0}) \frac{x_{t_1}}{x_{t_0}}, \quad (1)$$

where x represents either number of employees, turnover or other indicator in year t .

In comparison, Schreyer (2000) via his “Schreyer indicator” has introduced a combination of relative and absolute firm employment growth measurement based on Birch’s research. He is also of Birch’s opinion that a growth measure should be the result of effective management and innovation strategies and it’s not limited to a specific size of a firm:

$$S = (x_{t_{1+3}} - x_t) \frac{x_{t+3}}{x_t}, \quad (2)$$

where $x_{t_{1+3}}$ and x_t denote employment at the end and beginning of the referential period. According to this indicator, enterprises reaching 10% of the highest value of indicator would be defined as high-growth companies.

Hoffman and Junge (2006) proposed additional requirement of at least 60% 2-year growth with a minimum 20% growth per year.

In 2006, OECD proposed a widely accepted definition of high-growth enterprises resembling that of Birch et al. (1995) and Hoffman and Junge (2006).

Also for purposes of this paper, we use the mentioned OECD definition as it enables longitudinal and international comparisons. High-growth enterprises are defined as “all enterprises with average annualized growth greater than 20% per annum, over a three year period should be considered as high-growth enterprises. Growth can be measured by the number of employees or by turnover” (Eurostat-OECD, 2007, p. 61).

Those enterprises not older than 5 years with average annualized growth bigger than 20% per annum, over a three year continual period, are considered the term “gazelles” and represent a small share of total population of enterprises with ten and more employees in the economy (Eurostat-OECD, 2007).

Institute for small business and entrepreneurship (2009) at its 2009 ISBE Conference has presented important findings about high-growth enterprises from its research:

1. Only a few fast-growing enterprises generate a large share of net new jobs. This can be particularly seen during economic downturns when these firms continue to grow.
2. High-growth enterprises can be of all sizes.
3. In terms of high-growth, newness is more important factor than size.
4. High-growth enterprises and Gazelles may be found in all industries. Instead of general thinking, they are over-represented in services rather than in high technology industries.

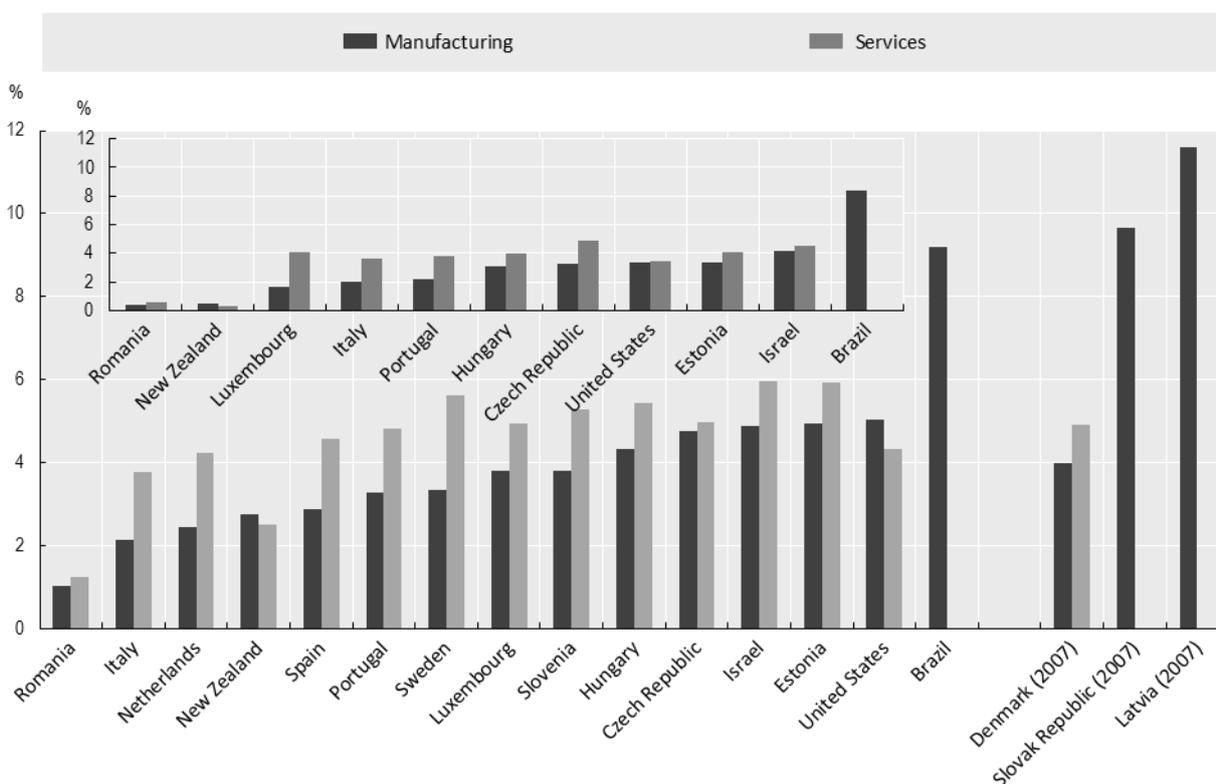


Figure 1: Rate of high-growth enterprises as of 2008 or latest year available (employment definition)

Notes: Data for Denmark, Israel, Latvia and the Slovak Republic are compiled according to ISIC 3.

Data for Denmark, Latvia, and the Slovak Republic are from 2007

Source: OECD, 2012

Under the OECD-Eurostat Entrepreneurship Indicators Programme (EIP) which has launched in 2006, internationally comparable indicators are provided covering robust statistics on entrepreneurship. EIP provides also data on prevalence of high-growth enterprises, however, statistics is still limited as data are available only for several countries. The most recent data are of 2008 or latest year available (Figure 1).

Among the countries for which data is available (divided by manufacturing and services – smaller figure covers year 2009, bigger covers year 2008).

The top for manufacturing was Latvia (11.61%), Slovak republic (9.66%) and Brazil (9.21%). The following countries were the USA (5.03%), Estonia (4.94%), Israel (4.90%), Czech Republic (4.77%) and Hungary (4.34%). For both manufacturing and services Estonia performed best (4.94% high-growth enterprises in manufacturing, 5.94% in services). The following countries were Israel (4.90%/5.97%), Czech Republic (4.77%/4.97%) and the USA (5.03%/4.33%). Of course, this picture is only a fragment as 4 out of 6 largest European economies are missing (Germany, France, Poland and United Kingdom) and no data for any Asian country is used.

3.2. Policies to Support High-Growth SMEs in the EU

There are many open methodological questions regarding high-growth enterprises. First, there is present a challenge of defining and selecting the right high-growth enterprises. For example, many current policies tend to focus on high-technology sectors, despite the fact, that empirical findings, as mentioned above, show over-representation of high-growth enterprises in other sectors (Kolar, 2014).

For further analytical steps, as other authors, we will concentrate on small and medium enterprises (SMEs) which are likely to achieve high growth (large high growth firms are better able to achieve their needs). Therefore, policies and initiatives designated SME friendly shall be especially applied for high-growth enterprises.

In Europe, policy attention to high-growth SMEs is significant, but on the level of Member States, it is quite limited. Such programs for the whole EU include Eurostars and the growth coordinator European Investment Fund (Lilischkis, 2011). According to Moore (2012), targeted national policies for high-growth SMEs can be mainly found in Norway, Finland and Denmark, similarly, targeted policies are implemented in Estonia, France, Ireland, Netherlands and Spain.

While there is present and increasing trend in studies about high-growth enterprises, the studies aiming at research about policies to support high-growth SMEs is very scarce. Among the most sophisticated studies about policies applied to high-growth enterprises are the ones by the OECD (2010) and Autio et al. (2007).

OECD research (2010) recommends a set of assorted tools to foster high-growth SMEs: improvement of business environment, encouraging entrepreneurship motivation, supporting of training in young and small enterprises, improvement of access to debt and equity finance and promoting innovation and internationalization activities. According to Lilischkis (2011), in fact, national policies concentrate rather on fostering R&D activities and access to finance instead of supporting growth of SMEs.

Authors Autio et al. (2007) executed a disquisitional analysis of policies targeted at high-growth enterprises. The study team focused on lessons and good practices stemming from high-growth SMEs policies in nine selected countries – Italy, Spain, Netherlands, the UK, Hungary, Finland, Australia, Brazil and Hong Kong. In summary, dedicated policies and initiatives aimed at high-growth enterprises should:

- Be highly selective, when talking about selection of participating enterprises and entrepreneurs. The reason is that only a few of them are willing and have the ability to achieve significant growth.
- Be proactive. There should be established support agencies, which would scan the environment and seek for potential high-growth enterprises rather than waiting for SMEs seeking for support individually. The authors warn about the potential of abusive practices.
- Tight collaboration with private-sector service providers what can ensure experience-based skills in managing high growth and enhancing credibility of the initiative.
- Be enhancing professionalism and competences. This shall support certain degree of exclusivity what helps to providing real value and credibility.
- Providing persistent effort as the enterprises' may be volatile.
- Involving highly customized and tailored management development activities which support experience sharing and involve interactive approach.
- Focus on development of managerial competencies, which are crucial for sustaining firm growth.

Table 1: Principal differences between general SME policy and high-growth SME policy

	SMEs Policy	High-Growth SMEs Policy
Policy Goals in relation to:		
entrepreneurs	allure more people to run a business	allure the right people to run a business
enterprises	support new start-ups	support the growth of existing enterprises
operational environment	facilitate business environment for SMEs	facilitate environment for firm growth
Resource Provision		
source	mostly public sources	combined public/private sources
type of financial sources	grants, subsidies, soft loans	R&D loans, innovations grants, business angels, venture, IPOs
dominant service	basic advice for firm creation, business planning	experience-based advice, strategic planning
resource distribution	equal access for everyone	select promising recipients
Regulatory Emphasis		
life cycle focus	remove bottlenecks to new business entry	remove bottlenecks to new to firm growth
fiscal regulations	reduce VAT for small firms	treat share options neutrally
attitude toward failure	avoid failure, bankruptcy	accept failure, but reduce related economic and social cost
links to other policy domains	industrial, social, labor policy	industrial, innovation, labor policy

Source: Autio et al., 2007

To be more precise in terms of what is a general SME policy and special SME policy focused on high-growth enterprises, Autio et al. (2007) developed a comparative overview between these approaches to policies (Table 1).

Anyadike-Danes et al. (2009, p. 39) under the UK National Endowment for Science, Technology and the Arts initiative provided a comprehensive study focused on the UK business growth in order to provide implications and the direction of the UK economic policy. The results also show that supporting high-growth enterprises is “perhaps a better policy option” for job creation than a general business support policy for SMEs. They recommend to continuing the development of such policies that shall facilitate the emergence of high-growth enterprises and their special needs

Moreover, as suggested by Lilischkis (2011, p. 7) “rather than trying to “pick winners”, policy makers should set framework conditions right to prepare a fertile ground for winners to pick themselves”.

These policies are generally agreed to contribute to growth of enterprises:

Table 2: Typology of policy areas supporting high-growth enterprises

Policy Area	Detail
Framework conditions for innovation and growth	<ul style="list-style-type: none"> – taxation, not excluding tax landscape for investors – financing (public/private) – education (secondary and higher) – research (publicly financed)
Stimulation of innovation demand	<ul style="list-style-type: none"> – innovation public procurement – pre-commercial procurement – standardization – product market regulations – support to internationalisation
Financing innovation and growth	<ul style="list-style-type: none"> – equity provisioning – corporate venturing – loans – grants for R&D activities – dedicated tax measures
Ecosystem for innovative firms	<ul style="list-style-type: none"> – science parks, incubators – clusters – human networks and resources – mentoring – awareness raising – skill development and accelerators
Business support services	<ul style="list-style-type: none"> – consultancy – sectoral federations and professional associations – chambers of commerce – clubs

Source: Lilischkis, et al., 2013a

During the Mutual Learning Seminar on Research and Innovation policies held on 20th March 2014 (European Commission) on policies to support high growth innovative enterprises it was concluded that design of specific policies targeting high-growth enterprises is solely based on the ability of public administration to identify and target such enterprises. While some countries alleged that targeting high-growth enterprises is too difficult or not possible at all, several other countries are able to apply specific

measures that target these enterprises- The two main policy options are thus (Kolar, 2014):

- focus solely on improvement of general framework conditions, business environment and elimination of barriers to do business (in addition to these activities),
- specific measures for targeting high-growth enterprises.

Lilischkis et al. (2013a) have collected opinions from high-growth enterprises from the EU 4 (UK, Germany, France and Poland) and policy makers by a questionnaire on perceived needs for specific policies targeted at high-growth enterprises (Figure 2). 41% of high-growth enterprises replied they had used a specific state support measures and almost all enterprises consider the support helpful. High-growth enterprises suppose that the best support lies in enhancing skills of companies' employees, supporting internal R&D, intellectual property protection, public-private R&D, internationalization and equity and debt finance. According to the results of the survey, difficult access to finance is one of the biggest perceived barriers to enterprise's growth.

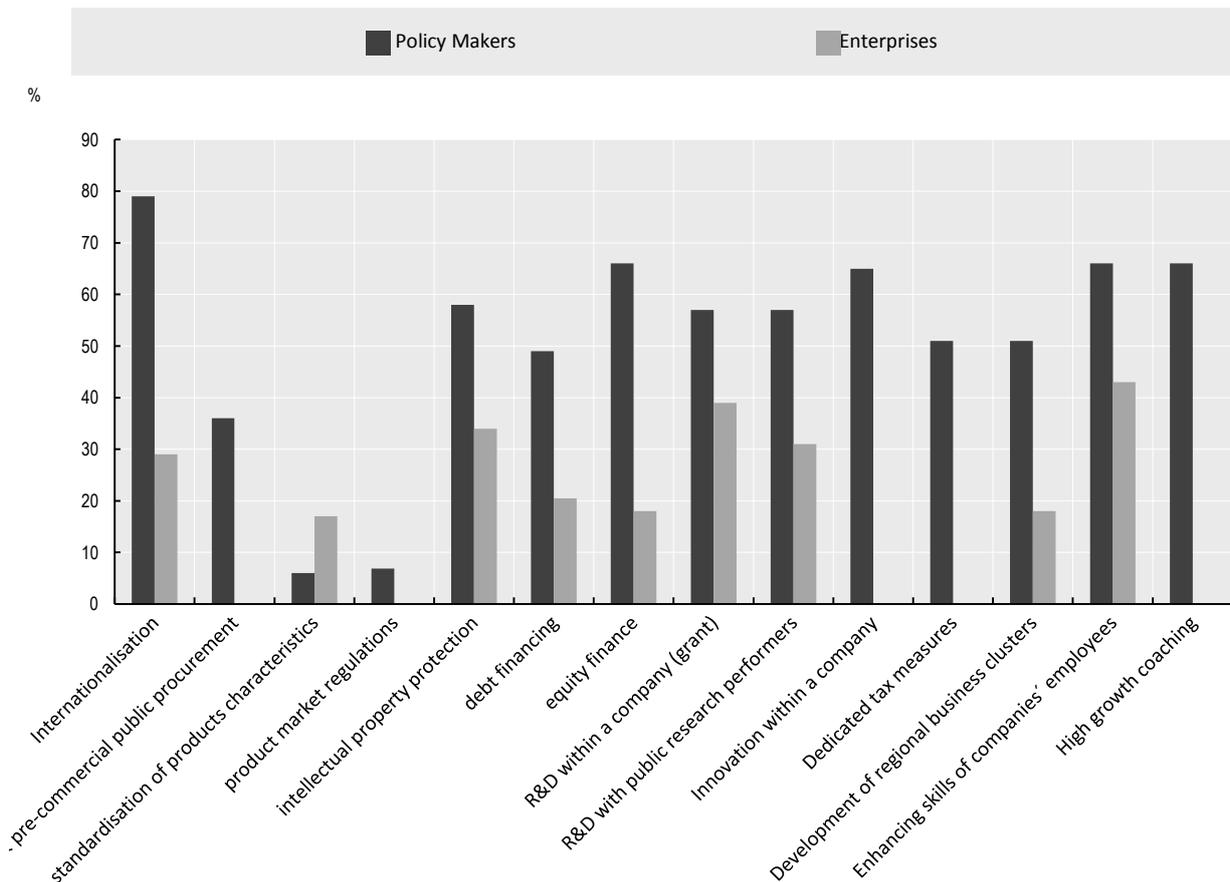


Figure 2: Main perceived needs for public policy by high-growth enterprises in % respondents enterprises by policy makers from 17 countries/regions.

Source: Lilischkis, et al., 2013b

4. Discussion and Conclusions

For achievement of economic growth, what is really needed are new jobs and new growing enterprises who have actually the ability to generate employment. From the aggregate point of view, growing new enterprises are needed for aggregate job creation. From the micro level point of view, enterprises' growth is necessary for the provision of high quality jobs. Both of these policy objectives would be better addressed if entrepreneurship support policies were specifically aimed at promoting firm growth.

In this paper we did not only characterize high-growth enterprises and their occurrence in the EU and several countries around the globe, but we briefly examined policy measures which should be designed specifically for high-growth enterprises.

Main conclusions stemming from this paper may be summarized as following:

- Policies shall focus on SMEs, which are likely to achieve high growth and on addressing the barriers faced by these enterprises.
- According to OECD (2010) recommendations towards national governments aiming at supporting and utilizing the growth potential of enterprises, policy approaches shall encompass following tasks: improvement of business environment, encouraging entrepreneurship motivation, supporting of training in young and small enterprises, improvement of access to debt and equity finance and promoting innovation and internationalization activities.
- In fact, national policies concentrate rather on fostering R&D activities and access to finance instead of directly supporting growth of SMEs.
- According to Autio et al. (2007) analysis, dedicated policies and initiatives aimed at high-growth enterprises should be aimed at selectivity, proactiveness, private sector collaboration, professionalism, sustained efforts and focus on skills.
- Lilischkis et al. (2013a) survey shows that the best support from high-growth enterprises' view lies in enhancing skills of companies' employees, supporting internal R&D, intellectual property protection, public-private R&D, internationalization and equity and debt finance.

It can be recommended, that policies shall focus on addressing the needs of enterprises with the growth potential, what requires a comprehensive research in the field of stimulation the enterprises' high growth, especially in the case of SMEs. Policy initiatives in the area of access to finance and supporting R&D and innovation shall be matched with the support to training and skill upgrading in new and small enterprises.

In conclusion, it is clear, that there is a significant lack of complex data covering the statistics of high-growth enterprises at the country level in the whole EU. We strongly recommend to implement statistical monitoring of this data, what could enable tasks to be investigated more thoroughly and rigorously with the application of econometric techniques.

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Examining Young People’s Attitude toward Special Domestic Items in Hungary

Ákos Varga¹ and Ildikó Kemény²

*¹Department of Media, Marketing Communications and Telecommunication, Faculty of
Business Administration, Corvinus University of Budapest, 8 Fővám tér, 1093 Budapest,
Hungary, email: akos.varga2@uni-corvinus.hu*

*²Department of Market Research and Consumer Behavior, Faculty of Business
Administration, Corvinus University of Budapest, 8 Fővám tér, 1093 Budapest, Hungary,
email: ildiko.kemeny@uni-corvinus.hu*

Abstract

In our study we have examined the awareness and attitudes of young people (18–24 years) in Hungary toward a special selection of items: as several countries in the world, Hungary also has its own list of domestic products, places and historical heritages, which are called ‘hungarikums’. These items could be defined as the core elements of patriotism, thus they are able to induce strong ethnocentric behavior. Our aim was to differentiate the emotional attitudes by gender. To achieve that, we have designed an online survey in order to get a basic understanding about the young people’s attitude toward the hungarikums and the gender differences in this age group.

We have found that the hungarikums are known in this age group, but most of them has a really small spontaneous awareness. Based on the opinion of the respondents the most typical hungarikum is the schnapps (‘pálinka’), and the Ilcsi natural cosmetics are the less typical to our country. By analyzing the gender differences with using ANOVA method we could conclude that the evaluation of the females are significantly higher in eight cases. Based on this evaluation we grouped the hungarikums with using the MDS method, and our results show that there are also some differences between the males and females.

This study is the first step of a complex neuromarketing study, where we examined the visual representation of the hungarikums in an fMRI machine. Further extension of the research project is to check the attention and interest with the usage of an eye tracking device.

Keywords: consumer ethnocentrism, gender difference, consumer behaviour

1. Introduction

The concept of ethnocentrism was developed by Sumner in 1906 (in Shimp, 1984): “it was originally conceptualized as a purely sociological concept that distinguished between in-groups (those groups with which an individual identifies) and out-groups (those regarded as antithetical to the in-groups). Shimp states that consumer ethnocentrism is designed to capture individual consumer cognitions and emotions as they relate to product offerings from other countries.”

The concept has object-based beliefs and attitudes (perceptions of product quality, value, etc.), which stands in the center of our study.

Consumers with strong ethnocentrism consider the consumption of foreign products dangerous, because it threatens the domestic economy, e.g. it could cause unemployment. The non-ethnocentric consumers can make more realistic quality-based judgments of foreign products, thus they prefer the foreign products more frequently (Malota and Berács, 2007).

Shimp and Sharma (1987) with the use of CETSCALE (consumer ethnocentrism scale, a worldwide accepted measurement tool) proved that strong ethnocentrism negatively correlated with consumer’s beliefs, attitudes, and purchase intentions toward foreign-made products (Shimp and Sharma, 1987). They also state that older individuals should manifest particularly strong ethnocentric tendencies because these individuals are especially threatened.

This study is the first step of a neuromarketing research project, aiming to discover young people (18–24 years old) awareness and attitudes toward a special selection of items: as several countries in the world, Hungary also has its own list of domestic products, places and historical heritages, which are called ‘hungarikums’. Thus, the purpose of this study was to identify the youth’s attitudes towards hungarikums, and to discover the gender differences within.

2. Literature review

The connection between different (foreign) products and high emotional involvement was discovered by Crawford and Lamb (1981). They said this involvement is particularly strong when the foreign products threatens the security of domestic economy and job security. Shimp and Sharma (1987) have had similar conclusions. Many other research have focused on the connections between consumers ethnocentrism and purchase intentions: Yelkur et al., 2006; Vida and Reardon, 2008; Nguyen, et al, 2008; Evanshitzky, et al., 2008; Poturak, 2014.

As for the hungarikums: according to the official website, the national treasures (and the hungarikums within) are values meant to be protected and preserved. They can be connected to Hungarian creative processes, production cultures, to knowledge, to traditions, landscape and fauna, national history and to every spiritual and material, natural and common value or product (“Magyar Értéktár – Hungarikumok gyűjteménye,” n.d.).

The protection of our national values contributes the shaping of national identity. Wide-range introduction of our national values within Hungary and abroad as well has top priority, in order to strengthen the country brand itself.

According to the regulation, the hungarikum is a collective name, based on a standardized classing, ranging and record system in order to distinct and highlight

values that are the characteristic features of the Hungarian nation, with their uniqueness, specialty and quality.

The list is approved by the Hungarikum Committee. Currently it consists 42 items, but there is an extended list with 106 items, called ‘national treasures’.

Table 1: Categories of hungarikums (2014/Q2)

Category	Hungarikum
Agriculture and food industry	Pálinka Törkölypálinka Csabai sausage or Csabai thick sausage Tokaji aszú produced in Tokaji vineyard Products from fattened goose Gyulai sausage or Gyulai paired sausage Hungarian grey cattle meat Kalocsa paprika spice Pick salami Hungarian acacia Hungarian acacia honey Herz Classic salami Makó onion
Health and lifestyle	Béres Drops and Béres Drops Extra Ilcsi natural cosmetics
Industrial and Technical solutions	Kürt data recovery Zsolnay porcelain and ceramics
Cultural heritage	Traditional dance house as a transmitter by heredity Busójárás from Mohács Hunting with hawks Matyó folk art Budapest – Banks of Danube, Buda Castle District, Andrásy street Hollókő village The Benedictine arch-abbey of Pannonhalma Hortobágy National Park The early Christian tombs of Pécs Lake Fertő – Neusiedlersee Tokaj wine region Herend Porcelain Hungarian operetta Kassai horse archery Lacework of Halas Folk art of Kalocsa 100-member Gypsy Orchestra Intellectual heritage of Count István Széchenyi Zsolnay Cultural District Classic Hungarian music
Sport	The life-work of Ferenc Puskás
Natural environment	Aggtelek Karst
Tourism and entertainment	Lamb stew of Karcag Gundel Heritage

The legal paragraph XXX/2012 was ratified by the Parliament of Hungary in April, 2012. In October, the Hungarikum Committee was established. The Committee has sixteen members, the President is the Minister of Agriculture. The other members are delegated by different ministers and departments. Their main objective is to set up the list of the National Values and Collection of Hungarikums.

The process of identification, organization and eventually, the protection have a system called Hungarian National Values Pyramid. The search and collection of values begins in the settlements of Hungary, since the local inhabitants are most likely familiar with them. Local historians, museologists, ethnographers, educators are probably already have a set of their local specialties. These lists are parts of wider, regional selections, which serve as the starting point for the Hungarikum Committee. This Committee has the right to certify a certain value into a hungarikum. The collection has 41 items at the moment (Table 1).

We believe that hungarikums are the core items of ethnocentrism in Hungary. They could arouse higher emotional connection, thus, higher purchase intent. Our opinion is that stronger, highlighted utilization of hungarikums in any domestic country image campaign could arouse stronger ethnocentric attitudes among the youth in Hungary.

3. Methodology and Data

During our exploratory research we have conducted an online survey among the students of two universities of Hungary. Our aim was to discover the attitudes of young male and female towards hungarikums. The survey had three major parts: in the first part we have asked about the spontaneous and supported notoriety of hungarikums. The second part focused on the attitudes towards the hungarikums, namely to what extent they feel characteristic of Hungary the specific item. The last part consisted of basic demographic data.

During the two weeks of data collection we have reached 132 respondents. The majority of them are women (95), lives in the capital (48) and only 15 of them lives in a village (Table 2).

Table 2: The characteristics of the sample

	Respondents	%
GENDER		
Male	37	28%
Female	95	72%
TYPE OF SETTLEMENT		
Capital	48	36%
County seat	32	24%
Other city	32	24%
Village	20	15%

4. Evaluation

The first part of our survey was about the spontaneous and supported notoriety of hungarikums. Based on our results, the strongest spontaneous notoriety belongs to the pálinka (87 mentions), followed by Kalocsa paprika spice (70 mentions) and Tokaji aszú wine (56 mentions). There were some incorrect mentioning as well: the Unicum schnapps (33), the túró rudi dessert (20) and the Rubik's cube (20) have the highest numbers.

Table 3: Gender differences in spontaneous and supported awareness

Hungarikum	Spontaneous awareness	Supported awareness	Diff $\Delta_{\text{Supp-Spon}}$	Means μ	St. dev. σ
pálinka	87	132	45	4.77	0.76
Kalocsa paprika spice	70	128	58	4.40	0.97
Tokaji aszú produced in Tokaji vineyard	56	130	74	4.70	0.71
Pick salami	36	131	95	4.38	0.90
Matyó folk art	23	124	101	4.02	1.11
Hungarian grey cattle meat	23	117	94	4.27	0.93
Herend Porcelain	20	129	109	4.31	0.83
Makó onion	18	125	107	4.42	0.87
Folk art of Kalocsa	18	122	104	3.99	1.12
Lacework of Halas	14	67	53	3.41	1.20
Gyulai sausage or Gyulai paired sausage	13	128	115	4.14	0.99
Zsolnay porcelain and ceramics	13	128	115	4.38	0.86
Hortobágy National Park	11	125	114	4.23	0.99
Béres Drops and Béres Drops Extra	10	129	119	3.61	1.20
Hungarian acacia honey	10	124	114	4.17	1.05
Busójárás from Mohács	10	123	113	3.63	1.11
Csabai sausage or Csabai thick sausage	9	122	113	4.02	1.03
Budapest – Banks of Danube, Buda Castle District, Andrásy street	8	123	115	4.44	0.94
The life-work of Ferenc Puskás	7	108	101	4.16	1.14
Hungarian acacia	6	108	102	3.42	1.27
Traditional dance house as a transmitter by heredity	6	73	67	3.36	1.24
Gundel Heritage	4	110	106	3.68	1.11
Kassai horse archery	4	37	33	3.18	1.20
Products from fattened goose	3	97	94	3.31	1.16
Aggtelek Karst	2	121	119	3.17	1.19
törkölypálinka	2	117	115	3.77	0.98
Herz Classic salami	2	117	115	3.74	1.09
Tokaj wine region	2	117	115	3.72	1.17
Hollókő village	2	107	105	3.42	1.20
Hungarian operetta	2	105	103	2.99	1.19
Hunting with hawks	2	70	68	4.50	0.75
The early Christian tombs of Pécs	2	65	63	4.30	1.02
100-member Gypsy Orchestra	1	117	116	3.75	1.19
The Benedictine arch-abbey of Pannonhalma	1	106	105	3.73	1.10
Kürt data recovery	1	39	38	3.01	1.24
Lamb stew of Karcag	1	24	23	2.56	1.21
Classic Hungarian music	0	116	116	3.37	0.94
Lake Fertő – Neusiedlersee	0	95	95	3.68	1.19
Intellectual heritage of Count István Széchenyi	0	92	92	2.46	1.24
Zsolnay Cultural District	0	82	82	4.08	1.11
ILCSI Natural Cosmetics	0	59	59	3.63	1.23

With the comparison of spontaneous and supported notoriety we have discovered that most of the hungarikums have high supported notoriety, but the spontaneous mentioning rate is low. The highest difference between the two value can be found in the cases of Béres Drops/Béres Drops Extra (Spon. Aw. = 10 person, Supp. Aw. = 129 person, Diff = 119 person) and the Aggtelek Karst (Spon. Aw. = 2, Supp. Aw. = 121, Diff = 119). The detailed results are presented in Table 3.

Table 4: Gender differences in supported awareness (notoriety)

Hungarikum	Male	Female	Difference $\Delta_{\text{male-female}}$
ILCSI Natural Cosmetics	7	19%	36%
Lamb stew of Karcag	8	22%	-5%
Kassai horse archery	11	30%	-2%
Kürt data recovery	12	32%	-4%
Traditional dance house as a transmitter by heredity	14	38%	24%
Zsolnay Cultural District	16	43%	26%
The early Christian tombs of Pécs	16	43%	8%
Lacework of Halas	17	46%	7%
Hunting with hawks	21	57%	-5%
Lake Fertő – Neusiedlersee	26	70%	2%
Hungarian operetta	27	73%	9%
Hungarian acacia	28	76%	9%
Hollókő village	28	76%	7%
The Benedictine arch-abbey of Pannonhalma	28	76%	6%
Intellectual heritage of Count István Széchenyi	28	76%	-8%
Products from fattened goose	29	78%	-7%
Classic Hungarian music	30	81%	9%
Busójárás from Mohács	32	86%	9%
Folk art of Kalocsa	32	86%	8%
100-member Gypsy Orchestra	32	86%	3%
Matyó folk art	33	89%	7%
The life-work of Ferenc Puskás	33	89%	-10%
Zsolnay porcelain and ceramics	34	92%	7%
Makó onion	34	92%	4%
Hungarian acacia honey	34	92%	3%
Budapest – Banks of Danube, Buda Castle District, Andrassy street	34	92%	2%
Csabai sausage or Csabai thick sausage	34	92%	1%
Herz Classic salami	34	92%	-5%
Tokaj wine region	34	92%	-5%
Gundel Heritage	34	92%	-12%
Herend Porcelain	35	95%	4%
Kalocsa paprika spice	35	95%	3%
Hortobágy National Park	35	95%	0%
Aggtelek Karst	35	95%	-4%
Törkölypálinka	35	95%	-8%
Hungarian grey cattle meat	35	95%	-8%
Pick salami	36	97%	3%
Béres Drops és Béres Drops Extra	36	97%	1%
Gyulai sausage or Gyulai paired sausage	36	97%	0%
Pálinka	37	100%	0%
Tokaji aszú produced in Tokaji vineyard	37	100%	-2%

The expressiveness of hungarikums was measured on a scale from 1 to 5, where 1 meant it is not characterizing Hungary, 5 meant it is strongly characterizing it. The results are similar to the results of spontaneous mentions: the most typical hungarikums

are the pálinka (average = 4.77, std. deviation = 0.76) and the Tokaji aszú produced in Tokaji vineyard (average = 4.70, std. deviation = 0.71). The least typical items (their average is below 3) are the Ilcsi Natural cosmetics and (average = 2.46, std. deviation = 1.24), KÜRT data saving (average = 2.56, std. deviation = 1.21) and the early Christian tombs of Pécs (average = 2.99, std. deviation = 1.19). It is important to note that notoriety and expressiveness are not correlating.

4.1. Gender characteristics

Our current study is an exploratory research, in order to provide a start-up point for our neuromarketing research project by discovering the youth's attitudes towards hungarikums. The revelation of gender differences is a popular approach in the field of neuromarketing, which also stands in the focus of our current research.

During our examination of gender differences, our first step was to discover the differences in supported recognitions. There is a significant difference between male and female in the case of five hungarikums (Table 4), and in each cases females have higher rates. The highest difference can be experienced in case of Ilcsi natural cosmetics: 55 per cent of the female respondents (52 persons) are familiar with this product, but in case of male the rate is only 19 per cent (7 persons). The notoriety of the different items are the same in the following cases: pálinka – 100 per cent, Gyulai sausage – 97 per cent and Hortobágy National Park – 95 per cent. In 24 cases the notoriety is higher among female respondents – from this the five cases presented above are significantly higher – and in 14 cases male respondents reached higher rates, but these results are not differ significantly (Table 5).

Table 5: Gender differences in supported awareness (crosstab analysis)

		Gender		Difference $\Delta_{\text{male-female}}$	Total	Sig.
		Male	Female			
Ilcsi Natural cosmetics	Familiar	7	52	36%	59	.000
		18.9%	54.7%		44.7%	
	Not familiar	30	43		73	
		81.1%	45.3%		55.3%	
Zsolnay Cultural District	Familiar	16	66	26%	82	.005
		43.2%	69.5%		62.1%	
	Not familiar	21	29		50	
		56.8%	30.5%		37.9%	
Traditional dance house as a transmitter by heredity	Familiar	14	59	24%	73	.012
		37.8%	62.1%		55.3%	
	Not familiar	23	36		59	
		62.2%	37.9%		44.7%	
Busójárás from Mohács	Familiar	32	91	9%	123	.057
		86.5%	95.8%		93.2%	
	Not familiar	5	4		9	
		13.5%	4.2%		6.8%	
Zsolnay porcelain and ceramics	Familiar	34	94	7%	128	.034
		91.9%	98.9%		97.0%	
	Not familiar	3	1		4	
		8.1%	1.1%		3.0%	

The differences of expressiveness between male and female respondents were also examined. Based on the results of our variance analysis, there are significant differences in case of eight hungarikums. In each case female respondents gave higher evaluations. The biggest difference belongs to traditional dance house as a transmitter by heredity ($\Delta_{\text{female-male}} = 0.73$). According to the responses, we have found that these eight hungarikums expresses Hungary more than the others, therefore they could be interpreted as female value representatives (Table 5).

The evaluation by male respondents is higher in the following five cases: products from fattened goose ($\Delta_{\text{female-male}} = 0.169$), Kassai horse archery ($\Delta_{\text{female-male}} = 0.123$), intellectual heritage of Count István Széchenyi ($\Delta_{\text{female-male}} = 0.217$), the life-work of Ferenc Puskás ($\Delta_{\text{female-male}} = 0.079$) and the lamb stew of Karcag ($\Delta_{\text{female-male}} = 0.327$).

Table 5: Gender differences in expressiveness (ANOVA analysis)

		N	Average	Std. dev.	Sig.	Difference $\Delta_{\text{male-female}}$
Budapest – Banks of Danube, Buda Castle District, Andrásy street	Male	37	4.16	1.14	.035	.385
	Female	95	4.55	0.83		
	Total	132	4.44	0.94		
Kalocsa paprika spice	Male	37	4.03	1.19	.005	.520
	Female	95	4.55	0.83		
	Total	132	4.40	0.97		
Zsolnay porcelain and ceramics	Male	37	4.11	0.99	.024	.376
	Female	95	4.48	0.78		
	Total	132	4.38	0.86		
Zsolnay Cultural District	Male	37	3.22	1.32	.016	.573
	Female	95	3.79	1.17		
	Total	132	3.63	1.23		
Hungarian acacia honey	Male	37	3.24	1.19	.012	.536
	Female	95	3.78	1.04		
	Total	132	3.63	1.11		
Traditional dance house as a transmitter by heredity	Male	37	2.89	1.24	.003	.729
	Female	95	3.62	1.22		
	Total	132	3.42	1.27		
Hunting with hawks	Male	37	2.81	1.15	.028	.505
	Female	95	3.32	1.18		
	Total	132	3.17	1.19		
ILCSI Natural Cosmetics	Male	37	2.14	1.16	.058	.454
	Female	95	2.59	1.25		
	Total	132	2.46	1.24		

4.2. Group possibilities of the Hungarikums

By using the evaluation of male and female we have tried to classify the hungarikums with the MDS method. In the interest of easier understanding we have applied the two dimensions solution from the possible classification methods. The data are suitable for the application of the method, since the stress indicators take values around 0.2 ($\text{Stress}_{\text{male}} = 0.156$, $\text{RSQ}_{\text{male}} = 0.90$; $\text{Stress}_{\text{female}} = 0.142$, $\text{RSQ}_{\text{female}} = 0.93$).

In case of two dimensional analysis, one of the axes in both cases (currently the X axis) shows how strongly a hungarikum expresses Hungary. The more it is positioned to the right of the figure, the more expressive it is. In case of male, the other dimension (Y axis)

is interpreted as the tangibility: the higher a certain value is positioned, the less tangible it is (e.g. it is connected to a touristic destination, or to an intellectual heritage). The hungarikums, which are positioned lower, have a more tangible dimension. On the opposite, in case of female the Y axis could be interpreted as the traditional axis: the higher a certain value is positioned, the more traditional it is.

Using the current position of hungarikums, in both cases we have separated them into five groups, by using cluster analysis. These clusters also show that there are well described differences between the genders, which results provide a solid basis for further analysis in the future (Figure 1 and Figure 2).

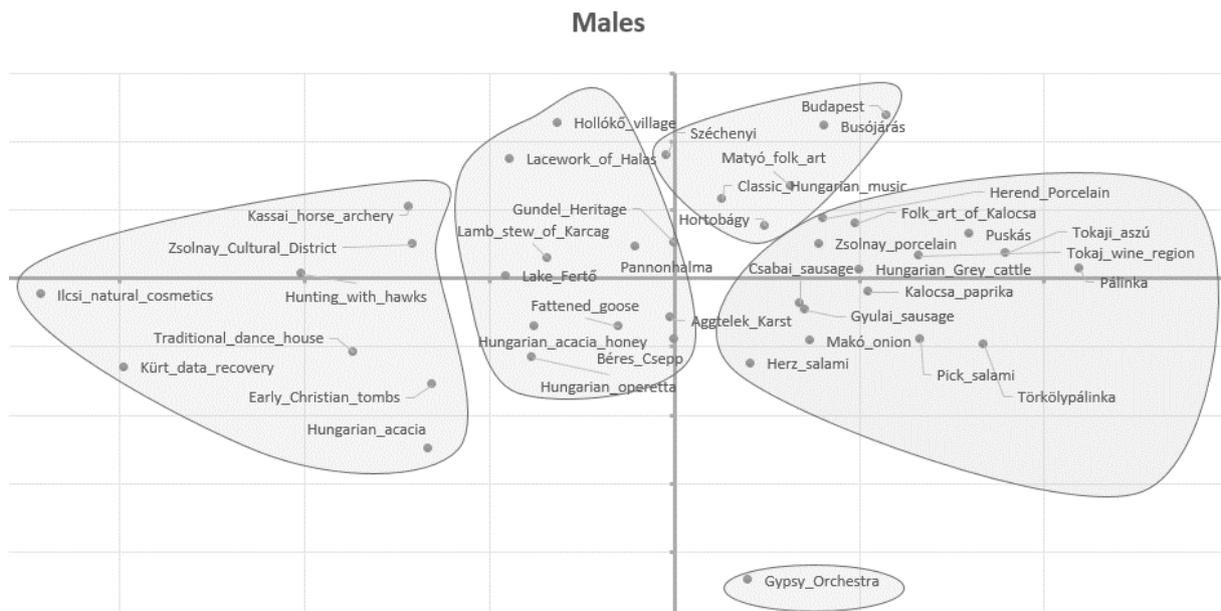


Figure 1: The groups of hungarikums based on the evaluation of males (N =37 respondents)

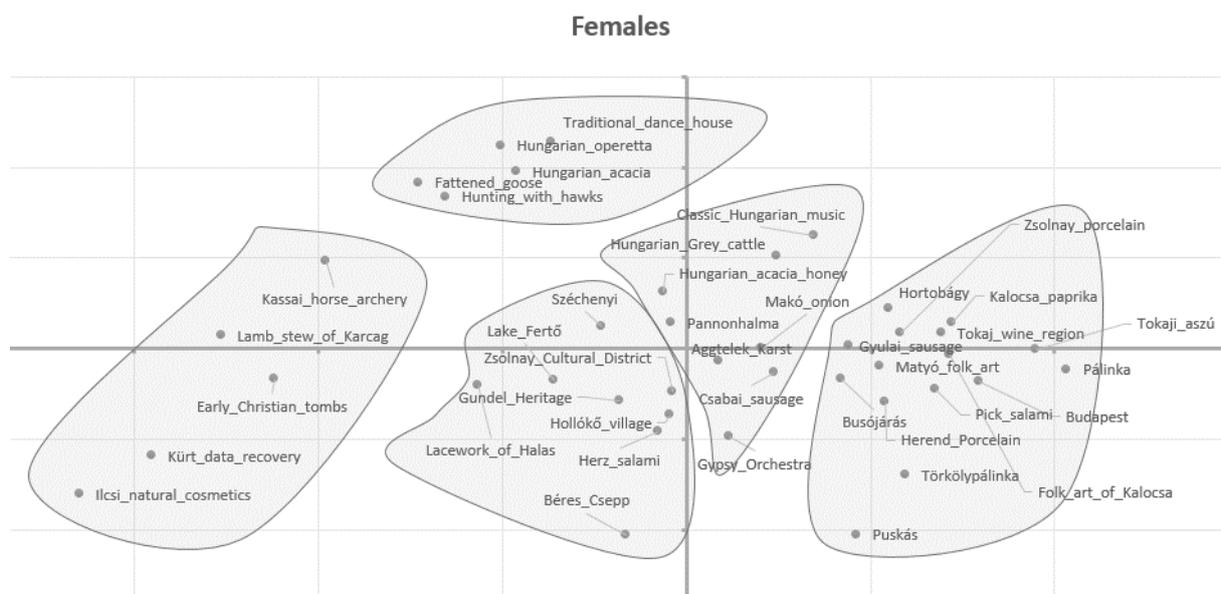


Figure 2: The groups of hungarikums based on the evaluation of females (N =95 respondents)

5. Conclusion, limitations and suggestions for further research

This research is the first step of a full-scale neuromarketing research. Based on these results, we are going to design our research involving different technical equipment and devices, such as fMRI and eye-tracking camera. The utilized visual stimuli are going to be presented based on the results presented above.

In this study we presented the results of an exploratory research in case of hungarikums on a university student's sample. Based on these results, we can see that there are significant differences in awareness and expressiveness between young male and female. By using MDS method, different groups have also been formed. Based on our results, further neuromarketing research looks to be a relevant method in order to discover the hungarikum-related perceptions and emotions, furthermore the results could help establishing initial hypotheses.

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SMEs Growth in the Czech Republic: Some Macroeconomic Perspectives

Nahanga Verter¹, Christian Nedu Osakwe², Miloslava Chovancová², Věra Bečvářová¹

¹Faculty of Regional Development and International Development Studies, Mendel University in Brno, e-mail: xverter@mendelu.cz; vera.becvarova@mendelu.cz

²Faculty of Economics and Management, Tomas Bata University in Zlin, e-mail: osakwe@fame.utb.cz; chovancova@fame.utb.cz

Abstract

Small and medium enterprises (SMEs) are seen as a vehicle for employment generation, wealth creation, economic growth and development in countries that have a sound investment climate. SMEs, account for approximately one-third of GDP, over 50% of the value added, 99% of the share of total registered enterprises, and represent 60% of total employment in the Czech Republic. In the light of this background, the paper explores the influence of some macroeconomic variables on SMEs growth in the Czech Republic for the period 1995–2013. In order to assess the impacts of the selected variables on SMEs growth, we employed an econometric technique. Our findings suggest a concave relationship between unemployment and SMEs growth in the Czech Republic. More precisely, it signifies that beyond a turning point, unemployment is likely to slow down SMEs growth in the country. Our results further hint at a positive relationship between economic growth and SMEs growth. However, our empirical estimates showed an insignificant relationship between domestic credit provided by the financial sector and SMEs growth in the country. The government of the Czech Republic should continue to provide an enabling investment climate and support for bolstering a sustainable SMEs development. For instance, the government should provide easier access and affordable credits and loans to SMEs and reduce bureaucratic bottlenecks.

Keywords: SMEs growth, unemployment, economic growth, finance, enterprises

JEL Classification: D, E02, E24

1. Introduction

Recent studies have proven that small and medium enterprises (SMEs) are vehicles for job creation, economic growth and development in both developed and developing countries (Yusuf and Dansu, 2013; Walczak and Voss, 2013; Ardic, Mylenko and Saltane,

2012; European Commission, 2010; Ayyagari, Beck and Demirguc-Kunt, 2007). SMEs represent the majority of all the enterprises in countries and are the main driving force of entrepreneurship development. SMEs account for over 90% and 60% of the share of total number businesses and employment in advanced economies (OECD, 2013). However, the development of these enterprises will only be possible if there is a favourable internal and external environment for them to flourish.

SMEs roles in the Czech Republic, Central, and Eastern Europe could be traced to the result of a long history of economic growth and industrialization since the 20th century. The industry as a new wave of SMEs development in the country began in 1989. Since then, the Czech economic system has changed from a centrally planned economy to a pluralistic market-driven economy. Consequently, SMEs were reinvented as microeconomic entities, after the restructuring, reforming and later privatizing the state-owned enterprises (Beran and Frková, 2003).

Data available from the Czech Statistical Office (2014) and the Ministry of Industry and Trade (2012), show that SMEs account for approximately one-third of GDP and over 50% of the value added. In addition, SMEs represent 60% of total employment, and also account for 99.8% of all registered enterprises in the Czech Republic. SMEs significantly contributed the country's GDP during economic upswings. It thus confirmed that SMEs is an integral part of the Czech economy that needs a serious attention.

Despite the importance of these enterprises, their growth and development in the country appears to be below expectations. According to some studies, financial needs (Beran and Frková, 2003; OECD, 2013; Ardic, Mylenko and Saltane, 2012), government administrative bottlenecks, lending interest rate, innovation and competitiveness (OECD, 2010; Tabas, Beranová and Martinovičová, 2012), household and government spending (Muller et al., 2014), integration into the European affairs and increasing internationalization (OECD, 2010; Clifton, Gärtner and Rehfeld 2011; Procházková and Kubíčková, 2012; Dasan, 2013; Kubíčková and Procházková, 2014; Muller et al., 2014; Zapletalova, 2014), among others, are the significant external environmental factors that are either contributing to or militating SMEs growth in the Czech Republic.

Some empirical evidence: Some researchers (Wennekers, van Stel, Thurik and Reynolds, 2005; Van Stel, Thurik and Reynolds, 2005; Van Stel, Storey and Thurik, 2007; Van Stel et al., 2010; Mukorera and Mahadea, 2014) find the cause and effect relationship between economic growth and entrepreneurship performance in countries across the globe. However, entrepreneurship is too broad in the present study. Given that the interest in the study of SMEs is globally recognized, we have decided to narrow our research on the effects of some selected macroeconomic indicators like economic growth (GDP), unemployment, and domestic credit (by the financial sector) on SMEs growth. Ahmad (2012) investigates the main constraints to SMEs growth in the Kingdom of Saudi Arabia. The results indicate that the difficulties, in accessing finance, bureaucratic bottlenecks, as well as the unfriendly business environment, are the major constraints to SMEs performance in the country. Similarly, Jasra et al. (2011) find a robust positive relationship between SMEs performance and the money supply, entrepreneurs' skills, and business plan in Pakistan. In the same direction, Mukorera and Mahadea (2014) determine the connection between micro and small-scale enterprises (MSEs) and some macroeconomic indicators in Zimbabwe. Using a Vector Error Correction Model (VECM), their findings suggest that unemployment, inflation, money supply and real GDP have influence on MSEs growth in the country. Plehn-Dujowich and Grove (2012) find that the unemployment rate, economic growth, and the growth of entrepreneurship are interrelated. Their findings suggest that the unemployment rate

causes entrepreneurship to grow. On the other hand, entrepreneurship influence economic growth and vice versa. Similarly, Thurik et al. (2008) stress that enterprises, unemployment, and economic growth are interwoven. Thurik (1999) found an inverse relationship between the rate of unemployment and enterprise growth. Evans and Leighton (1990) revealed a positive connection between unemployment and the new enterprises. Fritsch and Mueller (2004); and Bekeris (2012) find a negative relationship between unemployment and business growth.

In the Czech Republic, Dasan (2013) finds a positive relationship between internationalization and SMEs performance in the Czech Republic and Russia. Dasan argues that, these enterprises transfer best practices developed globally to their overall business. In addition, they are most likely to be more ambitious than domestic SMEs. Similarly, Muller et al. (2014) find that household and government spending have a positive influence on SMEs growth in the European Union member states, Czech Republic included. Similarly, Mateev and Anastasov (2010) find that Firm-specific characteristics such as current liquidity, internally generated funds, leverage, factors of production, future growth opportunities as driving factors in determining firms' growth and performance. Studies by Tabas, Beranová and Martinovičová (2012) reveal a positive association between innovation and financial performance of SMEs in the Czech Republic. They stress that the innovation is essential for SMEs performance and the ability to improve their competitiveness in the present era of globalization.

Studies on SMEs are based mostly on internal environmental factors, empirical research on the effects of social and macroeconomic factors on SMEs growth in the Czech Republic appears to be scanty. Thus, this study bridges this gap. The aim of this contribution is to analyse some macroeconomic indicators that are likely to be driving SMEs growth in the Czech Republic in recent time. At the end of the study, proffer some policy measures to the stakeholders for the sustainable growth of SMEs in the country.

The rest of the work is organized as follows: Section 2 presents the definition and the development of SMEs in the Czech Republic. Section 3 present materials and methods; Section 4 present results and discussion. Finally, section 5 concludes the study with policy recommendations, limitation and suggestions for future research.

2. Definition and Development of SMEs in the Czech Republic

2.1. Definition of SMEs

Table 1 presents the current definition of SMEs, which was proposed by the European Commission (2005), adopted by the European Union Member States (Czech Republic included) and entered into force in 2005. Micro enterprises are enterprises that employ less than 10 employees and whose annual turnover does not exceed 2 million euros.

Table 1: Definition of SMEs by the European Commission

Enterprise size	Employees	Annual turnover	Annual balance sheet total
Large	≥ 250	≥ €50 million	≥ €43 million
Medium- sized	< 250	≤ €50 million (in 1996 €40 million)	≤ €43 million (in 1996 € 27 million)
Small	< 50	≤ €10 million (in 1996 € 7 million)	≤ €10 million (in 1996 €5 million)
Micro	< 10	≤ €2 million (previously not defined)	≤ €2 million (previously not defined)

Source: European Commission

Small businesses are enterprises that employ less than 50 employees and whose annual turnover does not exceed 10 million euros. Medium sized are enterprises that employ less than 250 employees and whose annual turnover does not exceed 50 million euros or whose annual total balance sheet does not exceed 43 million euros (Table 1).

2.2. External Determinants of SMEs Development in the Czech Republic

Statistical data available from the Czech Statistical Office (2014) as shown in Table 2, the total of registered SMEs in both individual and legal entities (employing 0–249) in the Czech Republic has steadily increased from 1,077,844 in 2009 to 1,124,910 in 2013. The share of SMEs in the total number of active enterprises in the country in 2013 was 99.83%. Looking at the growth of SMEs and its share of the total companies in the Czech Republic, one cannot ignore its importance to the economy of the country. Even though the number of legal entities employing 0–249 has increased, collectively, in comparison with 2012, individual and legal entities declined by 18,308 enterprises. As shown in Table 2, this decrease is partly attributed to lack of financing, inability to compete favourably with the already well established enterprises, and the recent economic meltdown in Europe and other parts of the world that led to bankruptcies of some companies. Some of these enterprises winded up a few years after going to the market.

Table 2: Czech Republic: Trends of SMEs development, 2009–2013

Year	Total SMEs	SMEs- Legal entities	SMEs- Individuals	Total enterprises	SMEs (% of total enterprises)
2009	1,077,844	238,271	839,573	1,079,668	99.83
2010	1,106,908	256,876	850,032	1,108,736	99.84
2011	1,137,439	272,204	865,235	1,139,267	99.84
2012	1,143,218	228,564	914,654	1,144,943	99.85
2013	1,124,910	255,631	869,279	1,126,880	99.83

Source: Czech Statistical Office, 2014; Ministry of Industry and Trade, 2012

The importance of finance to SMEs is now widely recognised. Access to finance in forms of credit and loans could provide development opportunities for businesses and the economy, in general. On the other hand, lack of access to finance caused job creation and investment in SMEs to decrease even during the supposed recovery period in the Czech Republic (OECD, 2013). As shown in Table 3, the SME loans declined between 2009 and 2010 but rose in 2011. Lending interest rate is another factor for SMEs development. Many businesses, especially micro and small enterprises, may not borrow much when the interest rate is high even if there is money supply expansion in the form of credit and loans.

As presented in Table 3, in all the years, interest rate for SMEs was higher than larger firms. Dietrich (2010) stressed that the lack, of negotiating power of SMEs especially micro and small enterprises, has significant power in explaining differences in lending rates to large companies and small businesses. Similarly, Lacina and Vavřina (2013) argue that SMEs are more likely to face higher costs for bank credits or loans and higher rejection rates than larger firms. The total number of employees in SMEs decreased between 2009 and 2013. More so, the declined in 2013 as compared to 2012 was about 93 thousand (4.96%) of total 1,782 thousand employees. The share of SMEs employees on the total enterprises in the Czech Republic in 2013 was also slightly decreased from

61.7% in 2012 to 60% in 2013, representing a decrease by 1.8% (see Table 3). The decrease is partly attributed to the technological advancement of the country that has paved ways for many enterprises to substitute labour for capital inputs. Table 2 also shows that in 2013, SMEs performance or turnover was 4,315 billion CZK, which is compared to 2012, an increase of 97 billion CZK (2.3%). More so, the share of SMEs in a total of enterprises' performance in 2013 was 51.3%. Arguably, the importance of SMEs to Czech economy cannot be overemphasised.

Table 3: Czech Republic: SME and entrepreneur scoreboard, 2009–2013

Indicator	Unit	2009	2010	2011	2012	2013
Employees, SMEs	Number, thousand	1,893	1,833	1,820	1,875	1,782
Employees, SMEs	% of total enterprises	61.1	60.6	59.9	61.7	60.0
Employees, total enterp	Number, thousand	3,096	3,026	3,038	3,037	2,972
Performance, SMEs	CZK million	3,902,932	4,103,537	4,151,379	4,218,203	4,314,975
Performance, SMEs	% of total enterprises	52.8	51.7	49.7	50.0	51.3
Performance, total enterp,	CZK million	7,396,822	7,930,365	8,359,308	8,435,390	8,403,087
Business loans, SMEs	CZK million	13,833	11,788	12,210		
Business loans, SMEs	% of total business loans	18.8	17	18.1		
Business loans, total	CZK million	73,772	69,543	67,447		
Interest rate to SMEs	%	4.46	4.08	3.83		
Interest rate large firms	%	3.72	3.47	2.86		
Bankruptcies, total	Number	1,691	1,984	2,168		
Bankruptcies, total	Yearly growth rate, %	157	17.3	14.3		

Source: Czech Statistical Office, 2014; Ministry of Industry and Trade, 2012

3. Methodology and Data

3.1. Sources of Data and Analytical Strategy

The study employed mainly secondary data such as books, journal articles, and statistical reports. Annual statistical data for the analysis were obtained from the Czech Ministry of Industry and Trade (MIT), and Czech Statistical Office (CSO).

In this work, we have chosen to make use of an econometric technique. In an attempt to test the relationship(s) that may exist among the selected variables of interest, we made use of simple ordinary least squares (OLS) method (see equation 1). For the purpose of stabilizing the variance that may exist in the time-series data, all the variables were transformed into natural logarithms form.

$$\ln SMEgrow_t = \alpha_0 + \ln ECOgrow_t + \ln UNEMP_t + \ln UNEMP_t^2 + \ln DomCrFINSec_t + \mu_t \quad (1)$$

Where;

SMEgrow indicates SMEs growth, and it is captured by the number of SMEs;

ECOgrow shows economic growth (proxied by GDP);

UNEMP is the rate of unemployment while UNEMP² indicates the quadratic term of the unemployment rate;

DomCrFINSec stands for the domestic credit provided by the financial sector (% of GDP); and μ_t captures the error term (or residuals). Table 4 shows our prior signs for the variables in the model.

Table 4: Brief description of the variables in the model

Variable	Name	Description of the variable	Prior signs
SMEs	SMEgrow	SMEs are the annual total number of registered micro, small and medium enterprises (employing 0–149) in the Czech Republic	
Unemployment rate	UNEMP	Unemployment rate is derived from the share of the unemployed in total labour force.	+/-
Domestic credit	DomCrFinSec	Domestic credit provided by the financial sector of the economy such as monetary authorities and deposit money banks.	+
GDP	Ecogrow	Indicates economic growth in the country	+

4. Results and Discussion

4.1. Diagnostic Checklist

Owing to the short-span of the available time-series data (1995-2013), we assume all the variables to share a stochastic trend. For this reason, in order to guide against the pitfall of spurious regression result, we opted to subject the residuals of the initial OLS estimates to robust econometric checklist (see Table 6). More specifically, our approach is grounded in one of the seminal works of cointegration technique, popularly referred to as the two-step process of Engle-Granger cointegration method (Engle and Granger, 1987). Having obtained the residuals from the OLS estimate, we used the Augmented Dickey-Fuller test for unit root (see Table 5).

Table 5: Unit Root Test for Residuals derived from OLS estimate

Augmented Dickey-Fuller test for residuals using one lag	
Test with Constant	Test with Constant and Trend
Test Statistic (t-value) : -4.4395*	Test Statistic (t-value) : -5.2201*
Asymptotic p-value: 0.0001	Asymptotic p-value: 6.567e-005

Note: We have information criterion (AIC) to determine the order of the lag length of the error term prior to the ADF test. The asterisk (*) indicates significance alpha level at 1%

Table 6: Model robustness checklist

Test Type	Test Statistic [p-value]
Normality (Jarque-Bera)	3.916 [0.141]
Normality (Doornik-Hansen)	4.900 [0.086]
Autocorrelation (Durbin-Watson)	2.092
First-order Autocorrelation (Breusch-Godfrey)	0.140 [0.714]
First-order Autocorrelation (Ljung-Box Q')	0.189[0.664]
ARCH of order 1 (LM)	0.0023 [0.962]
Heteroskedasticity (White's)	17.548 [0.175]
Robust-variant Heteroskedasticity	7.502 [0.112]
Parameter Stability (CUSUMSQ)	[0.810]

Table 6 presents results of the diagnostic tests. The findings of the tests appear to fulfil the prior econometric classical test as all the P. values of the diagnostic tests in Table are greater than 5% level. In addition, all the results of the tests indicate that variables in the model are not heteroskedasticity. Additionally, the model is linear and correctly specified. It also demonstrates that the variability of a variable has minimum variance, and the error term is normally distributed. The variables used in the model

also appear not to be autocorrelated. The test for the model stability check was also carried out, and the model was confirmed to be stable. Given that the classical assumptions of the regression model were fulfilled, we have continued with the estimation model, and the results are presented in Table 7 and Figure 1.

4.2. Results

As presented in Table 7, all the results indicate elasticity. The findings show a strong relationship between the rate of unemployment (UNEMP) and SMEs growth in the Czech Republic, statistically significant at the 0.01 level. The result implies that, all things being equal, a 1% increase in the unemployment rate will spur SMEs growth by 16.9%. This result is in consonance with the works of Evans and Leighton (1990); Plehn-Dujowich and Grove (2012) who also find a positive relationship between unemployment and SMEs growth. The result, is, however, in contrast to the works of Thurik (1999); Fritsch and Mueller (2004); and Bekeris (2012) who find an inverse relationship between unemployment and SMEs growth in other countries.

Table 7: OLS results, using observations (1995–2013)

Dependent variable: lnSMEs				
Variable	Coefficient	Std. Error	t-ratio	p-value
Constant	-13.117	3.785	-3.465	0.004***
lnUNEMP	16.859	5.496	3.067	0.008***
lnECOGrow	1.0496	0.294	3.57	0.003***
sq_LnUNEMP	-4.44	1.544	-2.876	0.012**
lnDomCrFINSec	-0.553	0.421	-1.314	0.210
Sum squared resid	1.05	S.E. of regression	0.274	
R-squared	0.882	Adjusted R ²	0.848	
F(4, 14)	26.078	P-value(F)	2.33E-06	

Note: ** indicates statistically significant at the 5% level; *** indicates statistically significant at the 1% level.

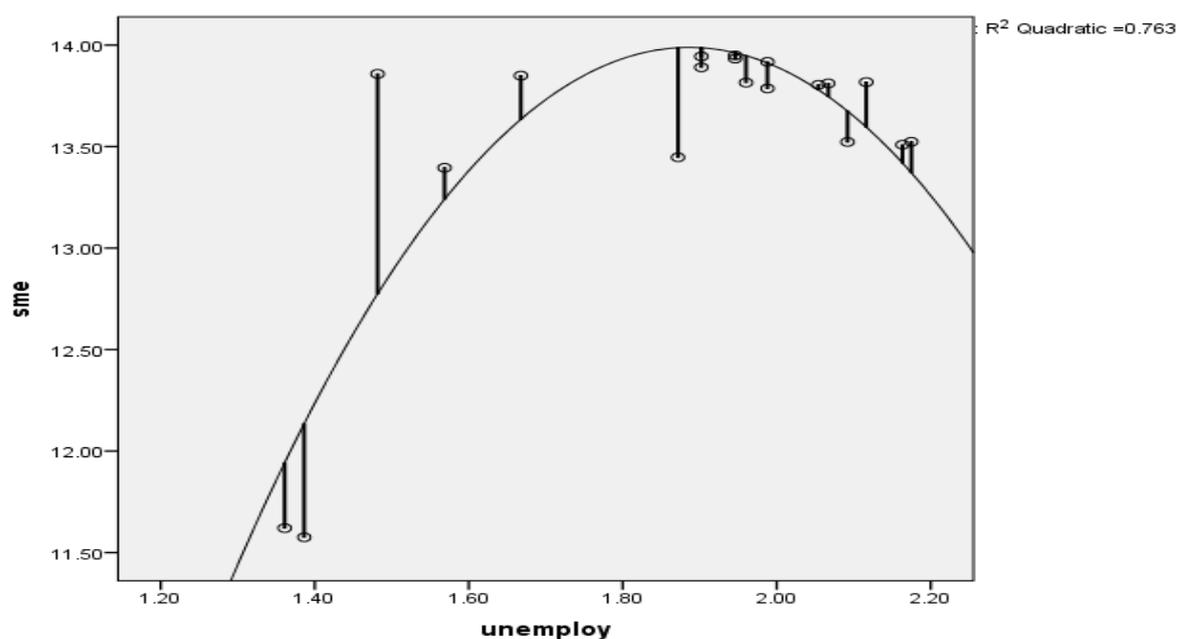


Figure 1: Czech Republic: SMEs growth Vs unemployment rate

As presented in Table 7, the results further hint at a positive relationship between economic growth (ECOgrow) and SMEs growth, statistically significant at the 0.01 level. All things being equal, a 1% increase in economic growth may stimulate SMEs growth by 1.05%. This result is in line with the works of Plehn-Dujowich and Grove (2012); Muller et al. (2014); Mukorera and Mahadea (2014) who also find a positive relationship between economic and SMEs growth. However, even though there is an inverse relationship between domestic credits provided by the financial sector (DomCrFINSec) and SMEs growth in the Czech Republic, it is statistically insignificant.

In quadratic term, the results suggest the possibility of a concave (non-monotonic) relationship between the unemployment rate and SMEs growth. Thus indicating that beyond a turning point, further rise in the unemployment rate is likely to slow down SMEs growth in the Czech Republic (see Figure 1).

5. Conclusions

Small and medium enterprises (SMEs) are widely seen as a vehicle for economic growth in countries that are poised to develop and remain globally competitive in the current era of economic globalization. Undoubtedly, there is a good investment climate in the Czech Republic as compared to the former Soviet Union and Eastern European countries. Even though, SMEs growth in the country is below expectation, these enterprises account for one-third of GDP and represent 60% of total employment in the country in 2013. Against this background, this study analysed the influence of some macroeconomic perspectives on SMEs growth in the Czech Republic.

We have employed an econometric technique in order to assess the effects of the selected macroeconomic variables on SMEs growth. Our results indicate a concave relationship between unemployment and SMEs growth in the Czech Republic. More precisely, it suggests that beyond a turning point, unemployment is likely to slow down SMEs growth in the country. Our results indicate a positive relationship between economic growth and SMEs growth. However, our empirical results show an insignificant relationship between domestic credit provided by the financial sector and SMEs growth in the country. Nevertheless, this contribution provides unique insights that may be a reference point for subsequent research in this area.

The government of the Czech Republic should continue to provide an enabling investment climate and support for bolstering a sustainable SMEs growth and development. For instance, the government should provide easier access and affordable credits and loans to SMEs and reduce bureaucratic bottlenecks.

5.1. Limitations and Future Studies

We would like to point out to the possibilities of other variables such as the interest rate spread, taxation, trade openness, the inflation rate, and economic freedom indicators that were not captured in our present study. These variables are likely to have an impact on SMEs growth in the Czech Republic. Thus, future studies should incorporate some of these socioeconomic indicators in order to assess their impacts on SMEs growth in the country. More so, given that the findings of this study are still preliminary in nature, our results only demonstrate associations between the selected variables of interest, but not causality. It is highly possible that unemployment does not 'Granger cause' SMEs growth. In the light of the statements above, we encourage other

authors in this field to investigate further if indeed there is a causality between unemployment and SMEs growth. In addition, they should also determine if the quadratic term of unemployment has a decreasing return to SMEs growth in similar economies. The key question would be what particular threshold value is unemployment seemed to slow down SMEs growth in the Czech Republic and similar economies?

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System Dynamics Perspective on Crises in Small and Medium Enterprises

Viktor Vojtko¹, Ladislav Rolínek², Petra Solarová³

¹*Department of Trade and Tourism, Faculty of Economics, University of South Bohemia in
České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail:
vojtko@ef.jcu.cz*

²*Department of Management, Faculty of Economics, University of South Bohemia in České
Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail:
rolinek@ef.jcu.cz*

³*Department of Trade and Tourism, Faculty of Economics, University of South Bohemia in
České Budějovice, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail:
petrasolarova@gmail.com*

Abstract

In this paper, we would like to add a new view on inner dynamics of crises in small and medium enterprises (SMEs) from combined perspectives of system dynamics, company life-cycles, crisis management, resilience and business continuity management in SMEs.

Based on our recently collected and analyzed data about 554 crises from 183 companies we have developed a conceptual system dynamics model partially synthesizing the findings.

We believe that this model can be used to enrich present knowledge and partially explain complex dynamics of crises in small and medium enterprises.

Keywords: SME, crisis, management, system dynamics

1. Introduction

The growth of companies is a very frequent topic for discussion. Media, governments, as well as shareholders and IPO markets are interested in fast growing companies and lack of growth is generally perceived as a problem. In this context, each attempt to further explain and overcome obstacles to growth may be helpful, especially in relation to the recent global financial crisis and its' impact on businesses.

One of the traditional approaches to this topic is based on analogies between natural life cycles and patterns of development in companies. In his seminal work, Larry E. Greiner (1972) started this school of thought with his 5-stages model of organizational growth evolutions and revolutions. A general assumption in this approach is that companies have to go through similar stages – creativity, direction, delegation,

coordination and collaboration – defined by similar problems during their growth and ageing.

A lot of further research, both theoretical and empirical, has subsequently been undertaken. Different authors (e.g. Adizes 1988; Kazanjian 1988; Rutherford et al. 2003; Lester et al. 2003) describe different classifications of growth stages – varying between 3 and 10, oriented more outwards or inwards or based on other criteria.

It is necessary to mention that although Greiner's model is present in many management textbooks, it is not without criticism. One of the main objections is applicability of these general principles in real companies and their specific circumstances, especially in relation to causes of and solutions for various crises that may also occur concurrently and challenges in stages recognitions (Macpherson 2005; Phelps et al. 2007). Furthermore, the organizational life cycle may be easily confounded with the business opportunity life cycle (Sull, Houlder 2006). And another problematic issue is according to Phelps et al. (2007) that the growth stages are only linearly described.

The topic of coping with crises in SMEs has gained some attention mainly due to the impact of global financial crisis on businesses. Several studies by Herbane (2010a; 2010b; 2013) have opened up this specific field and these were followed by further research related to a concept of resilience in the management of SMEs (e.g. Sullivan-Taylor, Branicki 2011; Hong, Huang, Li 2012) and business continuity management (e.g. Elliott, Swartz and Herbane 2002; Urbancová and Königová, 2011). One of the limitations of these studies is that they typically focus only on crises caused by changes in external environment which as we think is not enough.

Our argument is that it is useful to focus the research on both internal and external causes of organizational growth crises. In this way, it should be possible to model accordingly different crises under different circumstances, which is in line with previous system dynamics research in this area, related mainly to the application of system archetype Limits to Growth (Meadows et al. 1972; Forrester 1968; Sterman 2000; Oliva et al. 2003) or general use of system dynamics in SMEs' decision making support (Winch & Arthur 2002; Bianchi 2002).

The first goal of this exploratory study is thus to analyze recent empirical data about 559 crises from 183 Czech companies in such a way that would provide necessary grounding for development of a conceptual system dynamics model.

The second goal is then to create such a model that could explain occurrences, context and dependencies of different crises in companies.

The last goal of this paper is to show how the system dynamics approach can be applied in analyzing such organizational growth problems in a way which will help businesses to avoid causing further problems in the future.

2. Methodology and Data

The empirical data for this study were gathered in several stages between April and October 2014 in the form of face to face qualitative interviews with Czech entrepreneurs. The data set covers narrative description of 183 companies and their selection of at least three of their most important crises, i.e. situations threatening their very existence.

The companies were selected in a way to have broad coverage of all main industries according to the CZ NACE classification as well as of companies of different sizes – the

sampling was purposeful to allow us to build a model covering all important aspects of crises development in different circumstances.

The textual description of crises was categorized later which has revealed 19 specific crisis features. All these features were further analyzed to find out their combinations.

After this analysis a conceptual model was developed using causal loop diagram technique and model building methodology from the system dynamics discipline (Sterman 2000). The model, according to our opinion, shows causal relationships between various elements of company behaviour as well as external influences and meaningfully explains mechanisms of how different crises can occur.

3. Results

3.1. Data set summary

The data set consists of 183 companies and 554 crises with the following characteristics.

Table 1: CZ NACE distribution of companies in the data set

Value Label	Frequency	Valid Percent
A. Agriculture, forestry and fishing	12	6.56
C. Manufacturing	44	24.04
E. Water supply; sewerage; waste management and remediation activities	3	1.64
F. Construction	19	10.38
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	36	19.67
H. Transporting and storage	3	1.64
I. Accommodation and food service activities	15	8.20
J. Information and communication	8	4.37
K. Financial and insurance activities	3	1.64
L. Real estate activities	5	2.73
M. Professional, scientific and technical activities	13	7.10
N. Administrative and support service activities	2	1.09
P. Education	5	2.73
Q. Human health and social work activities	3	1.64
R. Arts, entertainment and recreation	10	5.46
S. Other services activities	2	1.09
Total (N)	183	100.00

It is clear that nearly all CZ NACE types of activities are present in the data set – the only missing ones are those that are not very common amongst SMEs in the Czech Republic.

The companies also vary according to number of employees (ranging from 0 to more than 100, where each category contains at least 13 companies), legal entity (the only missing type is public partnership), yearly revenue (ranging between 0.05 and 1300 million CZK, with mean value 68.01 million CZK and median value 10 million CZK) and a status of family firm (42.08% claim to be a family firm).

Based on the abovementioned characteristics it is possible to assume, that the data set covers really broad range of different types of companies in different circumstances and should provide a basis for induction and model building.

3.2. Data analysis

The data analysis for the purpose of this study consists of the following steps:

1. Basic frequency analysis
2. Cross tabulation analysis

3.2.1. Basic frequency analysis

The most common crisis features in the surveyed businesses were those related to 1) employees and 2) customers/demand – this category partially reflected impact of the global financial crisis and subsequent demand shock.

In the second distinctive group the crisis features roughly represent one quarter of cases each. These are 1) inputs and supplies, 2) regulations, bureaucracy and taxes, 3) collecting bills and 4) competition. All four are linked to the external environment.

Other crisis features are less common, i.e. their frequency was less than 20%. Nevertheless when combined with more frequent crises their impact might be significant as well.

Table 2: Crisis features frequencies (N=183)

Crisis feature	Valid percent
Employees	46.45
Customers, demand	42.62
Inputs, supplies	28.42
Regulations, bureaucracy, taxes	27.32
Collecting bills	25.68
Competition	20.77
Owners	16.94
Financial capital	15.85
Capacity	14.21
Natural disasters	10.93
Technical breakdown	10.38
Selling prices	8.74
Quality of production	8.20
Entrepreneur – personal crisis	7.10
Thefts	6.56
Placement of business	6.01
Processes	3.83
Outdated product	1.09
Legal entity	1.09

3.2.2. Cross tabulation analysis

We have further analysed the data using cross tabulations which has revealed quite a lot of potential dependencies between the following variables in the data set:

- CZ NACE and crisis features (mainly competition, collecting bills, selling prices, owners, employees).
- Legal entity and crisis features (mainly selling prices, natural disasters).
- Written strategy and crisis features (mainly financial capital).

This shows that circumstances like industry and legal entity could play a crucial role in understanding of crises in companies and it would be meaningful to respect these

differences accordingly also in the modelling process (these dependencies are to be analysed separately due to the limited length of this paper).

Another important comparison is between the crisis features themselves. Relative total frequencies are displayed in the Table 3. Table 4 contains frequencies relative to occurrence of crisis feature in a given row. E.g. if the value of competition crisis (C3) feature in column is 24% in the row of financial capital crisis feature (C2), it means that in 24% of cases when financial crises took place in a company also competition crisis occurred. The darker the cell colour, the higher relative frequency it contains.

Table 3: Crisis features cross table (N=183)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19
C1	28,4%	3,8%	4,4%	7,7%	7,1%	11,5%	2,2%	0,0%	0,5%	1,6%	1,6%	3,3%	9,3%	1,1%	0,0%	3,8%	0,5%	0,5%	3,8%
C2	3,8%	15,8%	3,8%	2,2%	2,7%	4,4%	0,5%	1,6%	1,1%	1,1%	2,2%	3,3%	9,8%	0,5%	0,5%	0,5%	0,0%	1,1%	1,1%
C3	4,4%	3,8%	20,8%	3,3%	2,7%	8,2%	2,2%	1,6%	1,1%	3,3%	1,6%	4,4%	7,1%	1,6%	0,0%	1,6%	0,0%	1,6%	2,2%
C4	7,7%	2,2%	3,3%	27,3%	3,3%	10,4%	1,6%	1,6%	1,1%	3,8%	1,6%	3,8%	9,8%	1,1%	0,0%	2,2%	0,5%	1,6%	2,7%
C5	7,1%	2,7%	2,7%	3,3%	25,7%	8,2%	1,1%	1,1%	0,0%	1,6%	3,8%	3,3%	11,5%	1,1%	0,0%	2,7%	0,5%	1,6%	1,6%
C6	11,5%	4,4%	8,2%	10,4%	8,2%	42,6%	2,7%	1,6%	0,5%	3,8%	2,7%	7,7%	16,9%	2,2%	0,0%	4,9%	0,0%	2,7%	3,3%
C7	2,2%	0,5%	2,2%	1,6%	1,1%	2,7%	8,7%	0,0%	0,0%	0,5%	2,7%	1,1%	2,2%	0,0%	0,0%	0,0%	0,0%	0,0%	1,1%
C8	0,0%	1,6%	1,6%	1,6%	1,1%	1,6%	0,0%	7,1%	1,1%	4,9%	0,5%	0,5%	4,4%	0,0%	0,0%	1,1%	0,0%	0,0%	0,0%
C9	0,5%	1,1%	1,1%	1,1%	0,0%	0,5%	0,0%	1,1%	3,8%	1,1%	0,0%	0,5%	1,6%	0,0%	0,0%	0,0%	0,5%	0,0%	1,1%
C10	1,6%	1,1%	3,3%	3,8%	1,6%	3,8%	0,5%	4,9%	1,1%	14,2%	0,5%	1,6%	6,6%	0,0%	0,0%	2,2%	0,0%	0,0%	2,2%
C11	1,6%	2,2%	1,6%	1,6%	3,8%	2,7%	2,7%	0,5%	0,0%	0,5%	10,9%	1,1%	2,2%	0,0%	0,0%	0,0%	0,0%	0,5%	0,5%
C12	3,3%	3,3%	4,4%	3,8%	3,3%	7,7%	1,1%	0,5%	0,5%	1,6%	1,1%	16,9%	5,5%	0,0%	0,0%	0,5%	0,0%	1,6%	0,5%
C13	9,3%	9,8%	7,1%	9,8%	11,5%	16,9%	2,2%	4,4%	1,6%	6,6%	2,2%	5,5%	46,4%	3,3%	1,1%	2,7%	0,0%	3,3%	3,3%
C14	1,1%	0,5%	1,6%	1,1%	1,1%	2,2%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	3,3%	6,0%	0,0%	0,0%	0,0%	0,0%	0,0%
C15	0,0%	0,5%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	1,1%	0,0%	1,1%	0,0%	0,0%	0,0%	0,0%
C16	3,8%	0,5%	1,6%	2,2%	2,7%	4,9%	0,0%	1,1%	0,0%	2,2%	0,0%	0,5%	2,7%	0,0%	0,0%	8,2%	0,0%	0,0%	0,0%
C17	0,5%	0,0%	0,0%	0,5%	0,5%	0,0%	0,0%	0,0%	0,5%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	1,1%	0,0%	0,0%
C18	0,5%	1,1%	1,6%	1,6%	1,6%	2,7%	0,0%	0,0%	0,0%	0,0%	0,5%	1,6%	3,3%	0,0%	0,0%	0,0%	0,0%	6,6%	1,1%
C19	3,8%	1,1%	2,2%	2,7%	1,6%	3,3%	1,1%	0,0%	1,1%	2,2%	0,5%	0,5%	3,3%	0,0%	0,0%	0,0%	0,0%	1,1%	10,4%

Table 4: Crisis features cross table relative to rows

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19
C1	100%	13%	15%	27%	25%	40%	8%	0%	2%	6%	6%	12%	33%	4%	0%	13%	2%	2%	13%
C2	24%	100%	24%	14%	17%	28%	3%	10%	7%	7%	14%	21%	62%	3%	3%	3%	0%	7%	7%
C3	21%	18%	100%	16%	13%	39%	11%	8%	5%	16%	8%	21%	34%	8%	0%	8%	0%	8%	11%
C4	28%	8%	12%	100%	12%	38%	6%	6%	4%	14%	6%	14%	36%	4%	0%	8%	2%	6%	10%
C5	28%	11%	11%	13%	100%	32%	4%	4%	0%	6%	15%	13%	45%	4%	0%	11%	2%	6%	6%
C6	27%	10%	19%	24%	19%	100%	6%	4%	1%	9%	6%	18%	40%	5%	0%	12%	0%	6%	8%
C7	25%	6%	25%	19%	13%	31%	100%	0%	0%	6%	31%	13%	25%	0%	0%	0%	0%	0%	13%
C8	0%	23%	23%	23%	15%	23%	0%	100%	15%	69%	8%	8%	62%	0%	0%	15%	0%	0%	0%
C9	14%	29%	29%	29%	0%	14%	0%	29%	100%	29%	0%	14%	43%	0%	0%	0%	14%	0%	29%
C10	12%	8%	23%	27%	12%	27%	4%	35%	8%	100%	4%	12%	46%	0%	0%	15%	0%	0%	15%
C11	15%	20%	15%	15%	35%	25%	5%	0%	5%	100%	10%	20%	0%	0%	0%	0%	0%	5%	5%
C12	19%	19%	26%	23%	19%	45%	6%	3%	3%	10%	6%	100%	32%	0%	0%	3%	0%	10%	3%
C13	20%	21%	15%	21%	25%	36%	5%	9%	4%	14%	5%	12%	100%	7%	2%	6%	0%	7%	7%
C14	18%	9%	27%	18%	18%	36%	0%	0%	0%	0%	0%	0%	55%	100%	0%	0%	0%	0%	0%
C15	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%
C16	47%	7%	20%	27%	33%	60%	0%	13%	0%	27%	0%	7%	33%	0%	0%	100%	0%	0%	0%
C17	50%	0%	0%	50%	50%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%
C18	8%	17%	25%	25%	25%	42%	0%	0%	0%	8%	25%	50%	0%	0%	0%	0%	0%	100%	17%
C19	37%	11%	21%	26%	16%	32%	11%	0%	11%	21%	5%	5%	32%	0%	0%	0%	0%	11%	100%

C1 means inputs, supplies, C2 financial capital, C3 competition, C4 regulations, bureaucracy, taxes, C5 collecting bills, C6 customers, demand, C7 selling prices, C8 entrepreneur – personal crisis, C9 processes, C10 capacity, C11 natural disasters, C12

owners, C13 employees, C14 placement of business, C15 outdated product, C16 quality of production, C17 legal entity, C18 thefts and C19 technical breakdown.

Previous tables show that occurrences of many of the crisis features are strongly linked. The most important relationships are between majority of crisis features (mainly financial capital, entrepreneur – personal crisis, thefts) and employee crisis. This suggests that one of the factors that may be behind is human resource management practices either directly causing the crises or not coping well with previous crisis solution.

Some other stronger relationships are between quality of production and input, suppliers plus customers, owners and customers, entrepreneur – personal crisis and capacity. All these are necessary to take under consideration when building general model.

3.3. System dynamics model of company crises development

To show the dynamics of such a crisis development and its' complexity we have developed a conceptual system dynamics model (see Figure 1), which should reflect some of the relationships as discovered earlier.

The causal loop diagram approach provides the necessary holistic view that should allow exploration of main causal relationships as well as analysis of causal loops representing feedbacks (in other words vicious/virtuous or balancing/goal seeking cycles).

Arrows in this diagram describe causal relationships between variables including relationship type – arrows with “+” mean the same direction of causal relationship (e.g. increase of source variable causes increase of the other one or vice versa), arrows with “-” mean the opposite direction of causal relationship (e.g. increase of one variable causes decrease of the other one and vice versa).

The model is still in its' early development stage now and far of perfect, nevertheless it shows the complexity of causal relationships that might exist in a company and it is possible, based on that, to explain dynamics of several types of crises e.g. related to costs cutting even though several factors are still missing in the model.

3.4. Customers/demand crisis scenario analysis

The most common crises that were mentioned in our data set were crises related to customers/demand and employees. When the first one occurred the second one occurred as well in 40% of related cases (as seen in the Table 4, row C6, column C13).

Based on the model it is possible to explore potential causal links between these two factors. If we start with demand shock (as in global financial crisis) decrease of potential customers could lead to decrease in revenue and profit. Profit might further decrease company attractiveness and could also lead to costs cutting in relation to employees (decrease in wages and/or number of employees). If so, employees could be influenced by both these factors and their satisfaction could decrease as well – leading to possible decrease in their overall quality of work.

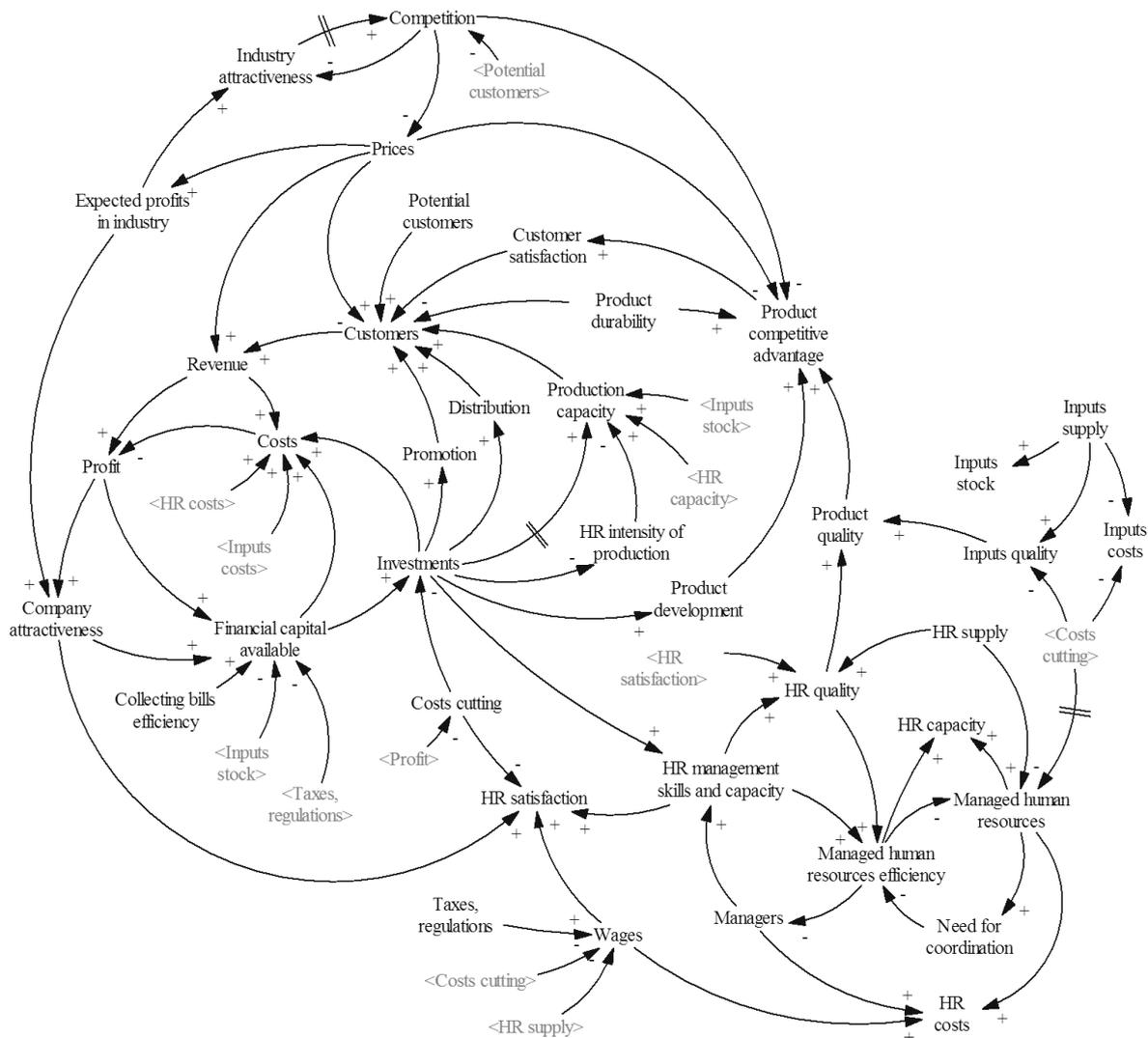


Figure 1: Causal loop diagram of company crises development

The quality of work may influence product quality, product competitive advantage and through that again customers which forms a causal loop that could be reinforcing the former decrease of customers in a situation when costs cuts would not be enough to compensate the decrease of revenue.

In certain industries (especially services), former employees could also start a new competition and thus increase the overall competition level. And the existing competition will be stronger just due to the fact that demand is more limited. This is expressed in the causal loop diagram through potential customers influence and the data set supports that as well (competition crisis 19.2% in relation customer/demand crisis).

The costs cutting probably also plays even more complex role. It may lead to decrease in investments and thus again in costs and revenue with similar impact as mentioned above. Or it may be implemented through the quality of inputs (materials, services for production).

If we take a look on the data set, it is possible to see that crises related to inputs (27%) are quite common in a situation when customers/demand crisis occurs and the same applies to quality issues as well (11.5%).

There were also other more frequent crises – regulations, bureaucracy, taxes (24.4%), collecting bills (19%) and ownership (18%). All might probably add to the problems described above.

What can be drawn as a conclusion from the scenario analysis and empirical data, is that external demand shock may be further amplified by improper management actions, especially towards employees. It would be thus meaningful in such situations to compensate such external shocks with better HR management, quality control and building reserves in advance.

4. Discussion and Conclusions

The above mentioned model is still in the first stage of development and we are working on it to include the other important relationships as well (e.g. the influence of owners). The final stage will be to translate the model to system dynamics stock and flow diagram, quantify relationships and simulate different scenarios to further understand dynamics of development of different types of growth crises in SMEs.

Even though the model is limited and conceptual only, it is from the beginning grounded in empirical data. This should together with proper evaluation lead to theoretical findings that would be meaningful for practice – e.g. what are the likely consequences of certain management decisions in particular situations.

One of the conclusions that can be made, even with such a limited model, is, that for successful dealing with a crisis in a company, it is not enough just to change one parameter. The underlying structure of relationships is quite complex and unintended consequences are very common.

Generally, we see this approach to be very useful in analyzing and explaining the causes of different growth crises in SMEs which supports previous findings in system dynamics literature (e.g. Sterman 2000).

Such analyses should also enrich literature related to crisis management, resilience and business continuity management in SMEs, because the system dynamics simulation model would provide a laboratory for testing of various management policies.

This all opens, according to our opinion, a possible new stream of research about crises in organizations – mainly from the perspective of their dynamics and mutual relationships between occurrences of different crises.

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International Business Management: The Management of Geographical Diversification of Czech Companies at the Beginning of Internationalization Process

Šárka Zapletalová¹

¹Department of Economics, Moravian University College Olomouc, tř. Kosmonautů 1288/1, 779 00 Olomouc, Czech Republic, e-mail: szapletalova@hotmail.com

Abstract

The target foreign market selection has a highly significant influence on the company's future performance. Selecting the appropriate foreign market is an important decision for company management and it demands a lot of resources and thorough planning. There is a wide range of factors that influence the company's choice of a target foreign market. The objective of this paper is to outline a geographical diversification of Czech companies at their initial stage of internationalization process and to determine factors that influence the choice of a target foreign market by the selected Czech entrepreneurial subjects. The data set comprises a total of 297 enterprises that participated in the research. The research was carried out via oral questioning and the main instrument was a questionnaire. The research has shown that the most commonly applied diversification strategy of Czech companies is a concentration strategy. Furthermore, it was found out that the majority of Czech companies operate in the geographical sub-region of Eastern Europe. When choosing the target foreign market Czech companies are influenced by many factors. The greatest influence on the choice of a target foreign market has market variables.

Keywords: geographical diversification, target foreign market, geographical sub-regions, cultural clusters, international business management, internationalization process, spreading strategy, concentration strategy, diversification strategy.

1. Introduction

The Czech Republic is a country with a high share of exported and imported goods in its GDP, which is typical of small countries, of which the country is an example. The Czech entrepreneurial subjects have been increasingly taking part in international market since the beginning of the 21st century and this trend seems to be growing. Most

companies are aware of the necessity to develop their business and entrepreneurship activities on an international scale. The necessity of active participation of Czech entrepreneurial subjects at an international market is conditioned primarily by the character of Czech economics and its foreign political orientation.

Internationalization can be approached either as a processor as a certain level of international intertwining reached by a company (Dörrenbächer, 2000). The decision to undergo geographical diversification is one of the key decisions for the company management at the beginning of the internationalization process. The paper aims to present the management of geographical diversification of Czech companies' entrepreneurial activities in the initial stage of internationalization process. The paper is organized into three parts. In the first part of the paper selected theories dealing with importance of geographical diversification as a key dimension of the internationalization process for enterprises. In the second part of the paper outlines the results of the survey realized between Czech entrepreneurial subjects. The finally section concludes the research and offers discussion of the most important implications.

2. Theoretical Framework

The scope of geographical diversification of international operations of companies is discussed in various economics literature as a key dimension of the internationalization process. Geographical diversification represents the distribution of entrepreneurial activities in various geographical regions. The internationalization of SMEs (Small and Medium-Sized Enterprises) is approached from two perspectives to geographical diversification: the wider geographical diversification (spreading strategy) and the concentration on a key destination market (concentration strategy).

The spreading strategy is based on the strategy of operation in multiple markets that is in geographic regions. The strategy is typical especially for large companies and for born global companies. Luostarinen and Gabrielsson (2004) suggest that a born global company must have business activities in at least two geographic regions. Katsikea et al. (2005) identified long-term advantages of this spreading strategy when companies used to improve the effectiveness of sales management and personal selling activities. The spreading strategy means that the process of accumulating diversified knowledge and experience has been accelerated, thus improving the competencies of the staff involved in international operations. The widespread geographical diversification is not without risks, particularly for SMEs. Pangarkar (2008) argues that SMEs are not smaller versions of larger companies, but are confronted with constraints in the internationalization process relevant to the pace of geographic diversification. The proactive and well-planned geographic expansion strategy is recommended for SMEs (Eusebio et al., 2007).

The concentration strategy is based on the strategy of operation on one key market, or rather one key geographic region. Beleska-Spasova and Galister (2010) hypothesize that smaller companies are less able to absorb the costs associated with international expansion. As a result, the companies concentrating on the home region often perform better than those trading predominantly in the other regions. When confronting the spreading versus concentrating strategy choice, the negative correlation between the number of markets served and the percentage of markets that are significant seems evident: the larger the proportion of goods that are channeled to a smaller number of key markets, the less remains for sale to other markets (Cieřlik et al, 2012).

The outcomes of some recent studies on international marketing strategies have shown the application of one more type of a diversification strategy. Aspelund et al. (2007) claimed that the success of some new international ventures derives from the company's effective implementation of both the concentration strategy and the spreading strategy. Morgan-Thomas and Jones (2009) come to a similar conclusion; they demonstrated that companies which internationalize rapidly enter a larger number of foreign markets while at the same time relying heavily on key export markets. A more refined formulation of the simultaneous use of concentration and spreading strategies is to adopt the concept of ambidexterity originally applied to international operations of large companies (Cieřlik et al., 2012). Ambidexterity addresses the need to simultaneously pursue exploratory strategies in new markets while continuing to exploit opportunities in established markets (March, 1991; Barkema and Drogendijk, 2007; Cellard and Prange, 2008). In summary, despite a generally positive reputation of the diversification strategy for SMEs this type of strategy involves significantly untenable risks, particularly for smaller companies with financial and human resource constraints and limited operational experience (Brouthers et al., 2009).

The choice of both a diversification strategy and concrete target foreign markets is influenced by various factors (such as company size, company age, incentive to entry, company resources etc.). Among the most important factors we can include physical distance and cultural distance. Physical distance is a geographical distance between countries or regions. In this paper with the key concept is a geographical sub-region. The geographic sub-regions of the world have been defined on the basis of original United Nations Statistics Division classifications. The United Nations have divided the world into sixteen geographic sub-regions: Sub-Saharan Africa, Northern Africa, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Central Asia, South-Eastern Asia, Southern Asia, Eastern Asia, Western Asia, Northern America, Central America, Caribbean, Southern America and Oceania (United Nations Statistics Division, 2013).

Cultural distance represents differences in language, culture, consumer behavior and the legal framework between home region and one or more host regions. These differences also affect the performance of international operations in foreign markets. In connection with cultural distance it is inevitable to discuss cultural clusters. Cultural clusters are specific categories which have been the result of the decomposition of the world based on a meta-analysis of cross-cultural studies. The world is divided according to five main variables such as ethnicity, religion, official languages, region world and native languages into the following ten cultural clusters: Nordic, Anglo, German, Latin-Europe, Latin-America, Eastern Europe, Confucian, South-East Asia, Middle East and African (Mensah and Chen, 2012).

In order to fulfill the aim of this paper the following hypotheses have been suggested:

Hypothesis 1: The number of target foreign markets is influenced by incentive to enter to foreign markets.

Hypothesis 2: The number of target foreign markets is influenced by entry mode.

Hypothesis 3: The number of target foreign markets is influenced by the level of target market knowledge.

Hypothesis 4: The number of target foreign markets is influenced by business activities.

Hypothesis 5: The number of target foreign markets is influenced by the use of business partners.

Hypothesis 6a: The company age at the first international entry relates positively to the number of target foreign markets.

Hypothesis 6b: The company size at the first international entry relates positively to the number of foreign target markets.

Hypothesis 6c: The number of years of the international management experience at the first international entry relates positively to the number of foreign target markets.

Hypothesis 6d: The number of cultural clusters at the first international entry relates positively to the number of foreign target markets.

Hypothesis 6e: The number of geographical sub-regions at the first international entry relates positively to the number of foreign target markets.

3. Materials and Methods

The research is part of the project focusing on the internationalization of Czech companies. The results presented here are the findings of the part of empirical research and are used to interpret the geographical diversification of entrepreneurial activities of Czech companies.

The companies included in the study are those that have undertaken internationalization activities and are incorporated in the Czech Republic. There were a total of 297 enterprises from a wide range of industries that participated in the research. The internationalization of the entrepreneurial subjects has been researched with the method of oral questioning and the main instrument was a questionnaire. In order to ensure a representative sample, the questionnaire was submitted to selected top managers or directors of enterprises. The total of 297 valid questionnaires was collected, which provided the response rate of 74%. The research was carried out in the Czech Republic between March 2013 and April 2013.

The choice of companies for the survey was based on the principle that they should belong to both sectors, i.e. manufacturing and services, and various industries. In the research sample (N = 297), there were 50% of companies representing manufacturing and 50% of service companies, altogether from 10 industries. The companies differed as to their size assessed by the number of employees so that 53% of the sample consisted of small enterprises, 29% stands for medium ones and the large ones make 18%. When it comes to the ownership of capital, the research sample constituted the companies of solely Czech capital.

The dependent variable in this study is the choice of the number of target foreign markets at the first international entry. The independent variables in this study are: incentive to enter foreign markets, the level of knowledge of the target foreign market, the cooperation with another company (Czech or foreign partners), the choice of geographical sub-region at the first international entry, the choice of cultural cluster at the first international entry, the branch of business activity, the number of years of the international management experience at the first international entry, the age of the company at the first international entry (company age), the number of geographical sub-regions at the first international entry, the number of the cultural clusters at the first international entry, and the company size (size is determined by the number of employees).

4. Results

The research subsumes three analytical methods: ANOVA Analysis, Regression Analysis and Factor Analysis. The analysis began by examining the correlation between variables. All variables were screened to reveal their distribution through Pearson correlation coefficients. The focus has been on the validity of the overall framework by examining the impact of the identified relevant variables on the final geographical localization choice.

The hypotheses 1–5 were tested through ANOVA Analysis. Table 1 presents the results of the analysis.

Table 1: ANOVA Analysis for Hypotheses 1–5

		Sum of Squares	df	Mean Square	F	Sig.
<i>Hypothesis 1</i>	between groups	603.544	7	86.221	1.156	0.328
	within groups	21552.261	289	74.575		
	total	22155.805	296			
<i>Hypothesis 2</i>	between groups	2253.641	49	45.993	0.571	0.990
	within groups	19902.163	247	80.576		
	total	22155.805	296			
<i>Hypothesis 3</i>	between groups	222.448	2	111.224	1.491	0.227
	within groups	21933.357	294	74.603		
	total	22155.805	296			
<i>Hypothesis 4</i>	between groups	21.663	2	10.831	0.144	0.866
	within groups	22134.142	294	75.286		
	total	22155.805	296			
<i>Hypothesis 5</i>	between groups	191.354	3	63.785	0.851	0.467
	within groups	21964.451	293	74.964		
	total	22155.805	296			

Hypothesis 1 presumes that the number of target foreign markets is influenced by incentive to enter to foreign markets. This hypothesis was not confirmed. Hypothesis 2 presumed that the number of target foreign markets is influenced by the entry mode. This hypothesis was not confirmed. Hypothesis 3 presumed that the number of foreign markets is influenced by the level of knowledge of the target foreign market. This hypothesis was not confirmed. In Hypothesis 4 it was assumed that the number of target foreign markets is influenced by the business activity: this hypothesis is not supported. Hypothesis 5 presumed that the number of target foreign markets is influenced by the use of business partners. This hypothesis was not confirmed.

The hypotheses 6a–6e were tested through Regression Analysis. The dependent variable is the number of target foreign markets at the first international entry. The independent variables are: the number of years of the international management experience at the first international entry (international experience), the age of the company at the first international entry (company age), the number of geographical sub-regions at the first international entry, the number of the cultural clusters at the first international entry and the company size.

Table 2 presents the results of a regression analysis in which the number of markets on the company age in Model 1 was first. The second stage subsumes the company size (Model 2). Model 3 has been based on the international experience of managers. Lastly,

in Model 4, two interactions have been incorporated: the number of the cultural clusters and the number of the geographical sub-regions.

Table 2: Regression Analysis for Hypotheses 6a – 6e

Independent variable	Model 1		Model 2		Model 3		Model 4	
	β	t	β	t	β	t	β	t
Company age (H6a)	-0.047	-0.806	-0.082	-1.275	-0.082	-1.275	-0.034	-1.354
Company size (H6b)			0.082	1.267	0.082	1.265	0.028	1.112
International experience (H6c)					0.005	0.090	-0.009	-0.390
Number of the cultural clusters (H6d)							0.418	7.220**
Number of the geographical sub-regions (H6e)							0.520	8.962**
R ²	0.002		0.008		0.008		0.848	
Adjusted R ²	-0.001		0.001		-0.003		0.846	
F	0.649		1.129		0.752		325.907	
ΔR^2	0.002		0.005		0.000		0.841	
ΔF	0.649		1.606		0.008		807.425	

N = 297, p < 0.01**

The overall regression equations in Models 1, 2 and 3 are not statistically significant ($F = 0.649$, $p > 0.10$; $F = 1.129$, $p > 0.10$; $F = 0.752$, $p > 0.10$), which suggests that the company age, company size and international experience do not explain the number of targeting foreign market at the first foreign entry. The independent variables explain 0.2% of the variance in Model 1, 0.8% in Model 2 and 0.8% in Model 3. The regression equation in Model 4 is statistically significant ($F = 325.907$, $p < 0.01$). The independent variable explains 85% of the variance in Model 4.

In Hypothesis 6a it has been hypothesized that older companies enter more markets at the first international entry. This hypothesis is not supported ($\beta = -0.047$, $p > 0.10$). In Hypothesis 6b, it was hypothesized that larger companies (companies with employees more 250) enter more markets at the first international entry. This hypothesis is not supported ($\beta = 0.082$, $p > 0.10$). In Hypothesis 6c, it was hypothesized that companies with greater international management experience enter more markets at the first international entry. This hypothesis is not supported ($\beta = 0.005$, $p > 0.10$). Hypothesis 6d proposed that the number of foreign target markets relates to the increasing psychic distance (measured by the number of cultural clusters). This hypothesis is supported ($\beta = 0.418$, $p < 0.01$). Hypothesis 6e proposed that the number of foreign target markets

relates to the increasing physic distance (measured by the number of geographical sub-regions). This hypothesis is supported ($\beta = 0.520$, $p < 0.01$).

Furthermore, the factor analysis has been carried out due to the specification of factors affecting the choice of target foreign market: it draws on 15 specified criteria as shown in Table 3. The criteria are based on information offered due to personal communication with selected experts from business and universities and on the basis of previous research. Respondents expressed their opinion on the importance of each criterion with the help of the five-point Likert Scale (5 = strongly agree to 1 = strongly degree). The reliability of measurements was acceptable (Table 3). The total reliability reached the value of $\alpha = 0.799$, standardized item $\alpha = 0.803$.

Table 3: Factor Analysis

Items	Mean (rank)	α	Factors			
			1	2	3	4
Adaptability of the product intended for foreign markets	4.12 (6.)	0.795	0.066	0.271	-0.065	0.648
Company resources	4.17 (4.)	0.798	0.186	0.030	0.068	0.825
International experience of management	3.76 (9.)	0.792	0.281	0.225	-0.201	0.503
Infrastructure in the target market	3.38 (14.)	0.786	0.442	0.193	0.140	0.216
Knowledge and information about the target foreign market	4.25 (2.)	0.786	0.467	0.287	0.092	0.195
Barriers on the target foreign market	4.07 (7.)	0.782	0.351	0.544	0.229	-0.011
The level of competition on the target foreign market	4.23 (3.)	0.788	0.073	0.750	0.233	-0.034
Size and growth rate of the target foreign market	3.95 (8.)	0.791	0.167	0.746	-0.035	-0.056
Political stability on the target foreign country	3.42 (13.)	0.777	0.832	0.110	-0.086	0.038
Tax conditions on the target foreign country	3.73 (10.)	0.778	0.614	0.006	0.320	0.229
Social and cultural differences between the target foreign country and the domestic country	2.96 (15.)	0.782	0.612	0.156	0.309	-0.304
Geographical distance domestic country from the target foreign country	3.45 (12.)	0.803	0.065	0.103	0.772	-0.124
Legislation and Law of the target foreign country	3.69 (11.)	0.776	0.722	0.112	0.212	0.010
Exchange rate stability	4.15 (5.)	0.796	0.327	-0.030	0.418	0.055
Cost related with the operations of the target foreign market	4.41 (1.)	0.793	0.064	0.172	0.619	0.383

Extraction Method: Principal Component Analysis;
 Rotation Method: Varimax with Kaiser Normalization;
 Rotation converged in 6 iterations

Then Varimax rotation was performed: 4 factors with eigenvalues greater than 1 were extracted. The factors loading greater than 0.5 are shown in bold. The results of the factor analysis are shown in Table 3.

The factor analysis extracted 4 factors with eigenvalues greater than 1: along with the observed loadings, this indicates the convergent and discriminant validity of these constructs. The factor loadings structure was employed to determine the factor scores of each company on the four constructs. All the scale items loaded highly on factors they represented and weakly on other factors. The four factors accounted for 67.7% of the total variation in the sample. Those four factors determine the choice of the target foreign market. Factor 1 “macro factor” is formed by the factors of macrolevel (political stability, tax conditions, social and cultural differences, legislation and law). Factor 2 “market factor” characterizes the target market in terms of entry preparation (market barriers, level of competition, market size). Factor 3 “operative factor” is associated with the realization of concrete operations on the target foreign market (geographical distance, costs). Finally, factor 4 “company factor” defines characteristics of the company associated with the foreign operations (adaptability of the product, company resources, international experience).

5. Discussion and Conclusions

The regional diversification of Czech company activities were monitored in terms of markets, geographic sub-regions and cultural clusters. The surveyed Czech companies operated in their initial stage of their internationalization process approximately on one market (mostly operate in Slovakia, Poland and Germany), on one geographic sub-region (mostly operate in sub-regions Eastern Europe and Western Europe) and on one cultural cluster (mostly operate in cultural clusters Eastern Europe and German). The number of selected markets (and the related geographic sub-regions and cultural clusters) was not affected by any observed variables (incentive to entry, company age, company size, entry mode, international experience, knowledge of market, business activity, business partners).

The results of research among Czech companies show clearly predominant diversification strategy – concentration strategy. The concentration strategy is dominant in companies, regardless of their age and size.

When deciding which foreign market to choose most Czech companies are influenced by various factors. With the help of factor analysis four factors have been identified. These factors can be classified into four main groups: macro factor, market factor, operative factor, and company factor. The degree of influence of each group of factor was determined based on the average of the mean values.

As shown in Fig. 1, the greatest influence on the choice of foreign target market has the market factor which constitutes variables assessment characteristics of a particular target foreign market. Among these characteristics can be included the level of competition, market barriers, market size etc. The second most influential factor group is the company factor. The operative factor is the third most important group of decisive factors when choosing the target foreign market. The least influential group of factors according to the investigation of selected Czech companies is the macro factor which describes macroenvironment characteristics of the target foreign country.

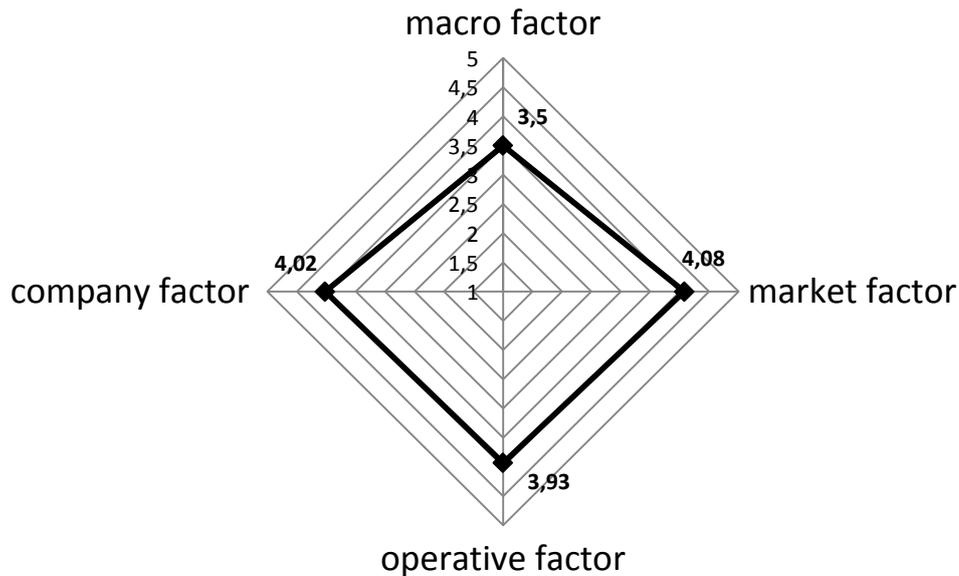


Figure 1: Factors Influencing the Choice of Target Foreign Market

Changing conditions and market structures demand that many companies devise new strategies as they search for a competitive place in their home markets and take advantage of emergent market opportunities. The participation of entrepreneurial subjects in international business is one possibility of strengthening competitiveness.

The aim of this paper was to investigate the type of management of geographical diversification of Czech companies' entrepreneurial activities in the initial stage of internationalization process. The results support the hypothesized relationships suggesting the importance of including interaction effects in the target foreign choice. The research has shown that the most commonly applied diversification strategy of Czech companies is the concentration strategy. Moreover, it was found out that the majority of Czech companies operate in the geographic sub-region of Eastern Europe. When deciding to choose the potential target foreign market most Czech companies are influenced by various factors. The greatest influence on the choice of target foreign market has market variables.

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Assistance System for Traffic Signs Inventory

Karel Zídek¹, Tomáš Koubek¹, David Procházka¹ and Marcel Vytečka¹

¹Department of Informatics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: karel.zidek@mendelu.cz

Abstract

We can see arising trend in the automotive industry in last years – autonomous cars that are driven just by on-board computers. During the driverless ride, computer must process a wide set of information gained by GPS locators and computer vision system, including GPS position, driving speed and descriptions of lanes and traffic signs. The traffic signs tracking system must deal with real conditions with data that are frequently obtained in poor light condition, fog and heavy rain or are otherwise disturbed. Completely same problem is solved by mapping companies that are producing geospatial data for different information systems, navigations, etc. Examples of such companies can be TomTom or Mapy.cz. They are frequently using cars equipped with a wide range of measuring instruments including panoramic cameras. These measurements are frequently done during early morning hours when the traffic conditions are acceptable. However, in this time, the sun position is usually not optimal for the photography. Most of the traffic signs and other street objects are heavily underexposed. Hence, it is difficult to find an automatic approach that can identify them reliably. In this article, we focus on methods designed to deal with described conditions. An overview of the state-of-the-art methods is outlined. Further, where it is possible, we outline an implementation of described methods using well-known Open Computer Vision library. Finally, emphasis is placed on methods that can deal with low light conditions, fog or other situations that complicate the detection process.

Keywords: OpenCV, traffic signs, image processing, object recognition, road inventory, machine learning, Viola-Jones detector, support vector machines

1. Introduction

It is possible to find a substantial amount of articles that deals with road sign detection. Described methods vary from pixel correlation calculations to neural networks. In addition, most of the articles do not discuss the ability to work in adverse weather conditions or other disturbing factors (heterogeneous backgrounds, fog, low light conditions etc.). However, there are many companies working in a mapping industry

that must deal with such conditions. Used camera equipment has naturally also its limitations; hence the detection applications must deal with chroma and luminance noise (see Figure 1, left image), optical distortions and other hardware-based shortcomings. At a suitable sunny day, there is not a significant difference between image obtained state-of-the-art camera and an older one. However, when mentioned problems (hardware limitations and environmental conditions) are multiplied, result images can be below the algorithm recognition abilities. Figure 1 (middle image) represents a situation with low light conditions, additional image distortion caused by raindrops (see Figure 1 right image) and a shape distortion caused by lens.

This article is focused on researchers or developers that consider a development of a traffic sign recognition system. To simplify such development, we refer to an implementation of described methods that is provided by Open Computer Vision Library (OpenCV, 2014). In spite of that, the overall recognition process is very complex. For this reason, this article deals just with the first part of this process – detection of traffic sign position within the RGB picture. The other part of the process, identification of a precise kind of the sign (e.g. Stop sign), is described just briefly. Nevertheless, even this step is supplemented by a possible implementation.

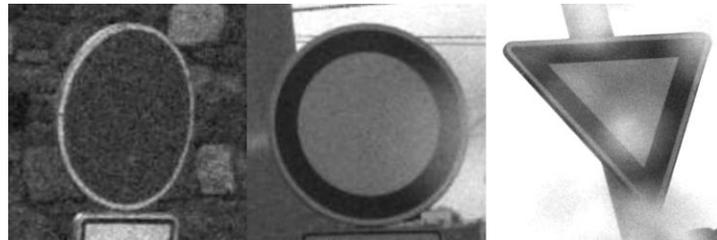


Figure 1: Examples of images distorted by hardware limitation of the camera (left image), light and weather conditions (middle image) or raindrops (right image).

2. Image preprocessing

The preprocessing phase can substantially simplify the sign detection process. Firstly, it is frequently recommended to reduce the resolution of input data. Further, it is possible to crop the input image in the way that areas with possible sign appearance are left only. This step has no significant influence on the results; it can however substantially speed-up the detection process.

Now, basic filtering can be applied. Frequently used are e.g. blur filter that can reduce the image noise, or colour equalisation. In a case of underexposure of the image, histogram equalisation can be done. Its influence is described e.g. in Bahlmann et al. (2005). Histogram correction must be done accordingly to the used detection method and used colour model. For instance, in case of HSL model, hue and saturation values should not be corrected using this method. Representation value of the image can be harmed.

The output of this phase is an image with reduced size and reduced distortions. Nevertheless, all these filters and adjustments, in general, must be applied cautiously. Inappropriate application can have a negative influence on the detection process. Additionally, particular preprocessing filter must be chosen accordingly to the used detection method. Therefore, selected preprocessing methods are in detail described in the following section that outlines the recognition part of the process.

3. Road sign recognition

All traffic signs must fulfil conventions of the Inland Transport Committee (1968). This agreement substantially simplifies their recognition. Naturally, each country issues a decree that describes an application of these rules to national legislation. For instance, there are five key categories of traffic signs in the Czech Republic (more details in the Regulation of Ministry of Transport (2001)). It is similar, with some exceptions, to road signs systems in other parts of the world. For instance, the first group consists of warning signs. A particular pattern is a triangular shape with bold red edge.

General sign recognition process is outlined in Figure 2. It naturally starts with image acquisition. Once the image is obtained, it must be cleared of distortions and unnecessary information. This part of the process is known as the image preprocessing. Further, a location where potential sign is placed is usually calculated. This step can be described as sign detection. Such possible sign is then classified. Hence, the specific kind of sign is identified, or potential sign is excluded from the results. The outlined steps can be implemented using many different methods.

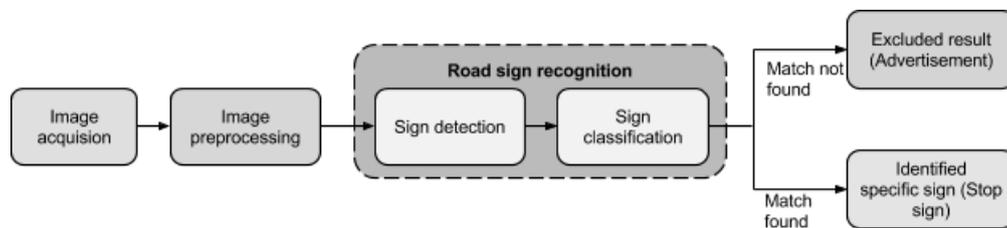


Figure 2. Overview of road sign recognition process.

Purpose of the detection and image quality are decisive factors for selection of an appropriate method. Real-time processing methods (e.g. methods for car systems) must be adjusted for high processing speed. On the other hand, this is obviously not a case of an offline system (for instance a road sign inventory). In this article, we aim at offline systems. In addition, different methods must be used for recognition of data in orthogonal projection, different for data with deformed perspective, etc.

3.1. Road sign detection process

As been already mentioned, the purpose of this step is to identify a possible road sign position in the image. Following section presents selected frequently used methods. The key issue usually is to choose an appropriate combination of these methods. Success rate of described methods can be in some cases improved by their proper combination, e.g. the colour segmentation and morphological operations can be used before descriptor detection. That depends on the particular application.

3.2. Colour segmentation

The goal of the colour segmentation is to split the image into so-called regions of interest (ROI) that possibly contains a road sign. This approach is based on assumption that sign colours are strictly defined by an appropriate national decree. Hence, image areas that contain these colours are possible sign positions. For colour segmentation, it is possible to use OpenCV function *inRange(inputImage, lowerBoundary, upperBoundary,*

segmentedImage). Method `inRange()` filters *inputImage* and stores result into *segmentedImage*. Parameters *lowerBoundary* and *upperBoundary* specify range of segmentation – that values can be stored into *segmentedImage*.

Some authors find this method unsatisfactory because of problems with the colour temperature, flares and other variables that change with a daytime, weather, etc. As a possible solution there is mentioned usage of colourless data. Such approach is described e.g. in Bahlmann et al. (2005). A colour and colourless data methods are compared in Bonaci et al. (2011). The result is that the colour data detection provides generally better results. However, success rate depends on the distance from the observer. In the case of distant signs, the colourless data method was better. The principal reason is that colour segmentation is not suitable for data that contains lesser amount of colour information. This is the case of very distant, hence small, signs.

In the case of colour data, it is desirable to minimize these problems. It is possible to use standard functions (included in OpenCV) like median filter or bilateral filter. Indeed, in the real-time applications could some of these filters cause problems because it can be challenging to achieve a proper ratio between desirable results and acceptable speed. The median filter is used to smooth images on the basis of an average value of selected squared area of neighbour pixels. In OpenCV, method `medianBlur(inputNoisyImage, blurredImage, sizeOfKernel)` can be called. The *sizeOfKernel* parameter describes size in pixels of the squared area that is considered during average pixel value calculation; therefore, its value must be odd positive number.

The median filter has one major disadvantage for the sign detection. Too high values could cause blurring of object edges, and that could make sign detection more difficult. For this reason, for image with higher signal/noise ratio is frequently used bilateral filter that preserves most of the edges in the image. The bilateral filter is also included in the OpenCV library and can be used as follows: `bilateralFilter(inputNoisyImage, outputImage, diameter, sigmaColor, sigmaSpace)`. The *diameter* parameter represents a diameter of neighbour pixels. The *sigmaColor* parameter states how much the pixels from the neighbourhood will influence the resulting colour. The *sigmaSpace* defines how much the pixels will affect each other when their colours are similar.

As been described, the dependence on the light conditions belongs between the principal disadvantages of the colour segmentation. Higher resistance can be found in some methods, e.g. filtration in colour spaces HSL or HSV. These methods are partially luminance invariant, and this property provides that some of the unwanted effects are filtered out (see Tran (2013)). The methods of HSL or HSV are based on hue component, which filter out the particular colour tones. Similarly, the colour space CIELUV can be used (see Mathias et al., 2013). Using the OpenCV library, colour model conversions can be done using the function: `cvtColor(inputImage, convertedModellImage, conversionCode)`. The *conversionCode* parameter selects the required conversion method. For purposes of our application, we use a conversion from RGB to HSL; the parameter is in this case `CV_BGR2HLS`. Other conversion methods are named similarly.

3.3. Morphology based operations

Although morphology-based methods are not widely used in the road sign detection, they are in some cases used as auxiliary tools. These methods can be applied after colour segmentation phase primarily for identification of ROI (sometimes also called BOI – blobs of interest). Each ROI contains one object that is given e.g. by its convex hull. The convex hull represents the smallest convex region that contains all given points. The

convex hull is useful especially when shape of the sign is distorted. This application is described in Maldonado-Bascón et al. (2007). OpenCV provides for the convex hull calculation function *convexHull(InputArrayOfPoints, outputArrayOfHullPoints)*. This function implements Sklansky (1972) algorithm.

Despite that, in some cases, these morphological operations can be used even before the colour segmentation phase for e.g. colour noise reduction (erode and dilate operations). Dilation method convolutes source image by a chosen kernel. This kernel is moved over the source image, maximal pixel value overlapped by kernel is calculated and image pixel in the anchor point position (usually center of the kernel) is replaced with this new value. For instance, dark lines on a light background are narrower after application of this method. The erode operation is the complete opposite. A minimal value under kernel is chosen; therefore, the dark areas of the image are enhanced. Hence, dark line on a white background is thicker after application. The first step is to create structuring element (convolution kernel) using *getStructuringElement(shape, size, anchorPoint)*.

The *shape* parameter decides a shape of the element (e.g. MORPH_RECT). The *size* parameter declares size of the element and *anchorPoint* defines the place where calculated new value will be stored. When structuring element is defined, erode and dilate operations can be called.

3.4. Machine learning methods

Methods based on artificial neural networks are widely used in computer vision applications. Several articles mention usage of artificial neural networks with Viola-Jones descriptor (frequently used for e.g. face detection). Neural networks can provide shape pre-classification and exclude false positive results of shape detection phase (described below). According to Bonaci et al. (2011), false positive results decrease is from 65% to 7%, so these methods can be used especially for simplification of the classification phase.

Most frequently used machine learning method is the Viola-Jones detector that is mentioned above Viola and Jones (2009). This approach is used in many projects - Mathias et al. (2013), Bonaci et al. (2011) or Bahlmann et al. (2005). Grayscale images are usually used as input for the method. However, even the colour data are acceptable. In such case is search usually done just within a specific colour channel.

The Viola-Jones algorithm is based on so-called Haar-like features. The Haar-like features are moved over the input image and rank actual position. The classifiers are sorted into cascades. The algorithm goes through this cascade of classifiers and calculates which conditions are fulfilled. Generally, a substantial advantage is that with sufficiently large training set, they are invariant to perspective deformation. A drawback of this approach is the computational complexity. Therefore, it has been modified.

Further, adaptive boosting algorithm is used for improvement of this classification approach. Algorithm evaluates particular classifiers and assigns their weight. Through process of classification, weights are continuously recalculated, taking into account previous results. It improves final results for complex situations Rojas (2009).

In OpenCV, it is possible to use implementations based on Haar-like features (Viola-Jones algorithm) or Local Binary Patterns (LBP). Both training and detection using LBP are substantially faster than with the Haar-like features; despite that, the Haar classifier is generally more precise. However, quality of the training set is an essential issue. As is explained in OpenCV (2014), it is possible to train an LBP-based classifier that will

provide almost the same quality of results as the Haar-based one. The library also provides several implementations of described AdaBoost algorithm. The implementation is described in detail on the OpenCV portal.

The OpenCV library provides two basic functions for cascade classifier training: *opencv_haartraining* and *opencv_traincascade*. The latter is a newer implementation that supports both HAAR and LBP features. In our implementation, the newer version is exclusively used. A positive training set must be prepared to produce an XML file with the cascade. OpenCV provides function for this purpose: it is *opencv_createsamples*. For the detection process itself can be used method *CascadeClassifier::detectMultiScale(Input, Output, scaleFactor, minNeighbors, minSize, maxSize)*. The input is an image in which we want to find the object. Results are stored into a vector of rectangles called output. Each found object is placed in one rectangle. The parameter *scaleFactor* specifies a reduction of image size at each image scale. The *minNeighbors* determines how many neighbour rectangles must be found to retain candidate rectangle. Parameters *minSize* and *maxSize* determine maximum and minimum size of the detected object.

Further advanced method for such kind of object detection is Integral Channel Features Classifier (ICF), described by Mathias et al. (2013). This method was initially used for pedestrian detection in car safety systems. ICF is basically an extension of Viola-jones detector. Input of this method is not only grayscale versions of source images, but also various kinds of heterogeneous sources of information. In Dollár et al. (2009), following different sources are used: grayscale images, separated colour channels, histograms of oriented gradients, results of linear (convolution) and nonlinear transformation (Canny edge detector) or threshold operation. ICF also uses AdaBoost for speeding-up of object classification. Against the Viola-Jones detector is ICF more robust. Even more, the method has not very high computational complexity. However, this approach is not implemented in the OpenCV library.

3.5. Shape-based detection methods

The shape-based methods are focused on a selected property of the detected object (e.g. colour, shape etc.). A substantial limitation of this approach is that this particular property can suffer damage in source data (due to weather conditions or any other external influence). Among these methods also belongs well-known Canny edge detector used e.g. in Garcia-Garrido et al. (2006). With the intention to simplify the computation, closed or almost closed edges are processed only. In such image produced by Canny edge detector, lines are identified using Hough transformations. For instance, for the triangle shaped signs, this method goes through the intersections of groups of three lines that form the angle of 60 degrees. Nevertheless, this method has two significant disadvantages: it is not perspective invariant, and rising amount of lines has a negative influence on the performance. The OpenCV library again provides both algorithms. Their explanation and usage examples can be found on the OpenCV (2014).

4. Proposed road sign detection implementation

As been already described, traffic signs have specific shapes and graphical content. However, many objects with similar shape or appearance can be found in a typical environment. Precise identification of a particular traffic sign is, for this reason, a non-

trivial problem. We designed an identification process composed of two phases, due to these facts. Usage of more than one method brings a substantial improvement of the process. For the first phase, we choose Viola-Jones descriptor described above. We used this method for primeval detection of a traffic sign in the scene. For each group of signs (on the basis of the shape) we create a detection cascade.

There are two basic approaches to prepare a training set. The first one is based on the deformation of a single picture with a desired object. The picture is rotated around all axes at specified angles and resampled to different resolutions. Training images based on this method can be prepared using this function:

```
opencv_createsamples.exe -img inputImage.jpg -w 24 -h 24 -num 1000 -vec output.vec
```

Where *-img* specifies path to the input image with an object, *-w* and *-h* specifies resolution of created samples, *-num* determines number of output samples and *-vec* specifies .vec output file with images in the binary format. The deformation angles of the images are left default in this case.

The other approach is based on a preparation of positive samples manually. It is necessary to prepare a text file that contains information about the picture and the object on the each line. Following line is an example of a single record from the file:

```
positives\positive0.png 1 50 50 220 220
```

The first column is a path to the image, the second specifies a number of objects in this image, the next two numbers are x and y coordinates of a left upper corner of a rectangle that specifies the position of the object. Last two numbers determines size of the rectangle. With such configuration file, it is possible to create training image using function:

```
opencv_createsamples.exe -info positives.txt -w 24 -h 24 -vec output.vec
```

Where *-info* specifies a path to the text file in required format. Others parameters have the same meaning as is described above.

The training process also requires negative samples, where the desired object is not present. Their list must be again prepared in a text file. Each line of the text file contains a full path to one negative sample. The training can be realized using following function:

```
opencv_traincascade.exe -data folder -vec output.vec -bg negatives.txt -numPos 100 -numNeg 50 -numStages 12 -w 24 -h 24
```

Where *-data* specifies a folder for temporary files, *-vec* is a dataset of positive images created in the previous step, *-bg* is the text file with paths to the negative images, *-numPos* and *-numNeg* specifies number of positive and negative samples used for every training stage, *-numStages* determine number of training stages. Parameters *-w* and *-h* specify the resolution of the positive samples. Output is an XML file that contains the cascade.

As been already mentioned, the critical factor for a training process is number of the negative and positive samples. In general, it is recommended to have approximately one thousand positive samples and two thousand negative samples. However, it always depends on the specific application. For the detection process itself, OpenCV provides function *detectMultiScale*. The output is a vector of rectangles where each rectangle contains the detected object. In our application, the output vector of rectangles contains positions and sizes of regions that match the traffic signs cascade (see Figure 3 A). All traffic signs detected by a particular cascade are of one type (shape). In this stage, a number of false positive regions without any sign is also detected (see Figure 3 B). It is

necessary to examine all these regions and discard all the false positive matches in the further step.

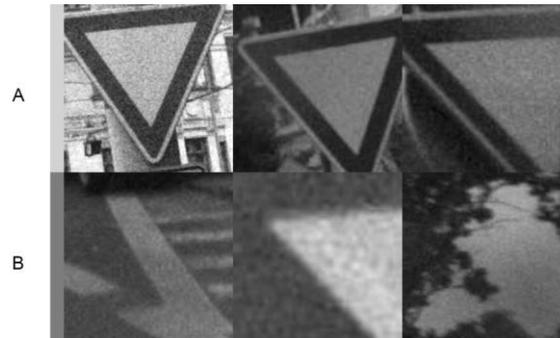


Figure 3: Correctly detected regions – A, False positive regions – B

Substantial improvement can cause removal of the particular image regions because few regions in each sample have obviously zero chance of traffic sign occurrence (see Figure 4 left image). Further, it can be set maximum and minimum size of a detected region. These restrictions can lower the false positive rate and also could reduce the computation load for the first phase. We aimed at off-line system, hence the application of these rules were not necessary. False positive records can be easily disposed in the identification step.



Figure 4: False positive region on left picture (square on the window near the roof) can be eliminated due to its position. On the right image is shown a distortion from raindrops.

Table 1: Results of a first phase detection without any correction of a position or size of a ROI.

Number of test pictures	Quality of test pictures	Correct detection	False positive detection	False negative detection
285 (city)	poor (rainy)	6	265	1

The results of our implementation of the detection phase are in Table 1. The testing data contained samples from a standard city environment (Brno, Czech Republic) obtained during a rainy weather by a mapping car. Many samples were substantially distorted by the raindrops on the glass of the camera. The samples contained seven traffic signs of the “right of way” type. Six of them were detected. Detection algorithm missed one sign due to these raindrops on the glass (see Figure 4 right image). This single miss causes a higher detection probability (approximately 85%); however, in case of larger data set, the success rate will be significantly higher. Indeed, higher accuracy of the detection process can be also achieved with more positive and negative samples.

4.1. Further steps

The next step after detection of potential traffic signs is a classification of its particular kind. Hence, output of this step is an explicit specification of the sign in the source data image. As well as during the sign detection, machine learning methods are used in sign classification process. Among frequently used approaches, artificial neural networks described by Garcia-Garrido et al. (2006) and Support Vector Machines (SVM) used by Mathias et al. (2013), Bonaci et al. (2011) or Maldonado-Bascón et al (2007) belongs.

Support vector machines is a classifier that can transform nonlinear classification task to a linear one. An SVM-based method divides the training dataset into two groups and creates a hyperplane, which separates them. This algorithm uses supervised learning. The main part of the algorithm is a kernel-based transformation that allows to find an optimal path dividing the hyperplane. Because SVM is a binary classifier, strategy for decision is necessary, e.g. binary decision tree is used Bonaci et al. (2011). OpenCV library includes support for this kind of classification. SVM implementation (OpenCV, 2014) uses two primary functions for SVM: *CvSVM::train* method for the classifier training and *CvSVM::predict* method for application of the classifier on the real data. Algorithm must be combined with some feature descriptor that can be classified. Commonly used descriptor is HOG (Histogram of Gradients) or pyramids of HOGs, e.g. used by Mathias et al. (2013) or Bonaci et al. (2011). Comparison of classification is done by SVM and neural networks is provided by Bonaci et al. (2011). Due to this research, SVM shows approximately 10% higher success in classification than ANN.

5. Conclusion

As been already explained at the beginning of the article, there is no optimal set of methods for traffic sign recognition. Suitable combination depends on environmental conditions during the image acquisition, hardware limitations, etc. Influence of all these factors can be limited by selection of appropriate parameters of described methods. Even more, a different method combination must be chosen for real-time systems used e.g. in cars and combination for off-line system such as road inventory application.

On the basis of the previous research, we proposed a solution for a dataset that is affected by poor weather conditions and/or perspective deformations. This dataset is processed in off-line system for traffic sign inventory. As been mentioned, road inventory is a time-consuming and expensive process that involves a significant amount of manual work. Such off-line detection systems can reduce time-consuming manual work of an operator.

Our solution is based on two-step processing. Firstly, the general kind of traffic sign is identified on the basis of the shape (restrictions, warnings...). For this step, we propose the Viola-Jones detector from the machine learning methods. Result is a set of regions that potentially contains a traffic sign from the particular group. The second step is identification of the precise type of traffic sign (e.g. elk warning or train warning). For this second step, we propose support vector machines (SVM) approach. One of the key advantages of proposed approach is that in the first step precisely identifies the traffic sign class; therefore, the SVM in the second step is just testing different signs from this particular category. This solution allows better adjustment of the methods and reduces the time necessary for the whole detection process.

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Customers’ Opinion Mining from Extensive Amount of Textual Reviews by Windowing and Decision Trees

Jan Žižka¹ and Arnošt Svoboda²

¹*Department of Informatics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: zizka@mendelu.cz*

²*Department of Applied Mathematics and Computer Science, Faculty of Economics and Administration, Masaryk University, Lipová 41a, 602 00 Brno, Czech Republic, e-mail: arnost.svoboda@econ.muni.cz*

Abstract

Customers of various services are often invited to type a summarizing review via an Internet portal. Such reviews, written in natural languages, are typically unstructured, giving also a numeric evaluation within the scale ‘good’ and ‘bad.’ The more reviews, the better feedback can be acquired for improving the service. However, after accumulating massive data, the non-linearly growing processing complexity may exceed the computational abilities to analyze the text contents. Decision tree inducers like c5 can reveal understandable knowledge from data but they need the data as a whole. This article describes an application of windowing, which is a technique for generating dataset subsamples that provide enough information for an inducer to train a classifier and get results similar to those achieved by training a model from the entire dataset. The windowing results, significantly reducing the complexity of the learning problem, are demonstrated using hundreds of thousands reviews written in English by customers of hotel services. The results show classification accuracy errors, training + testing time, tree sizes, and words relevant for the review meaning in dependence on the training subsample size. A user obtains knowledge represented by important words.

Keywords: text mining, customer opinion analysis, decision trees, decision rules, windowing, large data volumes, machine learning, computational complexity

1. Introduction

One of the present-day typical tasks is the analysis of web-based data, apparently whatever scientific or application area is taken into consideration. Collecting opinions (or reviews) from customers of various services is gaining in popularity because it can serve as a valuable feedback from the comparative advantage acquiring point of view,

Žižka and Rukavitsyn (2012). Intuitively, the more customers' meaningful opinions are available, the better information and knowledge – coming from the feedback – may be applied to the service improvement, thus supporting the competitive capabilities of economic subjects, Dařena et al. (2014).

Unfortunately, there is a couple of reasons why such an idea contends with difficulties when it should be realized in the real world. Customers are human beings that use their so called *natural language* for their communication, including sharing or providing opinions, be it reading and listening (passively) or talking and writing (actively). In the following, this research report deals with the customers' opinions that have a common, unstructured form expressed as freely written, not too long textual documents. Providers of various services make today possible to use personal computers and the Internet to let the customers write their opinions. Such entries are stored, can be again read via the Internet by other (maybe potential future) customers, and analyzed for revealing relevant points, which play significant roles in the opinions from different viewpoints. In this paper, the semantic analysis – performed by computers – was the main goal of the presented research.

Putting the existence of hundreds of natural languages aside, two other weighty problems must be taken into consideration when thinking about mining information and knowledge from the data, which has the non-numerical textual form expressed in natural languages (words, phrases, sentences):

- machines do not really understand human natural languages, and
- data volumes are growing excessively.

The first matter must be sorted out by suitable representation of the textual documents written in natural languages. The second issue is related to the problem that – as the other side of the coin – has arisen out of the very positive feature of the present day: it is relatively very easy to assemble and store electronic data, which leads to the emerging problem now informally called as *big data*. Thus, the main question here was how computers can discover significant knowledge in large number of customers' textual reviews.

It is, of course, true that in reality much more than 200,000 text documents (mentioned here) would be necessary to analyze; it could be easily millions, billions, and more. At the present time, the overwhelming majority of algorithms and procedures require having all the data in one batch – and the contemporary hardware has big memory difficulties, often unbeatable. That is another topic related to the *big data* problem area, which is out of the scope of this paper. The presented research deals here with a more traditional approach based on so called *windowing* described below.

The following sections provide the description of the textual real-world data obtained from the Internet, which was used for the investigation of the problems briefly mentioned above, including the applied specific data representation, the method of revealing possible information and knowledge via text mining, Srivastava and Sahami (2009), based on machine learning, then the comparison of large experimental results obtained with the help of various parameters, and a brief discussion.

2. Input Data Description

To investigate the presented problems, the research used data created by customers of hotel services. The data came from the publicly accessible web-site of a popular Internet-based company (booking.com) that enabled customers on-line booking of hotel

accommodation almost anywhere. After using the service, customers were allowed to write down their reviews simply from computer keyboards and the reviews were published on the booking company web-site. The customers could use any language and, in essence, no strict limitations were requested. The reviews were written quite freely in tens of different natural languages during several years. Each review had a special mark evaluating the positivity or negativity of the used hotel service: one star for a quite negative opinion, five stars for a quite positive one, plus two to four for mixed experience.

Table 1: Several illustrative examples of positive and negative reviews

Positive review examples	Negative review examples
<p>everything was great in this hotel, the staff, the swimming pool, the size of the room, the kitchen with microwave, coffee maker, toaster, and a hair dryer in the bathroom. although it is in a very relaxing area, there were bars and supermarkets around the hotel and it was very convenient. there are lots of activities for small kids and excellent size of swimming pool. definitely recommendable.</p>	<p>terrible! very unclean. first. upon arrival we were told that we could not have a non smoking room (which we had booked months ago). if this was not to our liking we could swap the next day! second. room was not clean, and of course smelt of smokers. third. we found a cockroach in the room. fourth. internet was charged at \$24.95 per 24 hours, but was given to us free after mentioning that my booking through booking.com said it was free.....should i go on?</p>
<p>i like your location not far from old town</p>	<p>toilet stink maybe because of the moist tiles & no ventilation. kettle not provided but tea, coffee etc available.</p>
<p>clean room and friendly staff, good for costal walk with easy access to local shops and restaraunts</p>	<p>tv channels poor, i cant imagine a 4 stars hotel with no one helped us to get our luggeges to the room the recptionest was very rude by saying u hav to take ur luggege to ur room!!</p>
<p>w oliwkowym gaju nieduża hacjenda z dopracowanymi dodatkami dała nam wyciszenie, nasłonecznienie i pyszne jedzenie. in the olive grove the small hacienda with supplements touched up gave us the calm, the solar exposure and the delicious food.</p>	<p>i am afraid the outer windows of my room (they were double glazed) were extremely dirty and spoiled the view. my other criticism would be that radio 2 was played in the brasserie throughout breakfast. the incessant chattering of chris evans and guests is very annoying when you are trying to read a newspaper or arrange your thoughts for the day. I don't think radio is appropriate in such a setting. selected background music - if anything - would be more acceptable.</p>
<p>excellent.</p>	<p>dining room</p>
<p>walking distance to the beach and shopping areas. the variety of food is good.</p>	<p>all was pleasant</p>

Table 1 illustrates several randomly chosen positive and negative reviews. One positive example is in two languages (Polish and English). The last negative example “all was pleasant” probably got just one star by mistake because it looks quite positively (unless it was meant as irony). The shown examples were not corrected, they were here

only transformed to the lowercase form, thus words like “luggeges” represent mistyping and grammatical errors (it should be “luggage” and cannot be in the plural). Incorrectly written words artificially increase the dictionary size with a negative impact to the information contents and computational complexity. Sometimes a review could not be categorized without knowing its star labeling, for example that “dining room” sample did not tell much.

English reviews distinctively prevailed, even if not all authors had English as a native language – English was very often taken as a kind of an “international” language. Altogether, there were almost 2,000,000 English positive and negative reviews, where the positive ones were more frequent (almost 1,300,000). Other significantly represented languages included Spanish, French, German, and others according to the native speakers’ distribution and number. Sometimes, authors of reviews used their native language together with the same message written in English (mainly smaller nations). The length of reviews was different – the shortest ones had just one word (like “Excellent”), the longest ones up to some 130 words, while the arithmetic average was around 21 words. The reviews were published plainly as they were written by their authors, without any spell-check or grammatical corrections, containing many mistakes that played a role as a kind of signal noise. More details can be found in publications of various text-mining research tasks using the same data (also in some other languages), see, for example, Žižka and Dařena (2011).

One of the research goals was to test capabilities of common personal computers (PC’s) that could be expected to mine such textual data provided that a regular hotel-service provider would own and apply an ordinary PC. Thus, not all the English reviews were used because the used available computer was a routine office PC with 8 GB of memory (RAM – it was the critical point) and two double-core processors 3 GHz. After some experimenting, a random choice of 200,000 (ca 10%) reviews was used for the investigation to avoid the insufficient memory failure. Some of the previous research tasks, for example, Žižka and Dařena (2012), demonstrated that such a choice was quite representative for the given data from the obtained result point of view.

3. Preprocessing and Representation of Reviews

At the first step, the reviews were divided into two classes: *positive reviews* and *negative reviews*. The positive review class included documents having 5 and 4 stars while the negative one contained reviews with 1 and 2 stars. Reviews with 3 stars were taken as something between and (because their number was not high) were excluded from the processing. To avoid problems with the unbalanced number of positive and negative reviews, the source set of 200,000 reviews contained 50% of positive and 50% of negative ones. Strongly unbalanced classes need additional, not always easy preprocessing, see, for example, Ganganwar (2012).

At the second step of the data preprocessing, the reviews were freed from special characters (for example, @, #, \$, %, *, &, and so like) if they were there. As various experiments and publications showed, for example, Sebastiani (2002), such characters in this kind of text analysis were semantically quite meaningless, providing no useful information and acting as noise. Similarly, all numbers and punctuation was removed, too, from the same reasons, so only terms (words) having at least one alphabetic character remained. In addition, all letters were converted to the lowercase form. Such kind of preprocessing is common, independently on a language, because it positively

(from the computational complexity point of view) decreases the number of lexical units without any significant loss of useful information for a machine.

Finally, all words having only one or two letters were removed, too, because such words included many so called *stop-words*, Sebastiani (2002), which did not contribute to the relevant semantic information of the reviews. Those words included mainly articles *a, an*, prepositions like *at, in, on*, and so like. Such simple kind of the data preparation was very beneficial because the total number of unique terms (the dictionary of the reviews) was substantially decreased from almost 120,000 to 56,462. That filtering enabled ultimately carrying out the large experiments with 200,000 reviews using a routine PC.

At the third step, the words in the reviews were transformed into numbers defined as frequencies of particular terms in individual documents. The research used the standard text document representation, Sebastiani (2002): Each review was represented as a vector in a multidimensional vector space defined by all the reviews' words, where each dictionary-word constituted an axis (dimension). A vector was a row in a matrix (table), where each column represented a word. A vector's coordinates were defined by a word frequency in a given review. Considering that the total number of words in the dictionary was 56,462 and the average number of a review's words was only ca 21, the vectors were very sparse (most of coordinates were just zeros). Non-zero coordinates were mostly 1, not often 2 or more, so the representation suggested the binary one.

It was possible to apply several more-or-less different representations (for example, binary or tf-idf), however, the previous experiments showed that the review analysis gave almost the same results independently on a specific representation. It was eventually the reason why the research used that simple, not very demanding representation, having in mind making the preprocessing of large data easier.

4. Design of Experiments

The set of experiments was designed to demonstrate what knowledge could be mined from the large data volume provided that it was impossible to analyze the whole set containing 200,000 reviews – which was true for the given PC with 8 GB RAM. One of possible known solutions is working with just part of the whole dataset. That part can be generated by random selection of reviews, forming a subset of an acceptable size both from the memory and computational time point of view. The question is how many elements such a subset should contain – lower number means faster computation without risking the memory insufficiency but less data also means less information.

In this investigation, the goal was to reveal what words are relevant attributes determining the membership of a review in the given two classes. Intuitively, if the total number of words was some 56,462 and the average number of words per review only 21, which is just 0.037%, a low amount of reviews evidently could not provide information enough because many important words would be eliminated. Thus, what is the right number of such reviews? Optimally all reviews should be used but it is not possible because of their too high number. The question is also what computer memory is available and how much time can be devoted to the analysis, which depends on the computational complexity of the analyzing process.

The experiments worked with many subsets created by random selection, starting from 2000 reviews (1% from 200,000), gradually (and non-linearly) increasing their number up to 160,000 (80%). Each subset was a “window” through which only part of

data was visible. This windowing method was taken over from Quinlan (1993). For each analysis, a random selection (always using different random generator seeds) of a certain number of training samples was performed. Then, the same number of randomly selected testing reviews from the remaining cases was chosen. When the number of training samples exceeded 100,000, the rest (from 200,000) was used for testing. The testing samples were used for predicting the expected possible classification accuracy the definition of which was $(TP + TN)/(TP + TN + FP + FN)$, where TP stands for the numbers of *true positive*, TN for *true negative*, FP for *false positive*, and FN for *false negative* labeling of unlabeled testing (or classified) cases, Witten et al. (2011). The accuracy measure served as an empirical proof of the correct generalization of the training samples, that is, the quality of the knowledge acquired from the data.

The problem of looking for important words was solved using a particular machine learning technique applied to data mining. One of often employed and reliable methods for finding relevant attributes (variables) is supervised learning aimed at training a classifier like a decision tree, Quinlan (1993), Witten et al. (2011), because each tree branch contains a series of questions to values of attributes that decide what class (group, category) a review belongs to. If the attributes are words the values of which are expressed as frequencies, then the words selected for generating a decision tree represent those important ones. The most important word is in the tree root because there the questioning starts and such a word is tested each time (in 100% of classification procedures). On the other tree levels, gradually closer to leaves, the decision is more and more detailed, however, such word frequencies are not so often tested. In the leaves (at the ends of branches), the final classification decision is given. Only a fraction of words is usually used and such words define the relevant attributes from the classification point of view. In addition, each branch represents also a rule, so it is possible to say which combination of words leads to an appropriate class.

The decision tree is generated via the process of training, where data samples with known classification are used. An individual sample represents only very concrete information on one case but using the inductive process, the generalization of many samples provides the knowledge searched for. Such knowledge is the represented by a tree or set of rules.

For the experiments, the decision tree generator known as *c5*, see Quinlan (2013), was used. The principle is based on an idea that each attribute is tested how well it splits a (heterogeneous) set of samples from more classes to (more homogeneous) subsets containing prevailing number of samples belonging to only one class (ideally samples only form one class). The *c5* algorithm measures the “purity” of a subset using *entropy* and is directed at minimizing the final entropy the value of which is ideally zero, while the worst case is when a set contains an even number of each class representatives. The subset entropy, $H(X)$, is computed from the number of samples of each class divided by the number of all samples in the subset, that is the a posteriori probability, $p(x_i)$, see, for example, Quinlan (1993):

$$H(X) = -\sum_i p(x_i) \cdot \log p(x_i) , \quad (1)$$

where X is a random variable taking real numerical values $x_i \in \mathbb{R}$. Using X , here actually a word taking frequency values, x_i , a set can be divided into two or more subsets. For each word and its generated subsets, the entropy is computed and then the average entropy given by all the subsets. A word generating the lowest average entropy is

selected for questioning. The whole process is recursively repeated as long as the entropy decreases. Some words are never selected because they provide no significant entropy decrease. The ultimate selected words contribute most of all to the entropy lowering.

As for the computational complexity, it is given by an algorithm employed for the requested analysis. For the above mentioned decision tree generator, the upper bound of the computational complexity estimation, $O[f(m,n)]$, is $m \cdot n^2$, where m is the number of training samples (rows in the matrix) and n is the number of words in the dictionary of reviews. Obviously, the computational time depends quadratically on the word number, so eliminating meaningless words during the data preprocessing phase is important. Except the list of relevant words and their significance, the results of experiments gave also the accuracy errors, sizes of trees (a number of tree nodes), and CPU time depending on the number of training samples. The outputs are discussed in the next section.

5. Results and Discussion

The results of experiments are summarized in the two graphs Figure 1 and Figure 2. The first graph, Figure 1, shows the influence of the increasing number of training samples (reviews) on the computational time CPU, classification accuracy, relevant attribute (significant word) number. The initial smallest number of training reviews was 2000, and the final largest one was 160,000 from 200,000 (the x axis).

What is the answer to the question “how many reviews should be used for obtaining good knowledge”? There is apparently no unequivocal answer and it depends on a user’s needs as well as possibilities.

As it can be seen, the computational complexity (CPU time) grows very quickly; in the end, the analysis of the 160,000 reviews took almost 500 CPU hours, which is almost three weeks. It is due to the nonlinearly increasing computational complexity given mainly by the number of unique words in all the analyzed text documents.

The initial review subset with 2000 samples gave 27 relevant words (*location* used in 100% tree tests – in the root, *excellent* 82%, *friendly* 78%, *located* 72%, *quiet* 71%, *helpful* 69%, *good* 65%, *great* 58%, *close* 56%, *comfortable* 54%, *nice* 52%, *clean* 50%, and so on) after 11,467.6 CPU seconds. The tree size was 37 nodes (after post-pruning) and the accuracy error was 15.8%.

On the other side, the last and largest analyzed review subset had 160,000 samples (80 times larger than the starting subset) and returned 206 relevant words the list of which included the same words as obtained from the lower number of samples plus many others that had their usage just in percentage units (for example, *staff*, *door*, *window*, *windows* 1%, then *well*, *free*, *sleep*, *center*, *room*, *station*, *bathroom* 2%, and so on). The tree size (5.57 times larger) was 1162 nodes (not a simple generalization) and the CPU time 1,771,545.7 seconds (almost 155 times longer). The accuracy error was 10.3% (5.5% decrease). Clearly, the accuracy error decreases fast after adding more and more training samples, however, from a certain data volume the declination is almost negligible in spite of constructing larger and more detailed tree using more words. Somewhere around 55,000 reviews (CPU 19 hours) the error decreases very slowly, losing just 1% for 160,000 reviews – however, the computational time dramatically increases up to 490 hours CPU. Thus, a user has to decide what time is worth of a certain error decrease. Looking at the graph, another question suggests itself: Is it worth of the

much extended effort to reach 10% accuracy error instead of 11%? Again, no unequivocal answer can be given as such things depend on a particular application and the data volume.

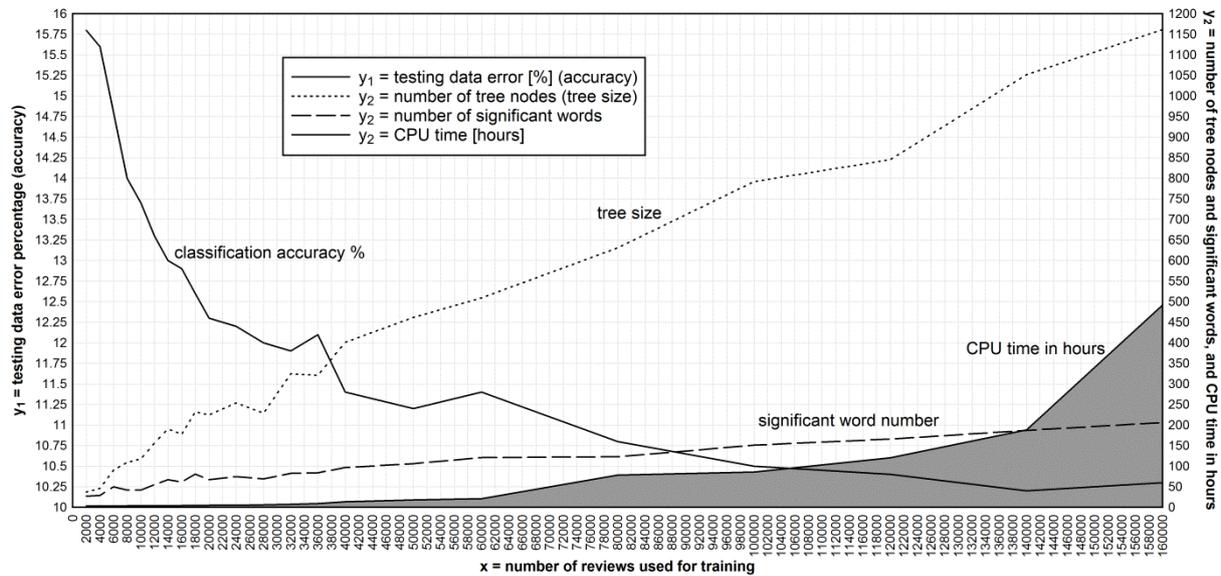


Figure 1: Measured dependence of classification accuracy, tree size, significant word number, and CPU time on the number of reviews

After the linear approximation of the functions demonstrating the growth of the decision tree and the number of relevant words, the graphs in Figure 2 show how the steepness of the information gain is gradually decreasing while the tree size (and the word number) constantly grows. The tree grows much faster than the number of relevant words which can be interpreted as the non-linear rate, $f_3(x)$, between these two monitored features. The function $f_4(x)$ is the inverted dependence $f_3(x)$ and represents the relative declination of revealed knowledge (relevant words) with respect to the increasing tree size. Again, a user should decide when to stop adding new training samples because of their omissible contribution.

6. Conclusions

The experimental investigation of the influence of the review number on the knowledge mined from the text documents demonstrated primarily the cardinal time dependence. With the permanent increase of the volume of hotel-service reviews, the CPU time of the text mining process grew non-linearly while the knowledge, expressed in generated semantically relevant words, remained increasing, too, even if its increase was progressively smaller all the time.

After finishing the above described research, which aimed at revealing relevant words that represented the reviews, a following series of experiments have been started to mine better knowledge that would provide more information understandable by humans: discovering significant phrases composed from relevant words. The first results are promising but they cannot be presented here because of the limited space.

The most of machine learning algorithms need to have all the data in memory at once, which is another obstacle linked with the increasing necessity to analyze and process very big data. Even if a user can employ such sophisticated and well implemented tools

as the *c5* decision tree generator, apparently new algorithms that would be able to process the very large data not at once but consecutively (in a stream) are necessary.

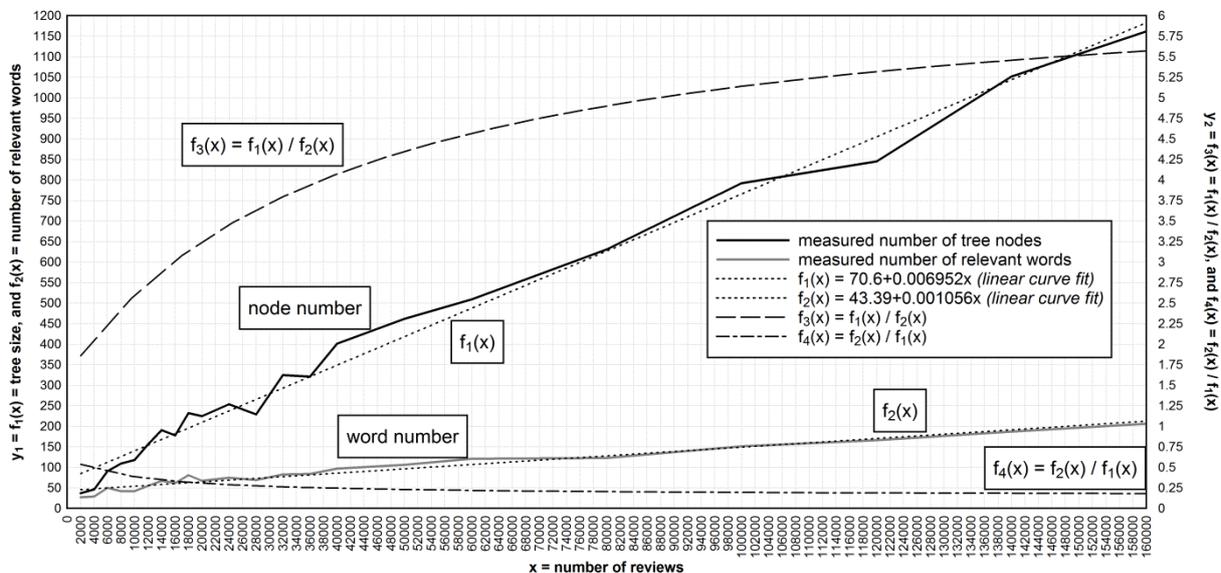


Figure 2: Linear approximation of the tree-size, $f_1(x)$, and word-number, $f_2(x)$, dependence on the number of training reviews. The ratio f_1/f_2 represents the steepness of the mined information growth with respect to the number of training samples

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Evaluating the entrepreneurial environment: a comparison of selected international initiatives

Marian Holienka¹, Anna Pilková²

¹Department of Strategy and Entrepreneurship, Faculty of Management, Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovak Republic, e-mail: marian.holienka@fm.uniba.sk

²Department of Strategy and Entrepreneurship, Faculty of Management, Comenius University in Bratislava, Odbojárov 10, 820 05 Bratislava, Slovak Republic, e-mail: anna.pilkova@fm.uniba.sk

Abstract

The aim of our paper is to summarize the most important international initiatives that evaluate the entrepreneurial environment (World Bank’s and IFC’s Doing Business report, World Economic Forum’s Global Competitiveness Report, and Global Entrepreneurship Monitor National Expert Survey) and to investigate their consistency in assessing its state and development. In doing so we look at the evaluation of the entrepreneurial environment in nine selected countries during the period 2006 to 2013 and search for common patterns and differences. We created a set of indices, one for each initiative, reflecting the changes of evaluation in different years, and performed a correlation analysis to investigate whether the evaluation results of the respective initiatives correlate at country-level. Our findings show that despite few cases of significant correlation, there was no general common pattern in assessment either within or between the analyzed countries. Thus, each of the three initiatives reflects the state and development of the entrepreneurial environment in a more or less different way. In our paper we discuss these findings and derive implications for both entrepreneurship research as well as for the policy making community.

Keywords: entrepreneurial environment, evaluation, international initiatives, comparison

1. Introduction

Entrepreneurial environment is considered to be a phenomenon fundamentally influencing the quantity as well as the quality of entrepreneurial activity. Therefore it is often the main target of entrepreneurship researchers, policy makers and practitioners.

Each of these groups applies different perspectives when assessing the entrepreneurial environment, based on their goals, motives and other contextual factors (Rehak et al., 2014). According to the perspectives applied, they search for suitable measures for assessing the quality of the entrepreneurial environment and its development over time. There are several international initiatives that attempt to provide such measures. Among them, the most important ones are the World Bank's and IFC's Doing Business report, World Economic Forum's Global Competitiveness Report and Global Entrepreneurship Monitor National Expert Survey. These are all well-established initiatives providing comprehensive measures of the entrepreneurial environment. Thus, entrepreneurship researchers, policy makers and practitioners need to be oriented in these initiatives. They should be aware of common patterns as well as differences shown when assessing the state and development of the entrepreneurial environment. They should also understand the potential origins of these differences and similarities, and most of all they need to understand their implications. This requires not only an understanding of the scope and methodology (i.e. basic characteristics) of these initiatives, but also having a contextual view on how these initiatives reflect the underlying phenomenon of the entrepreneurial environment in mutual context and over time. There have been several works attempting to investigate this area (e.g. Coduras and Autio, 2013; Verner and Tvrdon, 2012; Arslan and Tatlidil, 2012). However, due to their contents, methodological and contextual heterogeneity the body of knowledge in this field still requires further examination. Therefore the main research question of this paper is to investigate whether the above mentioned international initiatives evaluating the entrepreneurial environment show consistency in assessing its state and development.

2. Literature Review

Entrepreneurial environment is considered to be a phenomenon fundamentally influencing entrepreneurial activity (e.g. Stenholm et al., 2013). While the individual-level drivers play an important role in determining entrepreneurial activity, they also interact with economic and socio-cultural environmental influences affecting entrepreneurial actions (Krueger et al., 2000). According to Baumol (1990) and his rules of the game concept the importance of entrepreneurial environment lies not only in determining the quantitative aspect of entrepreneurial activity, but rather in affecting its qualitative allocation. Baumol built his statement on the hypothesis that the set of rules (i.e. entrepreneurial environment formed by institutions) instead of the supply of entrepreneurs itself or the nature of their objectives helps to dictate the ultimate effect on the economy via the allocation of entrepreneurial resources.

The understanding of the entrepreneurial environment concept nowadays increasingly builds on the institutional theory. This theory is traditionally concerned with how individuals, groups or organizations better secure their positions and legitimacy by conforming to the rules of institutional environment (Bruton et al., 2010). It introduces the concept of institutions that according to North (1990) represent "the rules of the game in a society or, more formally, are the humanly devised constraints that shape human action". We talk about institutions only in case of constraints having the character of rules or being considered given and obvious. This term therefore includes any form of human created constraint shaping human interaction (Alvarez et al., 2011). In simple words, institutions shape the behavior and interactions of

individuals, groups and organizations. Their influence directs the behavior of subjects to reach legitimacy and survive in the environment rather than to keep the efficiency-seeking focus only (Bruton et al., 2010). One of the individual and organizational interactions also shaped by institutions is entrepreneurship. Institutional theory with its issue-specific nature and comprehensive scope on factors shaping human actions offers the appropriate base to understand the entrepreneurial environment concept. Unlike approaches emphasizing the internal perspective or sole focus on efficiency it also accounts for social forces as drivers of individual and organizational action (Barley and Tolbert, 1997), and unlike approaches considering culture as the dominant factor (e.g. Hofstede, 1980) it broadens attention to the entire scope of potential influences shaping entrepreneurial actions and their nature (Busenitz et al., 2000). In this place we return back to above mentioned Baumol's rules of the game concept (1990) and consider the institutions to be those rules of the game that affect entrepreneurship and entrepreneurial activity in the economy.

Institutions can be generally divided into two main categories: formal institutions and informal institutions (North, 1990). The first represent the formalized rules and entire legal framework shaping the behavior of different society members, while the latter represent the constraints originated in socially transferred information and are part of the culture (Okruhlica, 2013). Another classification of institutions from entrepreneurship perspective has been introduced by Scott (1995) and further adapted by several entrepreneurship scholars (e.g. Kostova, 1997; Busenitz et al., 2000). It recognizes three so called institutional pillars that impact firm legitimacy and are considered crucial for understanding the development of entrepreneurship (Stenholm et al., 2013), namely: regulative, cognitive and normative institutions. The regulative pillar reflects the existing laws and rules in the environment that promote certain types of behavior and restrict others. The cognitive pillar reflects the cognitive structures and social knowledge shared by the people in the environment shaping the ways in which they select and interpret information. Finally, the normative pillar consists of social norms, values, beliefs and assumptions that are socially shared and carried by individuals and are related to their behavior. Following the above mentioned classifications we can generally relate the formal institutions to Scott's regulative pillar, while definitions of cognitive and normative pillars correspond with the nature of informal institutions in an economy.

2.1. Entrepreneurial Environment Evaluation: Selected International Initiatives

The attention to entrepreneurial environment evaluation is generally paid in the three main contexts of entrepreneurship research: 1) assessing the quality of entrepreneurial environment and its development over time (e.g. Coduras and Autio, 2013; Verner and Tvrdon, 2012), 2) identifying the factors affecting quality (e.g. Coduras and Autio, 2013), and 3) investigating for the influence of entrepreneurial environment on entrepreneurial activity, both from a quantitative and a qualitative perspective (e.g. Bosma, 2013). All these perspectives need one common input – a metric for evaluation of entrepreneurial environment or its different aspects. In our paper we focus on the most important international initiatives that evaluate the entrepreneurial environment and investigate for their consistency in assessing its state and development. Our work is therefore in line with the first mentioned research stream. The most important international initiatives evaluating the entrepreneurial environment in different

countries in our opinion are the World Bank group's Doing Business report, the World Economic Forum's Global Competitiveness Report and the Global Entrepreneurship Monitor National Expert Survey. Below we describe the main characteristics of these initiatives, namely in terms of their scope and methodology.

2.1.1. Global Entrepreneurship Monitor National Expert Survey

Global Entrepreneurship Monitor National Expert Survey (hereinafter referred to only as "NES") is an original tool developed to assess the state of the entrepreneurial framework conditions representing the rules of the game determining the entrepreneurial environment in the country (Bosma et al., 2012). NES covers different dimensions of so called "key entrepreneurial framework conditions" (EFCs), namely: entrepreneurial finance, government policies, government entrepreneurship programs, entrepreneurship education, R&D transfer, commercial and legal infrastructure, entry regulation, physical infrastructure and cultural and social norms. Overlapping this scope with Scott's classification (Scott, 1995), it covers all three institutional pillars, i.e. regulative, normative as well as cognitive. NES data are obtained from evaluations of experts selected following a strict protocol, and represent an expert subjective qualitative data by nature, since NES doesn't employ any objective indicators in its assessment. The availability of the subjective perceptions of experts directly involved in the entrepreneurship framework is a frequently appreciated unique feature of NES that is able to provide interesting nuances not covered by any other source of information.

2.1.2. World Bank Group's Doing Business Report

World Bank group's Doing Business report (hereinafter referred to only as "DB") is an annual report aimed at investigating the regulations enhancing and constraining business activity at an economy level (World Bank, 2013). DB covers 11 main topics: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency and employing workers. Applying Scott's classification (Scott, 1995), the attention of DB is by nature paid to the regulative dimension, while cognitive and normative dimensions are not considered in the evaluation. As for the methodology, the majority of data originates from reading laws and regulations in cooperation with local experts. These purely objective data are then in the case of certain indicators complemented by data obtained from experts based on their experience. However, even these data are collected through several rounds of interaction to secure their objectivity.

2.1.3. World Economic Forum's Global Competitiveness Report

World Economic Forum's Global Competitiveness Report (hereinafter referred to only as "GCR") is an annual initiative aimed at measuring macroeconomic and microeconomic foundations of national competitiveness. It is based on the Global Competitiveness Index, comprising 12 so called "pillars of competitiveness", namely: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size, business sophistication and innovation (Schwab, 2013). With respect to Scott's classification (Scott, 1995), GCR focuses mainly on the regulative dimension, while paying only minor attention to the normative dimension and not including the cognitive dimension. As for the

methodology, GCR uses objective statistical data together with data obtained from an annual Executive Opinion Survey, i.e. it is built on a combination of objective and expert subjective data.

3. Methodology

3.1. Sample

Our analysis was based on entrepreneurial environment evaluation in nine selected countries (in alphabetical order): Chile, Croatia, Finland, Peru, Russia, Slovenia, South Africa, Spain and Turkey. The main criterion applied for country selection was data availability, i.e. for the whole examined period (years 2006 to 2013) all DB and GCR data were available and maximum 1 year of NES data was missing/not accessible. Despite this convenience sampling approach we consider our sample to have sufficient explanatory power due to its heterogeneity. The countries in our sample are located on 4 continents (Europe, Asia, South America and Africa) and are classified in 3 stages of development according to the World Economic Forum 5-category classification (Efficiency-driven, Transition from efficiency- to innovation-driven and Innovation-driven). We obtained the data from three main sources: Global Entrepreneurship Monitor dataset (NES datasets on public domain for years 2006 to 2008, countries' national reports for years 2009 to 2010, NES datasets accessible for GEM members for years 2011 to 2013), World Bank's DB reports (editions 2007 to 2014) and World Economic Forum's GCR (editions 2006–2007 to 2013–2014).

3.2. Variables

The variables employed in our analysis represented the entrepreneurial environment evaluation by the included initiatives, i.e. NES, DB and GCR. For each initiative we selected one general measure of entrepreneurial environment evaluation. In the case of NES we have calculated an average value from mean values attributed by experts in particular countries to each key EFC. In the case of DB we have used the country's relative position (country rank to total number of countries). Finally, for GCR we considered the overall global competitiveness index value. To account for the development of evaluation during the examined period we have created a set of indices, one for each initiative. They were reflecting the changes of evaluation in different years, with value for 2006 representing index value 1. These indices represented the variables used in our analysis.

3.3. Methods

In our analysis the evaluations of entrepreneurial environment in different examined countries (using indices as described above) were first visualized. Secondly, in order to investigate for the consistency of NES, DB and GCR in assessing the state and development of the entrepreneurial environment in selected countries we have run a correlation analysis and constructed correlation matrices for each country. This enabled us to examine the correlations between the analyzed initiatives (Munk et al., 2013). For our correlation analysis we considered the period from 2007 to 2013 only, because in 2006 values of all indices were naturally the same (equal to 1). Since our data represent

a time series data by nature, we used Pearson's correlation (Nanasiova et al., 2008). To obtain the overall picture we have summarized the results of correlation analyses for all countries and initiatives, and looked for intra-country as well as inter-countries patterns of evaluation and its development given by analyzed initiatives.

4. Results

The results of our analysis are presented in two steps. Firstly, we present the visualization of entrepreneurial environment assessment by the examined initiatives in analyzed countries. This visualization is presented in Figure 1.

As the second step of our analysis we investigated for correlation between the time series values of indices developed from DB, GCR and NES entrepreneurial environment evaluation for each country. The summary of this analysis is displayed in Table I. The correlation matrices for all analyzed countries are presented in the Appendix.

Table 1: Summary of correlation analysis between DB, GCR and NES

Country	DB and GCR	DB and NES	GCR and NES
Croatia	No	-.839*	No
Finland	No	No	No
Chile	No	No	No
Peru	.837*	No	No
Russia	No	No	No
Slovenia	-.930**	No	.823*
South Africa	No	No	No
Spain	No	No	.893**
Turkey	No	No	.845*

As can be seen in Table I, in most cases we found no significant correlation between the time series of indices representing the evaluations of entrepreneurial environment state and development by the different initiatives included in our analysis. Firstly, in the case of GCR and NES there were three significant correlations, and all of them were strong and positive (Slovenia: .823, $p=.044$; Spain: .893, $p=.007$; Turkey: .845, $p=.034$). Secondly, we also found correlation between DB and GCR to be significant and strong in two cases. However, in one case it was positive (Peru: .837, $p=.019$), while in the latter it proved to be negative (Slovenia: -.930, $p=.002$). Finally, entrepreneurial environment evaluations by DB and NES showed significant correlation only in the case of one country, where it was strong and negative (Croatia: -.839, $p=.018$). Therefore in most cases (except for six) we can accept the null hypothesis that there is no significant correlation between entrepreneurial environment evaluations by different initiatives. Moreover, there are no signs of potential general pattern of relationships between the analyzed initiatives. We discuss these findings in the next section of our paper.

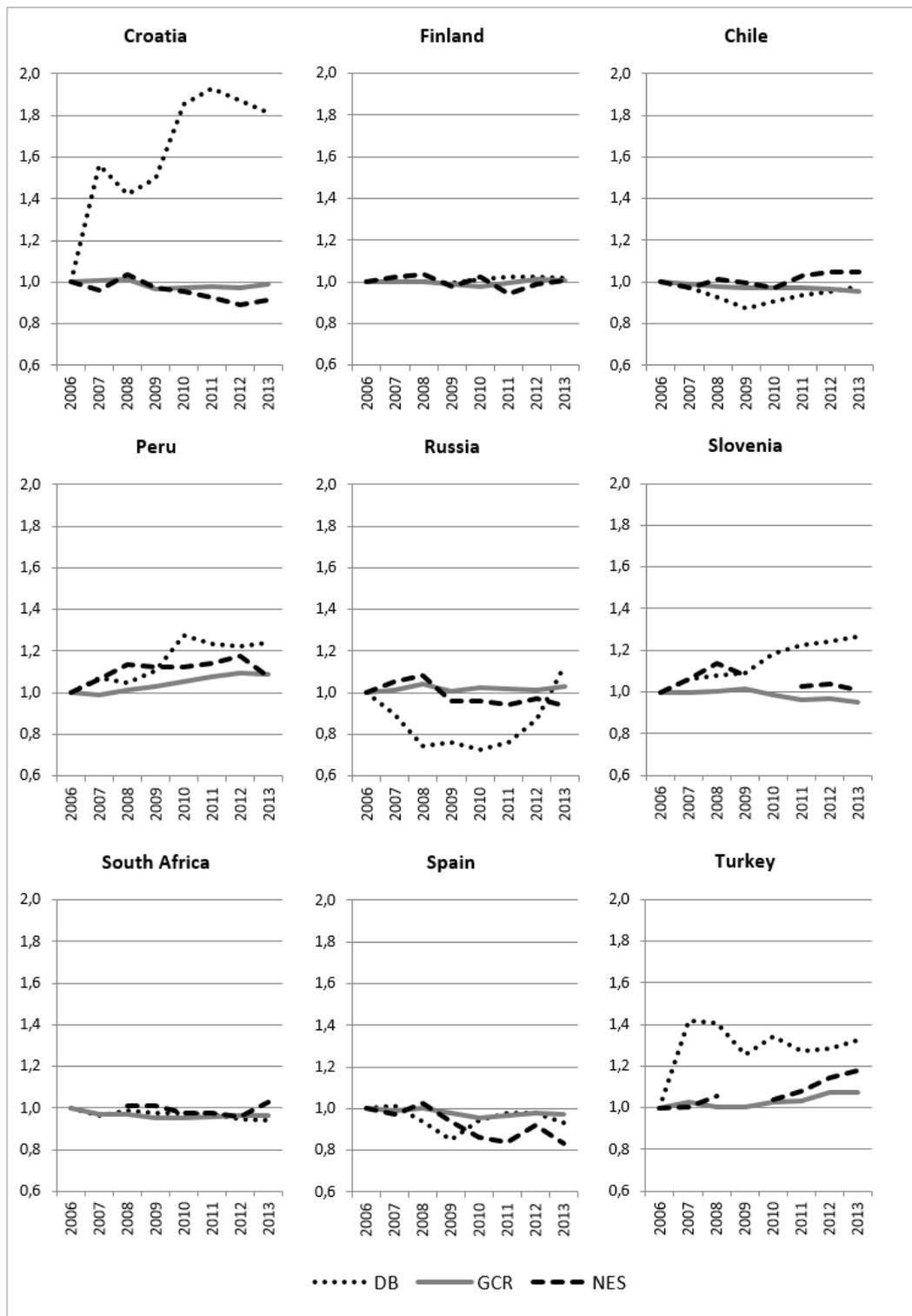


Figure 1: Entrepreneurial environment evaluation in analyzed countries by DB, GCR and NES (indices)

5. Discussion and Conclusions

The findings of our analysis suggest that the analyzed international initiatives provide no unambiguously corresponding evaluations of entrepreneurial environment state and development. Looking from an intra-country perspective, in the case of most countries

DB, GCR and NES show no significant correlation in assessing the entrepreneurial environment over the analyzed time. Accordingly, the inter-country summary shows no common pattern, either. Therefore we can conclude that the analyzed initiatives reflect the underlying phenomenon in a different way. Thus, researchers, entrepreneurship policy makers or practitioners should pay close attention to the right interpretation of the initiatives they use, and be careful when inclining to one or more of them as a source of input information for their research, analysis or decision making process.

Looking at different pairs of initiatives, we see that the relationship between entrepreneurial environment evaluation by DB and two other initiatives is especially ambiguous. On the other hand, in all three cases where the correlation was proved between GCR and NES it showed the same direction and similar strength, suggesting that, despite no general pattern being observed, the evaluations by these two initiatives tend to converge more than in the case of the other two analyzed pairs.

Our findings in general correspond to the findings of several previous works investigating the similar question. Coduras and Autio (2013) found that GCR and NES tend to show the ability to explain the outcomes of each other, but at the same time they concluded these initiatives are not overlapping to the degree of substituting one by the other. Verner and Tvrdon (2012) found that DB and other indicators of national competitiveness (including GCR) were not concordant in rankings of national competitiveness evaluation. After the exclusion of DB this concordance became significant and strong, offering indirect evidence that evaluations by DB and GCR provide different outcomes. Finally, Arslan and Tatlidil (2012) pointed out differences in environment evaluation by DB and GCR in case of Turkey. On the other hand, our previous analysis in the case of Slovakia using similar methodology as in this paper showed the correlation between GCR and DB to be significantly strong (Holienka, 2013). This indicates that in the case of some countries and under certain circumstances the perspectives of DB and GCR can correspond to each other. However, even if we added this case to our intra-country summary, it would not contribute to any general pattern.

In our opinion the difference between the initiatives suggested by our analysis should be attributed mainly to the differences in methodology. We find these differences to be leading to different reflections of the common underlying phenomenon – entrepreneurial environment in the economy. This phenomenon is rather complex and is viewed by each initiative contextually and from specific perspectives (resulting from the methodology behind the initiative). Therefore the given evaluations may reflect a different composition of its attributes (in some cases overlapping, in others not), thus providing in some cases similar but in other cases also contradictory overall assessments. The real life reason would probably be in the evolution of particular entrepreneurial environment components, especially those reflected by different initiatives in different way. Concluding on the above mentioned, in our opinion the search for the reasons for the differences suggested by our analysis should focus on two key characteristics determining what components of underlying phenomenon and how they are reflected, i.e. the scope of evaluation and its methodology. Accordingly, these key characteristics should also be considered when deciding on which initiative to use as a measure of entrepreneurial environment for the particular purpose.

Regarding the scope of evaluation, while DB is particularly focused on issues determining the regulatory environment, GCR covers the broader scope of environmental factors (including normative dimension), and NES further broadens its scope, and besides a wide array of regulatory factors it also covers normative and cognitive dimensions of the environment. This difference in the composition of the

attributes covered represents in our opinion a significant precondition for different assessment outcomes. Regarding methodology, the three analyzed initiatives would each have a different position on a scale from objectivity to subjectivity. While DB is almost exclusively based on objective indicators (which are complemented by expert subjective evaluation only in the case of a few items), GCR represents a combination of objective data together with subjective data (obtained through executive opinion surveys), and NES is purely based on subjective expert opinions of a predefined scope of experts assessing according to their experience the dimensions of entrepreneurial environment. In our opinion, these differences in the degree of objectivity versus subjectivity may also considerably contribute to the differences in overall assessment. We assume that subjectivity adds an important attribute to overall evaluation even in areas that are overlapping in terms of scope, because expert respondents might show higher sensitivity to certain issues in external environment and therefore perceive them with greater sensitivity than may be recorded by numbers. This view is in line with the suggestion by Coduras and Autio (2013) who attributed the observed discrepancies between rather objective GCR vs. more subjective NES in evaluation of entrepreneurial environment to effects of experts' feelings reflecting what people can perceive under specific conditions despite the objective indicators.

Summing up, each initiative due to its scope and methodology reflects a specific composition of entrepreneurial environment attributes in a specific way, providing a basis for their mutual complementarity. Each of the initiatives may contribute considerably. Therefore, in some cases a simultaneous usage of more than one initiative might be beneficial. However, if clear and unambiguous assessment is required, an initiative whose scope and methodology fits best the purpose should be considered.

The main limitation of our analysis remains in its scope. Since our analysis covers only a sample of nine selected countries, even though considerably heterogeneous, generalization of our findings might be limited. However, the lack of significant correlation is clear across our sample, suggesting that the same pattern may appear even after expanding to other countries. The other limitation that we see is the validity of the findings over time. The complex phenomenon of entrepreneurial environment develops dramatically and still brings new nuances that might not be similarly reflected or covered by different initiatives. Therefore the validity of any findings in this field would require constant updating. Similarly, also the initiatives may evolve in their scope or methodology, which will again imply the need for repeated analysis in the future.

In conclusion, it has been suggested by our analysis that the most important international initiatives evaluating the quality and development of entrepreneurial environment provide generally rather different outcomes and show no common pattern in assessment either within or between the analyzed countries. Thus, close attention should be paid by entrepreneurship researchers, policy makers and practitioners when inclining to one of these initiatives in their analyses or decision making. Careful consideration of scope and methodology that determine the reflection of the underlying phenomenon is suggested in order to find the most appropriate initiative, while the purpose of analysis should remain the main criterion. In some cases, it is advisable to consider the simultaneous usage of several initiatives to obtain the broad picture.

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Appendix

Table 2: Correlation analysis between DB, GCR and NES

Croatia				Finland				Chile			
	DB	GCR	NES		DB	GCR	NES		DB	GCR	NES
DB	Coeff. 1 Sig. . N 7			DB	Coeff. 1 Sig. . N 7			DB	Coeff. 1 Sig. . N 7		
GCR	Coeff. -,554 Sig. ,197 N 7	1		GCR	Coeff. ,479 Sig. ,276 N 7	1		GCR	Coeff. -,187 Sig. ,688 N 7	1	
NES	Coeff. -,839* Sig. ,018 N 7	,544 ,207	1 .	NES	Coeff. -,261 Sig. ,571 N 7	-,017 ,971	1 .	NES	Coeff. ,382 Sig. ,398 N 7	-,747 ,054	1 .
Peru				Russia				Slovenia			
	DB	GCR	NES		DB	GCR	NES		DB	GCR	NES
DB	Coeff. 1 Sig. . N 7			DB	Coeff. 1 Sig. . N 7			DB	Coeff. 1 Sig. . N 7		
GCR	Coeff. ,837* Sig. ,019 N 7	1		GCR	Coeff. ,025 Sig. ,958 N 7	1		GCR	Coeff. -,930** Sig. ,002 N 7	1	
NES	Coeff. ,233 Sig. ,615 N 7	,437 ,327	1 .	NES	Coeff. -,226 Sig. ,626 N 7	,427 ,340	1 .	NES	Coeff. -,810 Sig. ,051 N 6	,823* ,044	1 .
South Africa				Spain				Turkey			
	DB	GCR	NES		DB	GCR	NES		DB	GCR	NES
DB	Coeff. 1 Sig. . N 7			DB	Coeff. 1 Sig. . N 7			DB	Coeff. 1 Sig. . N 7		
GCR	Coeff. -,060 Sig. ,898 N 7	1		GCR	Coeff. ,128 Sig. ,785 N 7	1		GCR	Coeff. -,274 Sig. ,551 N 7	1	
NES	Coeff. ,009 Sig. ,987 N 6	,357 ,487	1 .	NES	Coeff. ,004 Sig. ,993 N 7	,893** ,007	1 .	NES	Coeff. -,647 Sig. ,165 N 6	,845* ,034	1 .

Assoc. Prof. Jitka Janová, Ph.D.,
Assoc. Prof. Svatopluk Kapounek, Ph.D.
Assoc. Prof. Danuše Nerudová, Ph.D.
Assoc. Prof. Petr Rozmahel, Ph.D.
Assoc. Prof. Jan Žižka, CSc.
Assoc. Prof. Pavel Žufan, Ph.D.
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