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Table of Contents

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The Analysis of the Impact of Selected Marketing Communication Factors on the Online Consumer Behavior

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Abstract:

The aim of the article is to analyze consumers' shopping behaviour on the Internet regarding selected marketing activities and explore the context of selected factors influencing the purchasing behaviour of consumers on the Internet. The empirical part of the article includes quantitative research, a basis of which is a questionnaire and assumptions made on the basis of the previous theoretical analysis. Based on these results we offer suggestions and recommendations for effective online marketing communications with regard to selling goods and services on the Internet. The conclusion points to the need to include Internet marketing activities to usual marketing activities in order to reach wide range of customers.

Keywords: internet marketing, marketing communication, purchasing behaviour.

JEL Classification: M3, M10.

1. Introduction

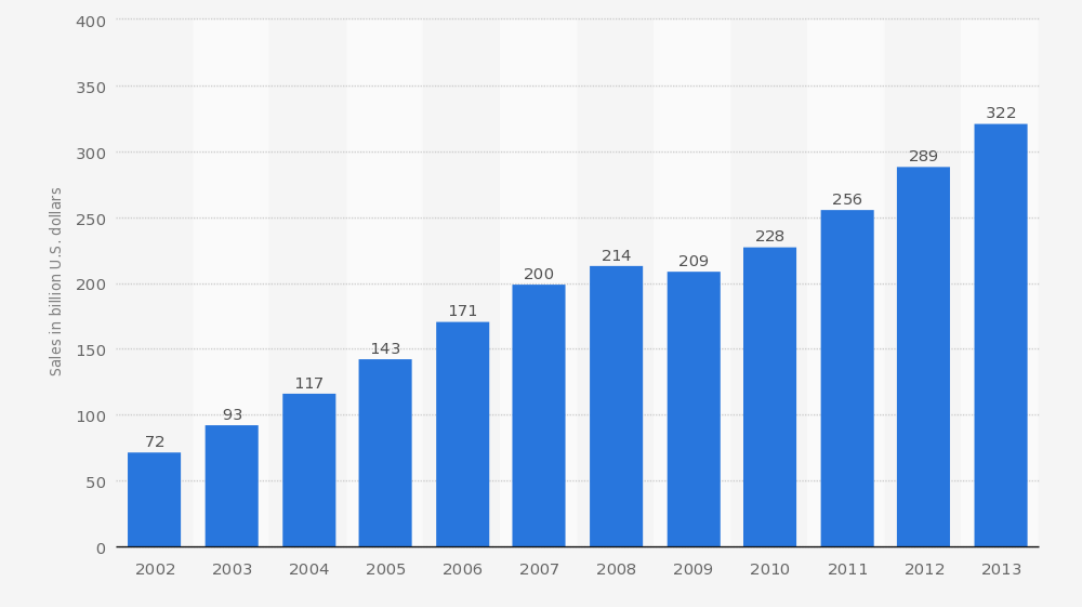
Successful marketing communication is rooted in the knowledge of customers, competitors, colleagues and also in the skill when dealing with the organization's ability to generate profit. The importance of direct communication is growing in relation to the individualization of relationships and new possibilities of communication technology (Šoltés and Gavurová 2014, 2015; Halásková and Halásková 2013, 2014). Proper analysis of the communication components and their choice is the decisive factor in the communication policy (Tomek 2011) and (Mohelská and Sokolová 2015). Even though e-commerce personalization has some specificities, most aspects are identical and common (Shukla 2012). Marketing concept of identifying and satisfying consumers' needs was the reaction of the discipline to new business realities of a demanding market (Kashani 2007). Přikrylová and Jahodová (2008) notes that no other medium had as crucial and global implications on the sales, marketing and communications as well as experienced tremendous growth as the Internet. That effect is also the key for financial performance of the entities (Bem *et al.* 2014, Szczygiel *et al.* 2015, Michalski 2015). Recent advances in information and communication technologies brought about the development of e-commerce (Gavurová 2011). An overview of relevant literature reveals the existence of different approaches to conceptualization of electronic services. Rust and Lemon (2001) describe e-services very broadly as a provision of excellent experience for consumers with regard to the interactive flow of information. This broad understanding can serve as a basis for further, more detailed research (Ştefăneşcu, A. and Ştefăneşcu, L., 2013).

Grönroos *et al.* (2000) provides a more specific definition in proposing a model in which online services can be divided according to their functional importance.

High popularity and growth of social technologies and platforms such as social networking is one of the main reasons for the growth of this field (Liang and Turban 2011, Michalski 2014). These advances form the thoughts of consumers and their position in the online space where they communicate, evaluate other products, seek the opinions of other consumers, create forums and share their experiences with using products and services (Hajli 2015). Based on their research, Kaplan and Heinlein (2010) define social media as a group of Internet applications that are rooted in the ideological and technological fundamentals of Web 2.0., and which allow the creation and exchange of user-generated content (User Generated Content). In addition to this general definition the authors also mention the existence of different types of social media that should be further differentiated. However, there is no systematic way for their categorization. If we want to create a system for classifying social media, it is necessary to rely on a set of theories in the field of media research (social existence, media richness) and social processes (self-presentation).

Another significant factor of the marketing communication impact on the purchasing behavior of consumers in the online environment is trust in the online environment. Gefen and Straub (2000) in their study describe the issue of trust as a challenging issue for consumers in e-commerce. Distrust prevents customers to form good relationship between them and businesses (Jones, Leonard 2008). Therefore, Hajli *et al.* (2014) claim that trust supported by social media featuring social interaction with customers' increases customers' level of confidence.

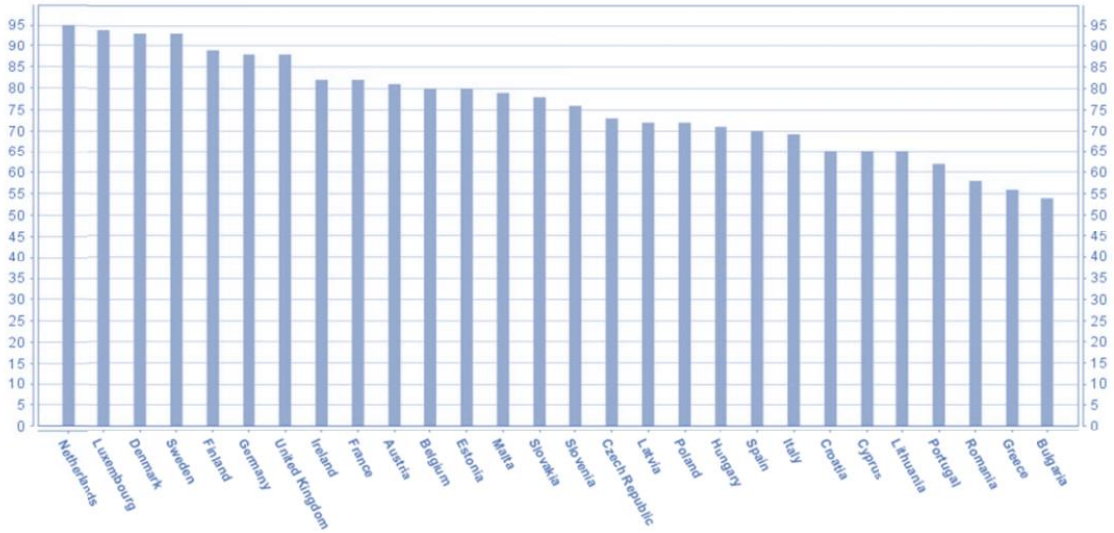
Online shopping industry has grown significantly over the past decade. The following figure shows sales statistics from 2002 to 2013 in the USA. In 2012, revenues from online sales accounted for more than $ 289 billion, while in 2011 it was about $ 256 billion. B2C online sales also recorded continued growth in 2013 accounting to more than $ 322 billion. More than one-third of online sales in USA were formed in tourism - travel, reservation and airline companies and web sites.



Source: www.statista.com

Figure 1 - Annual B2C revenues from online sales in the US in 2002-2013 - *billions of dollars*

For comparison, next graph shows the proportion of households with Internet access in different countries in Europe. The largest share of such households was recorded in 2013 in the Netherlands in 95% of all households. Netherlands is followed by countries - Luxembourg, Denmark, Sweden, Finland and Germany. The smallest proportion of households online can be observed in Bulgaria.



Source: www.statista.com

Figure 2 - Proportion of households with Internet access in different countries in Europe

2. Aim, methods and material

Nowadays we face more and more theoretical concepts focused on the marketing activities on the Internet as well as the purchasing behaviour of consumers. The main objective of the research is to analyze the shopping behaviour of consumers on the Internet with regard to marketing activities and explore contexts influenced by the selected factors that further influence purchasing behaviour of consumers on the Internet. The research does not collect only basic information about this way of shopping, but also specific questions exploring the opinions of the respondents more deeply.

Based on these research questions and the main objective we decided to propose the following research hypothesis:

H1. We expect statistical difference between gender of respondents and the extent to which they are affected by online advertising.

H2. We expect a statistical correlation between the credibility of the website and its presentation on Facebook.

H3. We expect statistical difference between gender of respondents and intention to purchasing behaviour on webpage.

To answer a set of hypotheses and to achieve the aim of the research we chose quantitative research that is based on an electronic questionnaire. This was an exploratory method based on collecting data composed of subjective answers of respondents - all internet users.

Shopping on the Internet implies knowledge of the online environment, having a personal computer with Internet access and the possibility of payment through internet banking or online payment by credit card. Due to this fact the sample of respondents was chosen on purpose. Respondents reported their age, gender and educational attainment. To reach the desired group the questionnaire was spread mainly on social networks and also through e-mails with accompanying text.

The questionnaire survey included a total of 23 questions, which were divided into three parts. The questions in the first section concerned the basic demographic and social data about the respondent. The second part focused on the issues of Internet usage and the third part of the questionnaire dealt with the specifics of an individual's purchasing behaviour on the Internet. The questions in the questionnaire were largely closed, using a five-point Likert scale ranging from favourable to dissenting attitude of the respondent. Another type of questions was based on the principle of selecting one or more options. The questionnaire provides sufficient space for expressing respondents' opinion. In the introductory part of the questionnaire the study focuses on basic demographic data of respondents like gender, age, education and social inclusion. The first question of our research focused on the respondents' gender. Of the 153 respondents participated in the research 81 were women and 72 men.

3. Results and discussion

For statistical evaluation of research hypotheses, we used two-dimensional inductive statistics- Student's two-sample t-test and Pearson's correlation coefficient. Student's t-test for independent samples tests the hypotheses of different diameters of the two groups (belonging to a group is given by a binary variable). The test is used to verify whether the observed difference in diameter samples is random (independent variables) or is statistically significant (dependent variables). The significant difference means that there is a relationship between the interval variable and binary variable ($P < 0.05$; $P < 0.05$).

Pearson's correlation coefficient measures the strength of statistical dependence between two quantitative variables. Correlation analysis does not reflect the causal relationship Y = f (X). The variable Y is independent of X and the two random variables X and Y changes constantly.

H1. We expect statistical difference between the gender of respondents and thus the extent to which they are affected by online advertising.

Table 1 - The average values of variables

Gender	N	Mean	Std. Deviation	Std. Error Mean
men	72	2,9583	1,26087	,14859
woman	81	3,0370	1,22927	,13659

Source: The output of the statistical program SPSS Statistics

Table 2 - Student's two-sample t-test

Levene's Test for Equality of Variances			t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95%Confidence Interval of Difference	
								Lower	Upper
Equal variances assumed	,495	,483	-,391	151	,697	-,07870	,20153	-,4768	,3195
Equal variances not assumed			-,390	147,935	,697	-,07870	,20183	-,4775	,3201

Source: The output of the statistical program SPSS Statistics

During the verifying of this research hypothesis, the variable used was composed of respondents according to their gender (women and men). We set the level of significance to p = 0.05. P value of the statistical significance test reached 0,697. This hypothesis is therefore rejected; there is no relationship between the variables. The research results indicate that there is no statistical significance between gender and level of impact of online advertising on respondents.

H2. We expect a statistical correlation between the credibility of the website and its presentation on Facebook.

We assume that there is a linear trend between the variables. For statistical evaluation we used Pearson's correlation coefficient that examines the degree of linear dependence between variables.

Table 3 - Pearson's correlation coefficient

	N	Credibility of the website	Presentation on Facebook
Credibility of the website	Pearson Correlation	1	-,043
	Sig. (2-tailed)		,594
	N	153	153
Presentation on Facebook	Pearson Correlation	-,043	1
	Sig. (2-tailed)	,594	
	N	153	153

Source: The output of the statistical program SPSS Statistics

These statistics indicates that there is a linear relationship between these variables. We confirm the hypothesis because the correlation values are positive and move at a specified interval. The analysis showed a significant relationship between the variables at the significance level $\alpha < 0.01$. The correlation coefficient reaches the level r = 0.594, which can be interpreted as a moderate to strong association between the monitored variables.

H3. We expect statistical difference between gender of respondents and intention to purchasing behaviour on webpage.

Table 4 - The average values of variables

Gender	N	Mean	Std. Deviation	Std. Error Mean
men	72	3,5972	1,15867	,13655
woman	81	3,8889	1,17260	,13029

*Source: T*he output of the statistical program SPSS Statistics

Table 5 - Student's two-sample t-test

Levene's Test for Equality of Variances			t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95%Confidence Interval of Difference

								Lower	Upper
Equal variances assumed	,536	,465	-1,544	151	,125	-,29167	,18887	-,6648	,0815
Equal variances not assumed			-1,545	149,300	,124	-,29167	,18874	-,6646	,0812

Source: The output of the statistical program SPSS Statistics

Also in this case, when we verifying this research hypothesis, the variable used was composed of respondents according to their gender (women and men). We set the level of significance to p = 0.05. P value of the statistical significance test reached 0.124. This hypothesis is therefore rejected; there is no relationship between the variables. The research results indicate that there is no statistical significance between gender and intention to purchasing behaviour on webpage.

Conclusion

Achieved results show that gender or place of residence does not matter in the online environment. The results say that online advertising affects both men and women. Another research hypothesis confirmed the relationship between the credibility of the organization's website and its presentation on Facebook. Our research indicates the necessity to also include online activities besides conventional marketing activities since these open up new possibilities and ways of achieving the set goal.

The questionnaire showed that the most substantial feature of the website is its credibility. The reputation of a company and its web page is gradually built with the satisfaction of each individual customer. It also lies in the e-commerce as a whole. The most crucial fact is correct and updated information about the products, compliance with delivery time and published price.

Social networking is growing and becoming more and more popular. As social networks are growing and new ones are being created, there are also available new advertising opportunities in this environment. This form of online company presentation is possible even without the existence of a website that can be fully replaced by Facebook page. If the online store exists only on Facebook, it faces difficulties. The Facebook site should contain updated information about the company and the products and the offered services. In this environment, it is necessary not to forget that the important aspect of the page's success is the number of fans. If consumers are happy with the brand, they become fans of the page and are willing to follow the activities of the brand on the social network and also recommend the brand to other users. It is therefore necessary to post information, photos or video in engaging and not distracting way.

Acknowledgment

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Dual Approach to Growth Accounting. Application for Benelux and Baltic Countries

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Abstract:

The globalization of the world brought strong links between economies: in "good times" brings an acceleration of positive developments in the economy while in "bad times" has signed an acceleration of negative developments in the economy. The result is sharp economic downturn. Its slowdown or complete cessation depends upon the nature of economic growth. The aim of the present article is to analyse the development of economic growth that the country reached in the pre-crisis, crisis and after crisis period. Analysis was performed by a dual method approach in the growth accounting in the Benelux countries (Belgium - BE, Luxembourg - LU, Netherlands - NL) and Baltic countries (Estonia - EE, Latvia - LV, Lithuania - LT). The result is that economic growth was largely formed by the accumulation of production factors than by increasing their efficiency in production. The only exceptions are the Netherlands.

Keywords: Solow residual, growth accounting, economic growth.

JEL Classification: J 40.

1. Introduction

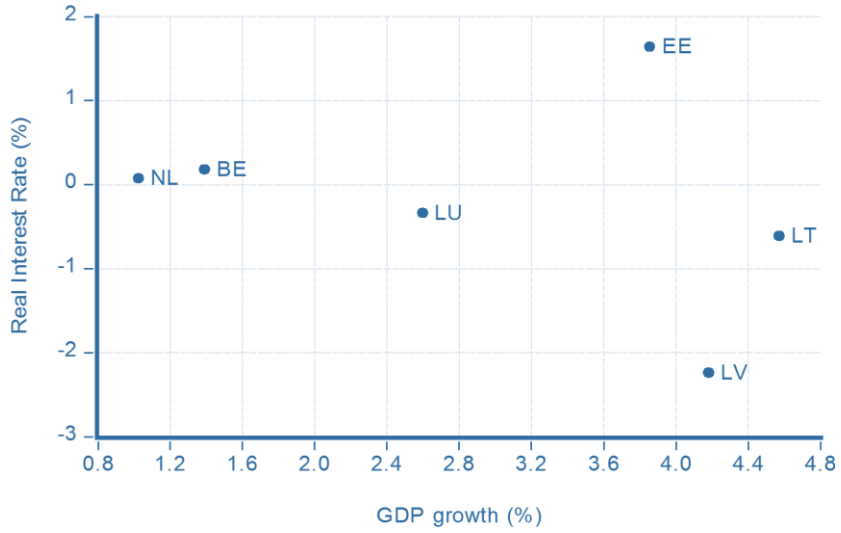
The globalization of the world brought strong links between the economies of such trade and financial markets. Such close connection brings the acceleration of positive developments in the economy in "good times", while the same acceleration has signed an acceleration of negative developments in the economy in "bad times". This connection is most pronounced manifested especially during the global economic crisis. The more open an economy is, the more it may undermine global economic crisis. The most important manifestation of the crisis is the sharp decline in gross domestic product. Countries in their production are coming under the level of its potential output and the economy gets into the gap of product. As reported (Huček-Reľovský-Široká, 2010) it is necessary to consider whether this decline is permanent consequences of the crisis or loss in GDP it is possible to catch up in the short term. It is evident that the return of the economy to a state of equilibrium (*i.e.* the level of potential output) would require a significant increase in the rate of growth of GDP. This problem is added the conflict in the perception of the cyclical position of the economy and expected price development. (See also Buleca and Andrejovska 2015)

2. Real interest rate and gross domestic product growth

Another problem which mainly affects the countries of the EMU is an effort to set common rules. At the beginning of the new millennium, the countries as a result of continuing problems in the economic field tried to avoid a situation in academic agendas known as an “Eurosclerosis” which was coined to describe a pattern of high unemployment, slow job creation, low participation to the labour force and weakening overall economic growth during the 1980s and most of the 1990s (Bentolila and Saint-Paul 2001). As a response to the situation was created a document is known as the Lisbon Agreement. The Lisbon Agenda is one of the clearest examples of the exogeneity of OCA. It was first adopted by the European Council in Lisbon in March 2000, and sets out a strategy which aims at addressing the issues of low productivity and stagnation of economic growth in the EU over a ten-year period. One of the basic assumptions of the expected common macro-region was that financial integration is not fostering economic divergence and seems to be actually helping to reduce the impact of idiosyncratic shocks. Over time, greater financial integration and modernisation will make it easier for households to insure against idiosyncratic risk through borrowing and lending and cross-country ownership of financial assets, which will allow for more income-smoothing. Furthermore, greater financial integration and modernisation are associated with more sustained economic growth.

Under the rules set by the OCA all participants in the area must have similar business cycles so that economic booms are shared, and the OCA’s central bank can offset and diffuse economic recessions by promoting growth and containing inflation (Mongeli 2008). In terms of synergy of economic growth and innovation, the question arises: Are real interest rate differentials within the euro area in any case correlated with growth

differentials? Standard growth and interest rate theory suggests that there should be, at least at lower frequencies, a positive correlation between real rates and economic growth across different countries. However, this tenet does not apply to a cross-country comparison within the EMU since in a monetary union; nominal rates canot reflect any more differentials in expected inflation. In contrast, one could expect that within a monetary union, real rate differentials are negatively correlated with growth differentials at least over business cycle frequencies if economic growth tends to be higher in countries with higher inflation.



Source: own calculation

Figure 1. Correlation between real interest rate and gross domestic product growth

We attempted to verify this claim on our countries surveyed. The Benelux countries have inflation rates, on average, the same level of around 2%. About the same level was the inflation of Lithuania. Estonia and Latvia are moving at around 4%. It is not possible to determine definite dependency, because no country that experienced the highest average economic growth in the period 2001 - 2013 (LT) has the lowest interest rate and no country (NL) with the lowest growth have the slightest interest rates. Our conclusions are not fulfilled even one of the preconditions - neither assumption by the standard theory, not a precondition for EU countries. The result is similar to what amounted to Mongelli (2008) in its analysis five largest economies of the EU.

3. Dual approach

Methodology

Given the important role to economic growth in the process of OCA correct formation we have selected the analysis of the evolution of economic growth that the country reached in the pre-crisis, crisis and after crisis period as an objective of the present article. Especially for the analysis of what the economy tends to do in the formation of economic growth - is the economy trying to achieve the desired growth through increasing the productivity of the factors or is it rather the increasing volume of factors entering into production?

In the analysis we used a process by which it is derived the primal and dual Solow residue. The pioneers of this method were Abrahamovitz (1956) and Solow (1957). Solow just came up with the idea to analyze the impact of individual factors on economic growth in the form of a dual approach to growth accounting. The essence of this approach is to adjust production function so that we were able to express so called "*Solow residuals"*. The Solow residual is sometimes interpreted as a measure of the contribution of technological progress. (Romer 2012, Mankiw, Romer and Weil 1992)

We used approach presented by Hsieh (2002). As a start point was used the basic national accounting identity - national output - presented as:

$$Y = rK + wL \tag{3.1}$$

where "*Y"* represents aggregate output, or aggregate income, "*K"* represents capital, "*L"* is labour, "*r"* is the real rental price of capital, and "*w"* is the real wage. After the differentiation of (1) with respect to time and dividing by Y we get:

$$Y' = r'K + rK' + w'L + wL' \tag{3.2a}$$

$$\frac{Y'}{Y} = r'\frac{K}{Y} + \frac{r}{Y}K' + w'\frac{L}{Y} + \frac{w}{Y}L' \tag{3.2b}$$

$$\frac{Y'}{Y} = r\frac{K}{Y}\left(\frac{r'}{r} + \frac{K'}{K}\right) + w\frac{L}{Y}\left(\frac{w'}{w} + \frac{L'}{L}\right) \tag{3.2c}$$

We used substitution in (2c):

$$Y' = s_K\left(\hat{r} + \hat{K}\right) + s_L\left(\hat{w} + \hat{L}\right) \tag{3.3}$$

where the identities "s_K" and "s_L" are the factor-income shares (Hlousek 2007). In the next step we placed the terms of the growth rates of factor quantities on left-hand side of the equation and the rest we left on the ride-hand side. Finally we obtained:

$$Y' - s_K\hat{K} - s_L\hat{L} = s_K\hat{r} + s_L\hat{w} \tag{3.4}$$

The left-hand side of the equation (4) is called the Solow residual primal (SR_p) or TFP growth. Decomposition of output growth gives us information about contributions of physical capital, labour and productivity to economic growth. After the removal of the contribution of these essential resources, the remaining part of economic growth, which was not explained by a combination of the growth rates of all production inputs, will be considered as the real value of TFP growth. (Wang – Yao, 2003)

$$SR_p = Y' - s_K\hat{K} - s_L\hat{L} \tag{3.5}$$

The right-hand side of the equation (4) is called the Solow residual dual (SR_d) expressed as share-weighted growth in factor prices.

$$SR_d = s_K\hat{r} + s_L\hat{w} \tag{3.6}$$

Under the condition that output equals factor incomes we can talk about the result that the primal and dual measures of the Solow residual are equal. No other assumption about the production function, bias of technological change or relation between factor prices and their marginal products is needed for this result. We do not even need to assume that the data is correct. (Hsieh 1999)

Data

In the analysis, we looked at evolution of the variables in the two groups of countries - the Benelux and the Baltic countries in the time period 2000 - 2013. The grouping Benelux countries are included in the monetary union, while the countries of the Baltic region represent a newly acceding country monetary union. It is thus a comparison of the original countries of the monetary union with countries that have joined the monetary union recently.

We used the aggregate measures of factor inputs and their prices in this paper. Data were collected from database of statistical offices of all countries and Eurostat. The frequency of used data was annual in period 2000 – 2013. We used specific data to the SR_p calculation such as gross domestic product in constant price of 2010, total hours worked and stock of gross fixed capital in constant price of 2010. The real interest rate was defined by 3 month nominal rates deflated by inflation. The real wage was calculated as a nominal wage-consumer price index ratio. Both time series are plotted in Figure 2.

Source: own calculation

Figure 2 – Real interest rate and real wage in Benelux and Baltic countries in period 2000 - 2013

As is evident from Figure 2, real wages had in all countries tend to grow. Specific development was in Luxemburg, where in 2005 there was a significant increase in the value of real wages. According to the information of OECD the main reason of such a huge change was due to the surge in energy prices as well as increases in excise tax rates. These changes lead to consumer price inflation acceleration and with high level of inflation nonetheless triggered an automatic increase of wage rates and pensions by 2.5% in early-October. (OECD, 2005) This also explains the steepest development of real interest rates in that country.

To obtain factor-income shares we used annual data of gross value added, nominal costs of labor per person and number of employed persons. Our average share of labour (S_L) of all countries was 50.12% .It is interesting to observe the distribution of share factors in different countries. Only two countries have a a significant percentage of labour (BE, NL), in one country the ratio is roughly around 50% on both sides (EE) and the remaining countries have experienced a significant representation of capital, see Table 1.

Table 1 – Share of labour and capital

Country	s_l	s_k
BE	68.59%	31.41%
NL	72.63%	27.37%
LU	36.63%	63.37%
EE	45.44%	54.56%
LT	39.98%	60.02%
LV	37.46%	62.54%

Source: own calculations

In the calculation we had to consider certain specifics. For Belgium, it was 2005. In that year there was a combination of several adverse circumstances for the country. The inflation of the previous years, posted a significant increase in energy prices, which was reflected in the prices of inputs, especially capital. (OECD 2005) For Luxembourg is a special year 2007, when there was a sharp, more than 1% increase in interest rates and short-term decline in inflation. This led to the fact that the cost of capital has seen wild swings in the market.

Similarly, significantly below the development of the capital market crisis has also signed on Estonia (2008). Not only was almost 1% increase in interest rates, but at the same time, the inflation rate rose by more than 4%, then that next year there is a significant drop. It was, however, accompanied by a strong decline in interest rates. In view of the peaks in the said period, which may lead to unnecessary distortions of the real development, we have analyzed set of these values diminished.

Analysis

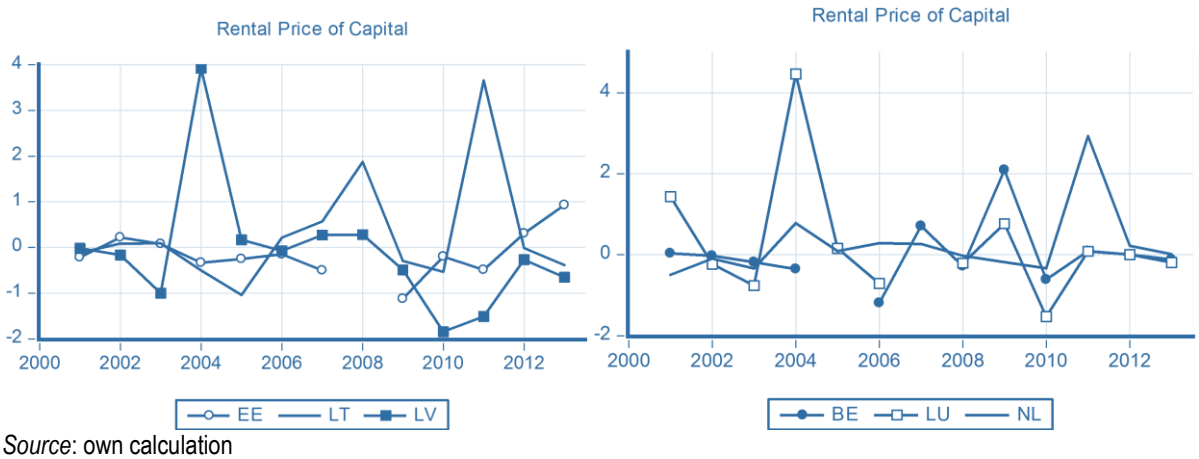
We used Equations 3.6 and 3.5 to calculate the final results. The results are in Table.2, 3 and graphical results are presented in Figure 3, 4 and 5.

Table 2 – Dual TFP for Benelux and Baltic countries

Country	Rental Price of Capital	Real Wage	Dual TFP
BE	0,016	0,010	0,026
NL	0,242	0,002	0,244
LU	0,257	0,009	0,266
EE	-0,143	0,022	-0,121
LT	0,278	0,012	0,291
LV	-0,104	0,019	-0,085

Source: own calculations

The results showed that the rental price of capital declined on average during the period only in two countries (EE, LV). Its development reflects the diminishing marginal product of capital associated with the growth in the volume of capital. Changes in real wage were not negligible but the nature of the changes was not as much dynamic as in the case of the capital prices.



Source: own calculation

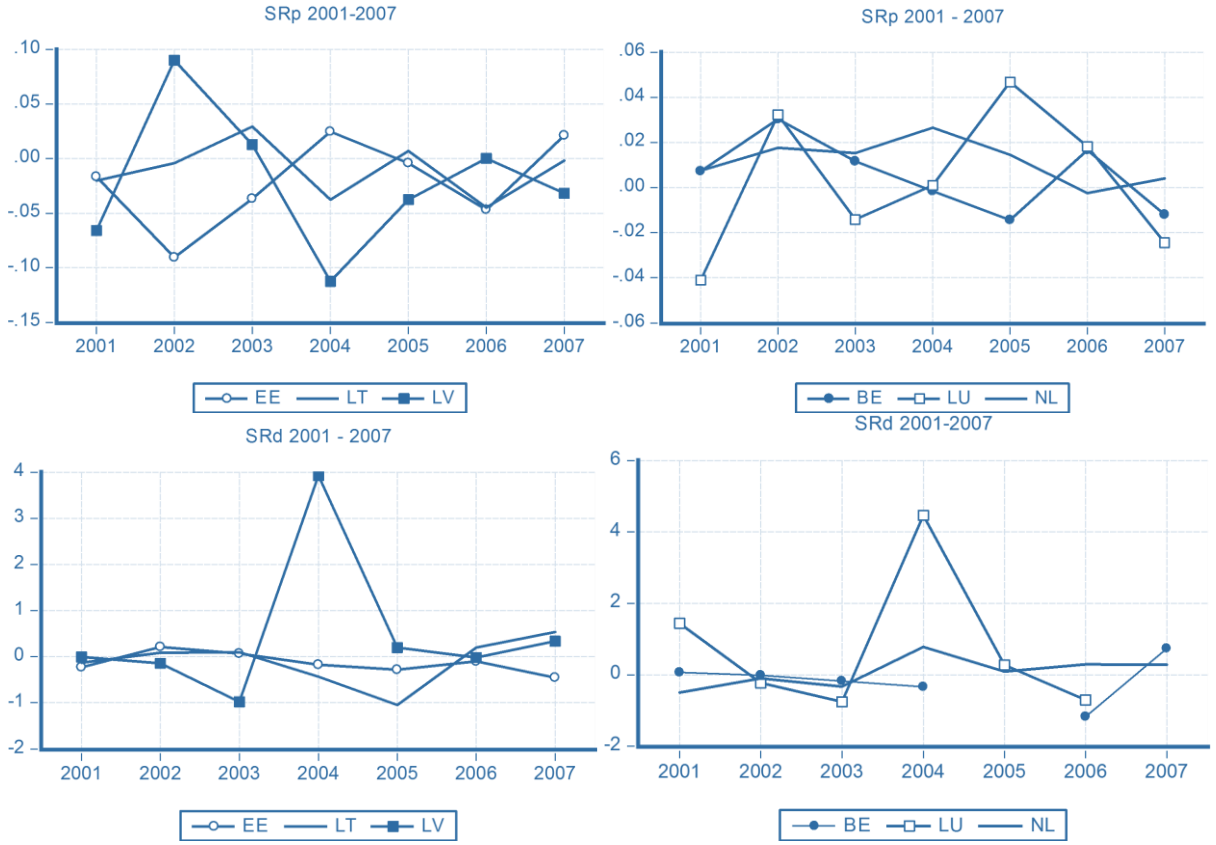
Figure 3 – Rental price off capital in Benelux and Baltic countries in period 2000 - 2013

The costs of capital were changed most significantly in 2004, 2009 and 2011. In June 2004, Estonia entered ERM 2 in preparation for the eventual adoption of the euro. Although the kroon was allowed to fluctuate within a 15% band, Estonia preferred a peg of EEK 15.6466 per euro. This led to lower inflation and lower interest rates. Positive developments in Lithuania in 2003, which was due mainly to the country's preparations for accession to the EU was relieved by a short-term deterioration of the situation in 2004, which according to the IMF was mainly due to the higher excise taxes and energy prices, coupled with strong demand. (IMF Survey, 2005) But this was more of a positive impact of economic and political changes in the economy.

While changes in 2004 we see as a result of positive economic and political changes in the country, negative changes in 2007-2011 are associated with easing of fiscal and monetary policy in the country as well as with onset of the crisis. We admit the possibility that the market might react to the imbalances on the markets already at that time. Strong imbalances in prices of capital in 2011 were clearly associated with a second wave of the crisis. It is the same with real wage developments. According to our opinion, while striking imbalances in the

years 2002- 2005 were associated with significant economic changes in economic development, turbulence in 2011 represented a direct result of changes induced by the crisis. Our results are somewhat consistent with the conclusions reached by IMF(2013).

However, the calculation of TFP has brought significant differences in results. In the pre-crisis period we can speak about approximately the same trend observed for both variables. It should be noted that the rate of change is significantly greater in the case of dual TFP as in the primal TFP. It means that there was a change (the positive and negative) of factors market price and it could affect the overall economic growth in the country.



Source: own calculation

Figure 4 – Primal and Dual Solow residual in Benelux and Baltic countries in period 2001 - 2007

In the case of the Baltic countries was the most significant year in terms of both indicators in 2004. The main reason we consider the fact that this year approached these countries to the EU, which resulted in efforts to meet the accession criteria. On the other hand, in this year there was a significant increase in energy prices, which also signed the overall evolution of prices in the market and was reflected mainly in the prices of capital. It's visible in both residues. In the case of the Benelux countries, most significantly stood out Luxembourg which responded to the changing energy prices and wages. Both methods of calculation have pointed out, even though in the primal residues year delay in comparison to the dual. It is evident that the dual residue, as reflected in the market price reflects the change earlier than primal residuum. On the other hand, it may be very short-term changes that represent a momentary blip of the market.

When analyzing the period since the crisis, it is possible to follow the development phase of the economic downturn in 2008, followed by a gradual recovery and improvement in the situation around the level before the crisis. For most of the countries surveyed year 2011 was again year of downturn and worsening indicators. Subsequently, the reinvigoration of the economy lasts until now.

Source: own calculation

Figure 5 – Primal and Dual Solow Residual in Benelux and Baltic countries in period 2008 - 2013

When primal Residual points to overall adverse economic developments so dual it refers to volatile price developments in the markets. The situation which was reflected in a sharp one-off deviation in prices in 2011 Latvii was also associated to the markets reacting to early elections, which were in the country at that time made. For the Netherlands it was the response to adverse developments in fuel prices on the markets.

In term of numbers, the calculation of primal and dual Solow residual revealed that the perception of prices on the market factors and the estimates in the national accounts established by the Statistical Office differ significantly.

By controlling for the quality and usage of the factors of production, we found that TFP has made a large contribution to economic growth (114.7%) in Netherlands, in Belgium (29.2%), in Estonia in reverse sense (25.8%). The biggest contribution of capital to GDP growth we found in Estonia (123%), Latvia (107%), Lithuania (93%) and Luxembourg (66%). The smallest contribution was from labour. It is the same for all countries. The biggest contributions of the labour are in Belgium (39%) and in Luxembourg (37%).

Table 3 - Results of primal Solow residual (growth rates)

	Estonia				Latvia			
	Capital	Labour	Primal TFP	Output	Capital	Labour	Primal TFP	Output
Annual	0.09	0.00	-0.012	0.05	0.06	-0.01	0.000	0.04
Annual weighted	0.06	0.00	-0.012	0.05	0.04	0.00	0.000	0.04
Contribution	1.23	0.02	-0.258	1.00	1.07	-0.07	0.008	1.00
	Lithuania							
	Capital	Labour	Primal TFP	Output				
Annual	0.07	0.00	0.005	0.05				
Annual weighted	0.04	0.00	0.005	0.05				
Contribution	0.93	-0.04	0.116	1.00				

	Belgium				Netherlands			
	Capital	Labour	Primal TFP	Output	Capital	Labour	Primal TFP	Output
Annual	0.01	0.01	0.004	0.01	0.00	0.00	0.012	0.01
Annual weighted	0.00	0.01	0.004	0.01	0.00	0.00	0.012	0.01
Contribution	0.32	0.39	0.292	1.00	-0.07	-0.07	1.147	1.00
	Luxembourg							
	Capital	Labour	Primal TFP	Output				
Annual	0.02	0.02	-0.001	0.02				
Annual weighted	0.01	0.01	-0.001	0.02				
Contribution	0.66	0.37	-0.029	1.00				

Source: own calculations

As we can see, the biggest contribution has capital. Only in case of Netherlands we can talk about the huge contribution of TFP. Based on our findings, the effect of total factor productivity to economic growth was much less important than the accumulation of capital or labour. Our findings confirmed the forecast of EU, besides a number of mechanisms that tend to dampen TFP in the aftermath of a crisis (including pro-cyclical R&D spending and rising risk aversion resulting in more expensive bank lending, drying capital markets and higher risk premiums for venture capital financing), there are also arguments that downturns can have a positive TFP impact as they can induce a process of essential restructuring and cleansing in the economy.

The expected effect of the crisis on TFP is ambiguous, with a range of specific factors making any definitive assessment of the fallout from the current crisis particularly uncertain. These factors include the need to allow, on the one hand, for the expected "one-off" downward shifts in the level of TFP associated with industrial restructuring, with some crisis-related industries (e.g. financial services and construction) likely to experience permanent reductions in the level of their activities as a result of the crisis.

Conclusion

The aim of the article was to determine whether economic growth that country within the last 13 years had reached was in implicit or explicit form. At a time when the economy has to deal with the consequences of the economic crisis is a way of achieving economic growth an important factor of renewability the required performance of the economy.

We focused on assessing the manner in which economic growth was achieved in the Benelux and Baltic countries. We used the method dual approach in the context of growth accounting. Our findings lead to the conclusion that it is immaterial whether they are the country from the west or east Europe, as only one country achieved its economic growth through increasing the productivity of the factors (Netherlands). The remaining five countries achieved economic growth through the accumulation of factors of production, particularly capital (Latvia, Lithuania, Estonia, Luxembourg) One of these five had achieved the economic growth through the equitable distribution of accumulation between capital and labour (Belgium). We think that this way of achieving economic growth (through the accumulation of productive resources) is not sustainable. Firstly, as is achieved in times of economic boom (2004 - 2007). It is therefore essential that the economy reconsider their approach and method of use of available resources. It's a way how to not widen the problems and avoid repeated recessions faced by all euro area countries.

According to our analysis we found also strong differences in results counted by dual approach. Despite the different results we believe that dual approach is a useful alternative for TFP measuring. Our further research in this area will focus on the more detailed elaboration of the impact of the various forms of capital on economic growth.

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Implementation of Corporate Social Reporting at the Ukrainian Enterprises

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Abstract

The paper deals with the organizational and methodical aspects of the implementation of corporate social reporting at the Ukrainian companies. The main purpose of this study is to define the essence of corporate social reporting and its importance in improving the efficiency of the enterprise management, since the financial reporting is unable to provide all necessary information to the parties concerned in their decision making. The general scientific methods of cognition are used to examine the research object, namely: systematization, analysis and synthesis, induction and deduction, comparison, abstraction, etc. The main problems of hampering the implementation of corporate social reporting in Ukraine are covered in this study. The key advantages of using social reporting to satisfy the needs of the parties concerned are also considered in the article. Special attention is paid to the description of a step-by-step process of creating and implementing corporate social reporting, using the Ukrainian enterprises as the example.

Key words: corporate social reporting, integrated reporting, sustainable development reporting, Global Reporting Initiative G4.

JEL Classification: M40, M41.

1. Introduction

Global changes caused by the financial and economic crisis contribute to the revision of the rules of doing business for all entities. This is due to the increasing threats of financial risks and difficulties in forecasting new trends in the economy. New rules of the game require from businesses to increase transparency of the information provided to all the parties concerned to enhance business activity and management decisions. Now, there are new tasks for improving the information presented in the reports, because it is insufficient to provide users only with the financial data. In particular, it is impossible to provide the information about the intellectual capital of the enterprise or about the environmental aspects of the company's activity using the financial data only.

The issue of social responsibility of business is very topical in the conditions of the developing economic relations. It necessitates creating the conditions for sustainable development that will help preserve the ecological and social resources and increase the value system in the society. Therefore, the issue of implementation of social responsibility of business and its reporting arises at the international and national levels. This is also due to the fact that the reporting, which is based on the International Financial Reporting Standards (IAS/IFRs) and US GAAP, is unable to provide the information to the users about the company's strategy, corporate management, indicators to create added value, etc. It is the corporate social reporting which is designed to solve the new problems faced by business and society.

It should be noted that the corporate social reporting has a number of synonyms, e.g. "social reporting", "integrated reporting", "sustainable development reporting", etc.

The *object* of the study is corporate social reporting, as well as the methodological and organizational aspects of its implementation at the Ukrainian enterprises. The *aim* of the study is to reveal the nature of corporate social reporting and to define its role in managing business activity. It is necessary to fulfil the following tasks to achieve this aim:

- to determine the nature of corporate social reporting at the enterprise;
- to show the advantages and the main trends in its implementation worldwide and in Ukraine;
- to provide recommendations in respect of organizational and methodological aspects of implementation of corporate social reporting at the large enterprises of Ukraine.

The *methodological framework* used for the research is the general scientific methods of cognition, namely, system thinking method, analysis and synthesis, method of comparison, induction and deduction, historical method, etc. The paper describes a systematized experience in creating corporate social reporting in foreign and national companies. With the system thinking method the nature of social reporting is studied and the

main trends in its using by the Ukrainian and foreign enterprises are considered. A graphical method of research is used to show the importance of the advantages of implementing corporate social reporting in the company management. Moreover, with the methods of comparison, as well as induction and deduction, the organizational and methodological aspects of implementation of corporate social reporting at the enterprises of Ukraine are presented.

2. Literature review

Many research papers of the Ukrainian and foreign economists are devoted to different issues of social responsibility in the economy. All these studies can be divided into several groups. Some scientists are exploring the nature and significance of social responsibility of business, its impact on the sustainable development of the economy and society. Other scientists are exploring the issues of measurement of social responsibility of the society and its importance for the profitability of the enterprise. Furthermore, there is a group of scientists who study the methodological issues of the formation of corporate social reporting and its impact on the business reputation and profitability of the company.

A. Horobet and L. Belascu in their works study the impact of the company's compliance with social responsibility strategy on the increase of its business reputation and market value. Moreover, they explore the functioning of socially responsible investment markets (SRI markets) at the regional and international levels, their interdependence with each other. (Horobet 2012)

A. Plachciak explores the essence of sustainable development and social responsibility as the basis for building a strong civil society and a thriving economy. He pays a special attention to studying the barriers preventing a society from achieving sustainable development in the economy, namely, geographical barriers, lack of faith and desire to implement a policy of sustainable development, economic barriers, social barriers, etc. (Plachciak 2009)

D. S. Dhaliwal explores the use of non-financial indicators in the reporting data. In his opinion, the use of non-financial data in the reporting of the company and in corporate social reporting leads to smaller errors in the future forecasts. Furthermore, the use of social reporting enhances transparency and openness of the economy at the macro and mega levels. (Dhaliwal 2012)

J. Hrebidek, O. Popelka, M. Stencl and O. Trenz deal with the measurements of environmental, social, economic and managerial performance of the agricultural and food enterprises. Moreover, they insist on including this information into corporate social reporting through the application of the Global Reporting Initiative (GRI), which will increase communication between different economic entities. It will help build the effective business in the country. (Hrebidek 2012)

One of the first scientists who started working on the problem of social reporting in the theory of accounting is M.R. Mathews and M.H.B. Perera. In particular, they studied the nature of social reporting and identified the main areas of the company's activity that must be covered by social reporting, namely: the environmental, social and economic data. (Mathews 1999)

The nature and importance of corporate social reporting are studied in detail in the works of the Ukrainian economicts K. Bezverkhiy (Bezverkhiy 2015, Bezverkhiy 2015), F. Butynets (Butynets 2014), I. Chaly (Chaly 2011), R. Kostyrko (Kostyrko 2013, Kostyrko 2015), M. Lohanova (Lohanova 2012), P. Matskiv (Matskiv 2015), I. Zhyhley (Zhyhley 2012) and others.

However, in these studies a little attention is paid to the organizational issues of the implementation and formation of corporate social reporting for businesses that operate in the post-socialist countries of the former USSR. This issue is described in this article.

3. Analysis results

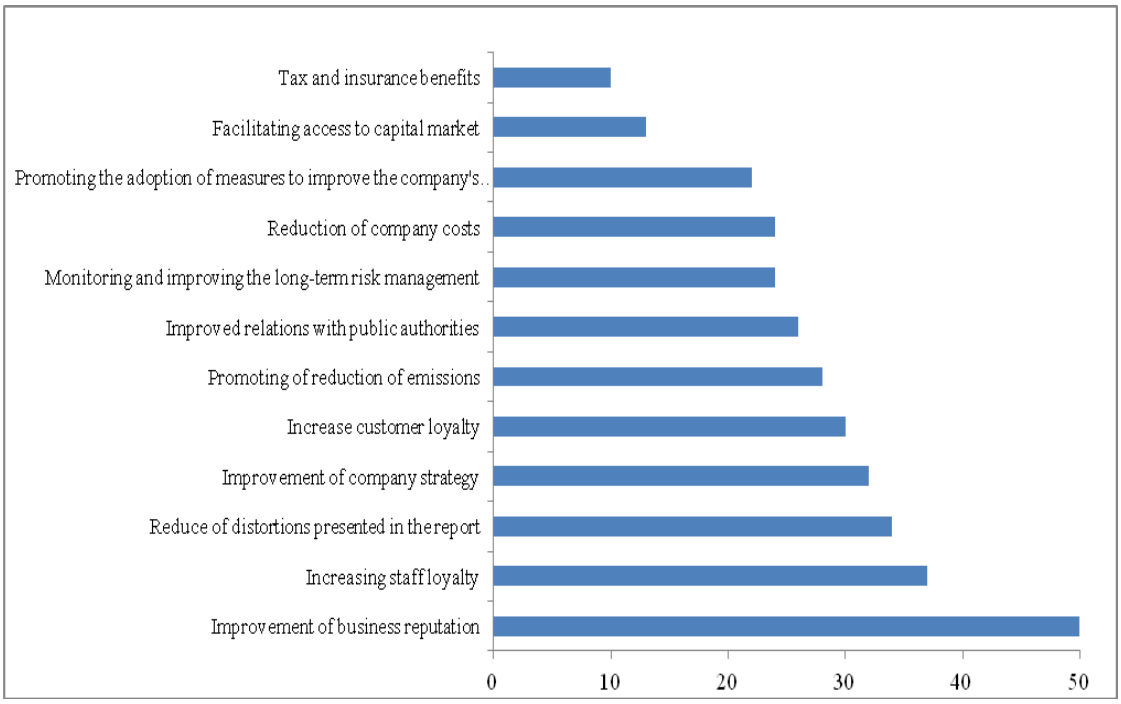
The classics of the accounting theory M. G. Mathews and M. H. B. Perera define social reporting in the narrow and broad meanings. So, in the narrow sense social reporting means a set of data on the personnel of the enterprise, manufactured and sold products, as well as rendered services. Its main aim is to reduce emissions into the environment by the enterprises, while in a broad sense the main purpose of social reporting is to present the information about the costs which will be incurred by the company as a result of economic activity of the enterprise (Mathews 1999). If the latter approach is taken into consideration for understanding social reporting, then the costs incurred by each member of society resulting from the operation of the business entities must be found out.

It is worth noting that the analysis of social reports of 7,000 enterprises from 31 countries of the world reveals the fact that reporting helps the analysts identify corporate values of the company. Moreover, the use of

such reports reduces the level of inaccuracy in forecasts by about 10% (Dhaliwal 2012). Furthermore, in some countries, e.g. in the South African Republic, the laws compel the companies to publish social reports, which are listed on stock exchanges. (Eccles 2011)

It suggests the emergence of the trend of preparing corporate social reporting to improve the management of their impact on the social sphere and the environment, to improve the operational efficiency, the rational use of human and natural resources, etc.

The greatest advantages of using the sustainability report are to improve corporate reputation and to increase the information transparency of the company. Moreover, one of the most important groups of users of such reports is the staff. Therefore, the introduction of integrated reports in the company allows increasing the loyalty among its employees. Also, the important factors for the implementation of these reports is the increasing management efficiency and reducing waste products, the facilitating access to the capital market, etc. Surveying conducted by Ernst&Young, which involved 579 respondents (companies) from all over the world, found out the main advantages of using reporting of sustainable development, as presented in Figure 1.



Source: http://www.ey.com/Publication/vwLUAssets/EY-Value-of-Sustainability-RUS/$FILE/EY-Value-of-Sustainability-RUS.pdf (reffered on 28.08.2015)

Figure 1 – Advantages of implementing the integrated reporting at the enterprise

The implementation of corporate social reporting at the Ukrainian enterprises is hampered due to a number of reasons – both organizational and methodological. So, when considering the organizational factors, one should take into account that this reporting must display a large amount of information which is not presented in the financial reporting. However, its coverage may lead to numerous questions of the other interested parties regarding some specific aspects of the company, which may be disadvantageous to the company's management. For example, it may be due to the detection of offences related to significant environmental losses, or non-paid extra hours of the staff, or inadequate labour conditions. Furthermore, not all Ukrainian top managers realize the need for the information disclosure, which is presented in corporate social reporting. Thus, it does not contribute to the popularization of this approach. This in turn determines the unsystematic and non-strategic nature in the preparation of such reporting for all the parties concerned. Moreover, because of the lack of the information some managers believe that the implementation of corporate social reporting may lead to significant financial expenses.

As for methodological problems related to the implementation of integrated reporting at the enterprises of Ukraine, they are difficulties in determining the essence of the information, difficulties in meeting the information needs of all the parties concerned, the necessity in balancing between the amount of information which is to be presented in the report of sustainable development and the information which is redundant, etc. (Bezverkhiy 2015, Lohanova 2012, Matskiv 2015)

Nowadays there is no special unique legal document which could regulate the method of social accounting reporting. However, there are several regulatory documents in the world which regulate the approaches to reporting concerning the use of innovations in the economic activity, indicators of environmental activities and relations with the staff and the society. These normative documents include Guidance on sustainable development reporting developed by the international non-profit organization Global Reporting Initiative, The United Nations Global Compact, ISO 26000 Social Responsibility, etc.

Thus, The United Nations Global Compact states that all social reports must be based on the principles of human rights, the principles of work, principles of environmental safety, and anti-corruption principles. However, the most popular is the use of Global Reporting Initiative G4. So, more than 90% of all the enterprises that are in the rating of the 250 largest companies in the world publish integrated reports in accordance with this standard, according to Fortune, an American business magazine. In Ukraine, only 5 companies make the integrated report following the requirements of the GRI, namely: SCM, Arcelor Mittal Kryvyi Rih, Obolon, Platinum Bank, and Ernst&Young. As for the other companies operating in Ukraine, they use other non-financial reports, which are not regulated by any standard. These reports are Environmental Report, Corporate Responsibility Report, Progress Report, etc. (Kostyrko 2015). It should be noted that the vast majority of national enterprises publish these reports irregularly, and the share of such enterprises is negligible (less than 1% of the total number of enterprises in Ukraine), which proves the thesis about the low transparency of business.

Furthermore, at the present stage of the development of the concept of corporate social reporting there is no unique generally accepted approach to the formation of an integrated report. It causes difficulties in organizing this process in the realities of current economic development in Ukraine. Therefore, it is necessary to determine the main stages to build the business processes associated with the formation of integrated reporting.

One of the first stages in the preparation of integrated reporting should be a preparatory phase. At this stage it would be expedient to define the purpose of this reporting, because it enables to increase business reputation of the enterprise, to increase own investment attractiveness, and to improve the confidence of creditors. Then the enterprise management should make a working group, which will include the employees of various departments. They will be involved in preparing the integrated report. Moreover, the enterprise needs to choose the standard it will guided by when preparing this report.

The second stage in the process of implementation of corporate social reporting at the enterprise is the organizational phase. During this phase, the meetings of the working group should define the main objectives and the expected results of the work of the working group. There they need to communicate to employees the need in providing this information to the parties concerned for decision making. The work schedule and the timing necessary for the implementation of the sustainable development reporting at the enterprise should be agreed at these meetings. The practice proves that this process can last from 6 to 12 months.

The third stage in the implementation of integrated reporting at the enterprise should be a methodological support. So, at this stage, the working group needs to develop methodological approaches to making corporate social reporting in the accounting policy of the enterprise, as this document is primary in the formation of methodical approaches to accounting at the enterprises of Ukraine. Furthermore, the presence of this document is determined by the Law of Ukraine “About accounting and financial reporting in Ukraine”. Thus, the order on the accounting policy at the enterprise must contain a normative document that will regulate the methodological approaches to making a social report, explain the structure and content of such a report, describe the frequency of the creation and publication of the report, describe the obligations of all the persons responsible for preparing the integrated report.

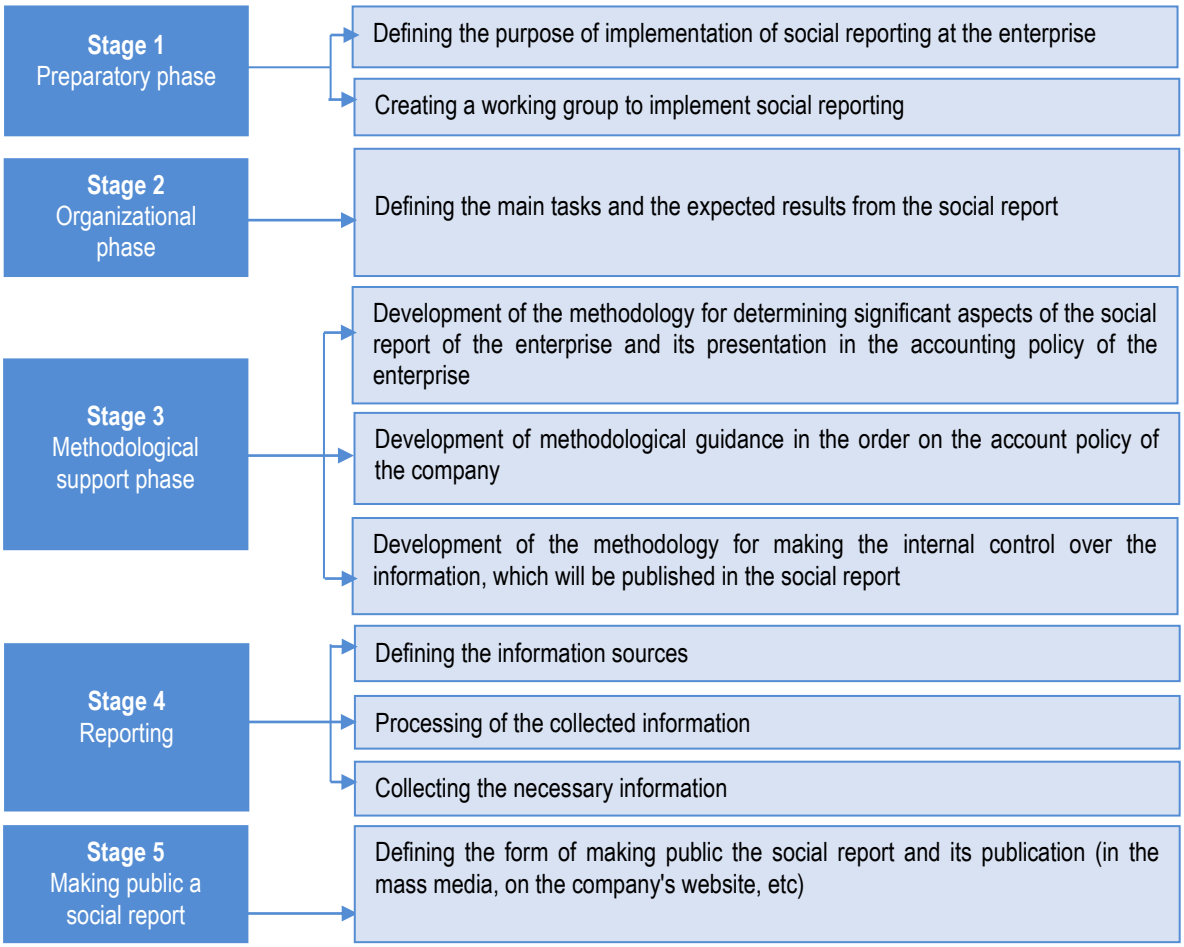
A separate section in the order on accounting policy at the enterprise should be the part describing the process of internal controlling over the reliability of the information provided in the sustainability report. Moreover, the methodology of revealing the essence of all the issues covered in this report is to be described. It will improve the quality of the information that will be used by the parties concerned in their decision-making process.

The phase of creation of the methodological support should be followed by the phase of report making. During this phase the working group collects information on the financial, social, environmental and management aspects of the enterprise that should be covered in the report. Thus, it is necessary to indicate the information sources, to obtain the necessary information from these sources and to aggregate it. Simultaneously, the internal control should be made over the information provided in the social report. The information presented in it must conform to the principles of accuracy, appropriateness, balance, comparability, materiality, and completeness.

The final stage of the process of creating and implementing corporate social reporting at the enterprise should be the dissemination of information contained in social reports. So, at this phase it is necessary to

determine the form of making the reporting public, to establish feedback channels from the target audience, which will use this report.

The general scheme of the process of the formation and implementation of corporate social reporting at the Ukrainian enterprises is presented in Figure 2.



Source: was compiled by the authors.

Figure 2 – The scheme of implementing corporate social reporting at the enterprises in Ukraine

Conclusion

In the study it was found out that one of the conditions for increasing efficiency of the enterprise performance in Ukraine and improving its management is the implementation and formation of corporate social reporting, which should contain the information on the economic, environmental and social impact on the parties concerned. However, in order to implement it efficiently, when the economic benefits from the use of the social report exceed the expenses on its formation and implementation, its planning must be well-thought. It is affected by numerous internal and external factors caused by the peculiarities of the Ukrainian business and law.

Thus, one of the priority spheres in the study of accounting is the preparation of integrated reporting by enterprises operating in Ukraine and worldwide. There is a need in the standardization of requirements for its completion to achieve this goal. It will help make the analysis and comparison of these reports with the other similar documents. To do this, Global Reporting Initiative G4 is applied worldwide. Its implementation contributes to a more efficient and equitable allocation of resources among the parties concerned.

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Dependency and Predictability of Stock Market Returns. An Empirical Study of German Capital Market

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Abstract

The paper examines the predictability of German stock market, and provides evidence that several economic factors have predictive power for the market return. The basic idea is that German stock market development is determining and enormously significant factor for the Visegrad Group countries because of their vital dependency on the German economy, where development in the stock market is a significant parameter of the state of the economy. Going out from this perspective we present an overview on current research on the stock market predictability, we formulate a research problem and using time series models as well as linear regression models we estimate and in detail describe important parameters of the German stock market development. We came to conclusion that four macroeconomic variables are specifically important and significant for the development of German stock market index DAX, namely Euro Area government bonds with AAA rating, German net trade in goods with all the countries of the world, net financial assets of German households and non-profit organisations serving households, and the exchange rate for Russian rouble to Euro.

Keywords: multivariate linear model, dependency, time series forecasting, equity markets.

JEL Classification: C51, C52, G12, G32.

1. Introduction

In recent years, Germany has been perceived as the most powerful state of the European Union with significant geopolitical role. Germany has developed mutually advantageous relations with other European countries, including Visegrad Group countries. It was this significant dependency of Visegrad Group countries on German economy that motivated us to investigate the predictability of German market.

The paper is organized as follows: The second section shortly describes the relationship between Central European countries and Germany. It also gives an overview of equity prices prediction from different points of view and then the German equity market and its predictability are discussed. In the third section we have pointed out specific variables considering their influence and dependency on the German's stock market return. In the fourth section we construct the model and predict the German's stock market return. At the end we discuss achieved results in context of other researches and we make a summary of them.

2. German equity market and its possible predictors

Nowadays, as Kunčič and Šušteršič (2012), Andrejovska (2013), Buleca (2014), and Buleca and Andrejovska (2015) show, the Central European economies vitally depend on the German economy and Germany is one of the most crucial partners of the Central European economies. Specifically as a group, Poland, Hungary, Czech Republic, and Slovak Republic, also called as Visegrad Group countries, account for roughly 10 per cent of Germany's foreign trade. It is very important to mention that for Visegrad Group the immediate benefits of close economic ties with Germany outweigh the risk. Unfortunately, a German recession or a reduction to German investment would cause significant problems for this group of countries.

Because of the significant and vital dependency on the development of German economy, we decided to analyse one of the significant German indicators - the development of the aggregated stock market in form of the most representative German stock market index DAX. We are focusing on the idea that stock market indices partially mirror the realities of the national economy. There is even evidence that movements in the stock market have a profound economic impact on the economy and everyday life. A fall in share prices might cause an economic downturn. Professor Gustav Cassel (1938) states that the stocks exchange have often been represented as an astonishingly sensitive barometer, which indicates beforehand what is going to happen in economic life.

Except for this interlinking, there is another issue connected with the discussion about predictability of the stock returns, which has been a hot issue in the financial studies of asset pricing. Some authors point out that the predictability of stock returns is the result of market inefficiencies. But other authors still widely believe that some financial and economic factors can have a great forecast power of stock returns. In their papers they proof that the stock return can be predicted by a linear models with some dependent variables (predictors), such as earnings yield or in general the economic cycle components like the growth of the industrial production, inflation rate, interest rates, etc.

The basic theory for the stock return forecasting is the capital asset pricing model, which is a model that indicates what should represent the expected or required rate of return on risky asset. According to Reilly and Brown (2003), the ultimate question regarding the CAPM is whether it is useful in explaining the return on risky assets. As mentioned further specifically, whether there is a positive linear relationship between the systematic risk and the rates of return on the risky assets. Sharpe and Cooper (1972), Douglas (1969), Black, Jensen, and Scholes (1972) found a positive relationship between return and risk, although it was not completely linear. Beyond the analysis of the expected rate of return and systematic risk (beta coefficient), several authors have also considered the impact of skewness on expected returns, and as shown by Kraus and Litzenberger (1976) who tested a CAPM with a skewness term, the three-moment CAPM corrects for the apparent mispricing and leads to better results. Other authors, like Fama and French (1988), analysed the hypothesis that dividend yields forecast returns of New York Stock Exchange stocks. In their study "*Dividend Yields and Expected Stock Returns*" they gave evidence that forecast power of dividend yields increases with the return horizon. This is caused by the fact that the variance of the fitted values grows quicker than the return horizon, while the variance of the residuals usually grows less quickly than the return horizon. Ferson and Harvey (1991) studied the prediction power of asset pricing models in several of their works. Their study "*Sources of Predictability in Portfolio Returns*" focuses on the ability of the multiple-beta asset pricing model to predict the portfolio returns. On the set of stock portfolios and industry portfolios they demonstrated that most of the predictable variation in the portfolio returns can be explained by shifts in the betas and risk premiums. Two years later, Ferson and Harvey (1993) used asset pricing models to analyse the predictability of 18 international equity market returns and its relation to global economic risks. This model captures more than half of the predictable variation in the expected returns that are defined by global risk premium and country-specific betas.

As mentioned before, the basic step in stock return forecasting is the capital asset pricing model (CAPM) widely used for evaluating financial assets, which was developed by Sharpe (1964), Linter (1965) and Treynor (1965). In this model the expected return of an asset is linked to its marked risk and is given by:

$$E(R_i) - R_f = \beta_i\big(E(R_M) - R_f\big) \tag{1}$$

where R_i stands for an expected return of ith asset, R_m is a return on the market portfolio and R_f represents risk-free return. Coefficient β_i symbolises the systematic risk of the asset.

The difference between the expected return of the selected asset R_i and risk-free return R_f represents the expected excess return of the asset. The difference between the return on the market portfolio and risk-free return is known as the market risk premium. Market risk premium is an additional return that investor can expect as the compensation for the risk associated with the hold of the market portfolio.

The CAPM can be extended and transformed into regression form:

$$E(R_{it}) - R_{ft} = \alpha_i + \beta_i\big(E(R_{Mt}) - R_{ft}\big) + e_{it}\,, \tag{2}$$

in which α stands for the regression constant and e_{it} is the error process at time $t = 1, 2, \ldots, T$.

Parameter α represents the intercept of the security market line (SML) and indicates how the return of i^{th} asset differs from the equilibrium return. The general linear model that will be used for our analysis includes more than one explanatory variable and is given by:

$$y_t = \alpha_0 + \beta_{1t}x_{1t} + \beta_{2t}x_{2t} + \cdots + \beta_{it}x_{it} + e_t\,, \tag{3}$$

for $t = 1, 2, \ldots, T$.

Several studies report that there is a relationship between selected macroeconomic variables and stock market returns.

Kwon and Shin (1999) investigated the impact of economic activities on Korean stock market. Their set of macroeconomic variables consisted of the production index, exchange rate, trade balance and money supply M1. In their analysis they observed direct long-run and equilibrium relationships between stock prices and variables.

Brahmasrene (2007) tested in his study the causality between the stock market index of stocks listed in the Stock Exchange of Thailand and industrial production, money supply M2, consumer price index, nominal interest rate, exchange rate of Thai baht per US dollar and oil price. He found cointegration between stock market index and selected variables during the pre-financial crisis period (January 1992 – June 1997). In the post financial crisis period (July 1997 – December 2003) he observed causality for the money supply M2, change in nominal interest rate and exchange rate.

Králik (2012) used the framework of the APT model estimated by a multivariate regression to analyse the relationship between selected macroeconomic factors and the Bucharest Stock Exchange market index. As the macroeconomic variables author chose the industrial production index, the wholesale price index, the consumer price index, the nominal RON/EUR exchange rate, foreign exchange reserve, the official interest rate, the interbank interest rate, M2, oil price, gold price, short-term T-bill rate and T-bond yield. According to his study the official interest rate, interbank rate, gold and short-term T-bills have significant impact on the Romanian market index.

Hsing (2011, 2013) tested the relations between macroeconomic variables and stock market in several of his studies. In his 2011 study he examined the impact of real output, government borrowing, the money supply, the domestic real interest rate, the CZK/USD exchange rate, the expected inflation rate, the foreign stock market index and euro area government bond yield on the Czech stock market index. In 2013, Hsing made similar study, but this time he examined the relationship between selected variables and Polish stock market. He chose fiscal policy, the policy interest rate, money supply, real output, the nominal effective exchange rate, the inflation rate, the German stock market index and U.S. stock market index as relevant macroeconomic factors.

3. Sample size, data and study period

The study was performed on a sample of thirty-seven quarterly returns of the German stock index DAX. The sample extends from the 1st quarter of 2005 until the 1st quarter of 2014. We divided our data sample into training sample covering the period from the 1st quarter 2005 until the 4th quarter 2011, and test sample covering the 1st quarter 2012 through 1st quarter 2014. The training sample was used to discover the relationships between macroeconomic variables and DAX and to construct the multifactorial linear model. Then the model predictions were tested against the test sample. Analysis and prediction were made using R software.

The macroeconomic variables used are quarterly data for the same period as the stock market data (DAX index), collected from secondary sources such as Eurostat and server Stooq.com, which publishes information from financial markets. Figure 1 depicts the DAX movements in the study period.

Figure 1 - German stock index DAX

The sample size in this research consists of German stock index DAX and four macroeconomic variables – euro area government bonds with AAA rating; German net trade in goods with all the countries of the world; net financial assets of German households and non-profit organisations serving households; and the exchange rate for Russian rouble to euro. Tests and modelling were performed on the twenty-eight quarterly observations for each of these variables. We have chosen four macroeconomic variables for the purpose of modelling German stock index that were already mentioned and are also presented in the Table 1.

Table 1 - Description of macroeconomic variables

Description of macroeconomic variables			
Symbol	**Variable**	**Unit**	**Source**
GB	AAA rated euro area government bonds	Zero yield curve	Eurostat 0
TG	Net trade in goods	Millions of euro	Eurostat [1]
FA	Net financial assets of households	% GDP	Eurostat 0
RU	Russian rouble (RUB/EUR)	Close price	Stooq.com 0

Figure 2 represents the course of selected macroeconomic variables during the observed time period.

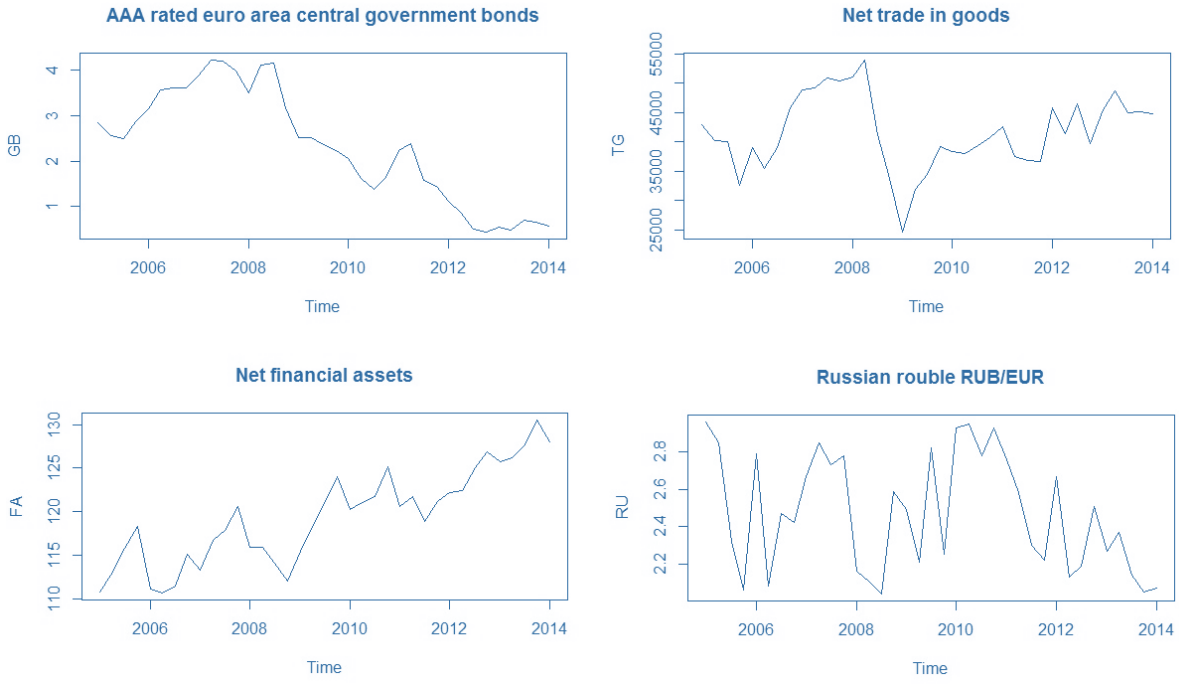

Figure 2 - Macroeconomic variables

Firstly, we examined the stationarity of German stock index to avoid spurious regression. For this purpose we used augmented Dickey-Fuller (ADF) test. The p-value for DAX time series (0.6312) shows that German stock index is non-stationary with an unit root. To ensure stationarity we transformed DAX into logarithmic first difference. ADF test p-value for logarithmic returns of DAX is 0.01, thus we made DAX time series stationary. From Figure 3 we see, that German stock index after the transformation into logarithmic returns is stationary with zero mean.

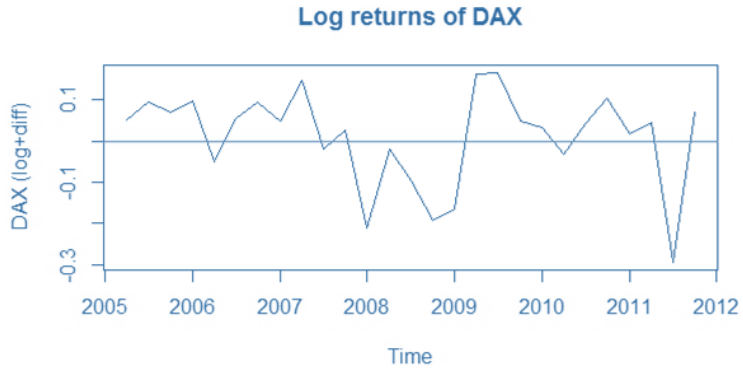

Figure 3 - Logarithmic returns of German stock index DAX

Before we constructed the model, we tested also the rest of the variables for stationarity. After performing the ADF test we see, that all variables are stationary in their first difference with results shown in Table 2 and Figure 4.

Table 2 - Stationarity tests of macroeconomic variables

		AAA rated government bonds	Net trade of goods	Net financial assets	Russian rouble
Symbol		GB	TG	FA	RU
Stationarity test	adfTest (k=0)	0,3472	0,4373	0,7972	0,3682
First difference	adfTest (k=0)	0,01	0,01	0,01	0,01

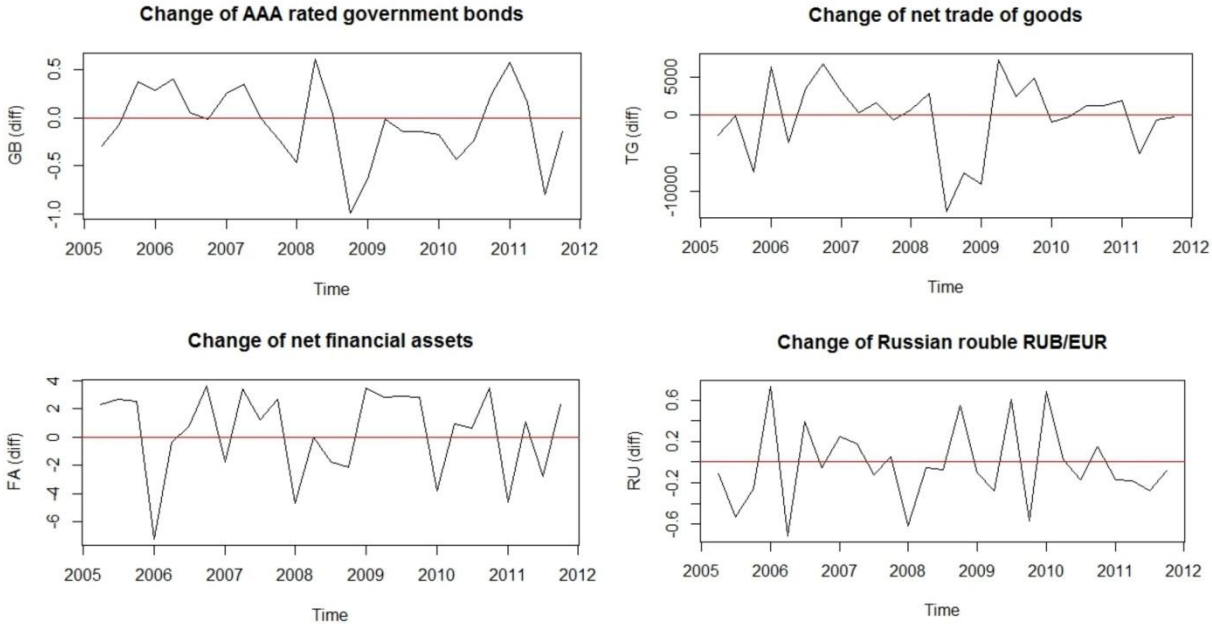

Figure 4 - Stationarization of macroeconomic variables

4. Construction of model and prediction

Composed multifactorial linear model is based on the relation, in which logarithmic return of DAX is a function of the first differences of selected macroeconomic variables.

$$\Delta \ln DAX = f(\Delta GB + \Delta TG + \Delta FA + \Delta RU) + e_t, \quad (4)$$

for *t = 1, …, 28.*

After the transformation into CAPM, our model takes the following form:

$$\Delta \ln DAX_t = \alpha_0 + \beta_{1t}\Delta GB_t + \beta_{2t}\Delta TG_t + \beta_{3t}\Delta FA_t + \beta_{4t}\Delta RU_t + e_t, \quad (5)$$

for *t = 1, …, 28.*

Table 3 reports the results for our regression model:

Table 3 - Regression coefficients of linear model variables

	Beta (β)	P - value	
Intercept (α)	0,01636	0,17909	
ΔGB_t	0,1533	0,0000649	***
ΔTG_t	0,000007583	0,00703	**
ΔFA_t	0,0196	0,0000761	***
ΔRU_t	0,1037	0,00376	**

All of the selected macroeconomic variables are statistically significant in explaining the German stock index. This could be the consequence of model errors, so before we analyse the results, we will test the most common linear model defects. The results of the individual tests are shown in Table 4.

Table 4 - Diagnostic tests of linear model

Test	R function	Value	Result
Heteroskedasticity	*bptest*	0,9191	Homoskedasticity
Autokorelation	*dwtest*	0,3878	Linear independency
Multicollinearity	*vif*	1,085136; 1,094658; 1,055130; 1,072187;	Not present in model
Normality	*jarque.bera.test*	0,4273	Residues are normally distributed
AIC	*AIC*	- 68,73392	-
BIC	*BIC*	- 60,95889	-

Our model doesn't display any signs of model errors, therefore it doesn't require any corrections and we can consider our regression coefficient as valid and unbiased.

After substituting regression coefficients from Table 3 into the equation (5), our linear model takes form as follows:

$$\Delta \ln DAX_t = 0{,}01636 + 0{,}1533 * \Delta GB_t + 0{,}000007583 * \Delta TG_t + 0{,}0196 * \Delta FA_t + 0{,}1037 * \Delta RU_t + e_t, \quad (6)$$

for *t = 1, …, 28.*

The coefficient of determination R^2 defines the percentage of logarithmic returns of the DAX index explained by linear model. In our case, linear model given by eq. (6) explains 76.91% of logarithmic returns of the German stock index. Adjusted R^2 of the model is 72.71 % and the p-value of 9.428 e^{-7} shows that our model is statistically significant.

There is a significant positive relationship between DAX and tested macroeconomic variables. The biggest impact is visible in the case of AAA rated euro area government bonds – one unit increase of the first difference of this variable results in 15.33% increase in German stock index return. One unit increase in the first difference of RUB/EUR exchange rate causes 10.37% increases in DAX return. One unit increase in net trade of goods leads to 0.0007583% increase in DAX return and one unit increase in net financial assets of households' results in 1.96% increase in DAX return.

For our prediction we used multifactorial linear model presented by eq. (5) and values of macroeconomic variables for the time period from 1st quarter 2012 through 1st quarter 2014. We predicted DAX logarithmic returns from 1st quarter 2012 to 4th quarter 2013. These predicted logarithmic returns were converted to simple returns using exponential function and then added to the last actual stock price value (4th quarter 2011) to get the predicted stock values. After this adjustment we compared the predicted stock price values for 1st quarter 2012 to 3th quarter 2013 with the actual DAX stock price values for this period. The accuracy of predicted values is shown in Figure 5.

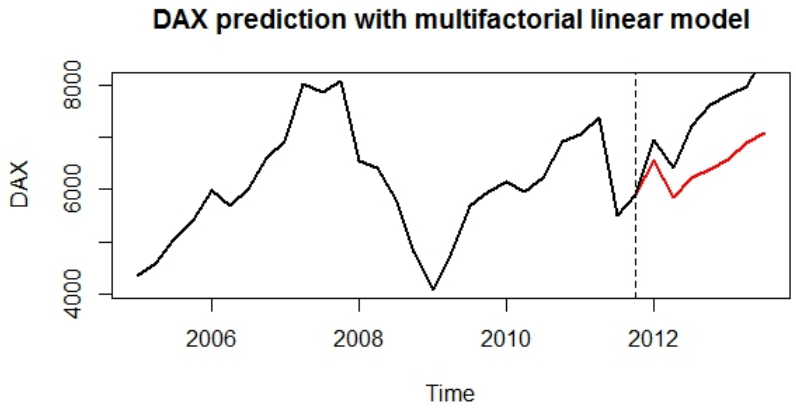

Figure 5 - DAX prediction with multifactorial linear model

Mean absolute error of our prediction is 999.1346 and, as we can see in Figure 5, our multifactorial linear model under-predicted DAX stock prices by as much as 18%.

Conclusion

Development of German economy and capital market is significantly important for other European countries, but specifically for Visegrad Group countries. A significant interdependency between Germany and Visegrad Group countries had motived us examine the predictability of German stock index returns using multifactorial linear model. After presenting an overview on current research on the stock market predictability and efficiency in the analytical part of paper we formulate a research problem and using time series models as well as linear regression models we estimate and in detail describe important parameters of the German stock market development. We came to conclusion that four macroeconomic variables are specifically important and significant for the development of German stock market index DAX, namely Euro Area government bonds with AAA rating, German net trade in goods with all the countries of the world, net financial assets of German households and non-profit organisations serving households, and the exchange rate for Russian rouble to Euro. Our results confirmed short-term relationship between DAX and selected macroeconomic variables, among which AAA rated euro area government bonds have the biggest impact. Our multifactorial linear model provided adequate fit to actual DAX stock prices although there is a degree of under-prediction involved as common for an econometric model.

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Does Shariah Compliance lead to Managerial Trustworthiness? Evidence from empirical analysis of Capital Structure of Shariah and Non-Shariah Firms in Pakistan

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Abstract

The Shariah law makes Amanah (trustworthiness) a fundamental obligation for all the contractual parties. From the agency theory perspective, we, thus, investigate managerial trustworthiness in capital structure decisions of Shariah firms and compare it with those of Non-Shariah firms, in the light of Islamic principle of Amanah (trustworthiness). Specifically, we examine whether capital structure of Shariah firms is partially influenced by managerial ownership under the motivation of self-interest. Using the data from Pakistan, our results show that, unlike Non-Shariah firms, leverage ratios in Shariah firms are insensitive to the varying degree of managerial ownership, indicating absence of managerial opportunism in financial decisions of these firms. For the Non-Shariah firms, on the other hand, our results confirm findings of previous research which reveal that managers manipulate leverage ratios in their own interestat the cost of firm value, indicating the severity of agency conflicts among these firms. Invoking agency theory, we argue that certain firm characteristics (such as lower free cash-flows and lesser liquidity), achieved through Shariah compliance, help Shariah firms mitigate agency conflicts. These features persuade managers to behave less opportunistically than their counterparts in Non-Shariah firms as shown from their financing choices. The results are important for understanding nature of the two types of firms studied and the cross-sectional differences between the capital structure choices of these firms. Besides, our findings have also implications for growing number of Shariah compliant firms and a new clientele of Islamic investors who have entered capital markets due to the Islamic image of Shariah firms in Muslim majority country like Pakistan.

Keyword: Capital structure, Shariah firms, Islamic finance, managerial opportunism.

JEL Classification: G32, G34.

1. Introduction

The principle of Amanah (trustworthiness) stands as a cornerstone of Islamic teachings on all forms of business contracts and dealings. Trustworthiness serves as a guiding principle in an agency contract involving an agent (or trustee) to act on behalf of the principal (or trustor).The principle obligates all contractual parties to act as trustee to one another and calls for strict adherence to theclauses stipulated explicitly (or implicitly) within the contract (Iqbal 1992). In the modern theory of firm which views a firm as a nexus of contracts between various stakeholders (Jensen and Meckling 1976), the relationship of principal (trustor) and agent (trustee) is analogous to that of owners and managers, according to which managers are put into charge of business to act in the best interest of the owners or shareholders (Jensen and Meckling 1976). In practice, however, the management is often tempted to act in its self-interest rather than the shareholders' (Fama and Jensen 1983), due to conflict of interests arising from agency relationship. A wilful violation of trust by the management (agents) in pursuit of its own interests rouses the conduct of managerial opportunism in the organization (Fama and Jensen 1983, Jensen

1986, Jensen and Meckling 1976), which is not only against the very spirit of the principle of *Amanah* (trustworthiness) in Islam but also the corporate ethics.

Friend and Lang (1988) argue that optimal capital structure (with desired level of leverage ratio. In trade-off theory, optimal capital structure refers to the debt ratio which optimizes costs (financial distress) and benefits (tax advantages) of debt), should be independent of the structure of ownership of the firm. The managerial-optimization hypothesis developed and tested by Friend and Lang (1988) suggests in case management also loses its stake at bankruptcy, it may deliberately keep the debt ratio lower than optimal level to avoid the risk of bankruptcy. Managers may also manipulate debt ratio to be sub-optimally lower to reduce the risk of unemployment in case of bankruptcy (Fama 1980). However, if varying managerial ownership in the firm affects the debt ratio in its capital structure then it is an indication of managerial opportunism or lack of trustworthiness. The prior literature recognizes such self-serving behaviour of managers in deliberately suppressing the debt ratios lower than optimal level in order to avoid their ownership and employment risk arising from higher level of debt and bankruptcy (Amihud and Lev 1981, Friend and Lang 1988). These findings, therefore, portray the lack of trustworthiness and the managerial opportunism among Non-Shariah firms.

2. Background of study

Deviation from trustworthiness leads to opportunistic behaviour, which could be easily reflected from the management's financial decision-making. A Shariah firm is an emerging genre of corporate entity whose business model conforms to the Shariah guidelines. For its utmost importance in Shariah, the principle of *Amanah* is of special interest in the case of Shariah firms. If a Shariah firm is indeed different from other firms, then one would expect its management to avoid opportunism by exhibiting the superior level of trustworthiness in their financial decisions. This discussion leads us to some empirically important questions regarding managerial behaviour in Shariah compliant firms, which include:

- Does management in the Shariah firm show higher inclination towards trustworthiness in their financial decisions than conventional firms?
- Dose Shariah compliance leads managers to behave in a trustworthy manner in their financing decision?

Questions like these are of fundamental importance given the importance that *Shariah* exerts on becoming trustworthy to obviate the behaviour of selfishness and opportunism. The early life of Prophet Muhammad (PBUH) as a trader portrays a model of trustworthiness, which earned him the titles of truthful (*Sadiq*) and trustworthy (*Ameen*). Being trustworthy is, thus, one of the basic attributes to achieve for a Shariahfirm. The importance of these questions lies also in their broader implications for religiously cautious investors who have been attracted to stock markets by the Islamic image of Shariah firms (Omran 2009). These investors would expect from a Shariah firm to abide by the Shariah principles in their larger spectrum of financial and business activities. The managerial behaviour based on self-interest and opportunism against the spirit of Shariah and ethics might lead to the departure of these investors from the stock markets.

The capital structure theory for Shariah firms devised by Ahmed (2007) (Ahmed (2007) argues that capital structure choice of a Shariah firm is likely to follow a pecking order theory. Accordingly, Shariah firm would first exhaust all its internal funds, before raising debt or equity. Ahmed further argues that likeconventional firms, certain firm characteristics such as size, profitability, tangibility etc. would determine the choice of financing option and leverage ratios in Shariah firms.) is based on the assumption that managers act in the very interest ofshareholders, i.e. they behave trustworthily. This assumption coupled with the novelty of Shariah firms arising from their Shariah compliance and the importance attached to trustworthiness in Islam make the case for the exclusive empirical analysis of managerial behaviour among the Shariah firms. This paper is a maiden attempt to investigate the managerial trustworthiness in financial decision making focusing on capital structure determination of Shariah firms in the light of Islamic principle. Like the issue of managerial trustworthiness/opportunism, capital structure is also one of the least researched areas in Islamic finance (Ahmed 2007, Haron and Ibrahim 2012). We are thus motivated to investigate whether capital structure of a Shariah firm is partially influenced by managerial ownership under the motivation of self-interest or opportunism.

We build on the supposition that Shariah compliance should be reflected in the overall spectrum of managerial decision making of Shariah complying firms, the determination of capital structure being one of them. The previous research has explored this assumption and has found the higher tendency of Shariah firms to report their earnings more truthfully (Farooq, AbdelBari and Haniffa 2015; Wan Ismail, Kamarudin and Sarman 2015). Literature also suggests higher propensity to pay dividend among Shariah firms (Farooq and Tbeur 2013) than their Non-Shariah counterparts mainly due to better corporate governance, and lower agency costs. In similar

vein, one would expect that the changes in capital structure should not be motivated by managerial self-interest. None of the previous studies, however, has studied this phenomenon of managerial opportunism in capital structure of Shariah compliant firms.

We extend our argument that Shariah compliance leads to certain firm characteristics, which are instrumental in minimizing agency conflicts between the shareholders and managers leaving relatively little room and reward for managerial opportunism. In line with this argument, prior literature asserts that managerial opportunism could be tamed by attaining certain firm characteristics that reduce incidence of agency conflicts. Reducing agency conflicts between the shareholders and managers is a way to obviate managerial opportunism. The crux of the agency conflict lies in misuse of free cash flows by managers in their own interests. Jensen (1986) argues that the free cash flows intensify agency conflicts between the management and shareholders of the firm, luring managers into the behaviour of opportunism. Various ways (such as paying regular dividend and using debt) have been proposed in prior literature to disgorge idle cash from firm's coffins to minimise agency costs attached with free cashflow. Reducing the amount of idle cash from the direct discretion of management is, thus a plausible way to mitigate agency conflicts (Jensen 1986). As one of its requisite, Shariah law requires most of the assets of the Shariah compliant firm to be in illiquid form. This is because the use of money, in any form such as cash or cash equivalent, as an earning asset is prohibited in Shariah law for the element of *Riba* (interest) in it. Hence, a Shariah compliant firm cannot invest too much in cash and other interest earning marketable securities (Derigs *et al.* 2008). A brief account of other qualitative and quantitative screens of Shariah compliance in Pakistan is given in appendix. For detailed discussion, see Derigs *et al.* (2008). Consequently, the level of cash and other liquid assets (such as receivables) tends to be lower in Shariah compliant firms (Derigs and Marzban 2008). The free cashflow hypothesis of Jensen (1986) postulates that firms with these characteristics are less likely to be affected by high agency costs arising from the misuse of free cashflow at the hands of management, as a result due to lower agency conflicts, managerial opportunism tends to decline in these firms. Consequently, management in the Shariah firm would be expected to behave less opportunistically and hence would be more trustworthy in it financing and other decisions than other firms.

Consistent with our hypothesis, we find that the debt ratio being determined independently of the degree of ownership held by management in the capital structure of Shariah firms. This indicates the non-manipulation of capital structure by the management for its own self-interest. In contrast, for conventional (Non-Shariah) firms, we find debt ratio being affected significantly by the level of managerial ownership within the organization, showing an indication of managerial self-serving behaviour. More specifically, we find the non-linear relationship between managerial ownership and leverage in Non-Shariah firms. When the level of managerial ownership in the firm is low, debt component in the capital structure inflates significantly as managers' stakes increase in firm's ownership. On the other hand, when the level of managerial ownership is high, debt component in capital structure deflates significantly with increase in managerial ownership. These findings support the alignment effect (Jensen and Meckling (1976) and entrenchment effect (Fama and Jensen 1983) respectively.

These results supports the entrenchment effect (Demsetz and Lehn 1985; Morck, Shleifer, and Vishny 1988; Stulz 1988) and managerial optimization hypothesis (Friend and Harbrouk 1988), which maintain that managers rely on lesser debt as their ownership in the firm increases as a bid to lower the risks of their ownership stake and undiversifiable human capital. Our results are robust to different econometric approaches implying some basic cross-sectional differences between Shariah and non-Shariah firms.

Our study contributes in several ways. The current Shariah screening methods only use superficial criteria to identify Shariah compliance. By invoking the principal of Amanah (trustworthiness), we test whether the Shariah compliant management actually behave in accordance with the fundamental teachings of Islamic principle by avoiding selfish motives in their financial decision making. By focusing on Shariah compliant firms, we contribute to the still developing literature on capital structure of Shariah compliant firms. By comparing our results with conventional firms we depict the inherent cross sectional differences between these two types of firms, which could pave the way for further research in capital structure differences between them. Finally, most of the studies on effect of ownership structure on capital structure are US oriented. By studying this relationship in Pakistan, we provide evidence from the developing world. The rest of the paper is organized as follows. Section 2 describes the motivation and literature review for the study. Section 3 describes data and methodology. Section 4 discusses results, section 5 concludes.

2. Motivation and literature review

Islamic Finance is emerging with a sizeable wealth of $822 bn in assets in 2009 (The Economist 2009). Unlike conventional finance, Islamic finance puts Islamic guidelines of doing business ahead of modern market-

based economic rationalities. The Islamic guidelines are mainly based on the moral and ethical values that Islam propagates to attain the objective of economic well-being or *Falah* for all human beings (Sarker 1999). One of the consequential effect of the rise of Shariah firms is the increasing participation of religiously and ethically motivated investors in the stock markets (Omran 2009), who would otherwise have chosen to stay away for their fears of being involved in forbidden activities of *gharar*, gambling, or detrimental speculation (Elgari 1993). Shariah firms, thus, not only appeal Muslim investors, but also have the potential to attract a large chunk of ethically thoughtful investors who would prefer to avoid evil industries like arms and ammunition, tobacco, and liquor (El Qorchi 2005). The increasing interest of religious and ethical investors in Shariah compliant firms, therefore, warrants attention to study the financial policies of Shariah firms for better understanding the nature of their financial decision making and the degree of their compliance to Shariah principles, as envisaged in Islam.

2.1. Trustworthiness as an economic asset

Trustworthiness has been studied as an important factor behind business success and failure (Macaulay, 1963). Greenspan, (1999) calls trust a root of any economic system, while Arrow, (1974) declared it as lubricant of an economic system. And, high-trust markets would facilitate more exchange and economic activity. Fukuyama (1995) maintained that countries with high trust level have competitive advantage in an uncertain global economy. Therefore, trustworthiness, in markets and economy as a whole, promotes business environment, risk taking, and entrepreneurial development.

The literature on managerial and economic benefits of trustworthiness abounds. An organization is deemed trustworthy if it keeps to its commitments even if economically disadvantageous and works on the best effort basis delivering what is optimal for all the stakeholders. At firm level, trust creates strategic advantage by reducing interaction cost of doing business and as a risk management tool. Bromiley and Cummings (1995) argue that without trust individuals and firms have to spend substantially in monitoring, control, and enforcement mechanisms. These transaction costs tend to decline as trust between parties flourishes. This leads to enhanced efficiency at firm as well as market level. The general business sector has discovered that trusting employees (Handy 1995), suppliers/buyers (Kumar 1996), and alliance partners (Nooteboom *et al.* 1997) leads to competitive advantages that outweigh potential risks associated with opportunism (Williamson 1985). When business are trustworthy i.e. they do what they say, it reduces transaction and monitoring costs for their trading partners resulting in earning premium (Burchell and Wilkinson 1997). Being trustworthy plays important role in financing and investing as collateral (Ottati 1994). Applying simple game models Dasgupta (1988) illustrated trustworthiness has value like any other intangible assets such as information and knowledge. Thus, high trust firms grow more productive and profitable than low trust firms, holding other things constant.

Some authors even argue that self-interest lies in being trustworthy. Hausman (2002) claims that trust worthiness could not be an alien territory to the self-interest. Hardin (1991) states further in this regard that the self-interest could be better pursued indirectly by being trustworthy, which may not necessarily mean altruism. According to Hausman (2002), trustworthy organizations succeed to build better reputation among their peers earning them softer and more cooperative responses from the other stakeholders. Practicing trustworthiness especially by the management would eventually drive out the costs of distrust within the organization and could arguably enhance the value of the firm. (Hausman 2002)

Finally, corporate theory still struggles to provide effective means to overcome agency conflicts. The traditional fixes of mitigating agency conflicts such as the use of debt (Jensen and Meckling 1976), dividend (Easterbrook 1984, Rozeff 1982) and rising managerial ownership (Jensen and Meckling 1976) fall short to meet the desired objectives effectively. Trustworthiness, here, could play an important role to reduce agency conflicts and costs monitoring and controlling. Identifying the shortcomings of traditional mechanisms, Berle and Gardiner (1932), emphasized the importance of ethics as a fix to the problems of interest clashes. The advocates of ethics, therefore, have highlighted the need for cultivating and deeply ingraining moral and ethical values based on trustworthiness within the organization as an alternative measure to reduce agency conflicts between all the stakeholders.

2.2. Trustworthiness and Shariah firm

Islamic Finance is emerging as one of the special kind of theoretical finance which is primarily based on the overall good of human and society while equally weighing the importance of individual interest. A Shariah firm is a genre of corporate entities which follows Islamic Shariah law in its business operations. In Pakistan, the classification of Shariah and Non-Shariah firms is based on criteria set by Shraiah Board of the Al-Meezan Investment Management Ltd. The procedure consists of qualitative (sector) and quantitative (financial) screening

as advised by the Shariah Board. Qualitative screens are applied first to exclude firms belonging to prohibited sectors in Islam, such as alcohol. Quantitative or financial screens are then applied to put limit on the (1) level of debt (2) level of Non-Shariah compliant income (3) investments, (4) level of liquidity and (5) Minimum share price. See appendix for details. The Shariah laws are strictly based on the principles of justice, and no injury (Sarker 1999) to any of the part to the business contracts. Sarker (1999) stipulates some of rights and obligations of contracting parties from Shariah perspective. Sarker observes that the Islamic basis for agency relationship is based strictly on trustworthiness. The agent working on behalf of the principal is assumed to serve the interest of company rather than his own (Iqbal 1992). A Quranic verse, "Oh you who believe! Fulfil obligations", in this context further stresses the importance of trustworthiness in more elaborate manner. A true believer is supposed to deliver on his obligations (explicit or implicit) faithfully, and is heralded with the love of Allah (Quran 3:76; 16:91; 13:20; 23:8), while the breacher is declared as faithless (Quran 2:100 and 8:56).

The importance of trustworthiness is highlighted in both Islamic teachings as well as the literature on morality and corporate ethics. We argue that by virtue of its strict social, ethical, and philanthropic adherence, a Shariah firm should incarnate a model of trustworthiness and social responsibility and hence is expected to behave in accordance with the expectations of all the shareholders as conceived in Islamic injunctions and modern finance theory.

Inspired by the special emphasis of Islamic finance on the principle of *Amanah* (trustworthiness), and its role as a catalyst to minimize the rift between the interest of management and ownership, we study the impact of managerial ownership on Shariah compliant firm's corporate financing decisions under the aegis of modern agency cost theory and compare the same with Non-Shariah or conventional firms. We argue that the two types of firms behave significantly differently from each other, and this difference arises from complying with Shariah laws.

We argue that Shariah compliance leads to certain firm characteristics (lower level of free cash flow and other liquid assets) that are handy to drive the agency conflicts down leading to better corporate governance within in the organization. Consequently, management of these firms is persuaded to act less opportunistically, which improve trustworthiness. The previous studies in this connection also indicate financial reporting by the management of Shariah firms is more truthful than Non-Shariah firms, as managers of Shariah firm do not engage in earnings management practices like their peers in Non-Shariah firms (Farooq *et al.* 2015).

2.3. Managerial self-interest and corporate financial decisions

The agency theory contends that the opportunism is mainly caused by the misalignment of interests or agency conflicts in the principal –agent relationship (Jensen and Meckling 1976). According to the agency theory the intensity of agency conflicts stimulates managerial opportunism, while the paucity of it discourages managerial opportunism and leads towards trustworthiness (Fama and Jensen 1983). The agency theory argues that due to the conflict between interests of shareholders and management, managers often behave to serve their own interest (Jensen and Meckling 1976). The managerial opportunistic behaviour motivated by pursuing self-interest, despite various monitoring and controlling means, and its resultant harming effect on corporate financing decisions are well established in conventional finance literature (Demsetz 1983, Shleifer and Vishny 1986). Previous studies suggest that managerial opportunism is reflected in various corporate decisions such as during the IPOs (Chalmers, Dann and Harford 2002); and in setting dividend policy (Eisdorfer, Giaccotto, and White 2015, Farinha 2003). Under the umbrella of agency theory, studies also show that managers reduce their non-diversifiable employment risks by avoiding firm's risk of bankruptcy through controlling debt in capital (Amihud and Lev 1981; Jensen and Meckling 1976; Pindado and De la Torre 2005; Treynor and Black 1976). Friend and Lang (1988) provided an empirical evidence of this by finding managers maintaining sub-optimally lower leverage ratios to escape bankruptcy risks.

There are numerous reasons why manager might behave selfishly. For example, the self-centred behaviour in the management may arise from their concern for personal reputation (Narayanan 1985), empire-building motives (Jensen 1986), making short-term bonus targets (Waegelein 1988), benefits from risk-taking when holding large stock options (Coles, Daniel and Naveen 2006), and perils from default risks affecting pension pay-outs (Sundaram and Yermack 2007). This strand of literature, therefore, recognizes the element of opportunism in managerial decision making, which is mainly caused by the increasing conflict of interest between management and owners.

In order to curb managerial selfish behaviour, managerial participation in shareholding is reckoned as one of the means to reduce agency conflicts. (Jensen and Meckling 1976) argue that allowing managers to possess firm's ownership aligns the corporate owners' and managers' interests, which eventually eliminates the agency

conflicts between them. Although this argument appears potentially convincing on surface, increasing insiders' ownership, however, would lead to another problem called "entrenchment effect" which sets in when firm's control shifts in the hands of the management by the dint of increasing managerial ownership (Berger, Ofek and Yermack 1997). With greater control and superior information, the entrenched managers have even greater freedom to manipulate corporate financial decisions for their own interest. As share of managerial ownership rises, so does their exposure to the bankruptcy risks. The entrenched management, in this case, is more likely to reduce leverage level to avoid bankruptcy. The literature so far exploring the possible impact of managerial shareholding and use of debt in capital structure shows mixed results. Those who find managerial ownership affecting debt ratio positively (Kim and Sorensen 1986), argue that managers prefer higher debt (a) to avoid agency cost of external equity and (b) to perpetuate their control over firm's operations (Florackis and Ozkan 2009). The other strand of literature finding negative relationship (Chen and Steiner 1999; De Miguel, Pindado and De La Torre 2005; Friend and Lang 1988) builds argument on the basis of risk aversion attitude among managers to avoid costs of default and bankruptcy (De Miguel *et al.* 2005). Some studies, however, also find nonlinear relation, in that at lower level of managerial ownership, the relationship is direct (alignment effect), while at higher level it is inverse (entrenchment effect) (Brailsford, Oliver and Pua 2002, Florackis and Ozkan 2009).

The most striking finding in above studies is that managers manipulate capital structure through distorting debt ratio from the optimal level for their personal interests, which indicates lack of managerial trustworthiness, hence, managerial opportunism. This study attempts to investigate the element of trustworthiness in corporate financing decisions of Shariah and Non-Shariah firms. Ahmed (2007) contended that the theoretical basis for the capital structure determination of Shariah firms resemble largely with that of conventional firms. Nonetheless, the capital structure of Shariah compliant firms is one of the most neglected areas in Islamic finance (Ahmed 2007, Haron and Ibrahim 2012). While developing the theory of capital structure in the context of Shariah firm, Ahmed (2007) assumes that managers act in the interest of shareholders. This assumption coupled with the novelty of Shariah firms arising from Shariah compliance and the importance attached to trustworthiness make the case for the exclusive empirical analysis of managerial trustworthiness/opportunism in capital structure decisions of Shariah firms. As, in case of Shariah firms, no prior study has addressed this hypothesis empirically, we initiate the research in this direction. For comparative purposes, however, we also study the same for Non-Shariah firms.

3. Data and methodology

3.1. Data

The data for this study comprise the financial and ownership data for the non-financial companies listed from 2009 to 2013 on Karachi Stock Exchange, the premier stock exchange of Pakistan. The financial data were extracted from the *Financial Statements Analysis of Companies (Non-Financial) Listed at Karachi Stock Exchange (2008-2013)*, published by the *State Bank of Pakistan* (SBP), the central bank of the country. The ownership data for Shariah and Non-Shariahwere extracted from their annual reports available on their respective websites. In Pakistan, firms are required to publicize their pattern of shareholding in the annual report as per the basic requirements of the *Securities and Exchange Commission of Pakistan* (SECP), the watchdog for corporate sector in Pakistan. Financial firms were dropped for their typical financial and capital characteristics and the excessive use of leverage in their capital structure (Rajan and Zingales 1995). One of the main reasons of selecting this period is that in Pakistan, Karachi Stock Exchange introduced the KSE Meezan Index (KMI-30), the index for top 30 Shariah compliant firms in Pakistan, in collaboration with Al-Meezan Investment Bank. The index was made functional since 2009 and firms were categorized as Shariah-compliant or non-Shariah according to criteria set by Shraiah Board of the Al-Meezan Investment Management Ltd, which also serves as a guideline for the construction of the KMI-30 Index.

Our analysis for the last 5 years suggested that on average there were more than 100 firms that qualified as sharia compliant. However, we applied some screening to derive our sample for the Shariah firms. Accordingly, we collected the firms that made the Shariah compliance list for all the years that are from 2009 to 2013.We achieved two main objectives out of this screening. First, by including the firms that consistently qualify as Shariah compliant; we minimize the likelihood of the error of identifying those firms as Shariah which make the list of the Shariah compliant securities only by chance. This enhances the credibility of our sample as truly representing Shariah compliant firms. Second, this screening also made our sample relatively more balanced. As balanced data records observations of same unit every time, it reduces noise and heterogeneity normally observed in unbalanced data (Cameron and Trivedi, 2009). Following this procedure, we collected the data for 68 Shariah firms from 2009 to 2013 for five years yielding our sample to 340 firm-year observations. Our sample of

Non-Shariah firms was mainly random. We however were limited to the availability of ownership data; therefore, we collected the balanced panel data on 75 Non-Shariah firms for the period 2009 to 2013, giving us 375 firm-year observations.

3.2. Variables

Debt ratio. Because our major concern is to study managerial trustworthiness in capital structure decisions, we apply the long term debt to total assets ratio as a measure of our capital structure. This is consistent with Friend and Lang (1988) and Rajan and Zingales (1995). We used book value as managers usually prefer book value of debt in decision making than the market value (Stonehill *et al.* 1975). Using book value instead of market value is also consistent with Shariah screening requirements on capital structure in Pakistan, which uses book value instead of market values.

*Managerial ownership***.** Our key variable of interest for this study is the managerial ownership of equity measured as fraction of managerial ownership (MO) in total equity of firm. It is calculated by dividing the shares held by managerial insiders (i.e. directors and executives) with total number of shares (Brailsford *et al.* 2002; Friend and Lang 1988; Pindado and De la Torre 2005).

3.2.1. Control variables

Managerial ownership is not the sole determinant of firm's leverage ratios. Capital structure theories identify various other factors which could possibly lead capital structure to vary across firms. In line with the modern corporate finance theories, Ahmed (2007) argues that the basic elements determining the capital structure of Shariah firms may not be different from those of conventional firms. Isolating the effect of these factors is therefore important. Following previous capital structure literature we, therefore, control for firm *size* (Rajan and Zingales 1995; Banerjee *et al.* 1999), *asset tangibility* (Banerjee, Heshmati and Wihlborg 1999, Rajan and Zingales 1995), *profitability* (Kester 1986, Rajan and Zingales 1995, Titman and Wessels 1988), risk (Myers 2001), and *growth.* (Mehran 1992)

Size. Larger size normally correlates with greater diversification providing firm a natural hedge against insolvency. Larger firms might also have greater debt capacity (Nagano 2003), resulting in a positive relationship with debt. This is also supported empirically (Bhaduri 2002, Pandey 2001, Rajan and Zingales 1995, Titman and Wessels 1988). We expect size to be positively related to firm leverage. Following Dang (2013) this study applies natural logarithm of assets as proxy to firm size (SZ).

Asset tangibility. Firms with more fixed and tangible assets have higher capacity to raise more debt (Myers 1977). Agency theory suggests that high-levered firms may tend to invest sub-optimally shifting the marginal risks of the investment to the creditors and benefitting the equity holders, given that the provision of limited liability for the equity holders. Consequently, lenders are more interested in fixed and tangible assets to issue debt to the firms in order to avoid the adverse effects of bankruptcy. Many studies, such as Williamson (1988), and Wald (1999) found the relationship of tangibility with leverage as positive. We use the ratio of net property, plant and equipment to book assets as a proxy to tangibility (TANG).

Profitability. Higher profitability leads to greater borrowing ability. The trade-off theory suggests that as the profitable firms borrow more, they need more debt to shield off their income from tax burden (Frank and Goyal 2009; Long and Malitz 1985). The pecking order hypothesis extended by (Myers 1984), suggest that debt comes next to retained earnings in the order of choice of financing, which relates debt negatively with profitability (Myers 1984). Empirical evidence generally supports the pecking order view (Rajan and Zingales 1995). We use five-year average of returns on assets as proxy to profitability (PROF).

$$MROA = \frac{1}{5}\sum_{t=1}^{5} ROA_{i,t} \tag{1}$$

Risk. Riskier firms may tend to avoid the use and reliance on much debt. Debt entails fixed cost of interest every year, which could be difficult for firms with unreliable or highly variable profits or cash-flow patterns. The likelihood of insolvency increases with volatility of earnings. Bradley, Jarrell and Kim (1984) and Hirota (1999) found this relationship valid for risk and leverage. We use standard deviation of last five years ROA as a measure of risk or volatility following (Friend and Lang 1988).

$$RSK_{i,t} = \sqrt{\frac{1}{5}\left(\sum_{t=1}^{5}(ROA_{i,T} - \frac{1}{T}\sum_{t=1}^{5} ROA_{i,t})\right)^2} \tag{2}$$

Growth. Pecking order theory (Myers and Majluf, 1984) predict the leverage to be lower if the growth opportunities for the firm are less than the availability of internal retained earnings. However, as soon as the positive NPV investment opportunities increase, the debt ratio tends to grow as firms may find the internal funds lacking to finance further expansion. Therefore, the possible relationship between the growth opportunities and leverage may be positive. Growth in this study is measured as percentage change in annual sales, which is considered a better measure the agency cost of debt.

3.3. Methodology

We test the following regression model for analysing the effects of managerial trustworthiness on leverage ratio in Shariah and Non-Shariah firms in Pakistan.

$$LEV_{it} = \beta_0 + \beta_1 MO_{it} + \beta_2 MO_{it}^{\ 2} + \beta_3 SZ + \beta_4 TAN_{it} + \beta_5 PROF_{it} + \beta_6 RSK_{it} + \beta_7 GRTH_{it} + \varepsilon_{it} \qquad (3)$$

where LEV_{it} *is* firm's leverage measured as total debt ratio, MO_{it} is the fraction of managerial ownership in total equity, SZ_{it} is size measures as natural logarithm of assets, TAN_{it} istangibility measured as a ratio of fixed assets to total assets, $PROF_{it}$ is profitability measured as five-year mean return on assets, RSK_{it} is risk measured as standard deviation of five-year return on assets, and $GRTH_{it}$ is growth measured as percentage change in annual sales. The subscript *i and t* refer to the cross-sectional and time variations.

The analysis is carried out in two stages. In the first stage, we run the model without squared managerial ownership term (MO^2). In the second stage, we enter the squared term which essentially tests the managerial entrenchment hypothesis. Theories based on convergence hypothesis (Jensen and Meckling 1976) and entrenchment hypothesis (Fama and Jensen 1983) maintain that at low level of managerial ownership in firms, managers tend to acquire higher levels of debt for safeguarding their interest, as bankruptcy costs for the management is lower at low level of ownership. We therefore expect a positive relationship between debt and managerial ownership when the managers' ownership stake in a firm is relatively low. However, when managers have high level of proportion of ownership in equity, they tend to reduce reliance on debt as the cost of bankruptcy may set in and affect their ownership stakes in the firm. At higher level of managerial stakes in the firm, we expect negative relationship between debt and managerial ownership. The former is called the alignment effect, while the latter is known as entrenchment effect. In both cases, either at lower level of managerial ownership or higher level of ownership, managers may significantly affect the leverage ratio of the firm in their own interest. However, if the managerial ownership tends to be insignificant, then we conclude that firm's capital structure is independent of the managerial ownership.

Equation 3 above is estimated using pooled OLS. The basic assumption underlying the pooled regression is that all the coefficients (slope and intercept) are constant across time and individual units of observations, i.e. companies in this case. For a further check of robustness, we apply the Tobit regression analysis on the same model. We used natural logarithm of debt ratio for achieving normality in our OLS estimates, while we used long term debt ratio as an alternative measure of leverage in the Tobit analysis. The observed debt ratios vary within the range of 0 and 1, where the observed values for debt ratio close to 0 indicate low leverage or lower proportion of debt in the capital structure, while values close to 1 indicate higher degree of leverage. Dougherty (2007) notes that OLS yields downward-biased estimates of slope-coefficient and an upwards-biased estimate of intercept when the dependent variable is of censored nature. Tobit models addressees most of these computational problems left unaddressed in OLS. Tobin (1958) introduced Tobit regression model, the estimation of which involves censoring of data from its lower or upper bound. The model employs maximum likelihood method and relies on likelihood ratio and Efron's Pseudo R-sq as measures of its goodness of fit. Existing financial research (Akhtar 2005, Rajan and Zingales 1995) widely used tobit model in capital structure studies to take the bounded nature of debt ratio which is used as a proxy to firm capital structure

4. Results

4.1. Descriptive

As a first step of our statistical analysis, we take the descriptive of statistics of our dependent and independent variables along with some key financial performance variables. Table 1 presents the descriptive statistics for the whole sample including both Shariah and Non-Shariah compliant firms. The total debt ratio varies between 0% to almost 90%, with a mean value of 21%. The managerial ownership in the firms also varies between 0% and 93%, showing that in some cases firms are almost entirely owned by the owner managers. The

mean ownership of management in the entire sample is 22%, which indicates that one-fourth of the ownership of the average firms in sample is owned by management. The average size of the firm in the sample is Rs. 22.73 bn. The tangibility measured in ratio of net fixed assets to total assets ranges between 0.2% to 87%, with a mean of about 44%.

In addition to these variables, we also took the descriptive of some financial performance measures, which include return on assets (ROA), and Return on equity (ROE), earnings per share (EPS), and sales growth. In terms of ratios, The ROA varies between negative 90% to 78%, with the mean ratio of 7.8%, whereas the mean ratio for ROE is 15.7%. The EPS hovered between negative 353% to 290%, however, the mean ratio for the EPS was 12.41% during the period for the sample. We took the percentage sales growth; our descriptive showed that the mean sales growth was 45.5% for an average firm for the sample.

Table 1 - Descriptive statistics all firms

	N	Minimum	Maximum	Mean	Std. Deviation
Debt ratio	713	0.00	0.94	0.21	0.27
Managerial ownership (%)	712	0.00	93.11	22.42	26.84
Total Assets (in thousands)	714	9001.00	414011041.00	22732297.67	50792022.95
Tangibility	713	0.00	0.87	0.44	0.25
Long term debt (in thousand	715	0.00	139888255.00	5167577.51	15954368.53
Return on assets	715	-90.16	77.74	7.75	15.54
Return on equity	715	-823.35	791.90	15.72	78.61
Earnings per share	715	-352.81	289.97	12.41	34.70
Growth	703	-145.92	17144.38	45.49	649.57

Table 2 - Descriptive statistics for shariah compliant and non-sharian firms

		N	Mean	Std. Deviation	Std. Error Mean
Debt ratio	Non-Shariah	375	0.25	0.33	0.02
	Shariah	338	0.17	0.18	0.01
Managerial Ownership (%)	Non-Shariah	375	28.73	27.96	1.44
	Shariah	337	15.41	23.67	1.29
Total Assets (PKR 000)	Non-Shariah	375	13,892,319.65	34,984,944.30	1,806,614.76
	Shariah	339	32,511,034.41	62,491,222.80	3,394,057.33
Tangibility	Non-Shariah	375	0.47	0.24	0.01
	Shariah	338	0.40	0.26	0.01
Long term Debt (PKR 000)	Non-Shariah	375	4,415,957.42	16,390,404.95	8,463,96.87
	Shariah	340	5,996,570.26	15,440,820.62	8,37,396.07
Stockholders' Equity (000)	Non-Shariah	375	298,4871.33	10,915,665.16	563,682.53
	Shariah	340	14,239,411.49	33,137,578.22	1,797,137.50
Gross Profit (PKR 000)	Non-Shariah	375	1,242,924.88	2,750,010.01	142,009.91
	Shariah	340	6,583,860.06	17,268,903.28	936,537.77
ROA	Non-Shariah	375	5.30	15.78	0.81
	Shariah	340	10.46	14.82	0.80
ROE	Non-Shariah	375	9.84	97.80	5.05
	Shariah	340	22.21	48.82	2.65
EPS	Non-Shariah	375	11.92	43.03	2.22
	Shariah	340	12.95	22.21	1.20
Growth	Non-Shariah	366	63.20	896.42	46.86
	Shariah	337	26.26	88.92	4.84

Table 2 contains the some descriptive statistics on Shariah and Non-Shariah firms. The debt ratio comparison shows that Shariah firms have the mean debt ratio of 17%, which is less than Non-Shariahfirms mean of 25%. This reveals that Shariah firms are relatively less levered that Non-Shariah firms. The ownership structure of the two types of firms indicates that on average managers own almost 15% of equity in Shariah firm compared to 29% in Non-Shariah firms. This also indicates that Shariah firms have more diverse ownership than Non-Shariah firms. As for size, Shariah firms appeared to be larger than Non-Shariah firms as indicated by the mean assets. However, despite being smaller, Non-Shariah firms have more assets in tangible form (47%) than Shariah firms (40%) on average. The indicators of profitability (gross profit, return on assets, and return on equity) reveal that Shariah firms on average perform better than Non-Shariah firms. However, in terms of growth, Non-Shariah firms seem to be undergoing higher growth than Shariah firms.

4.2. Regression analysis

In the agency framework, we test the relationship between capital structure and ownership patterns of non-financial firms with special interest in Shariah and Non-Shariah firms. The OLS regression results for the full sample and the subsamples of Non-Shariah firms and Shariah firms are summarized in Table 3. Using the natural logarithm of debt ratio as the dependent variable against the managerial ownership variables used as our main explanatory variables, we ran two variants of regression Eq.3. In the first case (Model 1, 3, 5); we used only managerial ownership (*MO*) as our main variable, while in the second case (Model 2, 4, and 6), we added the squared term of managerial ownership (MO^2) to test the managerial entrenchment hypothesis (Brailsford *et al.* 2002).

The results for the full sample (model 1) suggest that managerial ownership positively and significantly affects the debt ratio of the firm. This result indicates that as managerial share of ownership increases they tend to affect the firm's capital structure by including higher level of debt financing. It is therefore clear that managerial ownership, in general, affects the capital structure of firms in Pakistan. The results for our Non-Shariah sample (model 3) also show the similar patterns ($t = 2.76$, $p < 0.01$). However, for the Shariah compliant firms this relationship is insignificant as indicated by model 5. These results suggest that managerial ownership in Non-Shariah firms significantly determine the debt ratio, while we find that this is not the case with the Shariah compliant firms.

In the extended model to test for entrenchment effect, we include squared term of managerial ownership (MO^2). Table 3 reports the results for all firms (model 2), Non-Shraiah firms (model 4) and Shariah firms (model 6). We notice that both the sign and level of significance of the managerial ownership at level (MO) remains unchanged, whereas the squared term (MO^2) enters significant and negative for the all firms ($t=2.18$, $p < 0.05$) and for Non-Shariah firms only ($t= -1.18$, $p <0.1$). Interestingly, in case of Shariah firms, we find no significance of these coefficients.

We now turn to our control variables. The results show that firm size is positively related with leverage ratio of the firm. These findings are in line with Scott Jr and Martin (1975)) and Ferri and Jones (1979). Larger firms require more investment which may not be sufficed only through the equity financing. Moreover, larger firms have better access to capital and debt markets and can easily acquire debt through bond markets as well as financial institutions. Size, therefore, shows positive relationship with debt. This relationship was also found by (Agrawal and Nagarajan 1990) and (Brailsford *et al.* 2002).

The results depict significantly positive relationship of asset tangibility with debt ratio (p=000), which is highly significant. These results are in conformance with the trade-off theory of capital structure (Rajan and Zingales 1995).

We found negative relationship between the profitability and debt ratio at highly significant level (p=000). According to pecking order theory (Myers 1977), profitable firms would rather rely on internal funds or retained earnings than to access the external financing sources. In terms of growth, although we found positive relationship but the relationship was not significant. The positive link between the debt ratio and growth is justifiable as firms growing faster may rely on higher debt for financing their growth. Finally, we find the negative relationship between the risks (measured as standard deviation of returns on assets). This relationship suggests that firs with higher volatility or risk may have lower debt ratios due to higher bankruptcy risks.

4.3. Discussion of results.

The regression results obtained above have some important implications for the relationship between managerial ownership and capital structure for Shariah and Non-Shariah firms. The most striking of our results is significance of the relationship between the managerial ownership and capital structure in case of the Non-

Shariah firms only, whereas the same for Shariah firms was found persistently insignificant. Comparing these results, we infer that managerial ownership affects leverage ratio positively and significantly in Non-Shariah firms, while this relationship is insignificant for Shariah firms. Results suggest that capital structure of Non-Shariah firms is partly determined by the level of ownership by the management within the firm; hence, there is an indication of the use of debt ratio as a means to serving self-interest (Friend and Lang 1988). However, as shown, the behaviour of the Shariah firms is different and inclined towards trustworthiness. Further, in the extended analysis, the significantly positive signs on *MO* and negative signs on MO^2 for Non-Shariah firms only are consistent with the alignment effect (Jensen and Meckling 1976) and entrenchment effect (Fama and Jensen 1983).

Thus, we find the non-linear relationship between managerial ownership and leverage in Non-Shariah firms. More specifically, when the level of managerial ownership in the firm is low, debt component in the capital structure inflates significantly as managers' stakes increase in firm's ownership. On the other hand, when the level of managerial ownership is high, debt component in capital structure deflates significantly with increase in managerial ownership, indicating the managerial opportunism in manipulating debt ratios. The results for Non-Shariah firms are consistent with the findings of (Brailsford *et al.* 2002). However, our analysis yields unique characteristic of Shariah compliant firms, that their capital structure is independent of the level of managerial ownership for the sample from Pakistan and for the period of our analysis.

Table 3 - OLS Regression Estimates

Model 1, 3, 5:

$$Ln(D/A)it = \alpha_o + \beta_1 MO_{it} + \beta_2 SIZE_{it} + \beta_3 TANGIBILITY_{it} + \beta_4 PROFITABILITY_{it} + \beta_5 RISK_{it} + \beta_6 GROWTH_{it} + \varepsilon_{it}$$

Model 2, 4, 6:

$$Ln(D/A)it = \alpha_o + \beta_1 MO_{it} + \beta_2 MO^{2}_{it} + \beta_3 SIZE_{it} + \beta_4 TANGIBILITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 RISK_{it} + \beta_7 GROWTH_{it} + \varepsilon_{it}$$

Variables defined: Ln (D/A) is book value of debt over book value of assets, *MO* is fraction of managerial ownership in firm i equity, $Size_{it}$ is natural log of total assets, *Tangibility* is ratio of net property, plant and equipment to book assets, *Profitability* is mean returns on assets for 5 years, *Risk* is standard deviation of return on assets, *Growth* is annual percentage change in sales.
Sample is based on Shariah compliant and Non-Shariah firms as listed on Karachi Stock Exchange, Pakistan for the period 2009 to 2013.

*** p<0.01; ** p<0.05; * p<0.1

	All firms		Non-Shariah Firms		Shariah Firms	
	(1)	(2)	(3)	(4)	(5)	(6)
MO	0.005 (3.66)***	0.015 (3.18)***	0.005 (2.76)***	0.014 (2.72)***	0.004 (1.52)	0.015 (1.66)
MO^2		-0.000142 (2.18)**		-0.000116 (-1.81)*		-0.000173 (1.30)
Size	0.121 (5.00)***	0.128 (5.26)***	0.104 (2.94)***	0.112 (3.14)***	0.158 (4.42)***	0.162 (4.51)***
Tangibility	2.211 (12.84)***	2.178 (12.63)***	1.796 (7.91)***	1.800 (7.95)***	2.758 (10.86)***	2.686 (10.34)***
Profitability	-0.015 (4.36)***	-0.014 (4.23)***	-0.018 (3.84)***	-0.017 (3.73)***	-0.006 (1.13)	-0.005 (1.03)
Risk	0.030 (7.35)***	0.030 (7.36)***	0.057 (6.99)***	0.059 (7.13)***	0.022 (4.37)***	0.022 (4.24)***
Growth	0.000 (1.75)	0.000 (1.78)	0.000 (1.50)	0.000 (1.56)	0.001 (1.18)	0.001 (1.24)
Cons_	-5.168 (12.77)***	-5.319 (12.99)***	-4.718 (7.86)***	-4.919 (8.04)***	-6.173 (10.54)***	-6.237 (10.63)***
R^2	0.35	0.36	0.34	0.35	0.41	0.41
F	58.03***	50.71***	29.76***	25.98***	33.07***	28.65***
N	648	648	351	351	297	297

Although, our empirical analysis significantly finds the capital structure of Shariah compliant firms being insensitive to the varying degree of managerial ownership, indicating absence of managerial self-serving attitude in capital structure determination, we are rather wary of asserting these findings as an outcome to strict adherence to religion or Islamic principles by the management of Shariah compliant firms. One of the reasons why we are cautious is that none of these firms' management claims publically to follow the Shariah principles as the main model of their business. Consequently, we state that it may not be the adherence to Islam that is causing managerial trustworthiness in Shariah compliant firms. However, we argue that as Shariah compliance results in lower cash and liquid assets under the discretion of management, it reduces agency conflicts between the firms' managements and shareholders (Jensen 1986). Consequently, there exist lower chances and reward for management to pursue their self-interest, and behave more trustworthily. This tendency of truthfulness has also been observed in financial reporting practices of Shariah firms by their disinclination to the earnings management practices. (Farooq *et al.* 2015, Wan Ismail *et al.* 2015)

Table 4 - Tobit Regression Estimates

Model 1, 3, 5:

$$D/Ait = \alpha_o + \beta_1 MO_{it} + \beta_2 SIZE_{it} + \beta_3 TANGIBILITY_{it} + \beta_4 PROFITABILITY_{it} + \beta_5 RISK_{it} + \beta_6 GROWTH_{it} + \varepsilon_{it}$$

Model 2, 4, 6:

$$D/Ait = \alpha_o + \beta_1 MO_{it} + \beta_2 MO^{2}_{it} + \beta_3 SIZE_{it} + \beta_4 TANGIBILITY_{it} + \beta_5 PROFITABILITY_{it} + \beta_6 RISK_{it} + \beta_7 GROWTH_{it} + \varepsilon_{it}$$

Variables defined: D/A_{it} is book value of debt over book value of assets, *MO* is fraction of managerial ownership in firm i equity, *Size* is natural log of total assets, *Tangibility* is ratio of net property, plant and equipment to book assets, *Profitability* is mean returns on assets for 5 years, *Risk* is standard deviation of return on assets, *Growth* is annual percentage change in sales.
Sample is based on Shariah compliant and Non-Shariah firms as listed on Karachi Stock Exchange, Pakistan for the period 2009 to 2013.

*** p<0.01; ** p<0.05; * p<0.1

	All firms		Non-Shariah firms		Shariah firms	
	(1)	(2)	(3)	(4)	(5)	(6)
MO	0.001	0.002	0.001	0.003	0.001	-0.001
	(2.73)**	(1.87)	(1.99)*	(2.61)**	(1.49)	(0.41)
MO^2		-0.000126		-0.000306		0.0000165
		(1.10)		(2.10)*		(0.87)
Size	0.014	0.014	0.012	0.014	0.017	0.017
	(3.28)**	(3.41)**	(1.75)	(2.07)*	(3.39)**	(3.27)**
Tangibility	0.352	0.349	0.351	0.350	0.368	0.374
	(11.96)**	(11.83)**	(7.88)**	(7.93)**	(10.36)**	(10.34)**
Profitability	-0.003	-0.003	-0.004	-0.004	-0.002	-0.002
	(5.53)**	(5.48)**	(4.22)**	(4.10)**	(2.14)*	(2.18)*
Risk	0.009	0.009	0.016	0.017	0.006	0.007
	(12.00)**	(12.03)**	(9.59)**	(9.82)**	(8.66)**	(8.70)**
Growth	0.000	0.000	0.000	0.000	0.000	0.000
	(1.32)	(1.33)	(1.14)	(1.23)	(1.49)	(1.44)
Cons	-0.226	-0.240	-0.224	-0.279	-0.313	-0.304
	(3.25)**	(3.40)**	(1.90)	(2.32)*	(3.77)**	(3.63)**
Log likelihood	177.5322	178.13241	85.3286	87.51369	126.0818	126.4619
Likelihood Ratio (LR) Chi-Square	319.63**	320.83**	170.19**	174.56**	188.78**	189.54**
N	694	694	363	363	331	331

4.4. Robustness check

Our analysis based on OLS suggests that in Shariah compliant firms capital structure is independent of the level of the ownership by the management, which could be interpreted to incline towards trustworthiness or lack of opportunism. However, we conclude that in case of Non-Shariah firms, the effect of managerial ownership is significant indicating the element of managerial self-interest/opportunism or lack of trustworthiness in these firms. As a robustness check, we applied the same analysis using Tobit regression for our alternate measure of

capital structure, the debt ratio. The results are summarized in Table 4. We apply the same pattern of analysis as in the pooled OLS regression. The likelihood Ratio (LR) Chi-Square for each of our model (1 to 6) reported is highly significant rejecting the null hypothesis that all of the regression coefficients are simultaneously equal to zero. Thus, all our models are statistically significant and good fit.

It is interesting to note that our results regarding the impact of managerial ownership on firm's capital structure as means to achieve self-interest are consistent regardless the method we apply. Comparing model 3 and 5 which include only *MO* for both Non-Shariah and Shariah firms respectively, we conclude that in the case of Non-Shariah firms the variable is positive and significant, while the same for Shariah firms is not significant. This is an indication of no impact of managerial ownership on Shariah firms' capital structure, unlike the Non-Shariah firms. Following Brailsford *et al.* (2002) we also included the square term of managerial ownership (MO^2) in the model 4 and 6 for Non-Shariah firms and Shariah firms respectively. The results show similar pattern as in OLS regression. Thus, we conclude that in Shariah firms, the issue of managerial self-interest is not as such as in Non-Shariah firms in Pakistan.

Conclusions

Our objective in this paper is to study managerial opportunism reflected in the capital structure determination as managerial ownership raises in the Shariah compliant firms. A Shariah firm is a rapidly emerging species of corporate entities, which follows Islamic Shariah laws in its business operations. The fact that trustworthiness claims to be one of the central principles of Shariah law governing economic activities (The principles of *Truthfullness* and *Trustworthiness* are indisputably the two fundamental teachings on morality in Islam. The Prophet (PBUH) in his early age as a successful trader earned a reputation of being truthful (*SADIQ*) and trustworthy (*AMEEN*) in all his dealings), rouses our motivation to study managerial opportunism with special reference to Shariah compliant firms. The Islamic Shariah laws are strictly based on the principles of justice, and no injury or principle of *maslahah* for all the partners in a business contract. (Bashar 1997)

In this regard, while developing theory of capital structure in the context of Shariah firms, Ahmed (2007) begins with the supposition that, like any other firm, managers in Shariah firms act in the interest of shareholders. As discussed, the empirical findings contravene this assumption in case of conventional finance. No empirical study however has addressed this hypothesis exclusively from the perspective of Shariah firms. We initiate the research in this direction by investigating the impact of managerial ownership on capital structure of Shariah firms and compare our results with those for conventional firms. We, specifically, seek to determine whether managers influence leverage level of the firm in their own interest in Pakistan and whether this behaviour of management varies among Shariah and Non-Shariah firms.

The main hypothesis for this study is to test managerial self-interest through influencing firm's capital structure as their proportion of ownership varies within the firm and make a comparative analysis of this phenomenon for Shariah and Non-Shariah firms in Pakistan. Relying on our hypothesis based on the Islamic fundamental principles of Amanah (trustworthiness), we argue that managers of a Shariah compliant firm might behave differently than their counterparts in Non-Shariah firms. Based on the some of the main requirements of Shariah compliance, which require firms to maintain lower level of cash and other liquid assets, we argue that this tendency of maintaining low level of free cash flows by default in Shariah firms leads to lower the severity of agency conflicts within the firm. As a result, managers would be inclined to behave less opportunistically than in the case otherwise. Our results show significant differences between the managerial influence on leverage ratios in Shariah and Non-Shariah firms. Our results indicate that degree of managerial ownership affects debt level of the firm significantly in Non-Shariah firms indicating the element of opportunism and lack of trustworthiness, while we observe no such tendency in case of Shariah firms. As we select only those firms which qualify for the Shariah compliance for the whole period of the study, we argue that a firm which consistently makes the list of Shariah compliance securities for long period might possess special inclination towards following Shariah principles. This adherence to Shariah principles might instil in management of such firm a more responsible behaviour and attitude towards all the other stakeholders of the firm. In a Muslim majority country like Pakistan, compliance with Shariah principles might help firm gain a favourable reputation in the markets, which could possibly lead to a strategic advantage over the competitors.

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APPENDIX:

Shariah screening guidelines in Pakistan

According to the website of Karachi Stock Exchange (www.kse.com.pk), the specific criteria used to screen firms for Shariah compliance are as follows:

A. Qualitative Screening

- *Business of Investee Company (Qualitiative Screen).* The business should be Halal. Thus, firms in conventinal financial sector dealing in interest and firms in other non-permissible sectors such as pork and alcohal are excluded.

B. Quantitive Screening

- *Cap on Interest Based Debt: The maximum limit of interest bearing debt is 37%.*
- *Cap on Interest Based Investments: The maximum allowable limit for Non-Shariah investments is 33%. Non-Shariah investmets include investments in conventional financial securities.*
- *Cap on Shari'ah Non-Compliant Income: Shariah non-compliant income must be less than 5% of the total revenue.*
- *Minimum Requirement of Illiquid Assets: The miimum level for illiquid assets is 20%.*
- *Minimum Price of Share as per Shari'ah: The total share price of firm should not drop below the value of the liquid assets firm has at hand at particular time.*

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Analysis of Economic Aspects in Slovak and Czech Forest Sector in Comparison to European and World Forestry

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Abstract:

In this article we would like to search the similarity respectively the diversity of selected economic aspects in the forest sector of Slovakia and the Czech Republic. We have analyzed the structure of ownership in forestry, species composition of forests, timber trade, employment in forestry sectors and other significant indicators. Than we have focused on the situation in forestry within the whole Europe and compared it with the largest roundwood, sawnwood and woodpulp producers in the world. In the analysis we have observed some similarity between countries that we have examined. We have used the cluster analysis to verify this assumption of similarity. Main objective of the article is to explore several indicators of Slovak and Czech forestry and compare them with selected European and world countries, and obtain development trends in forestry sector for the future.

Keywords: forestry, timber, conifers, broadleaves, cluster analysis.

JEL Classification: Q15, Q17.

1. Introduction

Forestry and the related timber industry and timber trade are for many European and world countries very important sectors of national economy. Forests, forestry and forest products for a sustainable future, describes a world where economic output has more than doubled in the 20 years since the Rio Earth Summit, but this growth has been achieved at the expense of natural resources, including forests. The world now needs to change its thinking about “progress” and develop new approaches for future economic success. (State of World’s Forests, 2011)

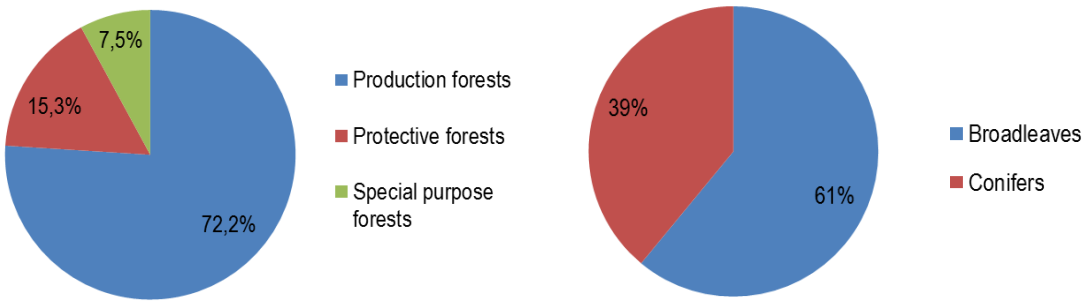
Managing forests responsibly and sustainably requires a balanced approach encompassing the three pillars of sustainability – economic, social and environmental.Except wood and wood products forests provide with number of ecological and environmental services, such as water purification, erosion control and carbon sequestration. It is needed to understand current forest resources and the variety of ways by which forests are changing.

2. Forestry in Slovakia

Forests of Slovakia belong to the state and private ownership. Privately owned is almost 55% of forest land, and is divided among thousands of owners. Over 46% of forest land bellows to state enterprise Forests of the Slovak republic. With respect to quality and availability of data we had chosen the enterprise Forests of the Slovak republic as a representative sample to fulfill the objective of article.

State enterprise Forests of the Slovak republic managed in 2012 the area of 921,051 hectares of forest land. According to forests categorization in Slovakia there are three groups of forests (divided by functions of forests), Commercial forests (710,666 ha), Protective forests (140,981 ha) and Special purpose forests (69,404 ha). The aim of protective forest is to prevent scarification, avalanches, wind erosion, and to help by water management. Special purpose forests have several functions:

- recreational function,
- nature conservation,
- hunting function,
- protection of genetic resources,
- protection of water resources,
- spa and medical feature,
- protection of human settlements from emissions,
- educational and research feature,
- state defense.



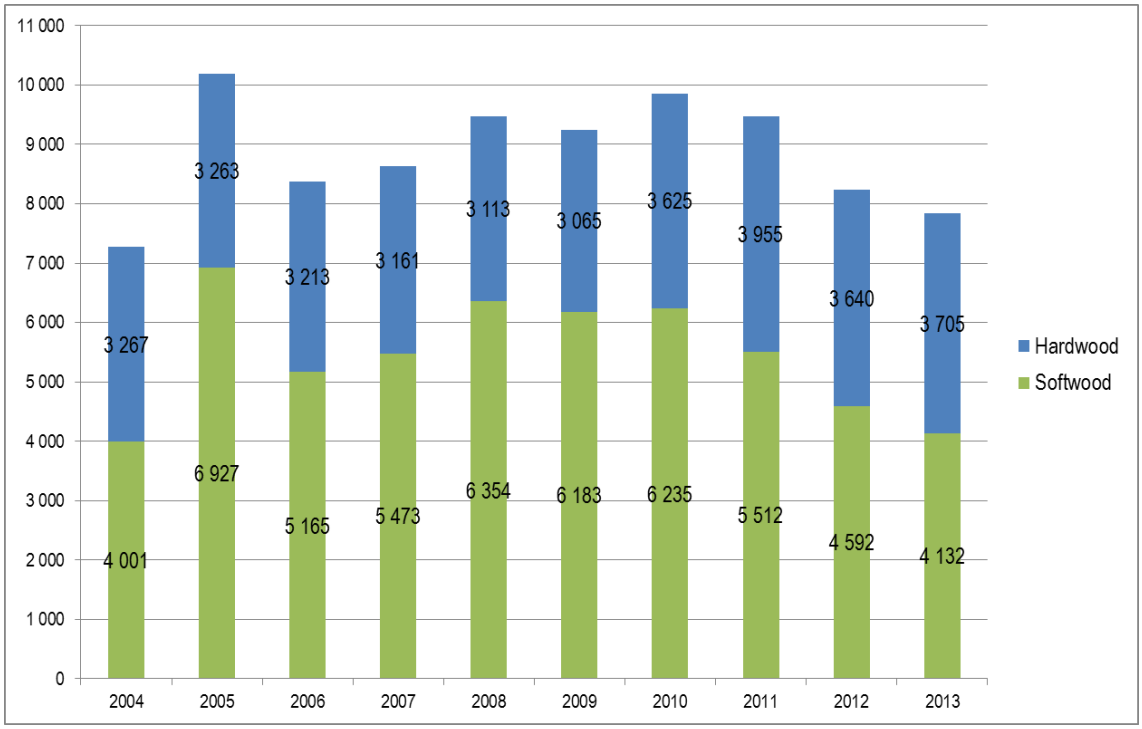
Source: Forests of the Slovak republic (2014)

Figure 1 – Distribution of forests owned by Forests of the Slovak republic state enterprise in 2012

Timber trade

The most important revenue source for maintaining forest functions and maintaining employment in the forestry sector is timber trade. It accounts for about 80% of all forestry receipts. Timber is also an essential raw material for the wood processing industry which ensures jobs, revenues and earnings in the sector. In 2013 there was delivered on domestic market approximately 7,610,600 cubic meters of wood (including captive use) in Slovakia. Compared to 2012 timbersupplies to domestic market were lower about 261,800 cubic meters (m^3). Supplies of hardwood were increased by 145,700 m^3, while the supply of softwood decreased by 407,900 m^3. Nowadays the reduction of raw timber supply is caused in particular by the decline in logging of softwood materials.

According to Ministry of Agriculture and Rural Development report Slovakia exported in 2013 approximately 3,122,000 m^3 of raw timber. Export was focused on EU countries. Within softwood there dominated supplies of Quality class I, II and III (46% of total export).Within hardwood the biggest supply was from firewood assortment (14.6 % of total export). In 2013 in comparison to 2012 was recorded a decrease in average conifers price of 0.18 EUR/m^3 and increase in broadleaves price of 1.04 EUR/m^3.

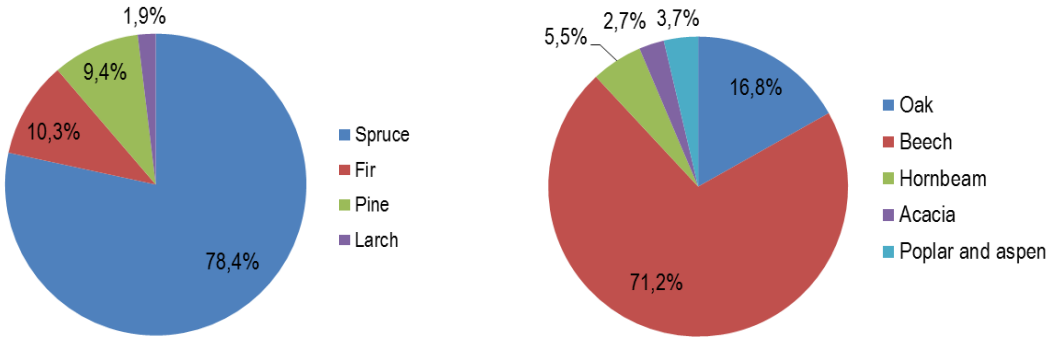


Source: Processed according to Slovstat

Figure 2 – Hardwood and softwood total supplies (thousand cubic meters)

The largest amount of supplies was recorded in 2005. This was due to large logging of timber after windstorm in the High Tatras in 2004. The change was reflected particularly in case of softwood supplies.

In 2012 there were imported 1.02 million m^3 of timber, while in 2013 there were about 0.922 million m^3. In 2012 there were exported approximately 3,408 million m^3 of raw timber abroad. Export increased in comparison to 2011 by 9.2 %. Export of timber was orientated at EU countries.



Source: Processed according to Slovstatdata

Figure 3 – Significant conifers and broadleaves for raw timber production in Slovakia (share of production in 2013)

Next Table 1 shows the wholesale price list of raw timber assortment without value added tax. The price list is in force from 1.1.2012.

Table 1 – Interval prices forraw timber in 2013 (EUR/cubic meter)

Wood	Quality class I	Quality class II	Quality class III (A, B, C, D)	Fuelwood
Conifers				
Spruce and fir	95 – 132 €	78 – 115 €	51 – 85 €	22 – 40 €
Pine	80 – 134 €	70 – 106 €	36 – 77 €	
Larch	90 – 171 €	75 – 137 €	38 – 99 €	
Broadleaves				
Oak	295 – 470 €	130 – 300 €	45 – 156 €	
Beech	134 – 300 €	50 – 170 €	40 – 80 €	
Ash	185 – 410 €	80 – 217 €	43 – 114 €	
Maple	185 – 483 €	115 – 267 €	41 – 135 €	
Linden and alder	98 – 210 €	49 – 183 €	33 – 77 €	24 – 46 €
Poplar and willow	69 – 95 €	45 – 76 €	31 – 55 €	
Acacia	115 – 183 €	80 – 153 €	45 – 100 €	
Hornbeam	90 – 127 €	41 – 110 €	40 – 65 €	
Birch	110 – 165 €	50 – 130 €	35 – 55 €	
Cherry tree and nut-tree	219 – 470 €	50 – 305 €	42 – 155 €	

Source: Processed according to Forests of the Slovak republic (2015)

Returns of forestry in 2013 decreased by 4.8% compared to 2012. Returns from timber sale decreased by 1.8%. More significant decrease was recorded in other returns and revenues. Seedlings production of declined by 23% in comparison to 2012. Other returns and revenues include further hunting, tourism and forestry services, incomes from sale and leasing of forest assets, revenues from financial capital and securities.

Material costs including depreciation have the largest share also in 2013, 55.9% of total costs. Material costs decreased because of decline in timber harvesting. Forestry is characterized by high labor costs. There were employed about 14 thousand people in Slovak forestry in 2013.

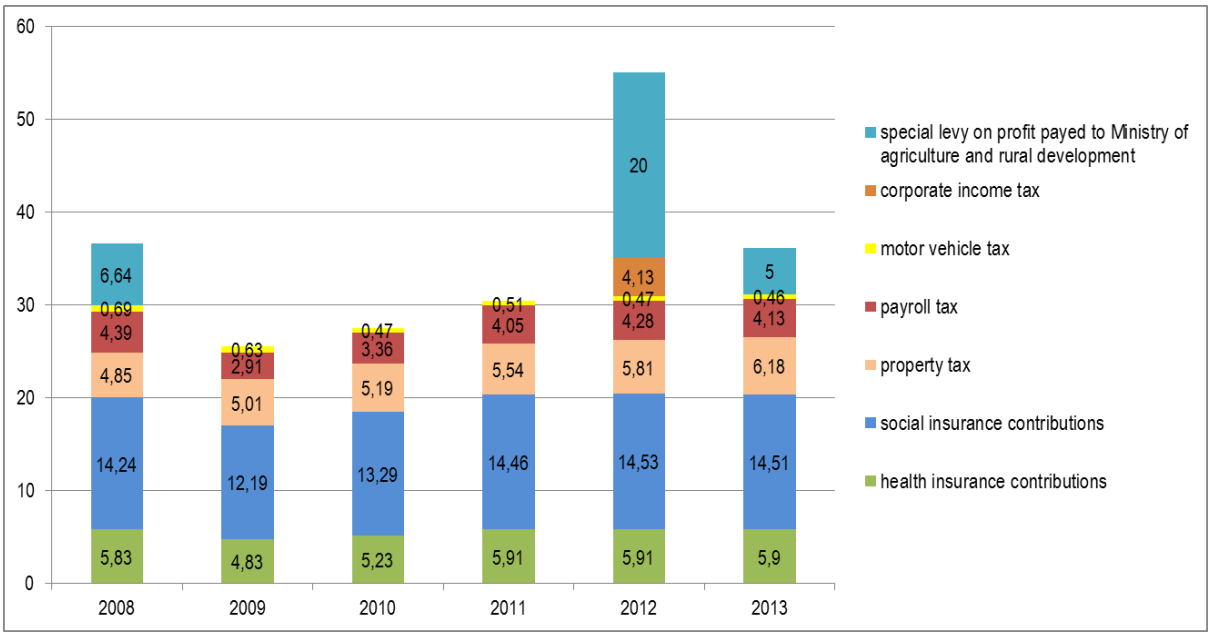
Table 2 – Returns and costs in Slovak forestry from 2007 – 2013 (mil. EUR)

Together ↘	2007	2008	2009	2010	2011	2012	2013	Graphs
Returns	511,49	501,93	386,74	478,82	544,24	494,44	470,91	
Costs	476,27	470,69	373,26	460,71	495,84	454,28	439,38	
Profit/Loss	35,22	31,24	13,49	18,11	48,4	40,16	31,53	
State forests ↘								
Returns	328,45	324,7	265,87	287,12	295,27	271,05	272,43	
Costs	323,91	317,33	265,73	285,07	280,08	257,96	263,43	
Profit/Loss	4,55	7,37	0,14	2,05	15,19	13,09	9	
Non-state forests ↘								
Returns	183,03	177,22	120,87	191,7	248,97	223,39	198,48	
Costs	152,36	153,36	107,52	175,64	215,76	196,32	175,95	
Profit/Loss	30,67	23,86	13,35	16,06	33,21	27,07	22,53	

Source: Processed according to Ministry of Agriculture and Rural Development

Forest management recorded in 2013 profit is 31.53 mil. Euro. The highest profit was recorded in 2011 followed by 2012. Realized gains and past profits are after share capital the main source of funding assets in state enterprise. The largest part of the assets is represented by forest lands. Only private businesses use financing via bank loans in this sector. There are strong indications on the basis of which we can say that private businesses have better results. We also can say that foreign capital is cheaper than equity capital also in forestry, and private business is more efficient than state one.

The highest share of paid taxes in 2013 had value added tax in the amount of 31.73 mil. Euro. This amont represents 60.8% of total taxes paid in 2013. Other taxes, levies and contributions paid by Forests of SR shows the Figure 4.



Source: Processed according to Forests of the Slovak Republic

Figure 4 – Taxes and contributions on Forests of the Slovak republic (mil. EUR)

After record timber logging in 2010 and 2011 and change in government in 2012, the government approved the special levy on Forests of the Slovak Republic profits in 2012 and anticipated profits in 2013. In 2012, this levy was twenty million EUR and in 2013 five million EUR.

In 2013 the average gross monthly salary in Slovak forest sector was 968 EUR in state sector, which represented increase in comparison to 2012 by 3.6%. Wages in private sector are lower but in last few years they grow faster than in the state sector. In the last three years the minimum wage has grown also in the national economy. Nowadays it is 380 EUR and it is going to be 405 EUR in 2016. In Slovakia worked in forestry in 2011 about 10 thousand people.

Table 3 – Monthly average salary in Slovak forestry

	2010	2011	2012	2013	2012/2013
State forests	902	926	934	968	+ 3,6 %
Non-state forests	469	767	790	841	+ 6,5 %
Together	676	850	862	907	+ 5,2 %

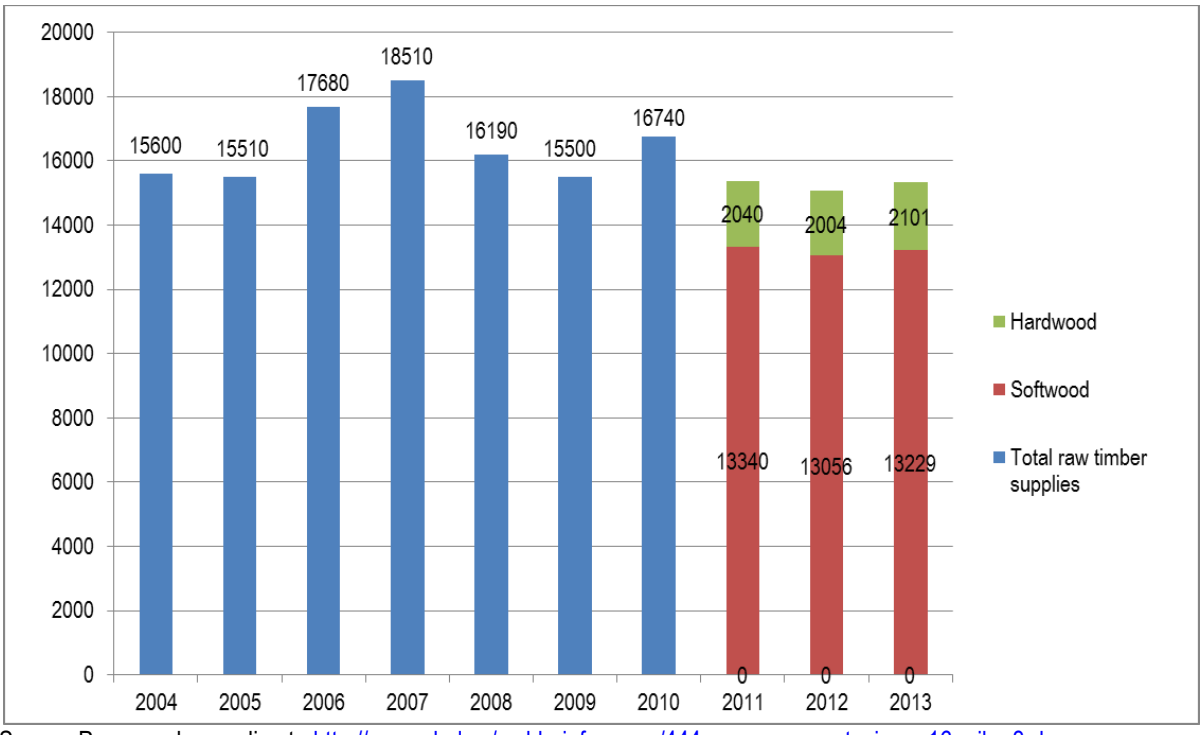
Source: Processed according to Slovstat

Support for forestry

In 2013 was provided support from public sources (state budget, EU funds and other sources) to forestry in the amount of 20,195,000 EUR. In 2012 it was 33,747,000 EUR. The decline was due to underspending from Rural Development 2007 – 2013 Program, which was also the main source of public money in 2013. The failure of public resources was strongly reflected in private sector too. The reason is that projects have been approved to most applicants in 2009 and financed to the end of 2012.

3. Forestry in the Czech Republic

Annual logging in the Czech Republic over the last decade oscillates between 15-17 million m^3 (2013 – 15.33 million m^3, 2012 – 15.06 million m^3, 2011 – 15.38 million m^3, 2010 – 16.74 million m^3, 2009 – 15.50 million m^3) and with the exception of major disasters (eg. hurricane Kyrill in 2007 with an annual extraction of 18.51 million m^3) permanently below the value of the increment. This means that total reserves and the average reserve of timber per hectare are constantly growing.

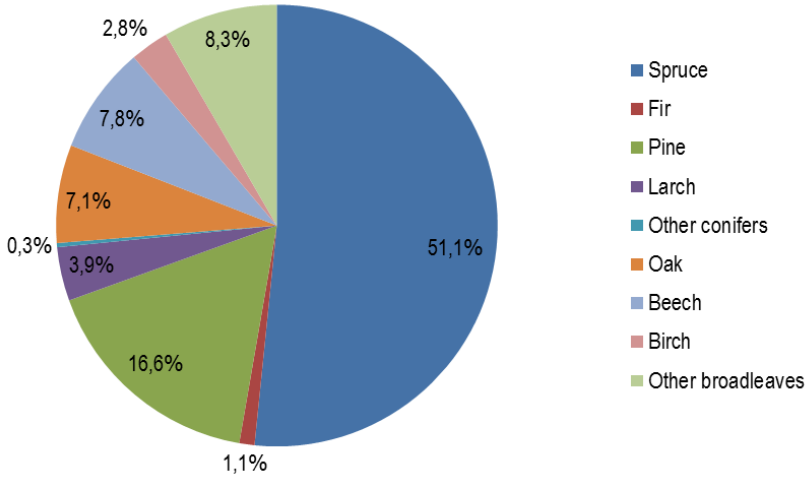


Source: Processed according to http://www.uhul.cz/rychle-informace/444-rocne-se-v-cr-tezi-cca-16-mil-m3-dreva

Figure 5 – Hardwood and softwood total supplies in the Czech Republic (thousand m^3)

The total stock of timber in Czech forests has increased from 307 million m³ in 1930 to 686 million m³ in 2012. We can see increase of 379 million m³, which represents almost 25 multiple of current amount of annual logging or the total stock of timber in UK. The total stock of timber in Czech forests is currently approximately equivalent to the annual consumption of timber in Europe.

Total supply of raw timber increased interannually of 270 thousand m³ in a total amount of 15,331 thousand m³ in the supply of softwood lumber, totaled 13,229 thousand m³ and supply of hardwood 2102 thousand m³. Annual increaseof supply was by softwood of 173 thousand m³ and by hardwood of 97 thousand m³. The total amount logging and subsequent supply of timber was affected by high demand from Austria and Germany, on the other hand, by a partial recovery of timber production industryin the country.



Source: Processed according to Forests and Forestry Report 2013

Figure 6 – Species composition in ha and in % of total timber land in 2013

The area of conifers still continues in decline. For example, spruce declined compared to 2000 on 69,614 hectares. On the other hand the proportion of broad leaves increases especially by oak and beech. The ratio of tree species mixing is steadily increasing in favor of mixed stands. This upward trend was also recorded in 2013. It is the result of sustained efforts of foresters to achieve optimum species composition of forests. These efforts arein the long term supported by subsidy policy of the state.

In 2012, the average price of timber within the different types of forest owners ranged from 52 to 56 EUR/m³. In 2013, the average price of timber within different types offorest ownersrangedfrom 49 to 57 EUR/m³.

Table 4 – Average prices for raw timber in 2013 (EUR/m³)

Wood	Quality class I	Quality class II	Quality class III (A, B, C, D)	Fuelwood
Conifers				29 €
Spruce	NA	106 €	57 – 81 €	
Pine	NA	NA	46 – 60 €	
Larch	NA	NA	50 – 79 €	
Broadleaves				37 €
Oak	488 €	237 €	58 – 98 €	
Beech	NA	77 €	45 – 80 €	
Birch	NA	NA	35 – 44 €	

Source: Processed according to Forests and Forestry Report 2013

Prices of timber (the mainsource of income for forest owners) after a significant decline in 2008 – 2009 increased. For the most frequently traded sprucesawn wood the price increasedby approximately 20% in 2013 compared to 2010. Almost all assortments of timber average prices were still increasing from 2010 until the end of 2013. Compared to 2012, in 2013 average prices increased, in particular softwood pulpwood and fuelwood. Decline in average prices was recorded for hardwood pulp. The average wage of employees increased over the

previous yearby 2.6%. The growth rate of average wages in forestry out paced growth in wages in the industry (0.9%) and stagnation of the whole national economy.

In 2013, the Czech Republic exported 6.2 million m^3 and imported 3.5 million m^3 of timber. Most of the timber goes to Austria and Germany.

Table 5 – Export and import of raw timber in 2013

	Export	Import
Together	6 183	3 545
EU – 27	6 155	3 079
Germany	2 374	484
Austria	3 420	371
Slovakia	156	1 001

Source: Processed according to Forests and Forestry Report 2013

Next table shows the development of returns and costs in Czech forestry during the 2007 – 2013. Returns of state forests increased in 2013 by 5.5% in comparison to 2012. In the private sector was increase in returns very similar with volume of 5.7%. The increase in costs was more significant in the state sector. According to analyzed data it seems that Czech state forests are more efficient in economy than Slovak.The number of employees in the forestry sector has been steadily declining as a result of improved operational efficiency (eg. the application of modern technologies), as well as an increase in self-employment. In 1990 worked 57,700 people in Czech forestry, in 2012 it was only 13,792 people.

Table 6 – Returns and costs in Czech forestry from 2007 – 2013 (mil. EUR)

Together ↘	2007	2008	2009	2010	2011	2012	2013	Graphs
Returns	1054,4	982	949,8	1110	1226,4	1222,2	1290,1	
Costs	958,2	916,5	876	910,1	934,5	916,3	994,2	
Profit/Loss	96,2	65,5	73,8	199,9	291,9	305,9	295,9	
State forests ↘								
Returns	757,5	706,2	675,3	824,9	924,6	890	938,9	
Costs	701,9	665,9	634,3	671,5	680,4	633,9	703,1	
Profit/Loss	55,6	40,3	41	153,4	244,2	256,1	235,8	
Non-state forests ↘								
Returns	296,9	275,8	274,5	285,1	301,8	332,2	351,2	
Costs	256,3	250,6	241,7	238,6	254,1	282,4	291,1	
Profit/Loss	40,6	25,2	32,8	46,5	47,7	49,8	60,1	

Source: Processed according to http://eagri.cz/public/web/mze/lesy/statistika/lesnictvi/resortni/?pageSize=50

Table 7 – Monthly average salary in Czech forestry

	2010	2011	2012	2013	2012/2013
State forests	923	975	1026	1038	+ 1,2 %
Non-state forests	699	740	755	777	+ 2,9 %
Municipal forests	741	728	760	779	+ 2,5 %
Industry	852	891	922	931	+ 0,9 %

Source: Processed according to Forests and Forestry Report 2013

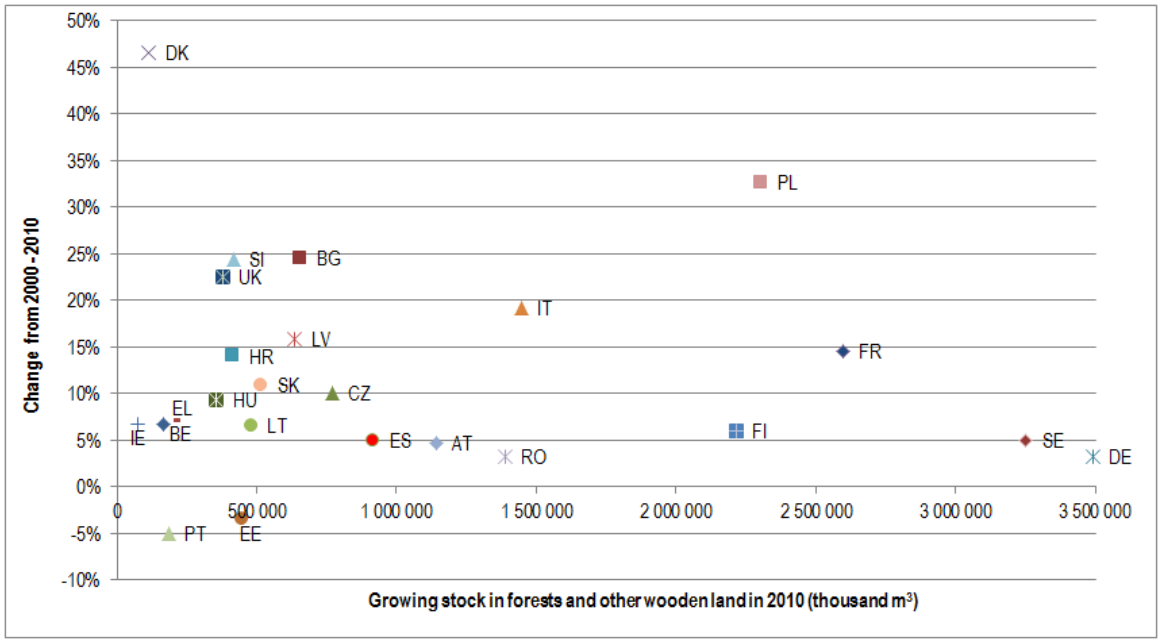
4. Forestry in Europe and the world in comparison to Slovakia and the Czech Republic

There are nearly 4 billion hectares of forests throughout the world. Forests cover about 30% of world's land area. 43 countries have forest cover over 50% and 64 countries less than 10%. On the territory of five countries (Russia, Brazil, Canada, United States and China) are more than half of all forests.

The proportions of the public and the private forest area in Europe (without the Russian Federation) are both about 100 million hectares. There are about 800 million hectares of public forest in the Russian Federation. Although substantial forest areas in Europe have been privatized, the total public forest area remains of the same order as 20 years ago. The private forest area has increased by more than 15%. The main reasons behind the changes in ownership structure are privatization and restitution of forest land in previously centrally planned economies. (State of Europe's Forests 2011)

In the forest sector public ownership is dominant in the Russian Federation (all forests), Central-East and South-East Europe (over 80%). In Central-West Europe, North Europe and South-West Europe the average percentage of forests in public ownership is around 30%. Privatization efforts particularly led to a significant increase in the area of private ownership of forest for Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Hungary, Romania, and Bulgaria.

The change of stocks in forests and other timberlands in selected European countries (according to available data) between years 2000 and 2010 shows the next Figure 7. In the upper half (above the zero level) are countries in which the stock in forests and other timberlands have been increased. Negative values (below the zero level) represent a reduction of forests in the country. There was a decrease only in Portugal and Estonia. The biggest increase was in Denmark. The diagram also indicates possible existence of clusters of countries. This is an impulse to examination in the next section of the article.



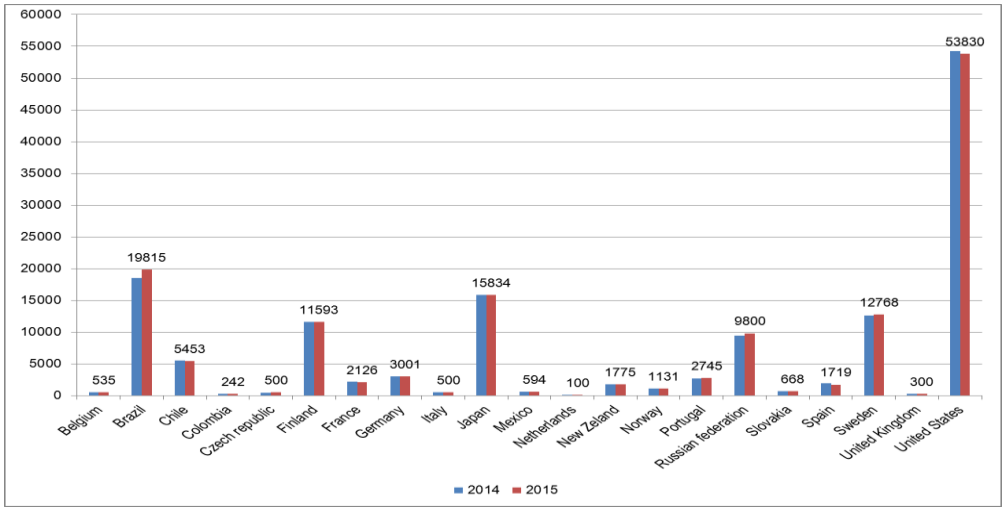
Source: Processed according to Eurostat

Figure 7– Growing stocks in forests and other timberlands development in selected EU countries

Forestry activities, wood processing and the pulp and paper industry contribute with 1% to GDP in Europe as a whole (more in several countries). The contribution of the forest sector to GDP is decreasing as other sectors of the economy grow faster, including the service sector. Investments and a shift of production from North and West Europe to Eastern Europe (particularly Central-East Europe, the Russian Federation and the Baltic states) helped to maintain relatively stable levels of value added in forestry and the wood industry and their contribution to GDP in Europe. Europe's pulp and paper industry has the weakest performance among the three forest subsectors; the value added in the pulp and paper industry experienced a steep decline over the past decade. (State of Europe's Forests 2011)

Following 29 countries represent about 85% of the world production of paper and paperboard: Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy,

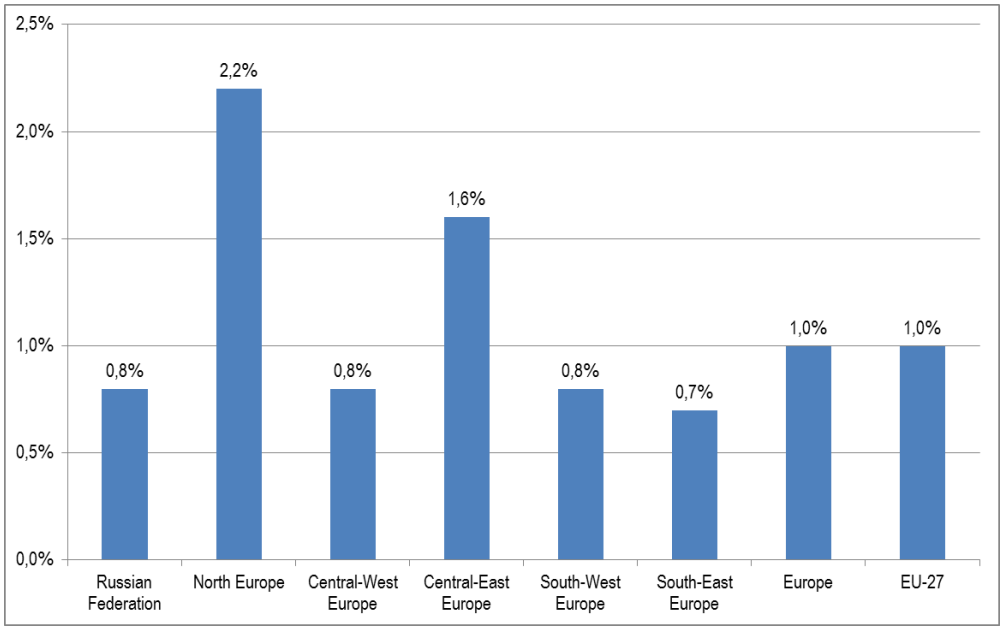
Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Poland, Portugal, Russian Federation, Slovakia, Spain, Sweden, Switzerland, United Kingdom and United States of America. The comparison was processed according to FAO's data. Missing countries were not willing to provide necessary data. Significant volume of wood pulp for paper and paperboards produce also China, Canada and Poland.



Source: Processed according to Pulp and paper capacities survey 2014 – 2019

Figure 8 – Wood pulp for paper and paperboard (thousand metric tons) comparisons of selected significant European countries and selected world countries

In 2008, gross value added by forestry, wood industries, and pulp and paper industries made 127 billion EUR in Europe and the sector's contribution to GDP was 1.0%. Forestry and logging activities account for 20% of the forest sector's gross value added; the remaining 80% is almost equally distributed between wood and paper industries. The economic importance of the forest sector and the distribution of value added among the three subsectors vary greatly among countries. The forest sector has the strongest macroeconomic importance in North Europe and Central-East Europe.



Source: Processed according to State of Europe's Forests (2011)

Figure 9 - Status of forest sector's value added distribution by region in 2008

Overall the forest sector's value added in Europe increased by 7% to 127 EUR billion between 2000 and 2008. The net value added per hectare varies significantly among regions. Central-West Europe has the highest

number (171 EUR / ha). During the last few years all regions except Central-East Europe and South-West Europe have had an annual increase in net value added.

The highest relative shares of gross fixed capital formation in value added in 2012 were recorded in Cyprus (42.1%) and Greece (26.3%) although these statistics inclined to reflect low levels of added value, rather than high levels of investment. They were followed by Poland (24.0%). Finland and Sweden each recorded shares of gross fixed capital formation in gross value added in the range of 16–18%.

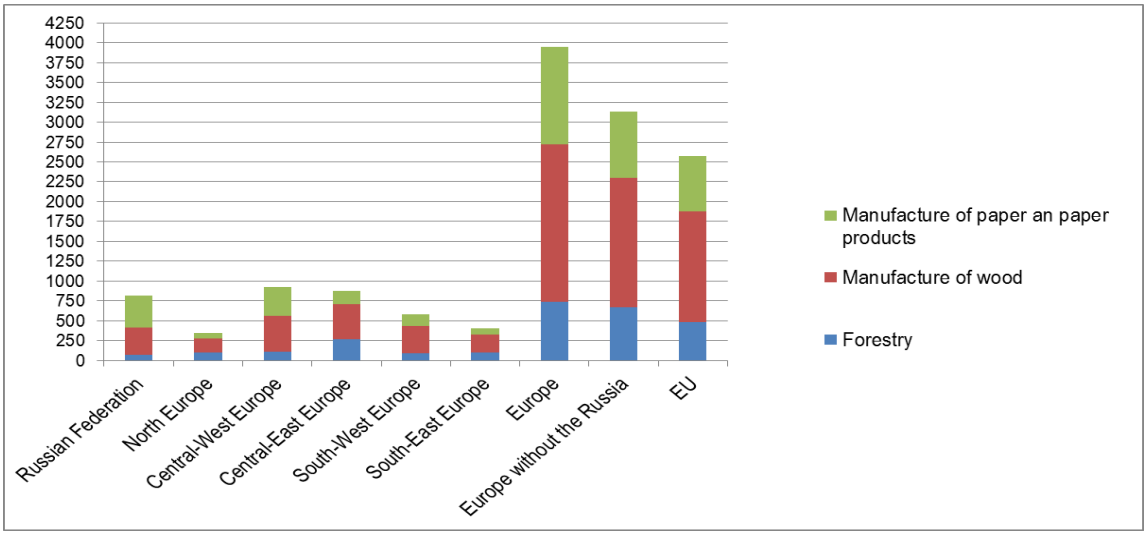
Table 8 – Comparison of selected indicators in Czech and Slovak forestry

	Forest ownership (2010)					
	Public			Private		
Czech Republic	76,8%			23,2%		
Slovakia	50,6%			49,4%		
	Gross output (EUR million)		Gross value added at basic prices (EUR million)		Gross fixe capital formation (EUR million)	
	2005	2012	2005	2012	2005	2012
Czech Republic	1035	1744	496	764	63	103
Slovakia	551	656	259	321	33	28
Change 2005-2012 (CZ)	68,50%		54,03%		63,49%	
Change 2005-2012 (SK)	19,06%		23,94%		-15,15%	
	Employment (1000 annual work units)			Apparent labour productivity (EUR 1000 gross value added/annual work unit)		
	2005		2011	2005		2011
Czech Republic	27,4		23,4	18,1		31,0
Slovakia	13,4		8,7	19,4		35,4
Change 2005-2011 (CZ)	-14,60%			71,27%		
Change 2005-2011 (SK)	-35,07%			82,47%		

Source: Processed according http://ec.europa.eu/eurostat/statisticsexplained/index.php/Forestry_statistics_in_detail

A ratio of labour input (as measured by AWUs (AWU – annual work unit)) per area of exploited forest provides some information on the labour intensity of the forestry sector. The highest levels of labour productivity using were recorded in Finland (EUR 125,000 per AWU) and Sweden (EUR 302,700 per AWU), while at the other end of the range, Bulgaria, Cyprus, Romania and Greece recorded productivity levels that were below EUR 16 000 per AWU.

Employment in forestry is still decreasing, especially in countries where is a high potential for mechanization of forest processes (Central-East Europe). However, there are several differences among regions. Approximately 25% of all people employed in forest sector in Europe are older than fifty years.



Source: State of Europa's forest Report (2011)

Figure 10 – Employment in forest sector in Europe (thousands of people)

The forest sector continues to be an important factor for employment, especially in rural areas. Employment is mainly high in rural areas with a low density of population. The highest number of forestry workers

can still be found in Central-East Europe. This coincides with a low level of mechanization of forest operations in these countries. The wood and paper industries show that these sectors play a very important role in employment in all regions. Comparatively low industrial employment rates can be found in North Europe, which is a clear indication of the very high level of productivity of these industries, mainly in Finland and Sweden. Employment in wood manufacturing and paper industries is about four times higher than in forestry. (State of Europe's Forests, 2011)

5. Cluster analysis

Imputed data are data from Eurostat database. Research method is cluster analysis. There are used two clustering methods – hierarchical agglomerative clustering and non-hierarchical clustering. The analysis was conducted in statistical software R 2.15.2. There are three variables, roundwood production, pulpwood and sawnwood production in selected European and world countries. The objective of cluster analysis is to achieve such groups of states, which would be characterized by certain homogeneity. Cluster analysis sorted data into groups with the greatest possible similarity within the group and the largest difference between groups.

The basic methods of clustering we used were:

- *Hierarchical methods* are based on sequentially joining of clusters, their number decreases continuously until finally all clusters are combined into one. This method is graphically displayed as tree diagram respectively cluster dendrogram. *Wards method* involves an agglomerative clustering algorithm. It looks for groups of leaves that it forms into branches, the branches into limbs and eventually into the trunk. Ward's method starts out with *n* clusters of size 1 and continues until all the observations are included into one cluster (The Pennsylvania State University). Ward's method use the Euclidean distance defined by the formula:

$$d_{ij} = \sqrt{\sum_{k=1}^{K} (x_{ik} - x_{jk})^2} \tag{5.1}$$

where x_{ik} is the value of „*k*" variable for *i-th* object and x_{jk}isthe value of „*k*" variable for *j-th* object.
For calculated distance is than determined the rule of linking statistical units into clusters.

- *Non-hierarchical methods.* If we consider two variables clusters can be visualized by using non-hierarchical method k-means. On the basis of previous hierarchical method is considered the same number of clusters.
- Hierarchical agglomerative clustering. There are „*p*" objects in the analyzed group, namely 39 countries in which are pursued „*k*" quantitative characters (3 variables), the distance d_{ij} between *i-th* element and *j-th* element is Euclidean distance. The steps of cluster analysis in R 2.15.2 were following:

Preparing data file:

```
>read.csv2("wood.csv")
>data=read.csv2("wood.csv")
```

Preparing data names:

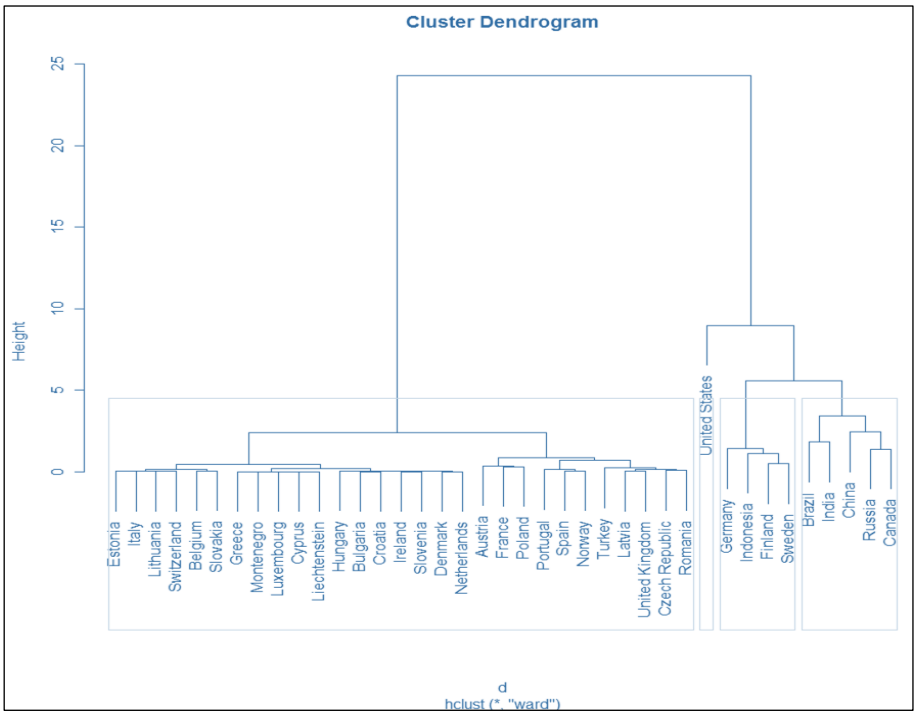
```
>country=data$Country
>row.names(data)=country
```

There are missing values of variables in some countries. It is necessary to remove them from the dataset. If variables are in different units, it is necessary to implement scaling, which means unit conversion to a comparable level:

```
> p<-subset(data, select=c(V12,V22,V32))
>data<-p
>data<- na.omit(data)
>data<-scale(data)
```

Ward Hierarchical Clustering and display dendrogram:

```
> d<-dist(data,method="euclidean")
> fit<-hclust(d, method="ward")
>plot(fit)
```



Source: Own processing in R 2.15.2

Figure 11 – Cluster dendrogram according to Ward's method

In the dendrogram we can identify only 4 groups of countries with similar characteristics. These groups are highlighted in color through the following commands:

```
>groups<- cutree(fit, k=4)
>rect.hclust(fit, k=4, border="green")
```

- Non-Hierarchical clustering. **K-means** clustering is the most popular partitioning method. It requires the analyst to specify the number of clusters to extract. A plot of the within groups sum of squares by number of clusters extracted can help determine the appropriate number of clusters. There are only two components, but they explain 95.32 % of the point variability.

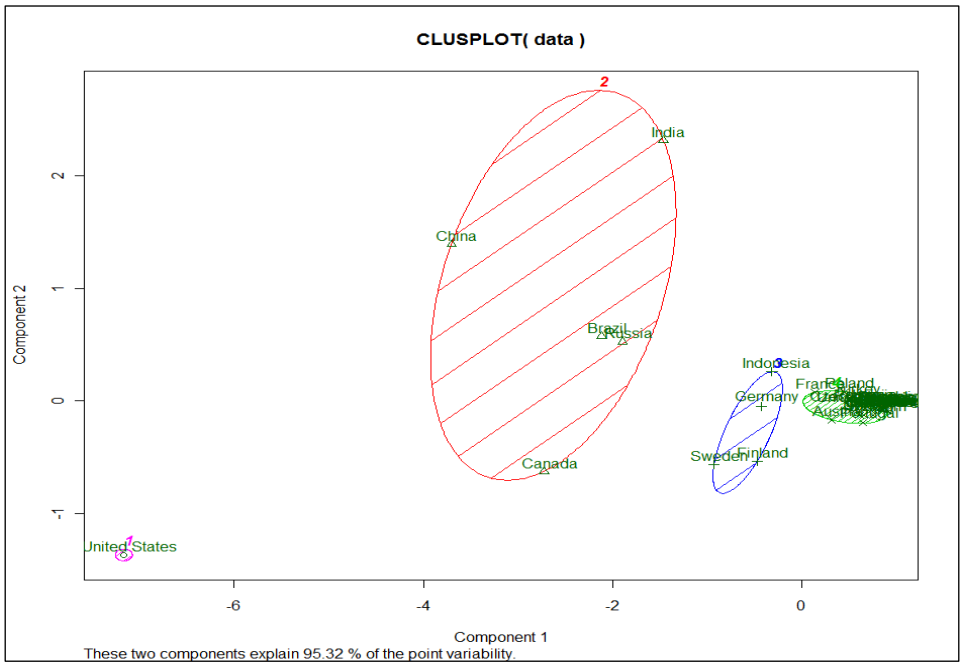
K-Means Clustering with 5 clusters:

```
>fit <- kmeans(data, 4)
```

Cluster Plot against 1st 2 principal components and vary parameters for most readable graph:

```
>library(cluster)
>clusplot(data, fit$cluster, color=TRUE, shade=TRUE,labels=2, lines=0)
```

Cluster analysis fundamentally confirmed the intuitive breakdown of countries during working on the paper. There are four groups of similar countries. Most of EU countries are in cluster no. 4. The largest European timber producers, Sweden, Finland and Germany are together with Indonesia in cluster no. 3. However this cluster is in scatterplot close to cluster no. 4. Following the variability of components there are other two clusters in the model. Cluster no. 2 consists of China, India, Brazil, Russia and Canada. According to explaining components the most different country is the USA in cluster no 1.



Source: Own processing in R 2.15.2

Figure 12 – Scatterplot with two components

Conclusion

Final production of the forestry sector in 2013 reached in Slovakia a value of about 466 million EUR. Gross added value of industry in the same year was 241.8 million EUR and Net added value 212.6 million EUR. Net income from independent activity reached 52.57 million EUR and net business income 31.5 million EUR.

In Slovakia there persist in this sector particularly problems associated with the ownership of forest land. There are thousands of private owners and this situation causes huge amount of problems and misunderstandings of various kinds. For example, in case of inheritance proceedings, sale of timber, forest development etc. As in other sectors, also in Slovak and Czech forestry, there is a trend of decreasing employment. In comparison to previous years there has been recorded a huge decline of forestry workers. There are many problems in forestry of Slovakia and the Czech Republic, therefore it is necessary to reverse the negative development and try to increase economic indicators like employment, profit, timber production, export of wood etc. in the sector. Here we see the opportunity to learn from forestry history, but also from other countries that are successful in forestry, manufacturing of wood, paper and paper products. Also cluster analysis indicates a possible direction of future cooperation efforts respectively suggests from which countries we should learn better efficiency in forestry sector.

Changes in the number of public and private forest holdings, not just the total areas in these categories, have important implications for forest management in Europe. The change in ownership structure that took place in European countries between 1990 and 2010 was mostly affected by the restitution and privatization process that has taken place in countries formerly under centrally planned economies. There is a tendency for the average size of private forest holdings to decrease in countries undergoing this process (e.g. Latvia, Hungary, Slovakia and Slovenia) and also in other countries that have an increasing forest area due to afforestation measures (e.g. Iceland, Ireland).

In the regions of Europe, Russian Federation and North America was together in 2013 produced 260,234 thousand m^3 of softwood and hardwood together, in 2012 it was 254,319 thousand m^3. Annual increase of production in 2013 was 2.3%. The largest share of these increases had North America region. Region Europe produced 111,952 thousand m^3 of softwood and hardwood in 2013 and 111,282 thousand m^3 in 2012.

Wood consumption had been increasing steadily in Europe until the 2008 – 2009 economic crises, which negatively affected the entire forest sector when consumption declined. Only wood for energy countered the decline with rising consumption primarily due to governments' renewable energy policies.

A crucial challenge for the next decade will be the recruitment of new entrants to maintain the necessary capacities in forest operations and management, both in numbers and with higher competences.

Acknowledgement

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Implementation of Analytic Hierarchy Process Method in Decision-Making on the Choice of Accounting between National Accounting Standards and International Financial Reporting Standards

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Abstract:

The article deals with selected aspects of accounting and preparation of financial statements in accordance with the national accounting standards, selected multinational system of accounting standards and their combinations. When deciding whether to keep accounts only in accordance with national legislation or in accordance with International Financial Reporting Standards, a variety of criteria is taken into account. As has been found, each of the criteria has a different weight. Most considered criterion is the level of costs. Moreover, a number of methods and procedures that are used by International Financial Reporting Standards are characterized by a higher level of sophistication.

The results of the research show that the highest weight occurs in case, when the accounting is performed only according to national accounting legislation. The drawback of this option might be a lower quality and limited comparability of financial statements.

Keywords: AHP, costs, International Financial Reporting Standards, financial statement, sensitivity analysis, weight of criteria.

JEL Classification: C69, M20, M41.

1. Introduction

Information on the economic events of an organization is provided by accounting. Accounting is an information and measurement system that identifies, records, and communicates relevant, reliable and comparable information about organization´s business activities. (Wild *et al.* 2005) In order to maintain their own competitive advantages, it is critical that organizations understand and monitor their performance (Štampestová 2014). An important role is played primarily by the financial statements. Accounting systems in individual countries are different. Increasing globalization of markets, international and intercontinental interconnection of the economies led to the initiation of a long process of accounting harmonization. The task of harmonization is to ensure comparability of reporting of financial information. As reported by (Reimers 2008), financial statements provide a basis for decision-making, therefore one of the most important tasks of accounting is to ensure that the financial statements give a true and fair view of the financial situation.

Today, the two main accounting standards are the International Financial Reporting Standards (IFRS), which are used or allowed in more than 120 countries, and the United States Generally Accepted Accounting Principles (US GAAP) which are mainly adopted in the USA. (Ghio and Verona 2015)

The aim of this article is, by using of the multi-criteria decision methods, to select and identify the financial reporting system which delivers the highest utility with respect to changes in criteria weight.

2. Role of international accounting standards in the harmonization of accounting

International accounting standards are one of the tools of global harmonization of accounting, because the large number of countries has made reporting under IFRS mandatory (Christensen, Hail and Leuze 2013). In comparison with the case in which the financial statements are prepared only according to national accounting standards and with the situation in which the IFRS are applied, the higher quality of accounting information occurs in case of financial statements prepared in accordance with IFRS. The basic theoretical foundation, which the IFRS are based on, is a conceptual framework. Currently, selected provisions of the conceptual framework are undergoing a change (Eccles and Hold 2014). The conceptual framework, inter alia, mentions e.g. the definition of the basic elements of financial statements. (Barker 2010)

General requirements for financial statements are dealt with by IAS 1 - Presentation of Financial Statements which largely follows the provisions of the Conceptual Framework and itemises them in detail. The Framework for the Preparation and Presentation of Financial Statements has stated that the objective of financial

statements is to provide information about the financial position, performance and capability of an enterprise. That is useful to a wide range of users in making economic decisions (Elliott and Elliott 2013). The need for regulation arises from the fact to achieve comparison between companies and over time. (McKeithand and Collins 2013)

Financial statements prepared according to the Czech accounting standards consist of a statement of the balance sheet, income statement and an annex. In case of the preparation of financial statements in accordance with IFRS, the mandatory parts are the cash flow statement and statement of changes in equity. The statement of the balance sheet provides information on the asset structure and sources of its coverage. Since the early fifties of the last century, the relationship between a company´s debt and equity has been dealt with by various theories of capital structure (Strýčková 2015). Information on the structure and the level of costs and revenues is provided by income statement. Preparation of the financial statements is not a simple matter.

Study on Administrative costs of the European Union (EU) Company Law Acquis examined the level of costs associated with the preparation of the financial statements. EU study on Implementation of IFRS and the Fair Value Directive and Evaluation of the Application of IFRS in the 2006 Financial Statements of EU companies have found out that the quality of financial reporting by application of the IFRS in the EU has increased. It is appropriate to continue with the implementation of IFRS.

Aspects of IFRS and their applications with regard to the quality of financial statements were dealt with by Barth, Landsamand Lang (2008), Barth (2014). In this case it was found that application of IFRS is associated with higher quality of the financial statements. Bartov, Goldberg and Kim (2005) analyzing compliance with the rules of IFRS in Germany and Ewertand Wagnhofer (2005) state that IFRS are characterised by a high degree of quality. Mandatory application of IFRS in Italy leads, that accruals quality in Italy has improved (Moscariello, Skerrantt and Pizzo 2014).

Conversely, conclusions of Tendelloand Vanstralen (2005) found that differences in enhancing of quality of the financial reporting were not noted. Paananen (2008) investigated the influence of adopting IFRS on the quality of accounting in Sweden. In this case, there was an increase in quality, but only after 2 years since the application of IFRS.

IFRS is represented by very sophisticated rules for financial reporting. In recent years, the large number of companies has to prepare financial statements mandatory in accordance with IFRS (Christensen *et al.* 2013). Adoption of IFRS facilitates according to Ball (2006) or Choi and Meek (2005) the transparency of information, it has an impact on reducing of costs, information asymmetry and on improvement of competitiveness. According to Black and White (2003) or Horton, Serafeimand Serafeim (2012) the increase of the comparability of financial information is the main benefit of IFRS. IFRS also lead to conservatism in financial reporting (Barker and McGeachin 2015). Other benefits of implementing IFRS include increased financial opportunities or decreased cost of capital. (Albu *et al.* 2013)

The advantage of IFRS is their globality, a higher degree of clarity, comparability and relevance in comparison with national accounting standards. The fact that the financial statements prepared in accordance with IFRS are accepted by global stock exchanges increases the level of credibility of these standards. The disadvantage of IFRS is the high degree of difficulty of the first-time application and the transition process to IFRS. The introduction of new accounting methods, adjustment of procedures and rules is a must. Accounting only according to IFRS is often not enough (*e.g.* in the Czech Republic in relation to the law on income tax and tax liability calculation). The IFRS is described as a 'principles-based' system with a more precise focus on investor relevance and the enhancement of the balance sheet as a statement of financial value (Bissessur and Hodgson 2012).

The advantage of accounting according to the national legislation is a relative simplicity and lower costs. On the other hand, the financial statements prepared only according to Czech accounting regulations are not accepted document on global stock markets. Due to national specificities, the comparability of information obtained from accounting is highly reduced. To adopt the decision on whether it is advantageous to have the financial statements prepared in accordance with IFRS or just according to Czech accounting standards, it is necessary to take into account several criteria, therefore the multi-criteria decision making is applied. (Bierman, Boniniand and Hausman 1986)

3. Methodology

The assessment of utility and risk of the *j*-th variants of accounting and reporting is performed by using the criteria matrix. A solution is selected from the set of variants $V=\{V_1; V_2; \dots V_n\}$, the criteria $C=\{C_1, C_2, \dots C_m\}$ are taken into account in decision-making process. The result is establishing of a model using a criteria matrix (A),

$$A = \begin{array}{c} \\ C_1 \\ C_2 \\ \vdots \\ C_m \end{array} \begin{array}{c} \begin{array}{cccc} V_1 & V_2 & \dots & V_n \end{array} \\ \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1j} \\ a_{21} & a_{22} & & a_{2j} \\ \vdots & & \ddots & \vdots \\ a_{i1} & a_{i2} & \cdots & a_{mn} \end{pmatrix} \end{array}, \tag{3.1}$$

where a_{ij} are elements of a matrix representing the absolute utility of *j*-th variant, and taking account of the*i*-th criterion, V_1–V_n are variants, C_1–C_m are criteria.

As it is clear from (1), it is a multi-criteria deciding where the solutions by using of AHP method is a widely applied method (Valasquezand Hester, 2013). The author of the method is professor Saaty, for more details about this method see e.g. Saaty (1980) or Saatyand Vargas (1994).

One of the major part of AHP method is a calculation of the weights of the criteria, for a result of an own solution is influenced by a differentiation of weight. Criteria weights are determined by using of the Saaty´s method; the advantage of the method is that it enables to specify the size of the preference by the number of points from the selected scale. Saaty (1980) recommends a usage of scales from 1 to 9, Saaty´s matrix (3.2) is established by comparing the criteria,

$$S = \begin{array}{c} \\ k_1 \\ k_2 \\ \vdots \\ k_i \end{array} \begin{array}{c} \begin{array}{cccc} k_1 & k_2 & \dots & k_j \end{array} \\ \begin{pmatrix} s_{11} & s_{12} & \dots & s_{1j} \\ s_{21} & s_{22} & & s_{2j} \\ \vdots & & \ddots & \vdots \\ s_{i1} & s_{i2} & \cdots & s_{ij} \end{pmatrix} \end{array}, \tag{3.2}$$

where s_{ij} are elements of Saaty´s matrix.

Standardized criterion weightv_i is determined by the approximative methods, e.g. by geometric mean proportion of the *i*-th criterion and the sum of the geometric mean of all criteria $\sum_{i=1}^{n} G_i$. Weight reflects the importance of all criteria considered (Tošenovský 2015):

$$v_i = \frac{G_i}{\sum_{i=1}^{n} G_i}, \tag{3.3}$$

$$G_i = \sqrt[n]{s_{i1}.\ s_{i2}.\ \dots\ s_{ij}}. \tag{3.4}$$

Using (3.3) and (3.4), the local weights of the main criteria and sub-criteria weights are calculated. Calculated local weights are recalculated by (3.5) into global scales:

$$v_{gi} = v_{il}.v_i, \tag{3.5}$$

where v_g is global weight of sub-criterion, $v_{il}$is a local weight of sub-criterion and v_i is a weigh of *i*-th criterion.

The resultant weight for the *j*-th variants is determined using (3.6):

$$VV = \sum_{j=1}^{n} v_{gi}, \tag{3.6}$$

where VV is the resultant weight and v_{gi} is global weight of the *j*-th variant.

In order to gain a relevant evaluation of the criteria significance in Saaty´s matrix S, it will be necessary to verify its consistency using consistency coefficient *CR*(3.7):

$$CR = \frac{CI}{RI}, \tag{3.7}$$

where RI is the random index. *CI* is consistency index determined by the equation (3.8):

$$CI = \frac{\lambda_{max} - N}{N-1}, \tag{3.8}$$

where λ_{max} is the largest eigenvalue of the matrix and *N* is number of criterions. λ_{max} is determined by equation (3.9):

$$\lambda_{max} = \frac{1}{N}\sum_{i}^{N}(S.w)_i\ /w_i, \tag{3.9}$$

where *N* is a number of criteria, *w* is a vector and *S.w* is the *i*-th element of the vector.

A value of the random index *RI* depends on the number of criteria. The values were derived on the basis of research by Saaty and his team of researchers at Oak Ridge National Laboratory and the Wharton School of the University of Pennsylvania. (Alonso and Lamana, 2006)

The assessment of the stability and robustness of the results is the task of the sensitivity analysis. The aim is to find out, how the order of variants is changed, when there is a change in values of the criteria weights. Methods for sensitivity analysis are listed e.g. Salteli (2008) or Triantaphyllou (2000).

The rules for determining the sensitivity limits are according to Triantaphyllou (2000):

$$\alpha_k^{m,n} > \frac{A_n - A_m}{x_{n,k} - x_{m.k}}, \text{for} x_{n,k} - x_{m,k} > 0, \quad (3.10a)$$

$$\alpha_k^{m,n} < \frac{A_n - A_m}{x_{n,k} - x_{m.k}}, \text{for } x_{n,k} - x_{m,k} < 0, \quad (3.10b)$$

where $\alpha_k^{m,n}$ express the sensitivity limits. It holds that the smaller the coefficients $\alpha_k^{m,n}$ are, the more sensitive the variants are to the weight *k*.

A_m and A_n are the values of the criterion determined by the equation (3.11):

$$A_{m=} \sum_j x_{m,j} . v_j, A_{n=} \sum_j x_{n,j} . v_j, \quad (3.11)$$

where $x_{m,j}$ a $x_{n,j}$ are the standardized value of the *j*-th variant.

For the expression of the sensitivity limits in % the equation (3.12) is applied:

$$\alpha_k^{m,n} > \frac{A_n - A_m}{x_{n,k} - x_{m.k}} . \frac{100}{v_j}, \text{for} x_{n,k} - x_{m,k} > 0, \quad (3.12a)$$

$$\alpha_k^{m,n} < \frac{A_n - A_m}{x_{n,k} - x_{m.k}} . \frac{100}{v_j}, \text{for} x_{n,k} - x_{m,k} < 0, \quad (3.12b)$$

where v_j is the weight of the *j*-th criterion.

The largest reciprocal of the smallest absolute value calculated according to (3.12) expresses the criterion that is most sensitive to change in its weight.

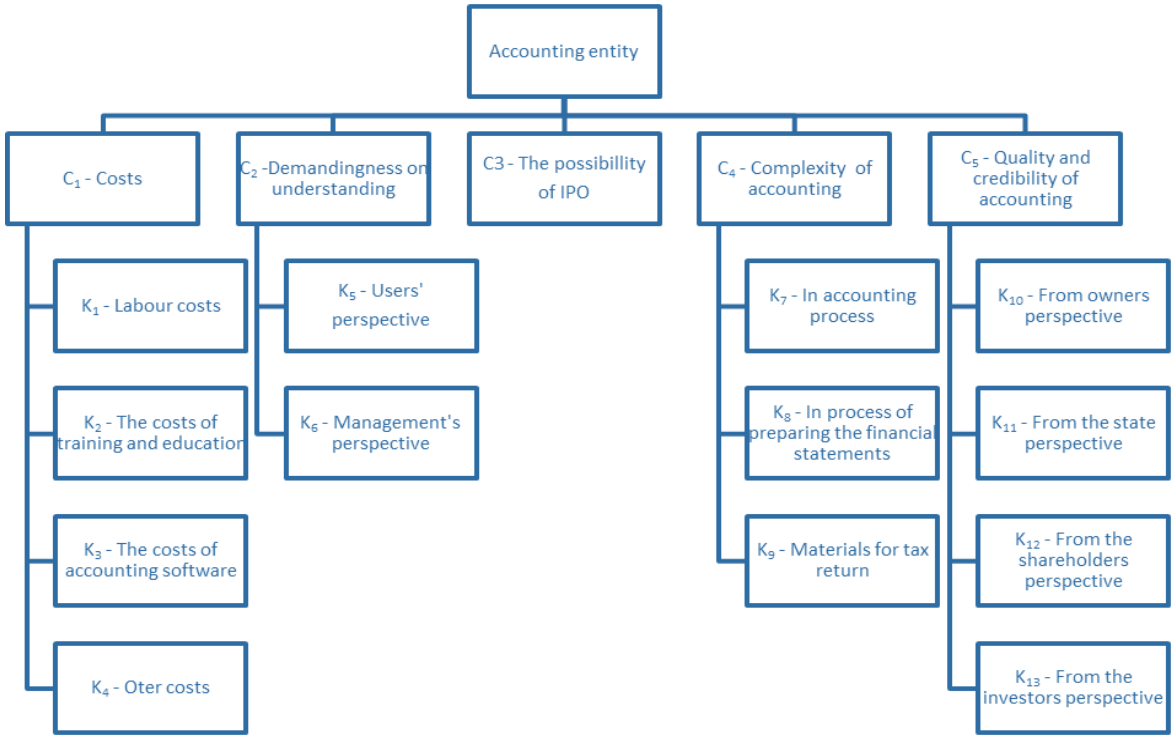
4. Application of multi-criteria decision

Five variants are assessed during the decision-making process:

- V_1 – accounting in accordance with Czech accounting regulation and IFRS;
- V_2 – keeping accounts in accordance with Czech accounting regulations;
- V_3 – keeping accounts in accordance with IFRS;
- V_4 – keeping accounts in accordance with Czech accounting regulation assuming a gradual implementation of IFRS and compliance of national legislation with IFRS in the period of time up to 10 years;
- V_5 – same as V_4 with compliance within 5 years.

The time period of 10 years for V_4 was chosen with regard to conclusion of the Convergence project which assumed the convergence of IFRS and US GAAP exactly in a time horizon up to 10 years. The US GAAP system is not included in a set of variants, since, as it is stated by Barth, Landsam, Lang and Williams (2012), Han and He (2013), Kaya and Pillhofer (2013) and Street *et al.* (2000), accounting of companies applying IFRS is comparable to those who use US GAAP. To the set variants, there are not included EU directives, because according to EC Regulation no. 1606/2002 of 19th July 2002 there are obligations to prepare consolidated financial statements in accordance with IFRS for companies that want to trade in the international capital markets, at least since 2005.

When decided on the selection of a variant displaying the highest utility, there will be assessed a total of five main criteria. Due to the application of the AHP method, the sub-criteria are defined for the selected main criteria. Schematic depiction of the criteria and sub-criteria are shown in Figure 1.



Source: own processing by software Make it Rational

Figure 1 – Criteria

Data and research

Data for the analysis were obtained from a questionnaire survey. The research was carried out in the Czech Republic in Zlin region, where there exist, according to data of the Czech Statistical Office, 165 industrial enterprises with number of employees exceeding 100. Buglear (2012), Neuman (2000) or Newbold, Carlson and Thorne (2013) state that it is difficult to obtain data from all the subjects, therefore it is appropriate for analyzing to choose a sample from the population basic set. The sample is determined by (3.13):

$$n = \frac{z^2.N.r(1-r)}{(d^2.N)+[z^2.r\ (1-r)]}, \qquad (3.13)$$

where N is a size of the basic set, z is the reliability coefficient, d is permitted margin of tolerance and r is a expected margin of tolerance.

The degree of certainty is determined according to Newbold *et al.* (2013) to 90 %, the coefficient value of reliability for this degree of certainty is according to statistical tables 1.65. A size of basic set N is 165. The expected margin of tolerance is as instructed by CHJ of the Ministry of Finance 2%, permitted margin of tolerance is according to the recommendations of the Chamber of Auditors of the Czech Republic 5%. By substituting the data into equation (13) it is obtained the size of a basic set sample.

$$n = \frac{1{,}65^2\ .165\ .0{,}02\ .(1-0{,}02)}{(0{,}05^2\ .165) + \ [1{,}65^2\ .0{,}02\ .(1-0{,}02)]}$$

$$n = 18{,}32$$

To obtain the relevant research findings, it is necessary to have data from 19 accounting entities. Summary of the data obtained from a questionnaire survey is indicated in Table 1. The values for K_1-K_4 are listed in CZK, the value of C_3 is expressed verbally: criteria K_5-K_{13} are evaluated by means of score scale from 1 to 10.

The more points of a scale from 1-10 for criteria K_5 and K_6, the higher is the demandingness of understanding. Evaluation of the demandingness of understanding is realized also from the perspective of internal and external users, for a range of users of accounting information is wide. (Arnold and Hope 1990)

Criteria K_7 - K_9 are based on the same principle of the allocation of scores, the higher is the difficulty of accounting, of preparation of the financial statements or tax returns, the more scores the *i*-th variant gains.

Criteria K_{10} - K_{13} evaluating the quality and credibility of accounting are based on the merits, that the more the value approaches 10, the higher is the quality and credibility.

Table 1- Summary data from a questionnaire survey

Criterion	V_1	V_2	V_3	V_4	V_5
K_1	227 367	162 405	194 886	194 886	204 886
K_2	32 550	21 500	30 000	27 900	27 900
K_3	41 800	23 960	37 010	32 290	38 260
K_4	8 000	6 500	6 500	7 000	7 500
C_3	Yes	No	Yes	No	No
K_5	7	8	10	7	8
K_6	5	3	6	7	8
K_7	7	4	5	6	6
K_8	10	6	9	7	8
K_9	3	2	8	5	7
K_{10}	7	6	9	8	8
K_{11}	9	8	9	7	8
K_{12}	6	6	9	6	8
K_{13}	9	5	10	6	8

Source: own processing according to data from the questionnaire survey

Determining the weight of criteria

For determining the weight of criteria C_1-C_5 and subcriteria K_1-K_{13} the Saaty´s method is used. The result of mutual comparing is the drawing-up of Saaty´s matrix in Table 2.

Table 2 - Saaty´s matrix for cumulative criteria C_1-C_5

Criterion	C_1	C_2	C_3	C_4	C_5	G	v_i
C_1	1	5	7	3	3	3.159	0.476942
C_2	1/5	1	3	3	1	1.128	0.169769
C_3	1/7	1/3	1	1/3	1/5	0.316	0.047768
C_4	1/3	1/3	3	1	1/3	0.644	0.097265
C_5	1/3	1	5	3	1	1.379	0.208256

Source: own calculation´s according to data from the questionnaire survey

Criteria weights v_i are determined by (3.3). To apply this equation, it is required to calculate the geometric means *G* using (3.4). For the evaluation to be relevant, it is needed in Table 3 to verify the consistency by the equation (3.7). λ_{max}, that expresses the largest eigenvalue of the matrix is calculated by the equation (3.9). *CI* is determined by the equation (3.8). *RI* value is according to Alonso and Lamana (2006) for the five criteria 1.12.

Table 3 - Consistency

Criterion	Λ_{max}	CI	RI	CR
C_1	5.402	0.101	1.12	0.089
C_2	5.351	0.088	1.12	0.078
C_3	5.162	0.041	1.12	0.036
C_4	5.403	0.101	1.12	0.090
C_5	5.127	0.032	1.12	0.028

Source: own calculation´s

The value of the consistency coefficient in Table 3 is for all criteria C_1-C_5 less than 0.1. It holds that the matrix is consistent.

Sub-crtiteria weights are determined in a similar way. A more detailed process is stated in the annex in Table A - D. Table 4 presents summary results.

Table 4 - Local and global weights of criteria and sub-criteria (in %)

Criterion	Weight	Sub-criterion	Local Weight	Global Weight
C_1	47.69	K_1	57.9	27.61
		K_2	15.9	7.59
		K_3	20.5	9.80
		K_4	5.6	2.69
C_2	16.97	K_5	12.5	2.12
		K_6	87.5	14.85
C_3	4.78	C_3	4.78	4.78
C_4	9.73	K_7	42.9	4.17
		K_8	42.9	4.17
		K_9	14.2	1.39
C_5	20.83	K_{10}	57.9	12.08
		K_{11}	5.7	1.19
		K_{12}	18.2	3.78
		K_{13}	18.2	3.78
TOTAL				**100.00**

Source: own calculation´s

The highest weight for the accounting entity holds the criterion C_1 – cost, particularly sub-criterion K_1 - the labour costs volume, because labor costs often have a large share in the total costs of accounting entities. Differences between accounting standards across borders is often cited as an important factor affecting the information processing costs (Khurana and Michas 2011).

The second most important cumulative criterion is C_5 – the quality and credibility of accounting, especially K_{10} - the credibility of accounting from the perspective of the entity owners. The third most important criterion is C_2 – understanding of the content of accounting by internal users.

In cumulative criterion C_4, the sub-criterion K_9 is of less importance, because the tax return can be processed using the added modules of accounting software. IFRS requires more detailed disclosure than prior GAAP (De George, Ferguson and Spear, 2013) it implies that the complexity in preparing of the financial statements according to IFRS is higher. The criterion C_3 – the possibility of entering the world stock exchange has the lowest weight. A condition for entering is the preparation of financial statements in accordance with IFRS.

Global weight calculation

To determine the final effect, it is needed to compare the *j*-th variants for the *i*-th criteria. Detailed calculation process is shown in Table E – Table R. Cumulative calculations and summaries are contained in Table 5. Determining of global weights of the *j*-th variant is the last step to determine an optimal variant. The resulting weight is calculated by (3.6).

Table 5 - The global weights V_1-V_5 (in %)

Criterion	V_1	V_2	V_3	V_4	V_5
K_1	0.95	15.60	4.24	4.24	2.58
K_2	0.29	4.55	0.53	1.11	1.11
K_3	0.37	5.75	0.96	2.03	0.69
K_4	0.08	1.03	1.03	0.38	0.17
K_5	0.79	0.24	0.06	0.79	0.24
K_6	3.39	8.21	1.75	0.98	0.52
C_3	2.045	0.23	2.045	0.23	0.23
K_7	0.14	2.29	0.92	0.41	0.41
K_8	0.14	2.12	0.27	1.10	0.54
K_9	0.38	0.69	0.05	0.19	0.08
K_{10}	0.85	0.38	6.23	2.31	2.31
K_{11}	0.46	0.11	0.46	0.04	0.12
K_{12}	0.20	0.20	2.19	0.20	0.99
K_{13}	1.03	0.12	1.84	0.22	0.57
TOTAL	**11.115**	**41.52**	**22.575**	**14.23**	**10.56**

Source: own calculation´s from Table E– R

When evaluating variants using AHP method, the global weights for V_2 – accounting according to Czech accounting standards come out as the highest. This variant has the highest value of the global weights. However, the quality of accounting information is lower. In case of emergence of multinational corporations of the investment from foreign partners, the accounting only according to national accounting standards is not sufficient. The main reason for the highest values of the global weights for this variant are lower costs which have the weight of 48 % in decision-making process. Accounting according to IFRS provides to accounting entities the information that are more relevant and quality compared to the outputs gained from financial statements prepared in accordance with Czech accounting standards. This can be seen in Table 4 with the criteria K_{10}-K_{13}, where the highest global weight is obtained by a variant based on full respect for the rules of IFRS.

This variant, (V_3) comes out as the second best. The benefit of this variant is the comparability of information in a multinational perspective. An acceptance of financial statements prepared in accordance with IFRS by the global stock exchanges adds to the enhancement of the quality and credibility (Cairns 2003).

V_1 records the highest costs due to the high costs associated with the double-entry accounting, the global weight is very low. With regard to the development and globalization of economies, not only for larger companies, the accounting only according to the national accounting legislation is insufficient.

A way, how to bring Czech accounting standards (CAS) nearer to IFRS, may be a gradual implementation of the IFRS provisions into the CAS. This variant, (V_4) is in the third position. The conclusion is that it is appropriate to implement IFRS provisions into CAS. When the global weight V_4 and V_5 are compared the results, however, suggest that it is better to implement IFRS gradually and over a longer period. Global weight V_5 that was based on the idea of the implementation of greater amount of IFRS provisions, is lower. Summary of advantages and disadvantages of considered variants is shown in Table 6.

Table 6 - Comparison of V_1-V_5

Variant	Advantages	Disadvantages
V_1	Financial statements respected by global stock exchanges, ensuring of a high degree of comparability of financial information from the national and international perspective.	Keeping a double accounting, high costs
V_2	Lower costs associated with keeping an accounting, a lower degree of difficulty of understanding the content of the financial statements, comparability in the context of the Czech Republic is sufficient.	Difficult comparability from an international perspective financial statements is not recognized by the world stock exchange.
V_3	Comparability not only from the national, but also multinational perspective financial statements in accordance with IFRS recognized by world stock exchange.	High costs, the high degree of complexity, especially in the first year of application, more extensive financial statement puts higher demands on the understanding of the content of accounting information.
V_4, V_5	Gradual implementation of IFRS might lead to the long term to achieve compliance with IFRS, there is the approach to IFRS system and distribution of the costs with the transition to the system within a few years	An accounting entity can not declare the full compliance with IFRS and therefore gain the benefits associated with IFRS application.

Source: own processing

Sensitivity analysis

The stability of the order depending on the change of the *i*-th criterion will be analyzed using equation (3.10a) and (3.10b). In Table 7, there are results for the cumulative criteria C_1-C_5, in the expression of the absolute change in weight of criterion. Subsequently, the percentage expression calculated using (3.12a) or (3.12b) is shown in Table 8.

The lower the value in Table 8, the higher is the sensitivity to changes in weight criteria. The most sensitive is the change in the weight of criteria in combination of variants V_1-V_5. When evaluated by AHP method, these variants have the lowest level of global weight.

Table 7 - Sensitivity analysis for C_1-C_5

Combination of variant	Criterion (absolute change)				
	C_1	C_2	C_3	C_4	C_5
V_1-V_2	1.205	7.121	-16.752	6.848	-17.575
V_1-V_3	2.260	-4.835	-	19.759	1.401
V_1-V_4	0.513	-1.293	-1.716	2.995	13.543
V_1-V_5	-0.194	0.162	0.306	-1.500	-0.383
V_2-V_3	0.939	2.853	-10.438	4.908	-1.912
V_2-V_4	1.424	4.085	-	8.026	-13.923
V_2-V_5	1.383	4.026	-	7.607	-9.736
V_3-V_4	-8.345	208.625	4.598	-18.141	1.050
V_3-V_5	5.437	11.443	6.620	57.214	1.785
V_4-V_5	1.143	3.634	-	5.478	-3.008

Source: own calculation´s

In order to reach a change of the order e.g. V_1-V_2, the C_1 criterion weight would have to be changed by 1.205. The original weight C_1 is 47.69. To change the order, the weight of C_1 would have to be higher by 120.5. In this case, it is only a theoretical interpretation; in practice, the weight of the criteria cannot be increased for the final weight to be higher than 100%. A similar conclusion holds for all values higher than 1.

The lowest value with C_2 in absolute terms is for a combination of variants V_1-V_5. In this case, it would be enough to change the order only to increase the weight criterion C_2 by 16.2.

Table 8 - Sensitivity analysis for C_1-C_5

Combination of variant	Criterion (precentral change)				
	C_1	C_2	C_3	C_4	C_5
V_1-V_2	2.526	41.960	-350.462	70.380	-84.374
V_1-V_3	4.740	-28.494	-	203.069	6.726
V_1-V_4	1.076	-7.617	-35.905	30.783	65.019
V_1-V_5	**-0.407**	**0.956**	**6.397**	**-15.416**	**-1.838**
V_2-V_3	1.970	16.813	-218.369	50.442	-9.178
V_2-V_4	2.985	24.074	-	82.492	-66.843
V_2-V_5	2.901	23.724	-	78.180	-46.740
V_3-V_4	-17.498	1229.375	96.188	-186.447	5.039
V_3-V_5	11.400	67.430	138.490	588.019	8.571
V_4-V_5	2.397	21.412	-	56.296	-14.442
CC	**2.457**	**1.045**	**0.156**	**0.064**	**0.544**

Source: own calculation´s

Using the sensitivity coefficient in Table 8, the order of criteria is determined depending on the sensitivity change of the weight criteria (from highest to lowest sensitivity) – C_1, C_2, C_5, C_3 and C_4. Criterion that is most sensitive to changes in weight is the cost.

It can be stated, due to the results of the sensitivity analysis, that the order of variants determined by AHP method is stable. Only variants V_1 and V_5 are more sensitive to changes in weight of criterion, these variants take some of the lowest effects. To change the order of the first three variants, there would have occuring very significant changes in the weights of the *i*-th criteria.

Conclusion

The results show that accounting and reporting according to two systems (national and multinational accounting) brings high costs, which is the reason why this variant takes the last position. In case of emergence of multinational corporations or investment from foreign partners, the accounting only according to national accounting standards is insufficient. The way to achieve a gradual compliance of national legislation with the IFRS rules might be variants based on the gradual implementation of selected IFRS provisions national legislation. The implementation of IFRS lowers the information asymmetry. (Bushmannand Smith 2001)

Comparability and transparency of financial statements may ensure further development of the economy worldwide. IFRS are, more than on their own accounting, focusing on the financial statements and do not strictly regulate the accounting procedures, because each accounting entity can define its own chart of accounts and choose such methods in order to achieve a true and fair frame.

The amount of financial statements prepared in accordance with IFRS increases. Integrating the principles on which IFRS is based into national standards has a positive impact not only on the accounting entities themselves, but also on their surroundings. The increasing global nature of the economy will continue to increase the pressure on unification of accounting systems. The implications for users of IFRS financial statements are that international comparability may have Increased (Nobes 2013). The ongoing Convergence process gradually eliminates the differences between IFRS and US GAAP. While, from the short term perspective, the implementation of IFRS into CAS might be less beneficial, in the longer term, the resulting effect will exceed the costs incurred.

For the financial statements to provide accurate information, it is necessary to consistently apply all accounting principles, whether it is accounted only in accordance with national legislation or IFRS.

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APPENDIX

Table A - Saaty´s matrix for sub-criteriaK_1-K_4 and consistency test

Criterion	K_1	K_2	K_3	K_4	G	v_i	λ_{max}	CI	RI	CR
K_1	1	5	3	7	3.201	0.579	4.122	0.041	0.90	0.045
K_2	1/5	1	1	3	0.880	0.159	4.083	0.027	0.90	0.031
K_3	1/3	1	1	5	1.136	0.205	4.088	0.029	0.90	0.033
K_4	1/7	1/3	1/5	1	0.312	0.056	4.130	0.043	0.90	0.048

Source: own calculation´s according to data from the questionnaire survey

Table B - Saaty´s matrix for sub-criteria K_5-K_6 and consistency test

Criterion	K_5	K_6	G	v_i	λ_{max}	CI	RI	CR
K_5	1	1/7	0.377	0.125	2	0	0	0
K_6	7	1	2.646	0.875	2	0	0	0

Source: own calculation´s according to data from the questionnaire survey

Table C - Saaty´s matrix for sub-criteria K_7-K_9 and consistency test

Criterion	K_7	K_8	K_9	G	v_i	λ_{max}	CI	RI	CR
K_7	1	1	3	1.442	0.429	3	0	0.58	0
K_8	1	1	3	1.442	0.429	3	0	0.58	0
K_9	1/3	1/3	1	0.481	0.142	3	0	0.58	0

Source: own calculation´s according to data from the questionnaire survey

Table D - Saaty´s matrix for sub-criteria K_{10}-K_{13} and consistency test

Criterion	K_{10}	K_{11}	K_{12}	K_{13}	G	v_i	λ_{max}	CI	RI	CR
K_{10}	1	7	5	3	3.201	0.579	4.182	0.061	0.90	0.067
K_{11}	1/7	1	1/5	1/3	0.312	0.057	4.171	0.057	0.90	0.063
K_{12}	1/5	5	1	1	1	0.182	4.202	0.067	0.90	0.075
K_{13}	1/3	3	1	1	1	0.182	4.004	0.001	0.90	0.002

Source: own calculation´s according to data from the questionnaire survey

Table E – Comparison of variants for K_1 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/9	1/5	1/5	1/4	3.43	**0.95**	5.30	0.076	1.12	0.068
V_2	9	1	5	5	6	56.51	**15.60**	5.26	0.064	1.12	0.057
V_3	5	1/5	1	1	2	15.36	**4.24**	5.07	0.017	1.12	0.015
V_4	5	1/5	1	1	2	15.36	**4.24**	5.07	0.017	1.12	0.015
V_5	4	1/6	½	1/2	1	9.34	**2.58**	5.12	0.030	1.12	0.027
Total	-	-	-	-	-	**100,00**	**27.61**	-	-	-	-

Source: own calculation´s

Table F - Comparisonof variants for K_2 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/9	1/3	1/4	1/4	3.80	**0.29**	5.35	0.074	1.12	0.066
V_2	9	1	7	6	6	59.91	**4.55**	5.41	0.080	1.12	0.072
V_3	3	1/7	1	1/3	1/3	6.95	**0.53**	9.31	0.069	1.12	0.062
V_4	4	1/6	3	1	1	14.67	**1.11**	5.14	0.034	1.12	0.030
V_5	4	1/6	3	1	1	14.67	**1.11**	5.14	0.034	1.12	0.030
Total	-	-	-	-	-	**100,00**	**7.59**	-	-	-	-

Source: own calculation´s

Table G – Comparison of variants for K_3 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/9	1/3	1/5	1/3	3.79	**0.37**	5.29	0.073	1.12	0.065
V_2	9	1	7	5	7	58.71	**5.75**	5.35	0.087	1.12	0.078
V_3	3	1/7	1	1/3	2	9.80	**0.96**	5.15	0.038	1.12	0.034
V_4	5	1/5	3	1	4	20.69	**2.03**	5.26	0.065	1.12	0.058
V_5	3	1/7	1/2	1/4	1	7.01	**0.69**	5.25	0.064	1.12	0.057
Total	-	-	-	-	-	**100,00**	**9.80**	-	-	-	-

Source: own calculation´s

Table H – Comparison of variants for K_4 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/9	1/9	1/6	1/4	2.87	**0.08**	5.34	0.084	1.12	0.075
V_2	9	1	1	4	6	38.29	**1.03**	5.16	0.039	1.12	0.035
V_3	9	1	1	4	6	38.29	**1.03**	5.16	0.039	1.12	0.035
V_4	6	1/4	1/4	1	4	14.17	**0.38**	5.37	0.092	1.12	0.082
V_5	4	1/6	1/6	1/4	1	6.38	**0.17**	5.36	0.089	1.12	0.080
Total	-	-	-	-	-	**100,00**	**2.69**	-	-	-	-

Source: own calculation´s

Table I -Comparisonof variants for K_5 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	4	9	1	4	37.26	**0.79**	5.109	0.027	1.12	0.024
V_2	1/4	1	6	1/4	1	11.33	**0.24**	5.124	0.031	1.12	0.027
V_3	9	1/6	1	1/9	1/6	2.80	**0.06**	5.311	0.077	1.12	0.069
V_4	1	4	9	1	4	37.27	**0.79**	5.109	0.027	1.12	0.024
V_5	1/4	1	6	1/4	1	11.34	**0.24**	5.124	0.031	1.12	0.027
Total	-	-	-	-	-	**100,00**	**2.12**	-	-	-	-

Source: own calculation´s

Table J - Comparisonof variants for K_6 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/4	3	4	6	22.81	**3.39**	5.232	0.058	1.12	0.052
V_2	4	1	6	7	9	55.32	**8.22**	5.329	0.082	1.12	0.074
V_3	1/3	1/6	1	3	4	11.80	**1.75**	5.285	0.071	1.12	0.064
V_4	1/4	1/7	1/3	1	3	6.57	**0.98**	5.269	0.067	1.12	0.060
V_5	1/6	1/9	1/4	1/3	1	3.50	**0.52**	5.301	0.076	1.12	0.068
Total	-	-	-	-	-	**100,00**	**14.85**	-	-	-	-

Source: own calculation´s

Table K - Comparisonof variants for C_3 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	9	1	9	9	42.86	**2.045**	5	0	1.12	0
V_2	1/9	1	1/9	1	1	4.76	**0.23**	5	0	1.12	0
V_3	1	9	1	9	9	42.86	**2.045**	5	0	1.12	0
V_4	1/9	1	1/9	1	1	4.76	**0.23**	5	0	1.12	0
V_5	1/9	1	1/9	1	1	4.76	**0.23**	5	0	1.12	0
Total	-	-	-	-	-	**100,00**	**4.78**	-	-	-	-

Source: own calculation´s

Table L – Comparison of variants for K_7 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/9	1/6	1/4	1/4	3.40	**0.14**	5.32	0.079	1.12	0.071
V_2	9	1	4	6	6	55.06	**2.29**	5.28	0.069	1.12	0.062
V_3	6	1/4	1	3	3	22.10	**0.92**	5.18	0.046	1.12	0.041
V_4	4	1/6	1/3	1	1	9.72	**0.41**	5.10	0.025	1.12	0.022
V_5	4	1/6	1/3	1	1	9.72	**0.41**	5.10	0.025	1.12	0.022
Total	-	-	-	-	-	**100,00**	**4.17**	-	-	-	-

Source: own calculation´s

Table M – Comparison of variants for K_8 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/9	1/3	1/7	1/5	3.29	**0.14**	5.29	0.074	1.12	0.066
V_2	9	1	7	3	5	51.00	**2.12**	5.27	0.061	1.12	0.062
V_3	3	1/7	1	1/5	1/3	6.36	**0.27**	5.20	0.051	1.12	0.046
V_4	7	1/3	5	1	3	26.38	**1.10**	5.19	0.049	1.12	0.044
V_5	5	1/5	3	1/3	1	12.96	**0.54**	5.21	0.052	1.12	0.047
Total	-	-	-	-	-	**100,00**	**4.17**	-	-	-	-

Source: own calculation´s

Table N – Comparison of variants for K_9 and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1/3	7	3	6	27.05	**0.38**	5.24	0.059	1.12	0.053
V_2	3	1	9	5	7	50.41	**0.69**	5.33	0.082	1.12	0.074
V_3	1/7	1/9	1	1/5	1/3	3.25	**0.05**	5.33	0.082	1.12	0.074
V_4	1/3	1/5	5	1	4	13.57	**0.19**	5.29	0.074	1.12	0.065
V_5	1/6	1/7	3	1/4	1	5.73	**0.08**	5.34	0.086	1.12	0.076
Total	-	-	-	-	-	**100,00**	**1.39**	-	-	-	-

Source: own calculation´s

Table O – Comparison of variants for K_{10} and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	4	1/6	1/4	1/4	7.06	**0.85**	5.37	0.092	1.12	0.082
V_2	1/4	1	1/9	1/6	1/6	3.18	**0.38**	5.36	0.089	1.12	0.079
V_3	6	9	1	4	4	51.58	**6.23**	5.34	0.084	1.12	0.075
V_4	4	6	1/4	1	1	19.09	**2.31**	5.16	0.039	1.12	0.035
V_5	4	6	1/4	1	1	19.09	**2.31**	5.16	0.039	1.12	0.035
Total	-	-	-	-	-	**100,00**	**12.08**	-	-	-	-

Source: own calculation´s

Table P – Comparison of variants for K_{11} and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	5	1	9	5	38.99	**0.46**	5.12	0.029	1.12	0.026
V_2	1/5	1	1/5	5	1	9.57	**0.11**	5.13	0.033	1.12	0.030
V_3	1	5	1	9	5	38.99	**0.46**	5.12	0.029	1.12	0.026
V_4	1/9	1/5	1/9	1	1/5	2.88	**0.04**	5.34	0.084	1.12	0.075
V_5	1/5	1	1/5	5	1	9.57	**0.12**	5.14	0.033	1.12	0.302
Total	-	-	-	-	-	**100,00**	**1.19**	-	-	-	-

Source: own calculation´s

Table Q – Comparison of variants for K_{12} and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	1	1/9	1	1/6	5.30	**0.20**	5.04	0.009	1.12	0.009
V_2	1	1	1/9	1	1/6	5.30	**0.20**	5.04	0.009	1.12	0.009
V_3	9	9	1	9	4	58.00	**2.19**	5.27	0.067	1.12	0.060
V_4	1	1	1/9	1	1/6	5.30	**0.20**	5.04	0.009	1.12	0.008
V_5	6	6	1/4	6	1	26.10	**0.99**	5.21	0.051	1.12	0.046
Total	**-**	**-**	**-**	**-**	**-**	**100,00**	**3.78**	**-**	**-**	**-**	**-**

Source: own calculation´s

Table R – Comparison of variants for K_{13} and consistency test

Variant	V_1	V_2	V_3	V_4	V_5	v_i[%]	v_{gi}[%]	λ_{max}	CI	RI	CR
V_1	1	7	1/3	6	3	27.37	**1.03**	5.31	0.077	1.12	0.069
V_2	1/7	1	1/9	1/3	1/6	3.17	**0.12**	5.33	0.082	1.12	0.073
V_3	3	9	1	7	4	48.78	**1.84**	5.32	0.080	1.12	0.072
V_4	1/6	3	1/7	1	1/4	5.79	**0.22**	5.28	0.069	1.12	0.062
V_5	1/3	6	1/4	4	1	14.89	**0.57**	5.27	0.067	1.12	0.060
Total	**-**	**-**	**-**	**-**	**-**	**100,00**	**3.78**	**-**	**-**	**-**	**-**

Source: own calculation´s

The Impact of Remittance Inflows on Inflation: Evidence in Asian and the Pacific Developing Countries

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Abstract

Remittance is one of the most important external sources flowing into developing countries. Many studies have examined the impact of remittances on macroeconomic issues. However, there is a gap of empirical research on the impact of remittances on inflation in Asian and the Pacific developing countries. This study applied such econometrics methods as Ordinary Least Squares (OLS), Two-Stage Least Squares (2-SLS), Panel Generalized Method of Moments (PGMM) and panel Granger causality to investigate this impact. Annual data for the period 1985 – 2013 of 32 developing countries in Asian and the Pacific is used in this study. The results found that remittance inflows significantly increase inflation during the research period and there exists a one-way Granger causality from remittances to inflation.

Keywords: Asian and the Pacific developing countries, Inflation, remittance inflows, Granger causality.

JEL Classification: C33, E31, F22.

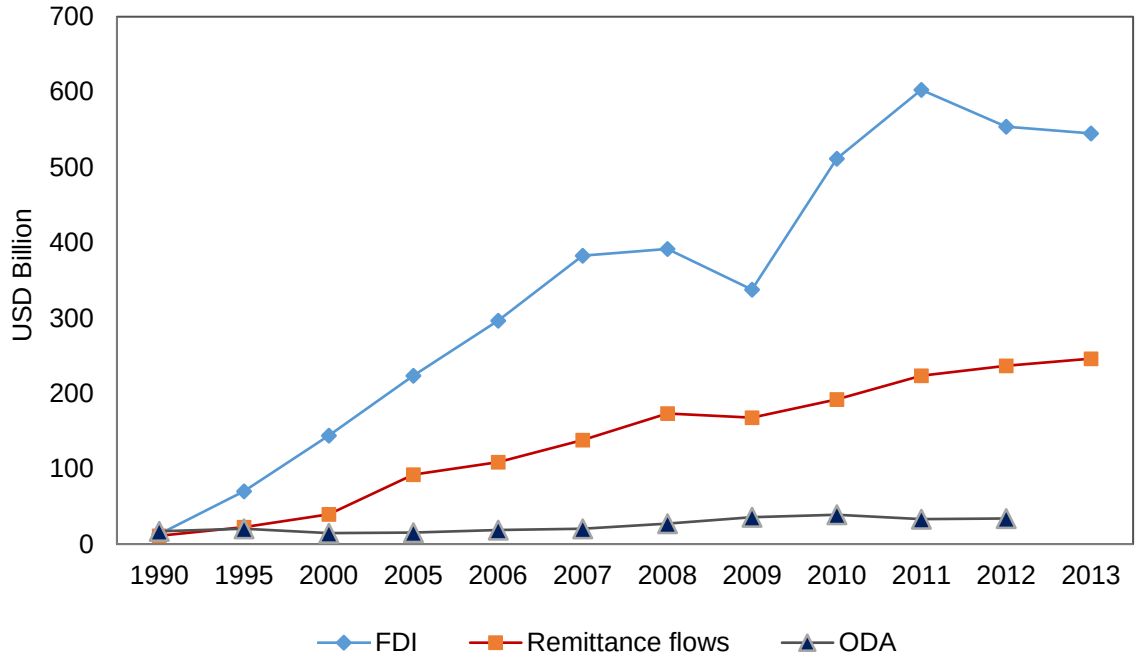
1. Introduction

Since the 1980s, remittances have been rapidly increasing in quantity in the developing world. Remittances are actually considered as an important capital source for fostering economic growth and reducing poverty in the developing countries. There have been many empirical researches on the effect of remittances on the macroeconomic issues in the recipient countries. In particular, some studies showed that remittance shave positive contribution to economic development such as economic growth promotion(Giuliano and Ruiz-Arranz 2009; Rao and Hassan 2011, Nyamongo *et al.* 2012), financial sector expansion (Chowdhury 2011, Aggarwal *et al.* 2011, Cooray 2012, Beine *et al.* 2012), economy's competitiveness enhancement (Bayangos and Jansen 2011), poverty alleviation (Acosta *et al.* 2008, Gupta *et al.* 2009, Imai *et al.* 2014), and improvement of household expenditures. (Combes and Ebeke 2011)

However, there are few studies on negative impact of remittances on the economy of recipient countries. For instance, some studies found the effect of remittances on social inequality (Acosta *et al.* 2008) or corruption (Berdiev *et al.* 2013). There seems to be a research gap on the relationship between remittance inflows and inflation for the case of the recipient countries in Asian and the Pacific or other continents. Consequently, the question of whether the relationship between remittance inflows and inflation is positive or negative or even insignificant remains unfastened.

In the recent years, Asian and the Pacific have emerged as a region with the most rapid growth of remittances in the world. According to data from World Bank, Asian and the Pacific's remittance inflows accounted for about 47% of the total amount of remittances worldwide. Within two decades, the remittances in Asian and the Pacific have increased 14 times, from $14.2 billion in 1990 up to $198.2 billion in 2010, and currently have a strong upward trend. In 2012, there are 20 Asian and the Pacific countries with the ratio of remittances to GDP greater than 1%. It is noteworthy that the amount of remittances is higher Official

Development Aid (ODA) and becomes the second capital inflow after foreign direct investment (FDI) with respect to the flows of foreign capital into Asian and the Pacific (Figure 1). However, in Asian and the Pacific region, remittances are mainly transferred into the developing countries. Specifically, the value of remittances into these countries accounted for 90% (in 2000) and 97% (in 2012) of the total amount of remittances into Asian and the Pacific countries.



Source: World Bank (World Development Indicators)

Figure 1 - Remittances and other resource inflows in Asian and the Pacific.

Therefore, how will inflation be affected by the remittances flow for the case of developing countries in Asian and the Pacific region? However, no matter how the impact of remittances is, this impact needs to be investigated as a basis for policies adjustments to stabilize inflation and maintain sustainable economic growth.

Consequently, this study was conducted to with the objective of examining the relationship between remittances and inflation in recipient countries with the using data from 32 developing countries in Asian and the Pacific. The research results may supplement in theoretical framework about the impact of remittances on the whole economy in general and the relationship between this foreign currency flow and inflation in developing countries in particular.

Next section presents the literature review by summarizing the empirical researches. Section III introduces the econometric model and describes research data. Section IV presents the regression estimations. Section V discusses the results of panel Granger causality. Finally, Section VI concludes remarkable findings.

2. Literature review and empirical researches

In fact, the remittance is one of the major foreign currency inflows that not only has the positive impacts on the economy but also causes macroeconomic instability, including the risk of inflation. However, in the world as well as in Asian and the Pacific region, there are few researches on the relationship between remittances and inflation, and the research results are inconsistent.

Narayan *et al.* (2011) examined the determinants of inflation using a sample of 54 developing countries in the world. Their result showed that remittances lead to an increase in inflation and the effect becomes more obvious in long term. However, this research is conducted using statistical data for period of ten years from 1995 -2004 and does not pay attention to particular feathers of remittances in the Asian and the Pacific developing countries. In addition, this study has not deeply analyzed the causal effect between remittances and inflation during the research period.

Continuously, Ball *et al.* (2012) applied a theoretical model and panel vector auto regression (PVAR) technique using a panel data for the case of 21 emerging countries in the world in the 1980-2010. Their research result found that remittances have increasing effect on inflation with a fixed exchange rate regime but decreasing impact on inflation under a flexible exchange rate regime. Termos *et al.* (2013) employed the panel regression methods (OLS and Anderson–Hsiao estimations) to prove the effect of remittance outflows on inflationin6 countries in the Gulf Cooperation Council (GCC) region over the period of 1972-2010. The result pointed out that the growth of remittance outflows decrease inflation rate in GCC countries.

In addition, Khan and Islam (2013) used VAR techniques to investigate the case of Bangladesh from 1970 to 2010. Research result proved that every 1% increase in the remittance inflows simultaneously increases the inflation rate at 2.48% in long term. However, their research found no short-term relationship between remittances and inflation in Bangladesh in this period. Also for Bangladesh's economy, Roy and Rahman (2014) applied VECM model to study the relationship between remittances and inflation in general as well as remittances and food inflation in particular. The results showed that the remittances increase both general inflation and food inflation. Furthermore, remittances were found to increase food inflation by 2.5 times compared with general inflation. More recently, Iqbal *et al.* (2013) investigated the nexus between remittances and inflation in Pakistan over the period 1980-2012. The finding evidenced that remittances have significantly positive impact on inflation. So this result recommends that the Pakistan's government should formulate policies to channel the remittances for productive investments (i.e. though investment in infrastructure) rather than for consumption by diverse means.

3. Methodology and data description

3.1. The econometric model

Based on the previous researches, we apply an economics model on inflation function to investigate the impact of remittance inflows on inflation for the case of Asian and the Pacific developing countries. The model is written as follows:

$$INF_{i,t} = \delta_i + \alpha_1 INF_{i,t-1} + \alpha_2 REM_{i,t} + \alpha_3 X_{i,t} + \varepsilon_{i,t} \quad (3.1)$$

i = 1,2,3..., N; t = 1,2,3..., T

Where, $INF_{i,t}$ denotes inflation which is defined by GDP deflator; $INF_{i,t-1}$ is the lag of inflation and REM is remittance inflows over GDP. Moreover, X denotes the matrix of variables such as economic growth rate (GDPG); government expenditure over GDP (GE); investment (INV) which is calculated by gross capital formation over GDP; the level of trade openness of the economy (OPENNESS); current account over GDP (CA). Finally, $\varepsilon_{i,t}$ is error term.

For the regression equation (1), three estimation methods with panel data including Ordinary Least Squares (OLS), Two-Stage Least Squares (2-SLS) and Panel Generalized Method of Moments (PGMM) are employed to examine the relationship between remittance inflows and inflation in recipient countries. 2-SLS and PGMM methods are applied with the aim of controlling for endogeneity in the research model and the results from OLS method is employed for comparison.

3.2. Data description

The research used annual data from 1985 to 2013 in 32 Asian and the Pacific developing countries. The data is extracted from the World Development Indicators database of World Bank.

Table 1 - Descriptive statistics of the variables

Statistics	Mean	Median	Maximum	Minimum	Std.dev
INF	7.88	6.75	280.1	-18.9	6.42
REM	6.65	2.94	49.2	0.03	9.51
GDPG	6.45	6.34	34.5	-14.1	5.15
GE	0.12	0.11	0.39	0.03	0.04
INV	28.3	26.5	69.2	13.03	10.0
CA	-0.23	-0.76	44.1	-32.5	11.8
OPENNESS	1.01	0.83	4.50	0.31	0.74

Source: World Bank (World Development Indicators)

4. Empirical results

In fact, remittance inflows are considered as foreign currencies; therefore, they may replace the domestic currency in recipient countries in function of intermediate exchange or reserve. Therefore, higher amount of remittances may increase the total intermediate exchange in the recipient countries. The growth of remittance inflows may increase both domestic consumption and aggregate demand of the economy. The effect of remittances on aggregated and will continue to expand with multiplier effect. Moreover, an increase in aggregate demand will raise the inflation rate, which is defined as the demand-pull inflation.

In addition, remittance inflows increase supply of foreign currency, and then exert pressure on decrease of exchange rate. The decline in exchange rate will impact on trade balance negatively. Therefore, the central bank needs to increase domestic money supply to buy foreign currency for raising the exchange rate. According to the Quantity theory of money, the growth of domestic money supply leads to higher inflation. Therefore, it is expected from this study that remittance inflows raise inflation in the developing countries in Asian and the Pacific region.

Table 2 - Estimation results

Statistics	OLS	2-SLS	PGMM
INF(-1)	0.2337*** (3.495)	0.2302*** (3.067)	0.8459*** (14.326)
GDPG	0.2943*** (3.430)	0.7843*** (3.456)	0.1916*** (2.890)
REM	0.1472*** (3.119)	0.1148* (2.109)	0.3160*** (3.404)
GE	-10.303 (-1.100)	-10.188 (-0.972)	-31.928 (-1.245)
INV	-0.0283 (-0.598)	0.1157* (1.758)	0.2061** (2.140)
OPENNESS	-0.3182 (-0.554)	-0.1187 (-0.293)	10.695*** (3.885)
CA	-0.081* (-1.805)	-0.1661*** (-2.727)	0.0877 (1.178)
Observations	206	197	178
R^2	0.219	0.072	-

Notes: t-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

The regression results were conducted using three estimation methods, including OLS, 2-SLS and PGMM. All regression coefficients representing the relationship among the variables are shown in Table 2. The main finding is the impact of remittances on inflation. As expected, the analysis results from three estimation methods show the positive relationship between remittance inflows and inflation and these impacts are statistically significant (1% and 10% level). These results confirmed that remittance inflows lead to upward pressure on inflation in the Asian and the Pacific developing countries.

According to the Impossible Trinity theory, the countries need to sacrifice an independent monetary policy for free capital flows (including remittance inflows) and fixed exchange rate regime. Thereby, the growth of remittance inflows leads to more complexity for monetary policy in stabilizing both exchange rate and inflation. This finding provides a significant empirical evidence for these countries to control inflation in the context of upward trend in remittance inflows.

The results also find that current inflation has a significantly positive relationship with inflation in the past, which reflects inertial inflation. Moreover, investment is also proved to have a positive impact on inflation because the growth of investment would increase the aggregate demand and then raise the demand-pull inflation.

The analysis results also find a significantly negative relationship between current account and inflation because 19 countries in the research sample (about 60%) run deficit on the current account in the research period. Moreover, current account deficit will reduce total intermediate exchange and decrease the pressure on inflation. From the analysis results, it is also confirmed that the economic growth and openness have significantly

positive impact on inflation for the case of these countries. However, the results find no impact of government expenditure on inflation in the research period.

5. Panel Granger causality test results

In this section, panel Granger causality test is applied to discover the existence of causal relationships between some macroeconomics indicators and inflation in Asian and the Pacific developing countries. The standard Granger causality test constructed by Granger (1969) is not suitable for panel data. Therefore, our paper employs the panel Granger causality test method developed by Hurlin and Venet (2001) and Hansen and Rand (2006). This method assumed that the autoregressive coefficients and the slope coefficients are constant in a panel VAR model. Some studies have applied the technique developed by Hurlin and Venet (2001) to test for Granger causality with panel data (Erdil and Yetkiner 2009; Töngürand Elveren 2014). On the basis of the researches by Hurlin and Venet (2001) and the previous empirical studies, we consider a panel VAR model to examine the causal effect of explanatory variables $x_{i,t}$ on dependent variable $y_{i,t}$ via estimating the following equation:

$$y_{i,t} = \sum_{k=1}^{q} \eta^{k} y_{i,t-k} + \sum_{k=1}^{q} \gamma_{i}^{k} x_{i,t-k} + v_{i,t} \quad (5.1)$$

where, t denotes periods, N are cross section units and i ϵ [1, N]. $x_{i,t}$ and $y_{i,t}$ are covariance stationary variables. η^{k} and γ_{i}^{k} are assumed to be constant over time.

Four methods of panel unit root test are employed in this paper, including LLC (Levin *et al.* 2002), IPS (Im *et al.* 2003), Breitung (Breitung 2000) and Choi (Choi 2001). The results of panel unit root tests indicate that some variables in the equation (1) are non-stationary at level. However, the testing results show that all variables are stationary at first difference at significant level of 1% (Table 3). Thence forth, the panel VAR model with first-difference variables is applied to test Granger causality in next step.

Table 3 - Results of panel unit root tests at level and first difference

Level							
	INF	**GDPG**	**REM**	**GE**	**INV**	**OPENNESS**	**CA**
LLC	-8.7387***	-7.3938***	1.1712	-1.6461*	-0.6275	0.7958	-4.5214***
IPS	-5.6499***	-10.072***	0.0088	-4.2250***	-1.3226*	-0.2374	-0.1377
Breitung	-5.8985***	-7.8966***	2.5355	-1.1846	-0.7239	-0.3184	-0.5100
Choi	-9.7081***	-8.8630***	0.0807	-4.0327***	-1.4162*	-0.2261	-1.3054*
First difference							
	ΔINF	ΔGDPG	ΔREM	ΔGE	ΔINV	ΔOPENNESS	ΔCA
LLC	-136.049***	-15.7057***	-6.8652***	-10.7189***	-15.1049***	-10.9788***	-5.5452***
IPS	-12.0171***	-15.6564***	-3.3355***	-14.9599***	-14.6015***	-15.2580***	-5.5585***
Breitung	-12.1627***	-13.2315***	-10.0065***	-12.4848***	-12.4667***	-10.1188***	-4.8764***
Choi	-20.9270***	-30.7138***	-7.0693***	-18.0762***	-13.1845***	-14.0531***	-7.1106***

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

On the basis of the technique developed by Hurlin and Venet (2001), we use two time stationary VAR models to examine the Granger causality between inflation and the explanatory variables in the equation (1).These VAR equations can be presented as follows:

$$\Delta y_{i,t} = \sum_{k=1}^{q} \eta^{k} \Delta y_{i,t-k} + \sum_{k=1}^{q} \gamma_{i}^{k} \Delta x_{i,t-k} + v_{i,t} \quad (5.2)$$

$$\Delta x_{i,t} = \sum_{k=1}^{q} \eta^{k} \Delta x_{i,t-k} + \sum_{k=1}^{q} \gamma_{i}^{k} \Delta y_{i,t-k} + v_{i,t} \quad (5.3)$$

The selection of the optimal lag length for panel VAR models relies on some criteria including Akaike Information Criterion (AIC), Schwarz Criterion (SC), Hannan-Quinn Information Criterion (HQ), Final Prediction

Error (FPE) and Likelihood Ratio (LR). The results from panel Granger causality tests between inflation and all explanatory variables are presented in Table 4.

The results from Table 4 indicate the existence of one-way Granger causality from remittance to inflation in Asian and the Pacific developing countries. It shows that remittance inflows increase inflation and this effect is statistically significant at 5% level.

Similarly, the results also find the existence of one-way causality from investment, trade openness and current account to inflation at 1% level of significance. Finally, it is found that there exists two-ways Granger causality between economic growth rate and inflation for the case of the Asian and the Pacific developing countries at significant level of 1%.

Table 4 - Results of panel Granger causality tests

Rem and Inflation		
Lag = 6	REM→ INF 16.17730**	INF→ REM 9.803004
Economic growth rate and Inflation		
Lag = 3	GDPG → INF 23.12958***	INF → GDPG 27.20191***
Government expenditure and Inflation		
Lag = 1	GE → INF 1.71526	INF → GE 0.857978
Investment and Inflation		
Lag = 7	INV → INF 18.96116***	INF → INV 9.314643
Trade openness and Inflation		
Lag = 2	OPENNESS → INF 49.74494***	INF → OPENNESS 1.055573
Current account and Inflation		
Lag = 2	CA→ INF 8.493614**	INF → CA 0.576376

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%.

Conclusion

Unlike the previous studies on the remittances-inflation nexus, a sample of 32 Asian and the Pacific developing countries over the period 1985-2013 was applied in this study to examine this relationship. The results found that higher remittance inflows raise inflation rate in these countries. In particular, results from three estimation methods applied in this research showed that there is a positive relationship between remittances and inflation. Furthermore, the Panel Granger causality test confirmed the existence of one-way causality from remittances to inflation in the research period. The research results complement and contribute to literature on the impact of remittances on the economy. The research findings also provide useful information about the impact direction of remittances on inflation, and thenceforth the policymakers in these countries can enhance the effectiveness of planning and operating monetary policy to stabilize inflation due to the upward trend in remittance inflows in Asian and the Pacific region.

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Appendix

Appendix 1 - List of countries used in research sample

Country	
Armenia	Lao
Azerbaijan	Macao
Bangladesh	Malaysia
Bhutan	Maldives
Cambodia	Mongolia
China	Nepal
Fiji	Pakistan
Georgia	Papua New Guinea
Hong Kong	Philippines
India	Samoa
Indonesia	Solomon Islands
Iran	Sri Lanka
Kazakhstan	Tajikistan
Kiribati	Thailand
Korea, Rep.	Turkey
Kyrgyz Republic	Vietnam

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Strategic Context of Russian Financial and Real Economy Sectors Interaction

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Abstract

Recent year's Russian economy has been continuously changing towards the un-raw model. In such circumstances, the active development of in-building of the goal-oriented financial institute into the process of managing the modernization in real sector of industry is of great value. Currently, the activity of Russian banks does not provide rational allocation of economic resources. This tendency is reflected in GDP's structure. All this stimulates the development of new form of real and financial sectors interaction. As well as industrial enterprises and banks that can provide an efficient use of the combined capacity of the participants. Besides, this can help to model a set of tools that will allow determining the optimal composition within the financial-industrial groups. In the article were present a model that allows investigating the impact of the effect of intra-group financing and management costs for the balance of corporate merger. This model can be used to analyze the conditions of the innovation-oriented financial-industrial groups' formation and to determine possible scope of investment. In accordance with the institutional and project-based approach the regulatory role of the state is grounded. It is assumed that the state stimulates the development and strengthening of strategic interactions of real and financial sectors of the Russian economy. As well as corresponding directions of the state impact at the processes are determined.

The model developed and the conclusions and recommendations presented can be used in the process of strategic decision-making in relation to the formation of institutional and infrastructural interactions of financial and industrial systems that are oriented at achieving the goals of modernization and sustainable development of the national economy in the long-term context.

Keywords: financial institutions, the real economy sector, modernization, financial and industrial group, strategy of the development, state regulation.

JEL Classification: G24, O25.

1. Introduction

Fundamental changes of the geopolitical and geo-economics' conditions oriented the vector of the strategic development of Russia towards the implementation of the non-raw model. This is directly connected with the objectives of rational allocation and use of financial resources for stimulating the development of the real industrial sector. New challenges facing Russian economy that have radically changed the environment, caused the modernization of management system of the industrial development, including those related to the formation of the new forms and methods of the interaction between the financial and real sectors of the economy. Here it is about the goal-oriented incorporation of financial institutions as an active element in the management of the modernization process in the non-raw sector of industry.

2. Literature review and the research methodology

Numerous studies in recent years show that the financial sector of economy decisively influences on the industrial growth in both developed and developing countries. Furthermore it sets the strategic vector for the economic entities and determines the efficiency of the industrial enterprises. Changing with the financial relationship the ratio between the investments directed to the simple and expanded reproduction, technical reconstruction and modernization of the existing production, the society affects the pace of economic development. (Boldyreva 2009)

Tendencies of the financial and real sectors of the economy are well represented in the scientific literature. Initially, in the works of classical economic theory (Schumpeter 1934, Keynes 1924) there is emphasized the

explanation of the reasons and factors of economic growth, as well as the justification of the state's role in ensuring the macroeconomic stabilization of the financial market and the national economy. Taking as a basis the classical approach to understanding the role of financial policy in the economic development of the West European and North American theorists (McKinnon 1963, Pagano 1992, Jovanovic 1997, Levine 2001) mentioned authors have proved the functional dependence between the sustainable development of the financial and real sectors of the economy. This became the basis for the modern understanding of such interaction.

As the evolution and the development of economic theory run, accompanied by the complexity facing financial systems of national economies, the emphasis in research of the real and financial sectors interaction was shifted towards the determining of the conditions and factors for their effective interaction and inter-subordination.Thus, the financial system has traditionally been viewed as a derivative of the real economy, which by itself has no effect on the economic growth, but only responds to the needs of the real sector (Robinson, 1952). And in Russian science interpretation of the category "financial system" is based on the underlying of the aggregate areas and elements of financial relations between all subjects of the reproduction process of distribution and redistribution of the gross national product (Litovskih, Shevchenk 2003). For the foreign science the "market" understanding of the financial system as a set of financial instruments, markets and institutions is more common (Goldsmith 1969). It assumes, that the financial system provides, in our opinion, a more complete understanding of the role of the financial sector in the development of the real economy and of the mechanisms of its impact on the functioning of the sector.

In recent years there took place a fundamental change in terms of the role of the financial sector in the development of the industry. This is associated with the ever-increasing diversion of financial resources from the real sector, that is not offset by any increase in the volume of public funding or preferential tax treatment, nor by giving the opportunities for a wider use of the bank credits (Fedulova 2010). As for the current state of the Russian economy's financial sector, some economists emphasize its weak link, or even a complete lack of connection with the real production: the income is provided mainly through the increased speculation rather than by the real investment.

Important steps in the conceptual understanding of these processes are associated with the works of the next Russian economists (Galanceva, Ahmedzjanova 2012, Lemeshhenko 2010, Knjazev 2011), who describe the prospects of the development of the industrysectors in the light of the investment activities of financial institutions. In accordance with the views of the authors, the financial sector is a transactional subsystem, which links the financial flows between the actors of the economic system. Such view became a basis for a methodological approach to the study of the mechanisms of the real sector development in Russian industry. According to such approach the formation of institutional infrastructure interactions of the financial and industrial spheres becomes more significant.

3. The analysis of the current state. Problem settlement

From the perspective of a strategic approach the process of goal-oriented interaction between the financial and industrial sectors (subsystems) of national economy is viewed as the realization of relations between their entities. It is assumed that such relations include the formation, distribution and use of financial capacity in the direction of initiating and supporting projects of modernization, innovatization and import substitution in the real sector. It should be noted here that under the financial capacity is assumed the ability of the system to provide funding services to the extent and quality that are required for the effective implementation of such processes in the industrial sector. Such services should be adequate (not contrary to, but supportive) to the modern trends of modernization and innovative development of the whole national economy.

In this regard, it should be noted that the strategic diagnosis of the potential of financial and industrial sectors interaction is of great significance. As it allows creating the model of effective development of these processes based on early recognition and overcoming the limiting factors. Namely, those elements of the financial sector, that can limit its potential as a key factor of industrial modernization due to the lack of their sufficient development for one reason or another. That's why they determine the main direction of the management influences. In addition, the strategic diagnosis of the interconnectedness level by goals and objectives of the financial and real sectors allows controlling the implementation of the national strategy for socio-economic development and achievement the global goals.

Thus, the competent financial and industrial policy assumes using the strategic approach and the effective decision-making tools. In this regard, it should be noted that due to the obvious economic and development strategies contingency, the correction of the macroeconomic forecasts will end with the appropriate correction of

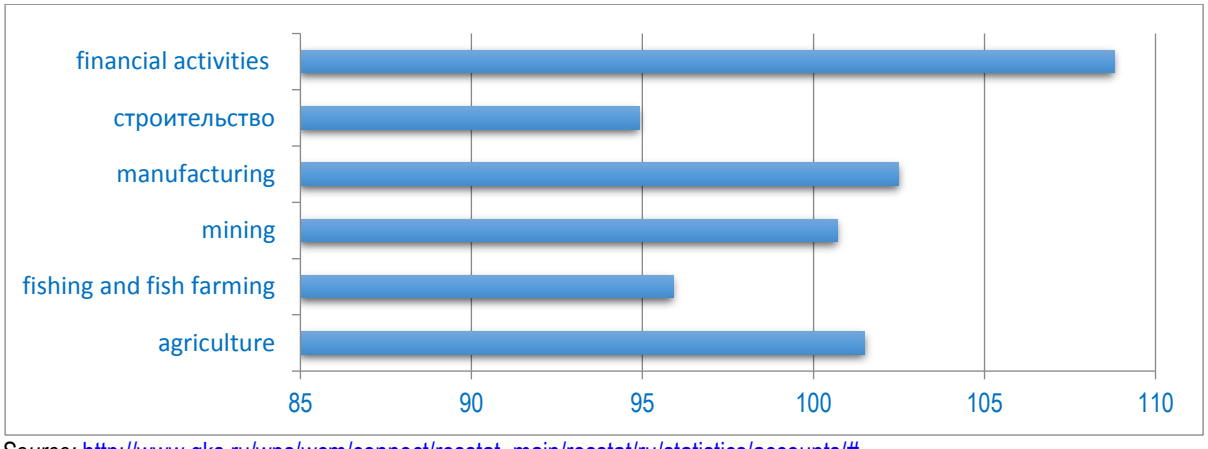
plans and programs of strategic development of the industry and the financial system. At the same time, as an essential component of the modernization of the industrial potential of Russia is the activation of innovative processes that provide economy transition to the perspective technological structures, the development of adaptive mechanisms for effective management of the financial and industrial sectors interaction are of the particular importance from the perspective of a strategic approach.

It appears that the basis for such a mechanism should be a concept, according to which the balance of the resource, institutional and management actions that take place in the named sphere of interaction, can only be achieved on the basis of aggregate policy-oriented measures that allow to achieve a compromise between the state and market regulation of the desired development of industry and financial systems (Matveeva, Chernova 2015). This is also important for the reason that in the context of global economic changes taking place in the competition of industrial innovation is not just a competition of individual enterprises for markets and financial resources, and is actually a competitive economic systems, providing a strong position of the country and its industrial business world. Strengthening the global geopolitical and economic threats assumes the selection of such economic mechanisms and approaches that can support a sustainable interaction between the financial institutions and industrial enterprises under the minimization of external risks. This is possible due to the formation of internal points that could stimulate the domestic demand for domestic products, as well as to ensure the necessary level of financial resources for the investment and adequate to the increasing demand level and structure of industrial production.

According to Je.R.Galimova, the socio-economic nature and institutional forms of the interaction between the real and financial sectors are changing with the development of the economic system, marked by new forms of manifestations, conditions and signs of relationship (Galimova 2007). Thus, in the conditions of market relations development in Russia the most widespread forms of cooperation were such as leasing, participation in the share capital, the foundation of branch banks, etc. During the crisis time (late 90s XX century, 2007-2009) the speculative and short-term motives were prevailing.

Currently existing the application of the real sector of the Russian economy to finance import-substituting production and technological modernization involves changing the concept of interaction between the real and financial sectors in the direction of orientation of the latter to provide a stable, innovative growth of the real sector in the long term. However, as the results of scientific studies, as well as real economic practice of recent times, show, the financial sector in Russia does not provide a rational allocation of economic resources, which is reflected in GDP structure.

Thus, in the real sector of the economy there is a reduction of GDP: agriculture - 3.2%, construction - 2.4%, while the financial sector GDP grew by 12%. The values of volume indices of the real GDP and gross value added in the financial sphere and in specific sectors of industrial production in 2014 are represented in Figure 1. Wherein the share of the real economy sector production is equal to a fifth technological structure and is not more than 6-8%.



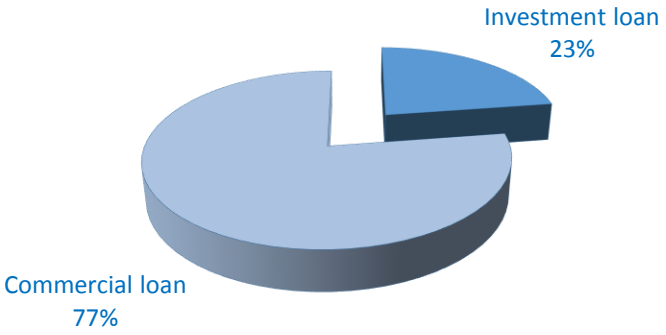
Source: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#

Figure 1 - Volume indices of GDP and gross value added in some sectors of activity in Russia, %

For the Russian real sector it is common the presence of excess tax burden imposed excessive costs, capital outflow, which significantly enhances the business risks in the circumstances of increased external threats. The real sector of the economy is not almost provided with "long" loans. According to Academician of

Russian Academy of Science, Sergei Glazyev, inefficient monetary-credit policy of recent years has led to a contraction of the money supply; loans have become expensive and inaccessible for manufacturing enterprises.

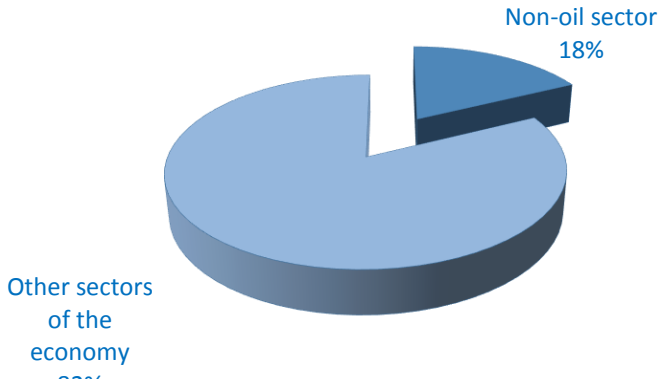
This, in particular, is confirmed by indicators of lending to the enterprises of various spheres of industrial production in South-Western Bank of Sberbank of Russia. It is the largest representative of the banking sector in the South of Russia. So, according to the data from 04/08/2015, the ratio of the commercial and investment loans in the named above bank is 77% and 23%, respectively (Figure 2). While it is known that it is an investment loan that is aimed mainly on the realization of the long-term projects of industrial development.



Source: http://www.sberbank.ru/ru/press_center/tb_all?id114=34640

Figure 2 - The ratio of the investment and commercial lending in the South-West Bank of Sber bank of Russia

In addition, the share of credit resources attributable to the non-raw sector of the economy is only 18% of their total volume (Figure 3).



Source: http://www.sberbank.ru/ru/press_center/tb_all?id114=34640

Figure 3 - The share of loans issued by the South-Western Bank of Sberbank of Russia, accounting for the non-raw sector of Russian industry

Thus, it is obvious that the current credit policy of the institutions of the financial sector in Russia is not focused sufficiently on the support of breakthrough innovation projects of the industrial sphere and therefore does not provide an adequate growth in the real economy. This causes the search for new mechanisms and instruments of mobilization and rational use of the financial infrastructure potential in the implementation of the strategic priorities of the national economy.

4. The interaction of the financial and industrial economy sectors: ways to improve

According to the international experience evidence, one of the fundamental factors of industry modernization is the availability of economic entitiesinteractions integration (clustering, networking) in relation to the implementation of technological innovation. It is based on theinteractions network formation where most of the resources are provided by the capitalization of industrial enterprises. This assumes the binding of the economic resources in order to upgrade them on the basis of production and technological innovation.

In its turn, practice shows that the financial-credit organizations presencein the industrial cluster increases the efficiency of the innovative capacity of enterprisessignificantly. This can provide additional potential of the resource capitalization by includingthe additional financial resources into the balance of economic assets (for example, previously inaccessible sources of venture capital financing). Considering that the potential of short-

term financing currently is clearly insufficient for the projects of technological innovation implementation, in case of integration of structures formation in the form of financial and industrial groups the possibility of capitalization of its resources increases.This is due to the lower cost of funds attracted from the external sources by engaging potential of the strategically important investor, as a commercial bankinto the process of innovation. An additional advantage, as the President and Chief Executive Officer of the corporation "Interpipe" E. Bernshtam remarks, is the ability to simplify the allocation of financial resources, including investment and increasing of the capacity to attract outside investments, as well as effectiveredistribution of funds between business areas in order to maximize the capitalization of the business as a whole (Bernshtam 2012). Bank is interested in participating in such a corporate structure because of the new possibilities of the development and strengthening of the financial stability of the bank, where the funds, deposits, securities and other assets of members of integrative associations are concentrated.

Banks as well as industrial enterprises are interested in such integration and in the expansion of investment space. Growth of the financial stability of these structures compared to the individual enterprises can reduce the investment risks.

Long-term financing of industrial activities in the integration framework can be carried out by the bank in the following ways:

- by providing loans by the bank, as well as by the financial, insurance, investment companies and pension funds with the assistance of the bank;
- through the loans with issuing bonds, bills and other debt liabilities;
- through the participation in the share capital of companies;
- by attracting foreign investors.

As the macroeconomic prerequisites are being created for ensuring the effectiveness of long-term crediting of industrial production, stock ownership will also help to activate the investment of the bank into the loans, primarily, in the controlled entities. At the same time the investment in the internal group of companies will develop, associated with the parent banks of the insurance companies, investment funds and other financial institutions.

To determine the optimal compound of the financial and industrial structure with the participation of a commercial bank can be used an economic-mathematical model.Such model is supposed to allow exploration of the effect of intra-group financing and management costs impact on the balance of corporate merger. The model of the corporation optimization, which unites the potentials of the bank, that is included in its structure on a long term basis, as well as the industrial enterprises, may look as follows.

Production functions of the entities within the corporation are (1):

$$q_i = f_i(x_i^j), \quad (1),$$

where q_i -the production volume at the enterprise i, x_i^j - costs of the j- type resource by i-th enterprise for the production or providing services.

Profits of an enterprise 'i', that is in a group, as a result of its production activities andprovided ofthe bank loan in the amount of k_i ^ can be representedas follows (2):

$$\begin{cases} \pi_i = \varphi_i(x_i^j, k_i) = v_i q_i - \sum_{j=1}^{J} w^j x_i^j - h_i k_i \to max \\ k_i \geq 0, i = \overline{1,n} \end{cases} \quad (2)$$

where: v_i– the value of output of production volumes in the enterprise i;

w_i ^ j –the value of the resource 'j' cost of the enterprise i;

k_i - the size of the loan for the company i;

h_i - the share of the bank loan, which is to be paid over the period of the loan, with interest for the i-th enterprise.

Then π (0) - is the operating profit without the loan. Bank, in its turn, also tends to maximize its profit. The bank's income from participation in the intra-corporate activities can be expressed as follows (3):

$$\begin{cases} \pi_b\ (k_{bi}) = \sum_{i=1}^{n} h_i\, k_{bi} + h_{bm} k_{bm} \to max \\ \sum_{i=1}^{n} k_{bi} + k_{bm} \le Q \\ k_{bi} \ge 0 \\ k_{bm} \ge 0 \end{cases} \quad (3),$$

where Q – maximum of the resources, that are forwarded by the bank for crediting if an enterprise in the volume of k_{bi} and the parent company in the volume $k_{bm}$of production output, h_{bm}- is a share of the bank loan that is to be repaid over the period plus interest for the loan to the parent company.

Let's assume that h' - is the level of the impact of the financial bank resources by investing them into the alternative projects out of the corporative structure. Than the necessary condition of the enterprise crediting in the volume Q should be the following inequality (4):

$$\frac{\sum_{i=1}^{n} k_{bi} + k_{bm}}{Q} \ge h' \quad (4)$$

This inequality ensures the bank that the impact of credit operations will be not less than if invested in alternative projects. The implementation of such strict inequality in this dependence guarantees that the bank will be interested exactly in this kind of activity.This meansthrough the participation as a financial unit in a financial unit in the structure of the corporate type that is under consideration, as the most efficient investment of its free funds. In case if the income on the bank's resources allocated to them for the inter-group purposes is less than h', this indicates that the Q value should be revised in order to bring it in line with the opportunities and needs of the integrated structure formed. The parents 'company profit will be as follows (5):

$$\begin{cases} \pi_m(k_{bm}, d_i\ , d_b) = v_m q_m - \sum_{j=1}^{n} w^j\, x_i^j + \sum_{i=1}^{n} d_i\, \pi_i + d_b \pi_b - h_m k_{bm} \to max \\ 0 \le d_i \le 1 \\ 0 \le d_b \le 1 \end{cases} \quad (5)$$

where d_b and d_i, - the share of the bank and parents' company of the share capital of the group.

Taking into account all the given arguments the fundamental relations of the model can be represented as follows (6):

$$\begin{cases} \pi_i = \varphi_i\ (x_i^j, k_i) = v_i q_i - \sum_{j=1}^{J} w^j\, x_i^j - h_i k_i \to max,\ k_i \ge 0,\ i = \overline{1,n} \\ \pi_b\ (k_{bi}) = \sum_{i=1}^{n} x_i\, k_{bi} + h_m k_m \to max,\ \sum_{i=1}^{n} k_{bi} + k_{bm} \le Q,\ \frac{\sum_{i=1}^{n} k_{bi} + k_{bm}}{Q} \ge h^{'}, k_{bi} \ge 0, k_m \ge 0\ , \\ \pi_m\ (k_{bm}, d_i, d_b) = v_m q_m - \sum_{j=1}^{n} w^j\, x_i^j + \sum_{i=1}^{n} d_i\, \pi_i + d_b \pi_b - h_m k_{bm} \to max, 0 \le d_i \le 1 \end{cases} \quad (6)$$

Balance of this model will be the set of (k *, d *, h *, $(x_i^j)^*$).

A large commercial bank can become a parent company by itself through the purchase of shares, the purchase of stakes in asset management, buying the debts of the industrial enterprises, etc. This can give it an opportunity to reduce significantly the investment risks due to the control trengthening over the loans usersand ensuring greater validity of credit resources through the collaborationinbusiness plan development with partners. In this case, the bank acts as the organizing center. Usually this helps the bank to carry out a large-scale capital investment in production. Here all depends on the bank's ability to mobilize and to use resources efficiently. The main challenge is the concentration of investments in the most perspective areas, as well as financing of innovations that have economic value.

In this regard it appears that the growing influence of the financial sector in the modernization of the real economy, including on the basis of the integration process, can be achieved by strengthening of the regulatory role of the state.It should be noted that we are not talking about the direct state regulation, but about co-regulation which suggests that the market mechanism and state regulation are not antagonistic, but complementary phenomena" (Nikitaeva 2007). State's role in this context can be defined as institutional mediation, expressed in forming a unified scientific and methodological basis of the strategy, methodology and mechanisms for the implementation of fiscal policy and in organization of the institutional consolidation of the rules and norms of financial market participantsbehavior.In other words, the state regulation of the interaction of financial and real sector should be based on the following principles:

- the sufficiency and a variety of forms and methods of financial resources attracting for the modernization of the real sector of Russian economy;

- the purposeful orientation of potential financial and credit institutions to achieve resource maintenance processes of the real economy modernization;
- the focus on the development of integration and networking cooperation of financial and credit institutions and industrial enterprises of the real sphere.

Solution of the mentioned problems is represented as the adaptation and correction of the forms, methods and technologies for the strategic management of public finances, focused on the support of non-oil sectors from the perspective of institutional and project approaches.

The institutional approach to the problems researchof Russian economy transition to the non-oil model of the development based on the increased participation in this process of the financial institutions, due to the fact that effective policies to support specific sectors or areas of activity, especially in the current environment of macroeconomic instability, determines the need for "simultaneous concentration on local socio-economic potential and regional institutional conditions" (Kolesnikov and Darmilova 2009). From the perspective of supporters of the theoretical direction, it largely institutional mechanisms will ensure the realization of the latent potential of non-primary sector of the economy in the implementation of modernization projects.From the perspective of the supporters of the theoretical direction, institutional mechanisms can ensure the realization of the latent potential of the non-oil sector of the economy in the implementation of modernization projects.

Project approach to managing the process of the real economy financing has a number of methodological features and instrumentation capabilities, like the following:

- strict orientation on the results - financial resources are directed not to the region or sector but in particular project;
- innovation – financial support will be provided to the innovative-oriented projects;
- elaboration of the project instruments by the state;
- high level of all project participants coordination;
- strict responsibility for the proper use of funds;
- finding the additional sources of funding and investors through the use of evidence-based evaluation of the innovative projects effectiveness taking into account their specific features, etc.

Conclusion

Thus, the basic problem of thedevelopmentof non-oil vector of Russian industry formation is the weak focus of the national financial system on the development of the real economy sector. When determining the basic vectors of thestate policy for the industrial development, it is necessary to focus on the fact that its main purpose is to provide a stable, innovative growth of the real sector in the long term.This should be considered as an imperative of institutional transformationsin regard to the industrial enterprises and enterprises in the financial and credit sphereinteractions.

Basic directions of the strategic interactions development of Russian sectors of economy should be:

- formation of the new forms and technologies of interaction of the non-oil sector and credit-financial enterprises that will be focused on the technological innovation transfer with the result-focused orientation;
- formation of the institutional environment, that allow developing new economic relations in the plane of interaction between financial institutions and industrial companies;
- identifying and supporting companies and their associations that can become the engines of growth of non-oil industries and leaders of import substitution.
- Implementation of these measures will enhance the capacity of non-oil development of the real sector of the Russian economy.At the same time special attention is paid to the state in the formation of supportive institutional structure of the society for the financial and industrial sectors interaction, as well as in opposition to external threats of political and economic nature.This is particularly due to the fact that "well-planned public investment projects tend to stimulate the accumulation of private capital, that seeks access and tries to reach innovative projects". (Amsden, Intriligator, McIntyre, Taylor 1996)

Implementation of the state policy focused on the design of the effective model of the financial and real sectors' interaction will strengthen the targeting of financial resources of innovative development and will provide better integration of the entities of industrial integration financial potentials towards the direction of the fullest appropriate targets of national strategies.

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Real Exchange Rates, Current Accounts and Competitiveness Issues in the Euro Area

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Abstract

The lack of nominal exchange rate flexibility in the monetary union induced the growing divergence of trade performance among the member countries. Intra-Eurozone current account imbalances among countries with different income levels per capita fuel discussions on competitiveness channels under common currency. Asynchronous current account trends between North and South of the Euro Area were accompanied by significant appreciations of real exchange rate in the periphery economies originating in the strong shifts in consumer prices and unit labor costs in these countries relative to the countries of the Euro Area core. The issue is whether the real exchange rate is a significant driver of persisting current account imbalances in the Euro Area considering than, according to some authors, differences in domestic demand are more important than is often realized. In the paper we analyze main aspects of current account adjustments in the Euro Area member countries.From estimated VAR model we calculateimpulse-response function of the current account to the real exchange rate (REER calculated on CPI and ULC base) and domestic demand shocks and variance decomposition to examine the relative importance of both shocks.Our results indicate that while the prices and costs related determinants of external competitiveness affected imports more significantly than exports, demand drivers shaped current account balances mainly during the crisis period.

Keywords: current account, real exchange rate, economic crisis, vector autoregression, impulse-response function, variance decomposition.

JEL Classification: C32, F32, F41.

1. Introduction

Euro Area member countries are still suffering from negative effects of the crisis period. Increasing economic imbalances have become obvious in the Euro Area since the start of the monetary union. Differentials in productivity, inflation and unit labor costs were indeed very persistent (Comunale and Hessel 2014). Economic and debt crisis highlighted their existence and impropriate economic policy mix has even intensified their negative implications. Economic imbalances are obvious not only among different countries (e.g. rising disparities between core and periphery) but also within particular member countries of the Euro Area (Gruber and Kamin 2005). In addition, we can observe clear contagion effect among the European Union member countries. Disturbances and distortions are fairly transmitted on both intra-country and cross-country levels. (Berger and Nitsch 2010)

Exposure of countries to negative implications of exchange rate volatility (Stavárek 2011) represents one of areas of empirical investigations related to the fixed versus flexible exchange rate dilemma (Calvo and Reinhart 2002). Analysis of various aspects of exchange rate shift and its influence on macroeconomic performance provides information on cross-country expenditure shifting/switching effects. The lack of nominal exchange rate flexibility in the monetary union induces the growing divergence of trade performance among the member countries with different income levels per capita (Chen, Milesi-Ferretti and Tressel 2012). Fixed nominal exchange rate triggers real exchange rate adjustments through relative price and unit labor costs levels alone, which can be difficult in the presence of rigidities in national goods and services markets. (Berger and Nitsch 2010)

Investigation of relative changes in real exchange rates and associated adjustments in current accounts reveals causal relationship between real exchange rate and international competitiveness (Rusek 2013). Shifts in competitiveness associated with real exchange rate movements correspond to changes in relative prices and unit labor costs. Real exchange rate appreciation makes domestic goods less competitive because their prices increase more than foreign prices. As a result, real exchange rate appreciation and subsequent decrease in foreign competitiveness of domestic goods on foreign as well as domestic markets shifts expenditures from domestic goods to goods produced abroad (Mirdala 2013a). Negative effect of the real exchange rate appreciation on the current account is significantly determined not only by a shift in demand preferences but also

by the ability of domestic economy to shift unused production capacities to more perspective areas with high growth perspectives (Chinn 2005).

The establishment of the Euro Area and introduction of the euro represent a crucial milestone in the ongoing discussions highlighting positive and negative implications of the nominal exchange rate inflexibility (Bayoumi, Harmsen and Turunen 2011). Although the contemporary evidence on empirical validity of causal relationship between the real exchange rate and the current account seems to be limited (Arghyrou and Chortareas 2008), we emphasize challenges addressed to the phenomenon of internal devaluation (Armingeon and Baccaro 2012) and wide range of its direct and indirect effects in the Euro Area member countries.

While internal devaluation in countries with nominal exchange rate anchor may improve price competitiveness and boost both internal and external demand, risk of deflationary pressures substantially reduce vital growth incentives (Hetzel 2015). Moreover, ECB (European Central Bank) by inflating its monetary base fueled by another wave of quantitative easing does not primarily follow idea of economic recovery (Christensen and Gillan 2015). Low interest rate environment may be followed by euro depreciation improving competitiveness of European producers on the foreign markets. However, as the most of transactions on the EU single market are conducted in euro among its member countries, Euro Area seeks common reasonable automatic mechanisms that would help to improve its internal competitiveness. (Peersman 2011)

Economic crisis intensified demand driven redistributive effects that induced diverse and spurious effects on current account adjustments. While current accounts temporary deteriorated (with quite different intensity in each particular economy) at the beginning of the crisis period (Kang and Shambaugh 2013), at the later stages we have observed a positive trend (either improvement or stable outlook) in almost all Euro area member countries reflecting intensified redistributive effects of the crisis on the cross-country expenditure shifting (Gaulier and Vicard 2012).However, existing nexus between surpluses in the core with deficits in the periphery addresses issues in both trade and financial linkages (Hobza and Zeugner 2014). While current accounts between North and South of the Euro Area do not necessarily have to be balanced, existence of large and persisting bilateral current account imbalances may induce policy tensions or rigidities (Berger and Nitsch 2012). Euro area is in a vicious circle and economic policy of European Union faces a real challenge.

Intra-Eurozone current account imbalances among countries with different income levels per capita fuel discussions on competitiveness channels under common currency (Belke and Dreger 2011).Disinflation followed by deflationary pressures induced shifts in competitiveness associated with real exchange rate adjustments through relative price levels. While external imbalances in countries on the periphery of the Euro Area were mainly driven by domestic demand boom fueled by increasing financial integration (Chen, Milesi-Ferretti and Tressel 2012), the role of changes in the competitiveness of the Euro Area core countries may be disputable. As a result, limited effectiveness of internal devaluation in reducing current account imbalances in the Euro Area could be expected (Sanchez and Varoudakis 2013). However, asynchronous current account trends between North and South of the Euro Area were accompanied by significant appreciations of real exchange rate in the periphery economies originating in the strong shifts in consumer prices and unit labor costs in these countries relative to the countries of the Euro Area core (Holinski, Kool and Muysken 2012). As a result, the issue is whether the real exchange rate is a significant driver of persisting current account imbalances in the Euro Area. (Lane and Milesi-Ferretti 2002)

In the paper we examine competitiveness issues associated with current account development in the Euro Area member countries. Our main objective is to examine effects of the unexpected shifts in real effective exchange rates (REER) and overall demand and associated current account adjustments in the core and periphery of the Euro Area. We employ VAR methodology to analyze responsiveness of current account to the real exchange rate (REER calculated on CPI and ULC base) and demand shocks as well as the relative contribution of both shocks in explaining adjustments in current accounts. Possible implications of the crisis period will be considered by the comparison of estimated results for two models estimated for each individual country for two subsequent periods 2000-2007 (pre-crisis period) and 2000-2014 (extended period). In both models for each country we alternate both CPI and ULC based REER. We suggest that a comparison of the results for models with different time period is crucial to understand redistributive effects and competitiveness issues associated with real exchange rates shifts (induced by different dynamics in the consumer prices and unit labor costs movements between the core and periphery of the Euro Area) and overall demand shifts.

Following the introduction, we provide brief overview of theoretical concepts referring to the relationship between the real exchange rate dynamics and current account adjustments in Section 2. In Section 3 we provide an overview of the empirical evidence about current account imbalances in the Euro area member countries.

While the recent empirical literature provides lot of evidence about the effects of real exchange rates shifts on current accounts, conclusion are quite different according to the relative importance of changes in competitiveness and its role in triggering intra-Eurozone current account imbalances.In Section 4 we observe main trends in the current account development in the Euro area member countries and highlight some stylized facts about common implications resulted from its determination. In Section 5 we provide a brief overview of the VAR model (recursive Cholesky decomposition is employed to identify structural shocks) that was employed to examineresponsiveness of current accounts to the positiveone standard deviation real exchange rate and demand shocks in the Euro Area member countries as well as the relative importance of both shocks in explaining adjustments in current accounts. In Section 6 we discuss the main results.

2. Overview of the literature

Bussiere, Fratzscher and Muller (2004) analyzed the current account determination in 33 countries employing an intertemporal approach via regression analysis considering effects of fiscal stance of government as well as real exchange rate deviations. Authors suggest that current account balances of countries included in the model are close to their structural current account positions confirming a validity of the intertemporal approach. Arghyrou and Chortareas (2008) investigated dynamics of current account adjustments and the role of real exchange rates in the current account determination in the EMU. Despite a limited evidence of most theoretical models in explaining causal relationship between real exchange rates and the current account, authors confirmed above relationship with significant validity and subject to non-linear effects. Lee a Chinn (2006) analyzed implications of real exchange rate fluctuations on the current account development in 7 most developed industrial countries. Authors suggest that while the variation in the current account is mostly determined by temporary shocks, permanent shocks seem to be much more crucial in explaining the variation in the real exchange rate. At the same time, their results confirmed validity of the intertemporal opened economy model. Sek a Chuah (2011) explored causality between the exchange rate changes and the current account adjustments in 6 Asian countries. Authors surprisingly conclude that the current account did not change much expected after the crisis. They suggest it is due to adjustments that authorities made in countries' financial policies to reduce the excessive exchange rates volatility. Obstfeld a Rogoff (2005) focused their investigation on estimation of effects of global current account imbalances reduction on exchange rates (USD, EUR and Asian currencies) equilibrium path in the model with alternative scenarios.Gruber and Kamin (2005) examined the global pattern of current account imbalances by estimating panel regression models for 61 countries over the period 1982-2003. Authors suggest that traditional determinants do not provide a comprehensive explanation of large current account imbalances for the US economy and Asian countries emphasizing an increased importance of role of financial crises itself. Mendoza (1995) examined the relationship between terms of trade, trade balances and business cycles using a three-sector intertemporal equilibrium model and a large multi-country database. His results indicate that terms of trade shocks associated with sudden real exchange rate shifts account for nearly ½ of actual total output variability.

Bayoumi, Harmsen and Turunen (2011) examined competitiveness issues within the Euro Area. Authors estimated responsiveness of both intra and extra Euro Area export volumes to changes in competitiveness using panel data. Their results suggest that long-term price elasticities for intra-Euro Area exports are at least double those for extra-Euro Area exports, so traditional real effective exchange rate indexes may overstate the effectiveness of euro depreciation in restoring exports growth in the Euro Area periphery. Belke and Dreger (2011) traced current account imbalances according to the catching up and competitiveness factors using paneleconometric techniques. Their results are in line with intertemporal approach confirming the existence of asymmetric imbalances between rich and poor countries. Moreover, real exchange rate movements are associated with changing patterns in current accounts that is why authors provide a rich evidence about the changes in competitiveness associated with unit labor costs adjustments. Chen, Milesi-Ferretti and Tressel (2012) examined origins of the current account imbalances within the Euro Area countries in terms of the relative importance of intra-Euro Area factors and external trade shocks. While generally confirming the traditional explanations for the rising imbalances, authors highlighted a large impact of competitiveness issues and asymmetric trade developments vis-à-vis China, Central and Eastern Europe and oil exporters. Comunale and Hessel (2014) aimed to investigate the relative role of price competitiveness and domestic demand asdrivers of the current account imbalances in the Euro Area by employing panel error correction models for exports, imports and the trade balance. Their results indicate that although differences in price competitiveness have an influence, differences in domestic demand are more important than is often realized. Gaulier and Vicard (2012) analyzed

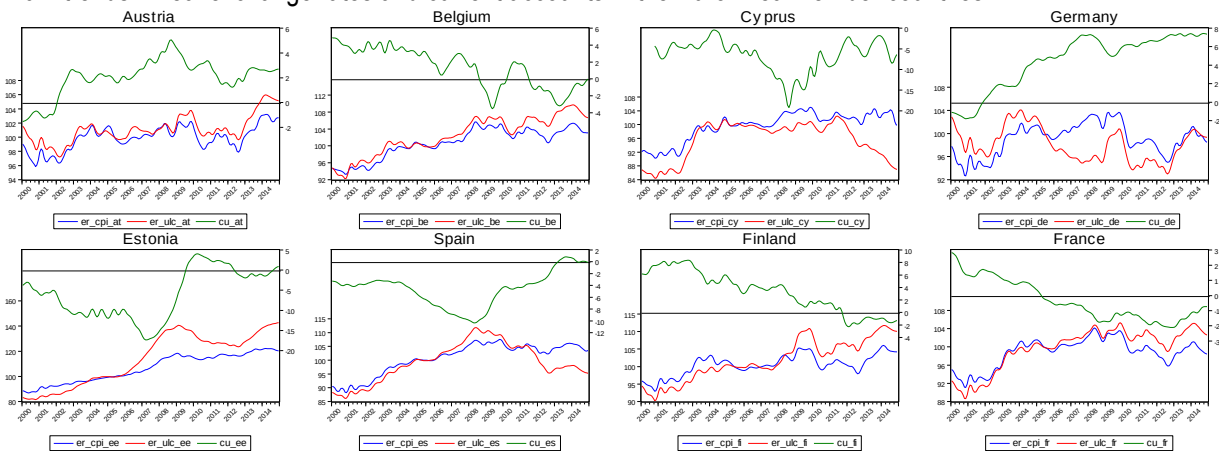
design patterns of current account imbalances in the Euro Area. Authors investigated that while current account dynamics are correlated with unit labor costs (ULC) and imports, they are not correlated with exports. Losses in cost competitiveness do not appear to have been the cause of deficits, but rather a symptom of a demand shock leading to price-level drift in the non-tradable sector.Holinski, Kool and Muysken (2012) documented a growing divergence between current account imbalances in northern and southern euro area countries from 1992 to 2007. Authors suggest that systematic monitoring of external imbalances and implementation of better coordinated policies to prevent the emergence of unsustainably large imbalances in the euro area is advisable.Rusek (2013) analyzed the long-term dynamics of the competitiveness in the individual Eurozone countries by estimating both external (current account) and internal (fiscal stance and credit dynamics) positions. Author suggest that changes in competitiveness associated with real effective

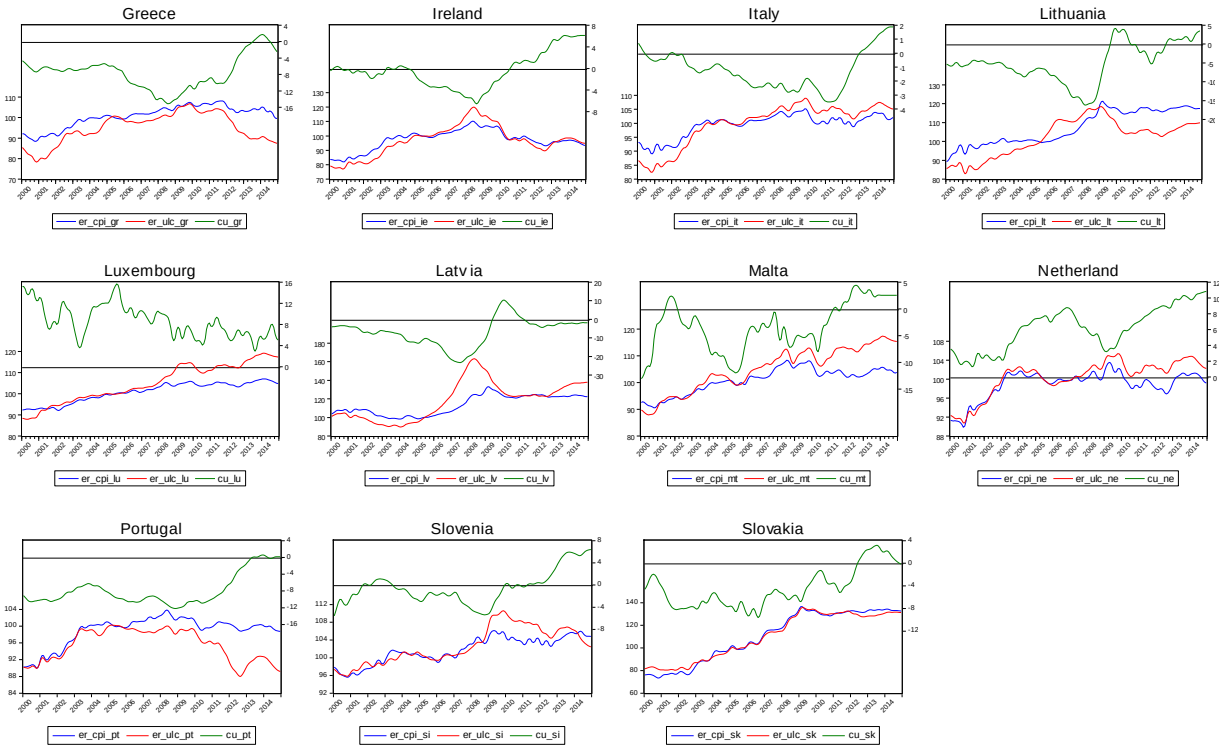
Berger and Nitsch (2010) studied bilateral trade balances for 18 European countries during the period 1948-2008. Following their results it seems that the introduction of the euro was followed by a considerable widening in trade imbalances among Euro Area members, even after allowing for permanent asymmetries in trade competitiveness within pairs of countries or in the overall trade competitiveness of individual countries. Real exchange rates and growth differentials significantly determined the direction of imbalances. In their later study (Berger and Nitsch 2012) authors examined association between trade and financial linkages on the same sample of the countries. Hobza and Zeugner (2014) explored the role of financial links in the accumulation and then adjustment of current account imbalances in the Euro Area. Their results indicate that the geography of financial flows can differ quite markedly from trade flow patterns and suggest that the nexus between surpluses in the 'core' with deficits in the periphery went along financial rather than trade interlinkages.Lane and Milesi-Ferretti (2002) examined the link between the net foreign position, the trade balance and the real exchange rate. The authors shown that the relation between external wealth and the trade balance within and across countries are related to the rates of return on external assets and liabilities also the rate of output growth.

3. Main trends in current account imbalances in the Euro area

Asymmetric external imbalances have become obvious since the establishment of the Euro Area. Increasing divergence in the current account balances between North and South of the Euro Area revealed bottlenecks in the architecture of the single monetary union. Recent economic crisis even increased heterogeneity within the Euro Area. Moreover, credibility of the single currency and low interest rate policy encouraged a significant capital flows from North to South of the Euro Area and contributed to the debt accumulation by both private and public sectors.

Large current account deficits fueled by real exchange rate appreciation and strong domestic demand indicates a significant loss of competitiveness in the periphery countries. Figure 1 provides a brief overview of main trends in real exchange rates and current accounts in the Euro Area member countries.





Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015).

Note: CPI based real effective exchange rate (REER_CPI) and ULC based real effective exchange rate (REER_ULC) are expressed as indexes (left axis in figures) (2005 = 100). Current account is expressed as percentage share on GDP (CU) (right axes in figures).

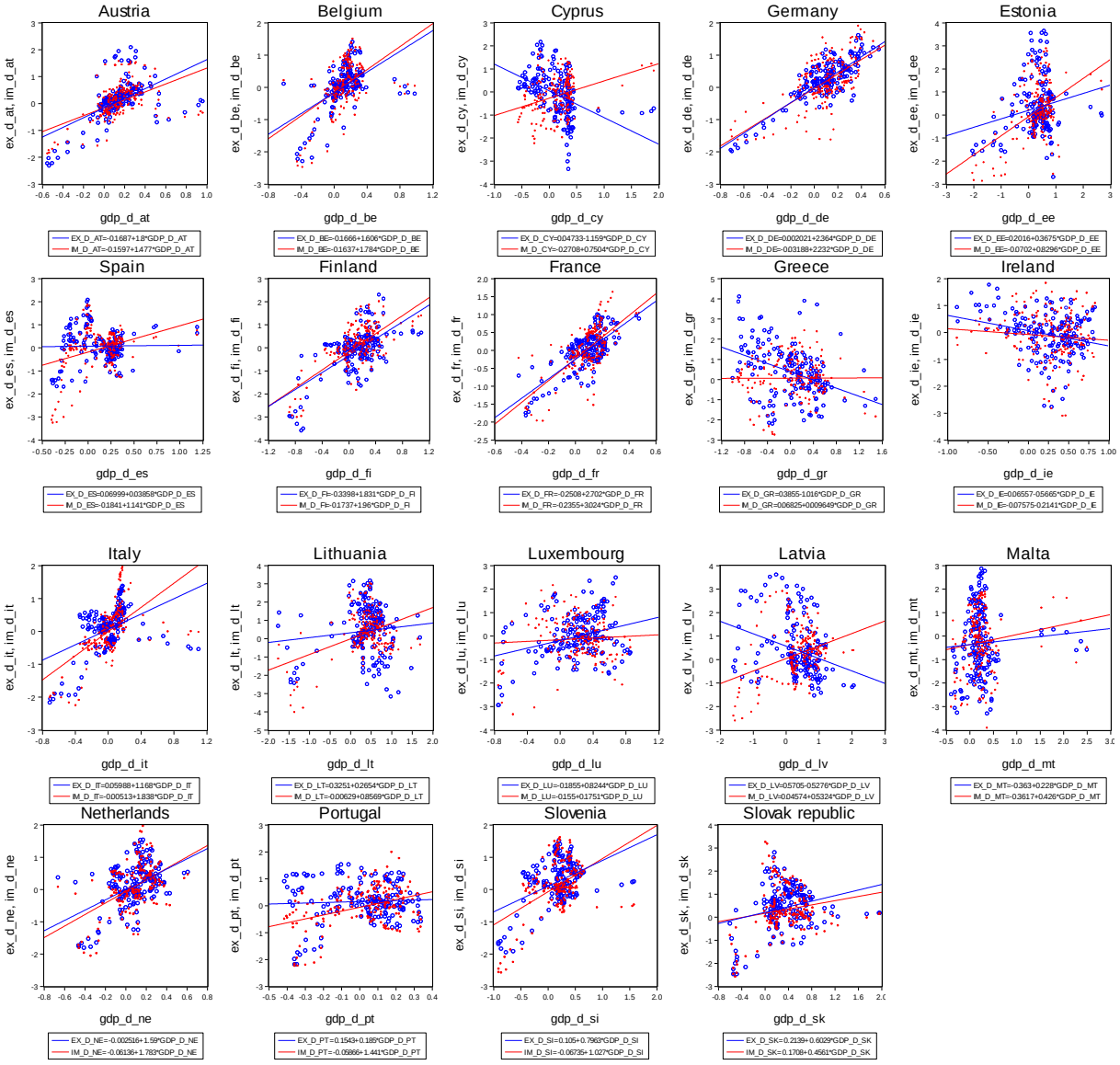
Figure 1 - Real effective exchange rates and current accounts (2000M1-2014M12)

While all countries from the group experienced real exchange rate appreciation (based on both consumer prices and unit labor costs) during the whole pre-crisis period since the birth of the Euro, this trend is clearly the strongest in the periphery countries. However, similar trend is also present in Baltic countries (Estonia, Latvia and Lithuania operated in the pegged exchange rate regime during the whole pre-crisis period outside the Euro Area.) and Slovakia which suffered from large current account deficits too. However, the loss in competitiveness is more significant considering costs (unit labor costs) rather than prices (consumer prices) that provide supportive evidence about another convenient channel of demand driven current account imbalances. Large current consumption and associated accumulation of private and public debt even emphasize generally expected implications of intertemporal choice in countries represented weaker part of the common currency area. As a result, significant trend in consumer prices and unit labor costs based real exchange rates discrepancies in the most countries indicates asynchronous effects of processes that determine internally caused changes in the relative external competitiveness.

Figure 1 also indicate sudden break at the end of the pre-crisis trend in both current accounts and real exchange rates in all countries that even emphasize distortionary effects of the crisis period. Most deficit countries experienced almost immediate sharp though temporary improvement in the current account balances accompanied by the real exchange rate depreciation induced by a drop in consumer prices and unit labor costs (that decreased even more). Economic crisis and associated recession clearly reduced demand incentives that even contributed to the reduction in current account deficits that is why the net effect of the price and costs related boost in the competitiveness on the external imbalances is the subject of the recent empirical research.

Figure 2 depicts mutual relationship (simple linear regression) between the dynamics of real output and the dynamics of exports and imports in the Euro Area member countries. In most countries economics growth seems to have positive effect on export performance.However, the situation seems to be different in almost all deficit countries. Growth rates of the real output are negatively associated with export performance in Cyprus, Greece, Ireland, and Latvia while in Spain and Portugal we have observed just a negligible positive relationship between real output and export dynamics. Results for all six countries indicate competitiveness issues in good

times, though good news in bad times. The problem is even more significant (in good times) in small open economies like Ireland and Latvia. On the other, all above mentioned countries experienced significant decrease in real exchange rates (with higher dynamics in unit labor costs based real exchange rate) that boosted their export performance, putting exports into the role of a significant driver of their post-crisis economic recovery.



Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015).

Note: Dynamics of export share (EX_D) and import (IM_D) shares on GDP are expressed as therelative change in the monthly percentage share of export and imports of goods on GDP. Real output dynamics (GDP_D) is expressed as monthly percentage change of the seasonally adjusted real output. Both variables are seasonally adjusted.

Figure 2. Dynamics of export and import shares on GDP and dynamics of real output (2000M1-2014M12)

More comprehensive picture about the competitiveness issues revealed a comparison of the mutual relationship between the dynamics of export and import shares. Asymmetric dynamics of exports and imports shares in Cyprus and Latvia indicates risks of negative current account development in good times. As a result, periods of economic growth during the pre-crisis era resulted in persisting and excessive current account deficits in these countries. Asymmetric dynamics of both exports and import shares was also observed in Greece thought the results for imports are clearly affected by the crisis period (the results for the pre-crisis period indicates strong positive correlation between real output and import shares dynamics). All remaining countries experienced symmetric dynamics of both export and import shares. Moreover, comparison of the correlation relationship

between dynamics of export and import share and dynamics of real output for most of the core countries in the North of Euro Area for the pre-crises and extended period (not presented here) indicates significant increase in the intensity of this relationship during the extended period (this result is confirmed by decomposed results presented in Tables 1 and 2). The size and openness of individual countries does not seem to be a significant determinant of export and import shares on total output. However, differences between correlations of total output dynamics anddynamics of exports and imports shares in countries with persisting current account deficits is mostly significant. Finally, crisis period affected dynamics of export and import shares in all countries emphasizing its redistributive effects, cross-country expenditure shifting and related competitiveness issues that is why more comprehensive investigation of the effects of the overall demand dynamics and current account balances in both surplus and deficit countries is necessary.

Table 1 summarizes correlation relationships between export shares and real output dynamics in the Euro Area member countries decomposed into three years long sub-periods. Detailed results revealed important implications for deficit and surplus countries for both pre-crisis and crisis periods.

Early stage (2000-2002) followed by the establishment of the Euro Area indicates weak relationship between dynamics of export performance and total output (except for Finland, France, Ireland and Spain). Low dynamics of total output in Western Europe was affected by recession in European Union during 2000 and 2001 while later new Euro Area members from Eastern Europe were recovering from the end of 1990s recession. As a result, most countries experienced diverse dynamics of total output and exports. Second stage (2003-2005) was characterized by the boost in performance and the most of countries experienced a significant strengthening in the correlation between total output and export dynamics. However, Baltic countries, Greece, Malta and Portugal still suffered for low dynamics in export performance and Slovak republic experienced significant boost in export performance (correlation still negative).

Table 1. Dynamics of export share on GDP and dynamics of real output (2000M1-2014M12)

	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014
Austria	-0.2709	0.7017	0.8889	0.8450	0.5520
Belgium	0.1019	0.6329	0.7152	0.8929	0.4172
Cyprus	-0.0981	0.5334	-0.0877	0.3270	0.3784
Germany	0.1819	0.7781	0.9389	0.9819	0.2102
Estonia	-0.1600	-0.6676	0.0710	0.8453	-0.1524
Spain	0.7391	0.1283	0.6633	0.9462	-0.3995
Finland	0.5577	0.1690	0.5532	0.8718	-0.2185
France	0.6611	0.7466	0.5735	0.9777	0.2422
Greece	-0.0117	-0.7009	-0.0024	-0.4746	-0.3474
Ireland	0.6990	0.2075	-0.5981	-0.6234	0.1243
Italy	-0.1141	0.7905	0.9497	0.9641	-0.4165
Lithuania	-0.2726	-0.1163	-0.3489	0.6761	0.2090
Luxembourg	-0.0895	0.6815	-0.5514	0.8430	-0.1197
Latvia	-0.4574	-0.2649	-0.5230	-0.4040	-0.1444
Malta	0.1067	-0.2979	-0.4251	0.7431	-0.1535
Netherland	0.0609	0.6877	0.8119	0.9398	-0.7091
Portugal	-0.2533	-0.0302	0.5762	0.5722	-0.6118
Slovenia	0.0529	0.5010	0.7670	0.9603	-0.5101
Slovakia	-0.3063	-0.6525	0.5855	0.8337	-0.4010
AVERAGE	**0.0593**	**0.2015**	**0.2925**	**0.6378**	**-0.1027**

Source: Author's calculation.

Note: Data represents coefficients of mutual correlations between dynamics of export share on GDP and dynamics of real output.

During the third period (2006-2008) the correlation of total output and export performance even strengthened, though it remained still negative for Greece, Latvia, Lithuania and Malta (correlation even weakened). The results for Cyprus and Luxembourg was affected by reduced export performance due to higher real output dynamics and at the end of this sub-period the correlation already captured asynchronous trend caused by the negative effect of the arising crisis on the total output dynamics.Early crisis sub-period (2009-2011) revealed a substantial increase in the mutual relationship between total output and export performance dynamics

in almost all countries (significant deterioration followed by improvement in both variables with increased sensitivity of export shares indicating higher dynamics in external demand in both directions). However, we also have observed a strengthening in the asynchronous trend in Greece, Ireland and Latvia caused the boost of the export performance. While export driven recovery helped all three countries to improve their overall performance, highly volatile export dynamics and lagged real output improvements caused deepening in the negative correlation between real output and export share performance. The last sub-period (2012-2014) brought a substantial decrease in the mutual relationship between both variables. It refers to changed patterns of the economic recovery during the later stages of the post-crisis period based on increased dynamics of domestic components of aggregate demand.

Table 2 summarizes correlation relationships between import shares and real output dynamics in the Euro Area member countries decomposed into three years long sub-periods. Detailed results revealed important implications for deficit and surplus countries for both pre-crisis and crisis periods.

Similarly to the results from the Table 1, early stage (2000-2002) indicates generally weak relationship between dynamics of import shares and total output for the whole group of countries. However, this time the results indicate more diverse trends in individual countries (strong positive correlation in eight countries and strong negative correlation in four-five countries). Negative development in countries at the beginning of the period was thus associated with diverse effects on demand for both domestic and foreign goods. Next sub-period (2003-2005) brought a minor increase in the correlation of both variables. Still persisting negative correlations experienced mostly smaller, more opened and/or weak performing economies due to higher volatility in the dynamics of import shares. During the third period (2006-2008) most of countries experienced improvement in the relationship between dynamics of total output and import shares. The only exception with negative correlations remained just two countries - Luxembourg and Malta in which the design of the growth pattern induced a reduction in the shares if imports on the total output.

Table 2. Dynamics of import shares on GDP and dynamics of real output (2000M1-2014M12)

	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014
Austria	-0.0669	0.4907	0.5603	0.8501	0.6046
Belgium	0.1808	0.6644	0.4012	0.8793	0.4459
Cyprus	0.3200	0.7310	0.3023	0.8274	0.5353
Germany	0.3679	0.4244	0.4810	0.9287	0.6183
Estonia	0.3178	-0.7703	0.3956	0.9004	0.3448
Spain	0.6082	0.1381	0.9125	0.9459	0.7884
Finland	0.6967	-0.1733	0.5497	0.9335	-0.0236
France	0.3860	0.5120	0.5643	0.9724	0.0590
Greece	-0.3028	-0.1348	0.1061	-0.1407	0.3515
Ireland	0.5755	0.3644	0.1220	-0.2632	-0.2127
Italy	0.3649	0.6596	0.7723	0.9434	0.6630
Lithuania	-0.4451	-0.4396	0.0579	0.8035	0.4421
Luxembourg	-0.6321	-0.3481	-0.5081	0.7550	-0.1637
Latvia	-0.0219	-0.1499	0.7192	0.6789	0.4460
Malta	0.3587	-0.2064	-0.4140	0.6414	-0.1475
Netherland	0.0843	0.7164	0.7577	0.9371	-0.5563
Portugal	-0.0334	0.5985	0.3883	0.7924	0.4843
Slovenia	-0.2399	0.2727	0.8701	0.9798	-0.2767
Slovakia	-0.4229	-0.5601	0.4263	0.8445	-0.2210
AVERAGE	**0.1103**	**0.1468**	**0.3929**	**0.7479**	**0.2201**

Source: Author's calculation.

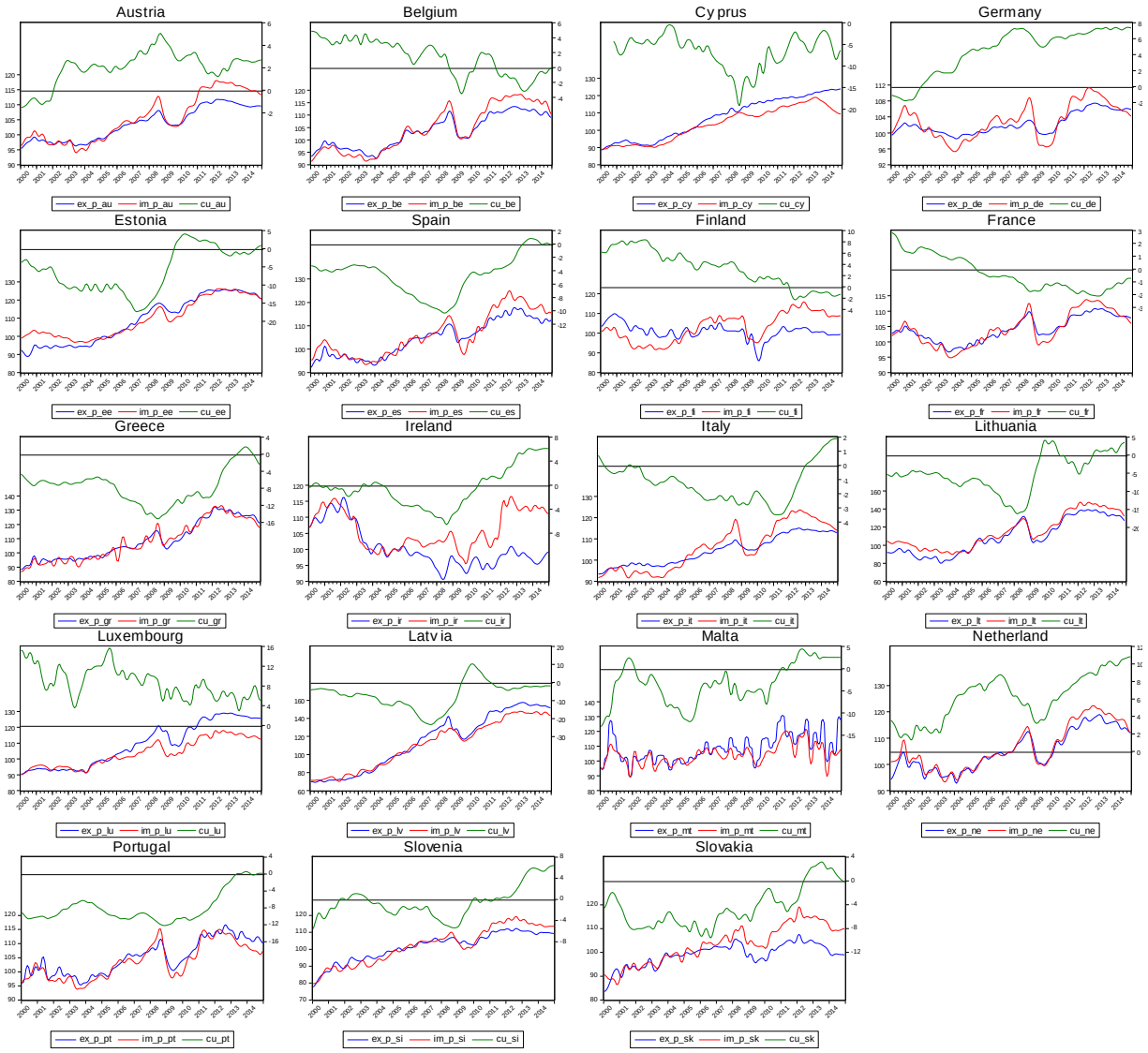
Note: Data represents coefficients of mutual correlations between dynamics of import share on GDP and dynamics of real output.

Early crisis sub-period (2009-2011) was associated with a significant increase in the correlation between total output and import performance dynamics in almost all countries. Only exceptions are Greece (with suppressed positive imports dynamics since the beginning of the crisis period) and Ireland (with less depressed imports during the initial stage of the crisis period).The last sub-period (2012-2014) brought a substantial decrease in the mutual relationship between both variables. Similarly to the results from the Table 1 our results refers to changed patterns of the economic recovery during the later stages of the post-crisis period based on

increased dynamics of domestic components of aggregate demand associated with less dynamics of demand for foreign goods though we have observed some exceptions (Cyprus, Greece, Portugal, Spain).

Figure 3 provides a brief overview of main trends in export prices, import prices and current accounts in the Euro Area member countries. An increase in terms of trade (prices of exports-to-prices of import ratio) is usually associated with the current account improvement provided low price elasticity of exports and imports.

However, persisting increase in terms of trade (due to exchange rate or domestic prices shifts) is obviously followed by deterioration in international competitiveness especially with increasing lag. Single currency and fixed nominal exchange rate environment in the common currency area allows adjustments in the term of trade only via domestic prices. As a result, demand and costs related channels of domestic prices dynamics represent crucial determinants of external competitiveness of individual Euro Area member countries.



Note: Export prices (EX_P) and import prices (IM_P) are expressed as indexes (left axis in figures) (2005 = 100). Current account (CU) is expressed as % share in GDP (CU) (right axes in figures).

Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015).

Figure 3 - Export prices, import prices and current account (2000M1-2014M12)

Prices of exports and imports in individual Euro area member countries did not follow common trend. Most of the countries experienced increasing trend in the development of export and import prices since 2000-2003 (as direct effect of the recession in European Union during 2000 and 2001). However, there is still enough room to recognize some different patterns in this general trend. Countries from past Eastern bloc (Baltic countries, Slovak

republic and Slovenia) that operated outside the Euro Area during the whole pre-crisis period experienced almost continuous increase in the prices of exports and imports due to generally lower national price levels and price level convergence fueled by strong territorial orientation of their foreign trade toward Western European countries. Most of old EU member countries operated within the Euro Area experienced more dynamic increase in import prices (narrowly followed by the dynamics of export prices) (especially during last 3 years before the crises) fueled by strong domestic demand accelerated by low interest rate policy conducted by ECB. Crisis period changed this trend in several ways. First, the overall dynamics of export and import prices during the early stages of the crisis period decreased due to drop in demand incentives. Second, overall dynamics of export prices decreased more significantly due to higher decrease in external demand (in comparison with domestic demand).Third, asynchronous dynamics in prices of exports and imports affected mainly small and opened economies. Forth, increased dynamics in import prices since 2010 till 2012 was fueled by early wave of economic recovery fueled by low interest rate environment heavily managed by activities of ECB.

More detailed information on averaged export-to-import prices ratios (terms of trade) in the Euro Area member countries provides Table 3. Most countries experienced improvement in the terms of trade between two initial sub-periods. Recovery from early 2000 crisis generally did not provide negative effect on the terms of trade in the whole group of countries. Moderate decrease in term of trade experienced Belgium, Finland, Greece, Ireland, Malta, and Portugal. Newcomers from past Eastern bloc still experienced unfavorable terms of trade fueling negative current account development though keeping foreign exports more competitive.

Table 3 - Terms of trade (2000M1-2014M12)

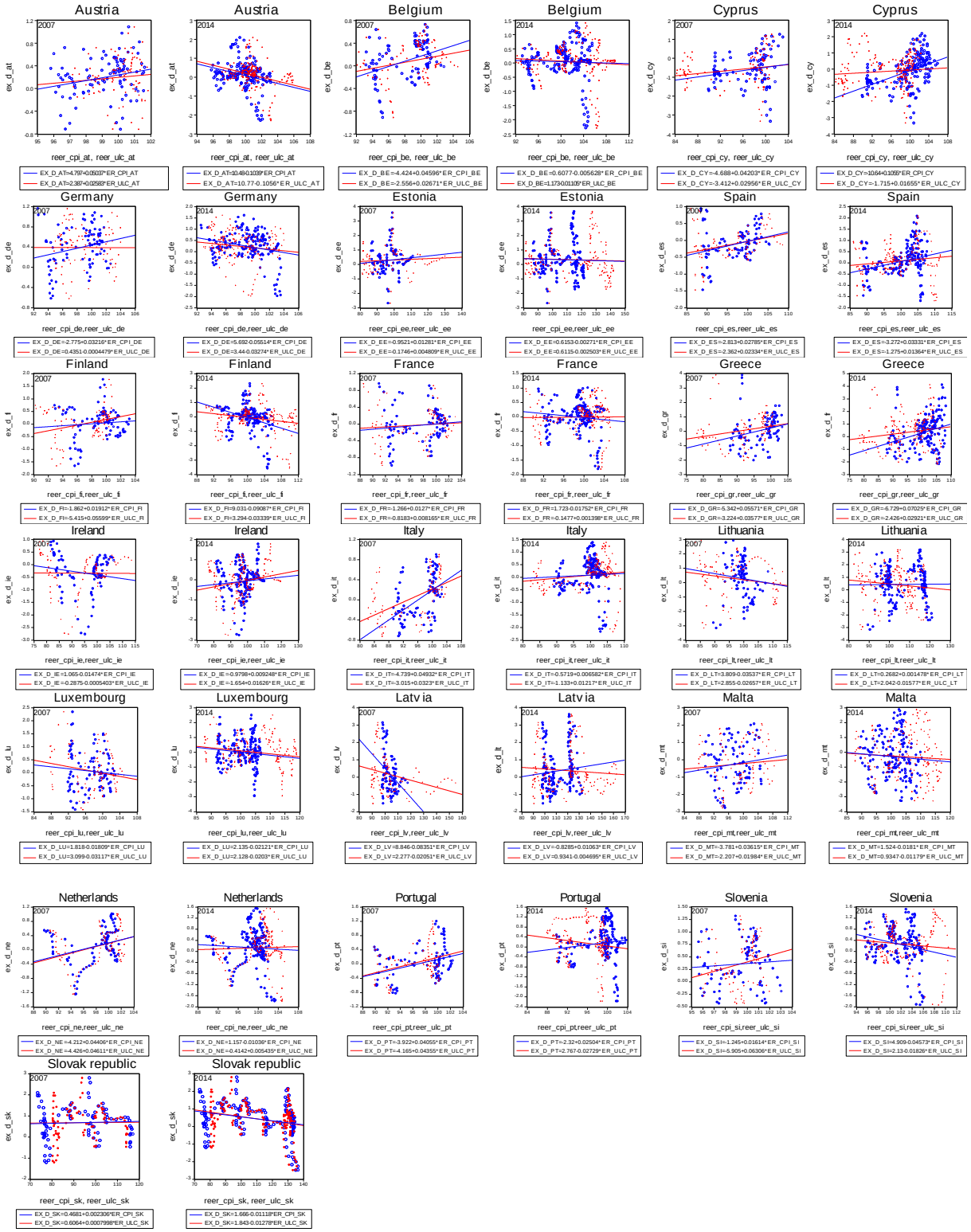
	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014
Austria	99.34	100.71	98.41	97.89	95.09
Belgium	101.98	100.73	98.67	97.66	96.15
Cyprus	101.38	101.59	103.24	105.52	105.72
Germany	98.71	101.51	97.79	100.10	98.65
Estonia	92.48	98.45	102.26	102.41	100.05
Spain	97.77	99.76	99.21	99.53	95.72
Finland	107.82	104.24	95.33	93.35	90.47
France	100.43	100.91	99.35	100.23	98.72
Greece	101.86	100.73	100.52	98.10	100.86
Ireland	112.96	110.52	113.63	95.50	89.78
Italy	102.58	102.97	96.09	98.08	95.17
Lithuania	90.34	95.72	97.95	95.66	95.03
Luxembourg	98.50	100.14	105.87	108.71	110.30
Latvia	97.01	99.33	104.32	104.94	105.73
Malta	102.91	101.59	103.37	106.62	108.17
Netherland	97.83	99.97	99.83	98.80	97.65
Portugal	101.49	101.14	100.12	101.86	102.39
Slovenia	101.56	102.12	99.37	98.56	95.43
Slovakia	99.89	99.84	96.73	93.36	90.62
Average	**100.36**	**101.16**	**95.90**	**99.84**	**98.51**

Note: Data representsaveraged ratios of export-to-import price index.
Source: Author's calculation.

Substantial decrease in demand for both foreign exports and domestic imports during early stages of the crisis period resulted in decrease in terms of trade and thus slightly improved price competitiveness of international trade in the whole group of countries.However, some countries (i.e. Cyprus, Estonia, Spain, Greece, Ireland, Lithuania, Latvia, Malta, Netherlands, Slovak republic) did not experience a drop in terms of trade and suffered from relative reduction in the price competitiveness at the early stage of the crisis period though deficit countries experienced a significant improvement in the current account balances. Early recovery period during the economic crisis (2009-2011) brought a significant improvement in terms of trade in the whole group of countries though most of deficit countries experienced an opposite trend that was i.e. in Baltic countries and Slovak republic associated with another moderate deterioration in the current account balances. During the last sub-period terms of trade moderately decreased in the whole sample of countries though Cyprus, Greece, Luxembourg, Latvia, Malta, and Portugal experienced an opposite trend.

While the general trend in the development of terms of trade provide reasonable facts about exports and imports dynamics for North and South of the Euro Area as well as new Euro Area member countries from the

past Eastern bloc, more comprehensive insight into current account determination is necessary. Figure 4 reveals mutual relationships (simple linear regression) between exports shares on GDP and REER based on both CPI and ULC in the Euro Area member countries. Results indicates mixed conclusions about the effects of changes in prices and costs related competitiveness and associated dynamics in the exports shares.



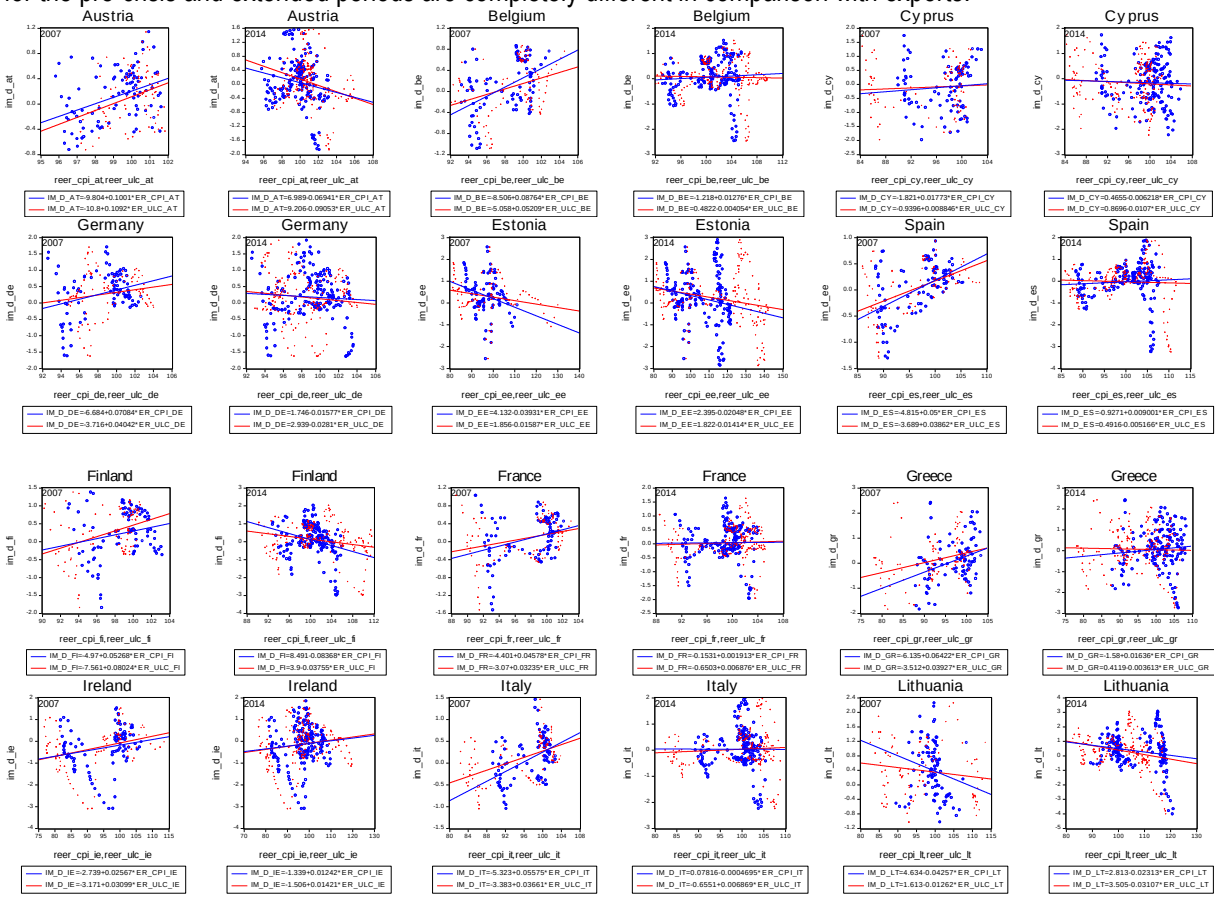
Note: Dynamics of exports share on GDP (EX_D) is expressed as the relative change in the percentage share of exports of goods on GDP. CPI based real effective exchange rate (REER_CPI) and ULC based real effective exchange rate (REER_ULC) is expressed as index (2005 = 100). Year 2007 in figures means period 2000-2007 while year 2014 in figures means period 2000-2014.

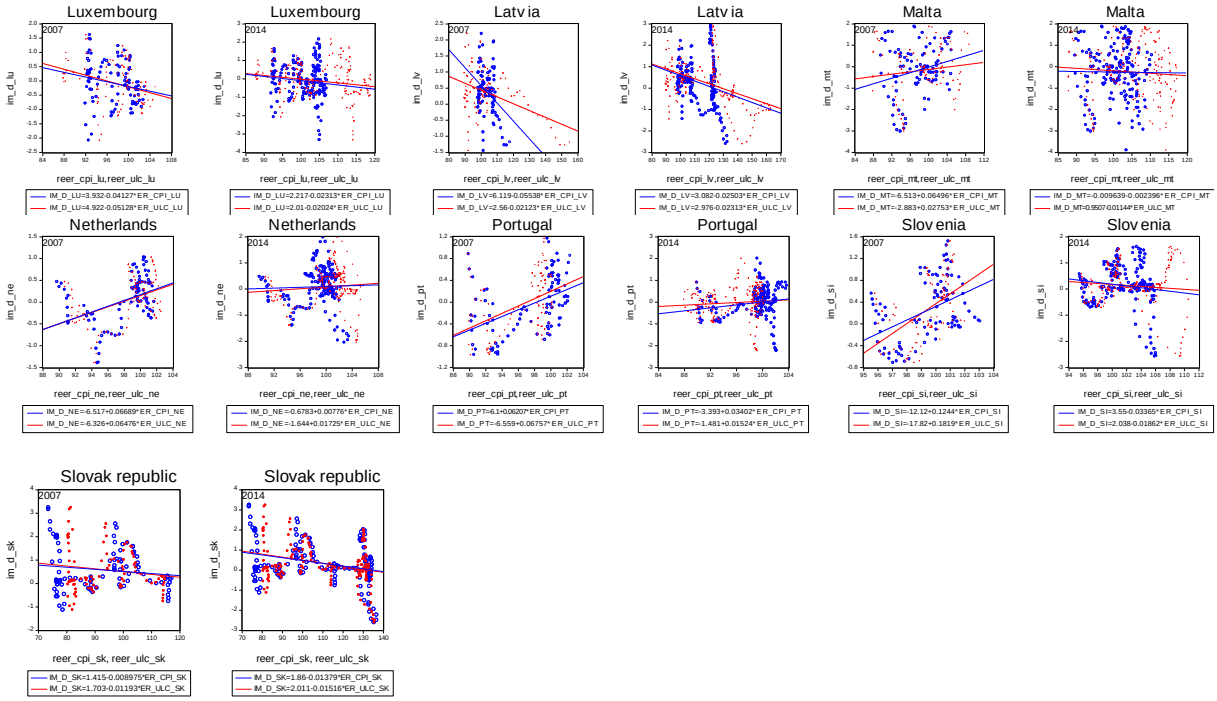
Source: Author's calculation.

Figure 4. Dynamics of exports shares on gdp and real exchange rates (CPI and ULC based) dynamics (2000M1-2014M12)

An increase in REER indicates a reduction in the competitiveness that is why reduction in the dynamics of exports share or negative relationship is generally expected. Surprisingly, export dynamics in most of the Euro Area member countries was associated with increasing trend (appreciation) in both CPI and ULC based REER indicating reduced importance of price and costs related effects on export performance though generally low dynamics of exports in the periphery countries of the Euro Area indicates the negative role of the loss in external prices and costs related competitiveness (Gaulier and Vicard 2012; Chen, Milesi-Ferretti and Tressel 2012; Sanchez and Varoudakis 2013). Minor exceptions were examined in case of Germany (ULC), France (both CPI and ULC), Ireland (both CPI and ULC) Luxembourg (both CPI and ULC) and most of new Euro Area member countries. However, crisis period clearly changed this picture making export performance of almost Euro Area members much more sensitive to the changes in external competitiveness based on both CPI and ULC. Significant decrease in external demand during the crisis period increased the role of prices and costs related determinants of export performance.

Figure 5 reveals mutual relationships (simple linear regression) between import shares on GDP and REER based on both CPI and ULC in the Euro Area member countries. Results indicates mixed conclusions about the effects of changes in prices and costs related competitiveness and associated dynamics in the import shares. However, key conclusions about the relative importance of the prices and costs related determinants of imports for the pre-crisis and extended periods are completely different in comparison with exports.





Note: Dynamics of imports share on GDP (IM_D) is expressed as the relative change in the percentage share of imports of goods on GDP. CPI based real effective exchange rate (REER_CPI) and ULC based real effective exchange rate (REER_ULC) is expressed as index (2005 = 100).Year 2007 in figures means period 2000-2007 while year 2014 in figures means period 2000-2014.

Source: Author's calculation.

Figure 5. Dynamics of Imports Share on GDP and Real Exchange Rate (CPI and ULC based) Dynamics (2000M1-2014M12)

Dynamics of import shares on GDP was positively correlated with appreciation of both CPI and ULC based REER in almost all countries but the new Euro Area member countries. Putting together results of Figures 4 and 5 we suggest that price and costs related determinants of external competitiveness had reduced role in determining the external current account imbalances making domestic and foreign demand drivers much more important in these five countries from the Central and Eastern Europe. In all remaining Euro Area member countries real exchange rate appreciation had a positive effect on import dynamics. As a result, imports and its price and costs related determinants represented more significant driver of trends in current account balances than exports exogenously determined by the dynamics in foreign demand leaving less room to prices and costs related determinants. Effects of the crisis period are also presented in Figure 5 and reflects reduced role of REER shifts in determining external positions of both North and South of the Euro Area.

4. Econometric model

VAR models represent dynamic systems of equations in which the current level of each variable depends on past movements of that variable and all other variables involved in the system. Residuals of vector ε_t represent unexplained movements in variables (effects of exogenous shocks hitting the model); however as complex functions of structural shocks effects they have no economic interpretation. Structural shocks can be still recovered using transformation of the true form representation into the reduced-form by imposing a number of identifying restrictions. Applied restrictions should reflect some general assumptions about the underlying structure of the economy and they are obviously derived from economic theory. There are two general (most used) approaches to identify VAR models. (I) Cholesky decomposition of innovations implies the contemporaneous interactions between exogenous shocks and the endogenous variables are characterized by a Wald causal chain. Ordering of endogenous variables then reflects expected particular economy structure following general economic theory assumptions. However, the lack of reasonable guidance for appropriate ordering led to the development of more sophisticated and flexible identification methods -(II) structural VAR

(SVAR) models. Identifying restrictions implemented in SVAR models reflecttheoretical assumptions about the economy structure more precisely.

We employ a VAR methodology to analyze effects of unexpected real exchange rate and demand shifts on current account adjustments in the Euro Area member countries. Cholesky decomposition of variance-covariance matrix of reduced-form VAR residuals is implemented to estimate effects of real exchange rate appreciationand increase in overall demand on the current accounts deterioration.

True model is represented by the following infinite moving average representation:

$$AX_t = B(L)X_{t-1} + B\varepsilon_t \quad (1)$$

where X_t represents $n \times 1$ a vector including endogenous variables of the model, $B(L)$ is a $n \times n$ polynomial consisting of the matrices of coefficients to be estimated in the lag operator L representing the relationship among variables on the lagged values, each of A and B represent $n \times n$ matrices which coefficients will be specified later, ε_t is $n \times 1$ vector of identically normally distributed, serially uncorrelated and mutually orthogonal errors (white noise disturbances that represent the unexplained movements in the variables, reflecting the influence of exogenous shocks):

$$E(\varepsilon_t) = 0, \quad E(\varepsilon_t \varepsilon_t') = \Sigma_\varepsilon = \mathrm{I}, \quad E(\varepsilon_t \varepsilon_s') = [0] \quad \forall t \neq s \quad (2)$$

Vector X_t consists of six endogenous variables -real output $(y_{r,t})$, money supply (m_t), core inflation (p_t), short-term nominal interest rates $(ir_{n,t})$, real exchange rate $(er_{r,t})$ and current account (cu_t). In the six-variable VAR model $(X_t = [y_{r,t}, m_t, p_t, ir_{n,t}, er_{r,t}, cu_t,])$ we assume six exogenous shocks that contemporaneously affects endogenous variables - demand shock $(\varepsilon_{y,t})$, nominal shock $(\varepsilon_{m,t})$, inflation shock $(\varepsilon_{p,t})$, monetary policy shock $(\varepsilon_{ir_n,t})$, exchange rate shock $(\varepsilon_{er_r,t})$ and current account shock $(\varepsilon_{cu_n,t})$.

Structural exogenous shocks from equation (1) are not directly recoverable due to the complexity of information included in true form VAR residuals. As a result, structural shocks cannot by correctly identified. It is then necessary to transform true model into following reduced form

$$X_t = A^{-1}B(L)X_{t-1} + A^{-1}B\varepsilon_t = C(L)X_{t-1} + e_t \quad (3)$$

where $C(L)$ is the polynomial of matrices with coefficients representing the relationship among variables on lagged values and e_t is a $n \times 1$ vector of normally distributed errors (shocks in reduced form) that are serially uncorrelated but not necessarily orthogonal:

$$E(e_t) = 0, \quad \Sigma_e = E(e_t e_t') = A_0 E(e_t e_t') A_0' = A_0 A_0', \quad E(e_t e_s') = [0] \quad \forall t \neq s \quad (4)$$

Relationship between reduced-form VAR residuals (e_t) and structural shocks (ε_t) can be expressed as follows:

$$e_t = A^{-1}B\varepsilon_t \text{ or } Ae_t = B\varepsilon_t \quad (5)$$

As we have already noted at the beginning of the section we implement a Cholesky identification scheme to correctly identify structural shocks. In order to identify our model there must be exactly $n^2 - \left[\left(n^2 - n\right)/2\right]$ relationships among endogenous variables of the model, where *n* represents a number of variables. We have to impose $\left(n^2 - n\right)/2$ restrictions on the matrix A_0 based on the Cholesky decomposition of the reduced-form VAR residual matrix that define matrix A_0 as a lower triangular matrix. The lower triangularity of A_0 (all elements above the diagonal are zero) implies a recursive scheme (structural shocks are identified through reduced-form VAR residuals) among variables (the Wald chain scheme) that has clear economic implications and has to be empirically tested as any other relationship. Identification scheme of the matrix A_0 implies that particular contemporaneous interactions between some exogenous shocks and some endogenous variables are restricted

reflecting causal (distribution) chain of interaction transmission. It is clear that the Wald causal chain is incorporated via convenient ordering of variables.

Considering lower triangularity of a matrix A_0 the equation (5) can be rewritten as follows:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{bmatrix} e_{y_r,t} \\ e_{m,t} \\ e_{p,t} \\ e_{ir_n,t} \\ e_{er_r,t} \\ e_{cu,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{y_r,t} \\ \varepsilon_{m,t} \\ \varepsilon_{p,t} \\ \varepsilon_{ir,t} \\ \varepsilon_{er_r,t} \\ \varepsilon_{cu,t} \end{bmatrix} \quad (6)$$

Correct identification of exogenous structural shocks reflecting Cholesky ordering of variables denotes following assumptions:

- Real output doesn't contemporaneously respond to the shock from any other endogenous variable of the model.
- Money supply doesn't contemporaneously respond to inflation, interest rates, exchange rate and current account shocks, while it is contemporaneously affected only by the real output shock.
- Inflation doesn't contemporaneously respond to interest rates, exchange rate and current account shocks, while it is contemporaneously affected by real output and money supply shocks.
- Interest rates don't contemporaneously respond to exchange rate and current account shocks, while it is contemporaneously affected by real output, money supply and inflation shocks.
- Exchange rate doesn't contemporaneously respond to the current account shock, while it is contemporaneously affected by real output, money supply, inflation and interest rates shocks.
- Current account is contemporaneously affected by shocks from all of endogenous variables of the model.

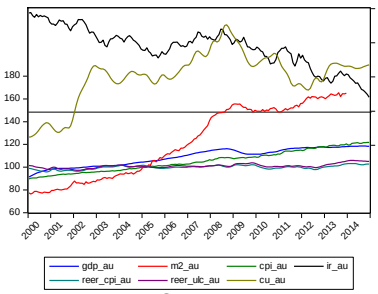
After initial period endogenous variables may interact freely without any restrictions. Estimated VAR model is used to compute impulse response functions to analyze responses of the current account to the positiveone standard deviation real exchange rate and demand shocks in the Euro Area member countries as well as the relative contribution of both shocks in explaining adjustments in current accounts. To check the robustness of empirical results we estimate the model considering different ordering of the endogenous variables in models with time series for two different periods (pre-crisis period - model A (2000M1-2007M12) and extended period - model B (2000M1-2014M12)):

- model 1 $\left(X_t = \left[y_{r,t}, m_t, p_t, ir_{n,t}, er_{r,t}, cu_t\right]\right)$
- model 2 $\left(X_t = \left[y_{r,t}, er_{r,t}, m_t, ir_{n,t}, p_t, cu_t\right]\right)$
- model 3 $\left(X_t = \left[y_{r,t}, p_t, m_t, ir_{n,t}, er_{r,t}, cu_t\right]\right)$

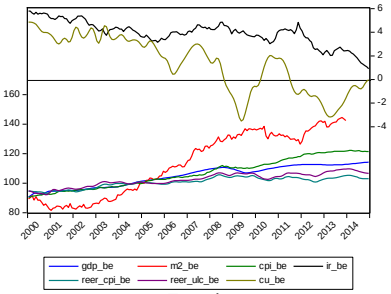
5. Data and results

To estimate effects of the unexpected real exchange rate and demand shifts on current account adjustments in the Euro Area member countrieswe employ monthly data for period 2000M1-2007M12 (model A) consisting of 96 observations and for period 2000M1-2014M12 (model B) consisting of 180 observations for the following endogenous variables -real output (nominal industrial production deflated by GDP deflator), money supply (monetary aggregate M2), inflation (core inflation), long-term interest rates (long-term nominal interest rates of government bonds with ten years maturity), real exchange rate (both CPI and ULC deflatednominal effective exchange rate) and current account of the balance of payment (Figure 6).

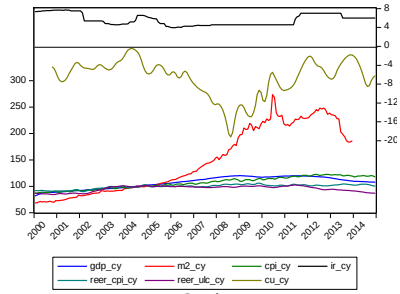
Austria



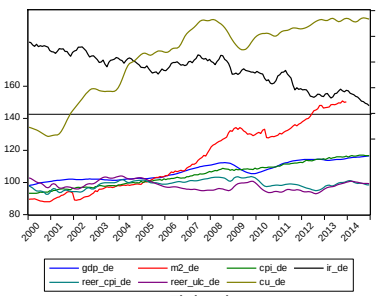
Belgium



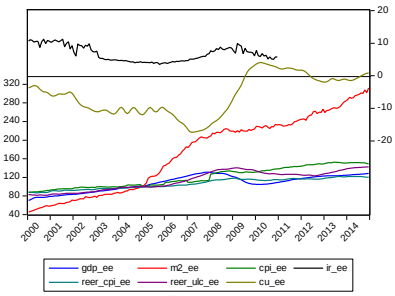
Cyprus



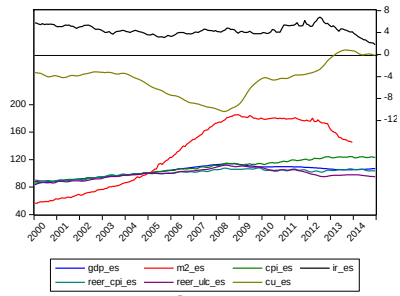
Germany



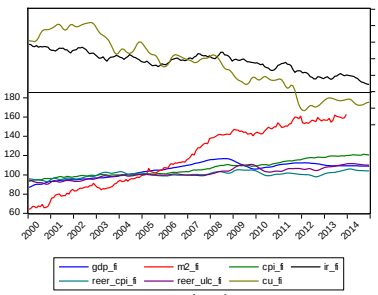
Estonia



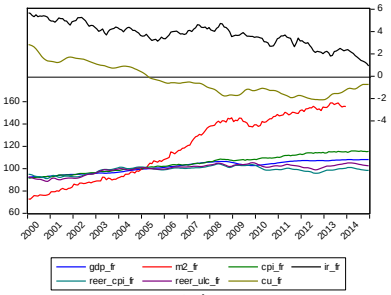
Spain



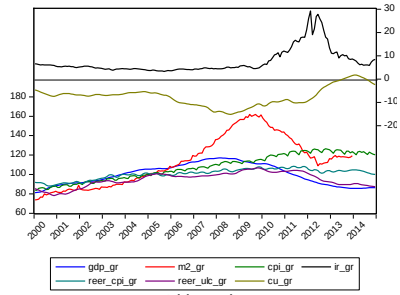
Finland



France



Greece



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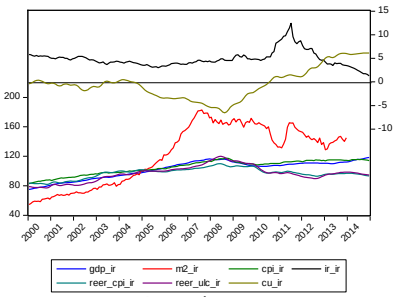
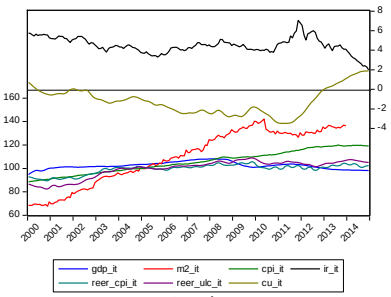
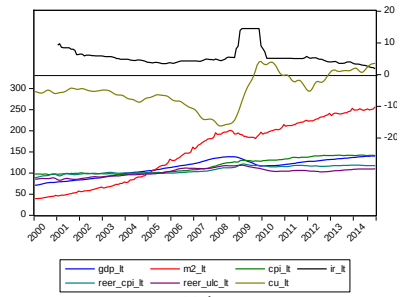


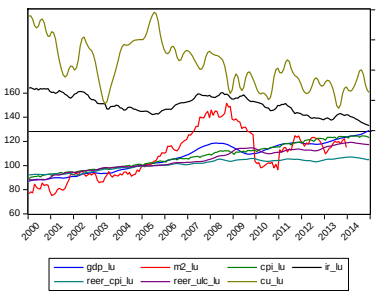
Italy



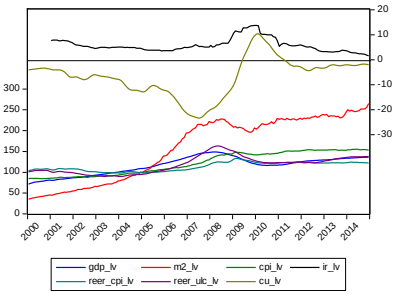
Lithuania



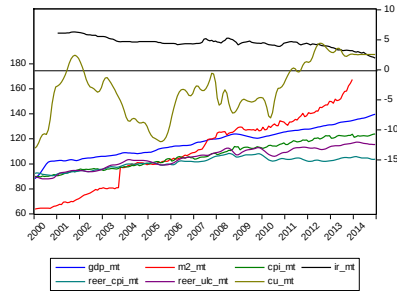
Luxembourg

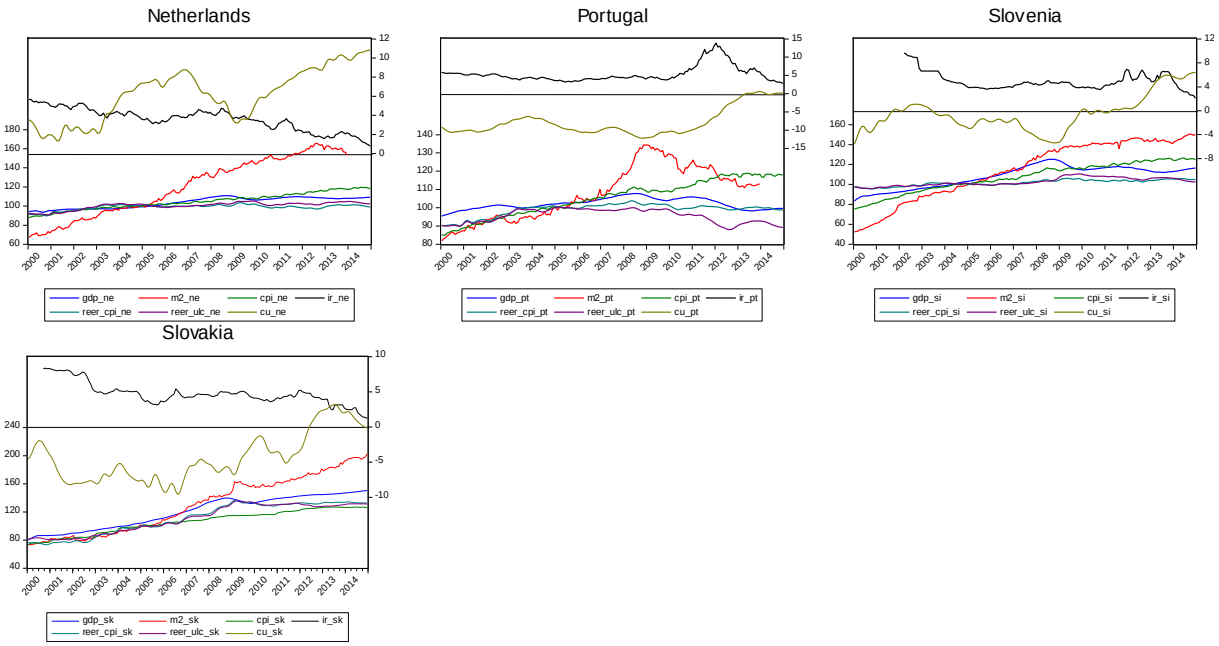


Latvia



Malta





Note: Endogenous variables -real output (GDP), money supply (M2), inflation (CPI) and CPI/ULC based real effective exchange rate (REER_CPI, REER_ULC) are expressed as indexes (left axis in figures) (2005 = 100). Interest rates (IR) and current account (CU) are expressed in percentage (right axis in figures).

Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015).

Figure 6. Real output, money supply, inflation, interest rates, real effective exchange rates (CPI and ULC based) and Current Account (2000M1-2014M12)

Estimation of two models is in line with the primary objective of the paper to reveal a relationship between the dynamics of real exchange rate and overall demand and current account adjustments considering possible implications of the crisis period on estimated results. Time series for real output, money supply, inflation, interest rates and current account were drawn from IMF database (International Financial Statistics, November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015). Time series for real output, money supply, inflation and current account were seasonally adjusted.

To correctly identify exogenous shocks hitting the model as well as to compute impulse-response functions it is necessary VAR model to be stationary. To check stationarity of the model it is necessary to test the time series for unit roots and cointegration.

A. Testing procedures

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were computed to test endogenous variables for the unit roots presence. Both ADF and PP tests indicate that most of variables are non-stationary on values so that the null hypothesis of a unit root presence cannot be rejected for any of time series. Testing variables on first differences indicates that time series are stationary. We may conclude that variables are integrated of order 1 I(1).

Because there are endogenous variables with a unit root on values it is necessary to test time series for cointegration using the Johansen and Juselius cointegration test (we found reasonable to include variables I(0) for testing purposes following economic logic of expected results). The test for the cointegration was computed using two lags as recommended by the AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion).

Results of Johansen cointegration tests confirmed our results of unit root tests. Both trace statistics and maximum eigenvalue statistics (both at 0.05 level) indicate that there is no cointegration among endogenous variables of the model.

To test the stability of VAR models we also employed a number of diagnostic tests. We found no evidence of serial correlation, heteroskedasticity and autoregressive conditional heteroskedasticity effect in disturbances. The model also passes the Jarque-Bera normality test, so that errors seem to be normally distributed. VAR

models seem to be stable also because inverted roots of the model for each country lie inside the unit circle. Detailed results of time series testing procedures are not reported here to save space. Like any other results, they are available upon request from the author.

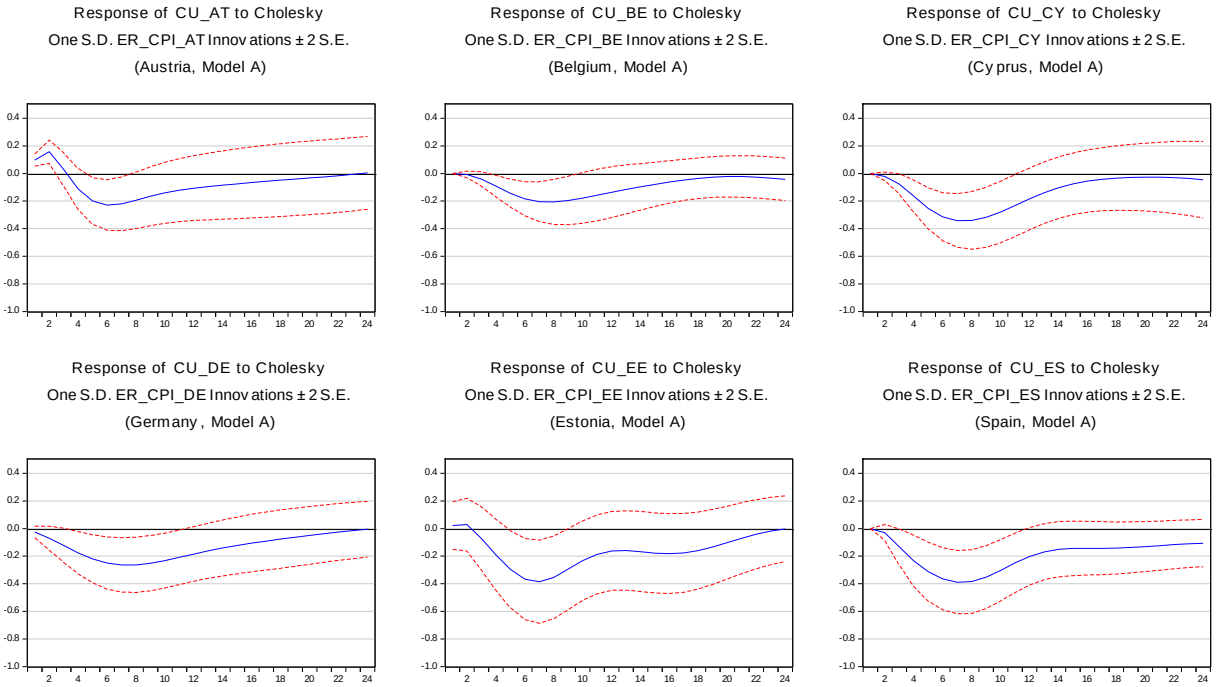
Following results of the unit root and cointegration tests we estimated the model using variables in first differences so that we can calculate impulse-response functions and variance decomposition for all nineteenEuro Area member countries. Following the main objective of the paper we focus on interpretation of responses of the current accountto the positive one standard deviation real exchange rate (increase in REER) and demand shocks and the relative contribution of both shocks in explaining adjustments in current accounts. To observe effects of changes in relative competitiveness associated with sudden shifts REER and overall demand on current account adjustments we estimate models with CPI and ULC based REER separately.

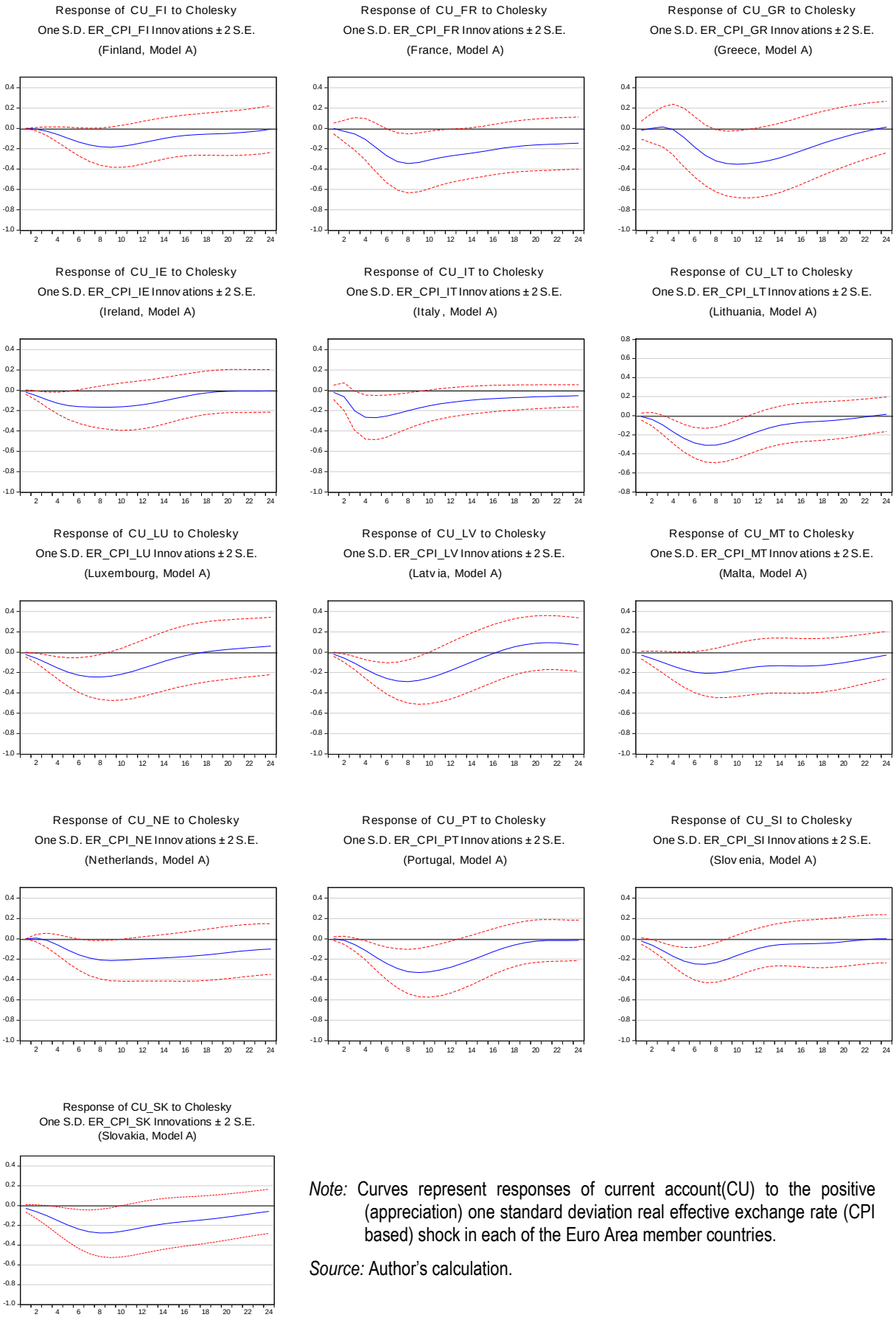
We also observe effects of the crisis period on the current account determination in Euro Area member countries by comparing the results for estimated models using time series for two different periods - model A (2000Q1-2007Q4) and model B (2000Q1-2014Q4).Changed ordering of variables didn't seem to affect results of the analysis. Considering that impulse-response functions are not very sensitive to the ordering of endogenous variables we present results of both models (model A and B) with default ordering of endogenous variables (detailed results for two models different ordering of variables are available upon request from the author).

B. Impulse-response functions

Effects of real exchange rates and demand shifts on current account adjustments in the Euro Area member countries are examined from estimated responsivenessof current accounts to the positive (appreciation) one standard deviation real exchange rate and demand shockemploying monthly data for two subsequent periods 2000-2007 (model A) and 2000-2014 (model B). Results seem to be sensitive to overall performance of the countries considering differences in the response patterns of the current accounts between core and periphery of the Euro Area. While current accounts in the group of periphery countries seem to be more responsive to the REER shocks revealing more dynamic cross-country expenditure shifting effects, current accounts in the core countries seem to be less vulnerable to the shifts in competitiveness associated with real exchange rate appreciation.

In the Figure 7 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (CPI based) shocks in the model with time series for the pre-crisis period (model A1) in the Euro Area member countries.





Note: Curves represent responses of current account(CU) to the positive (appreciation) one standard deviation real effective exchange rate (CPI based) shock in each of the Euro Area member countries.

Source: Author's calculation.

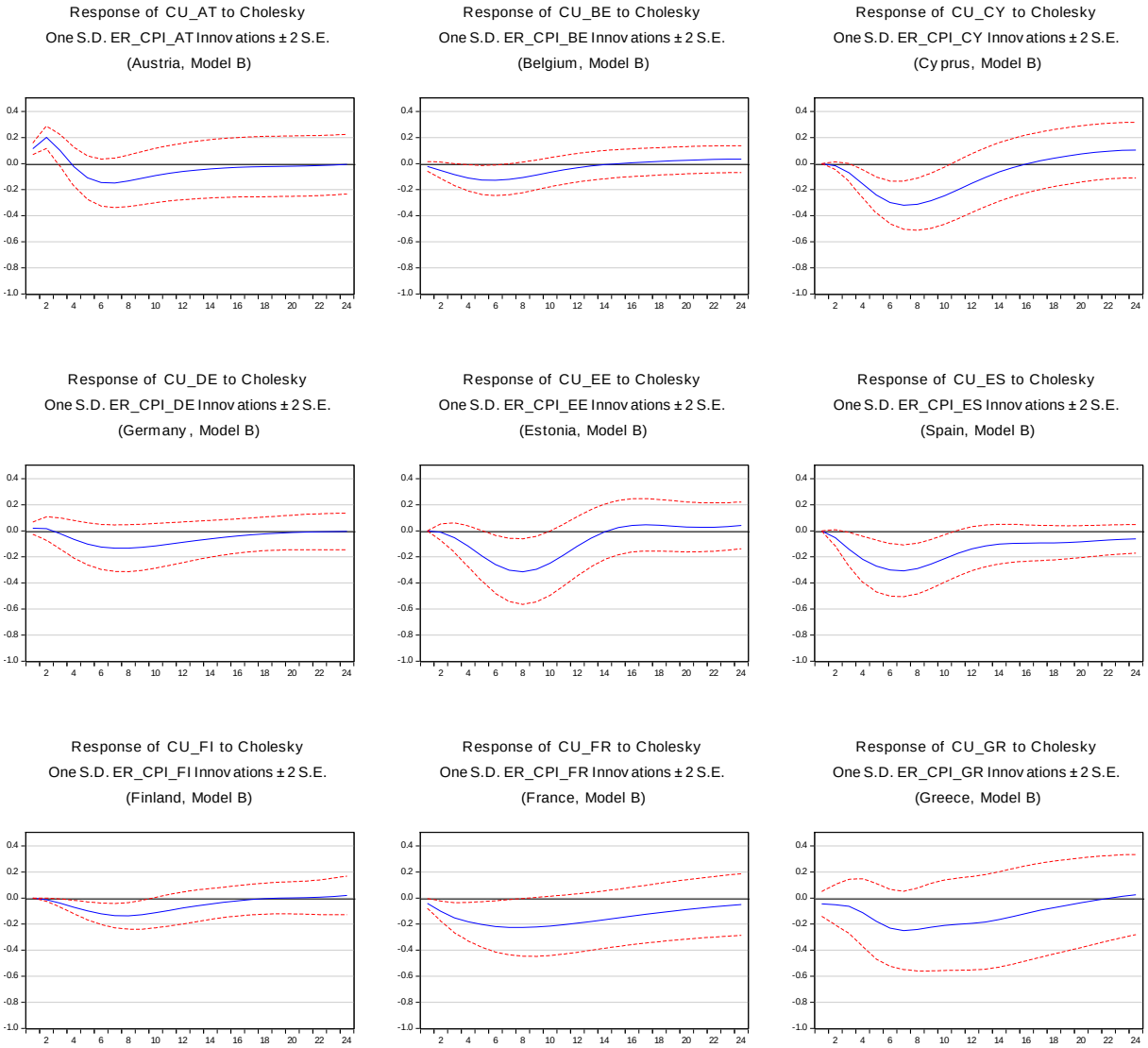
Figure 7. Responses of Current Account to REER (CPI based) Shocks (2000M1-2007M12) (Model A1)

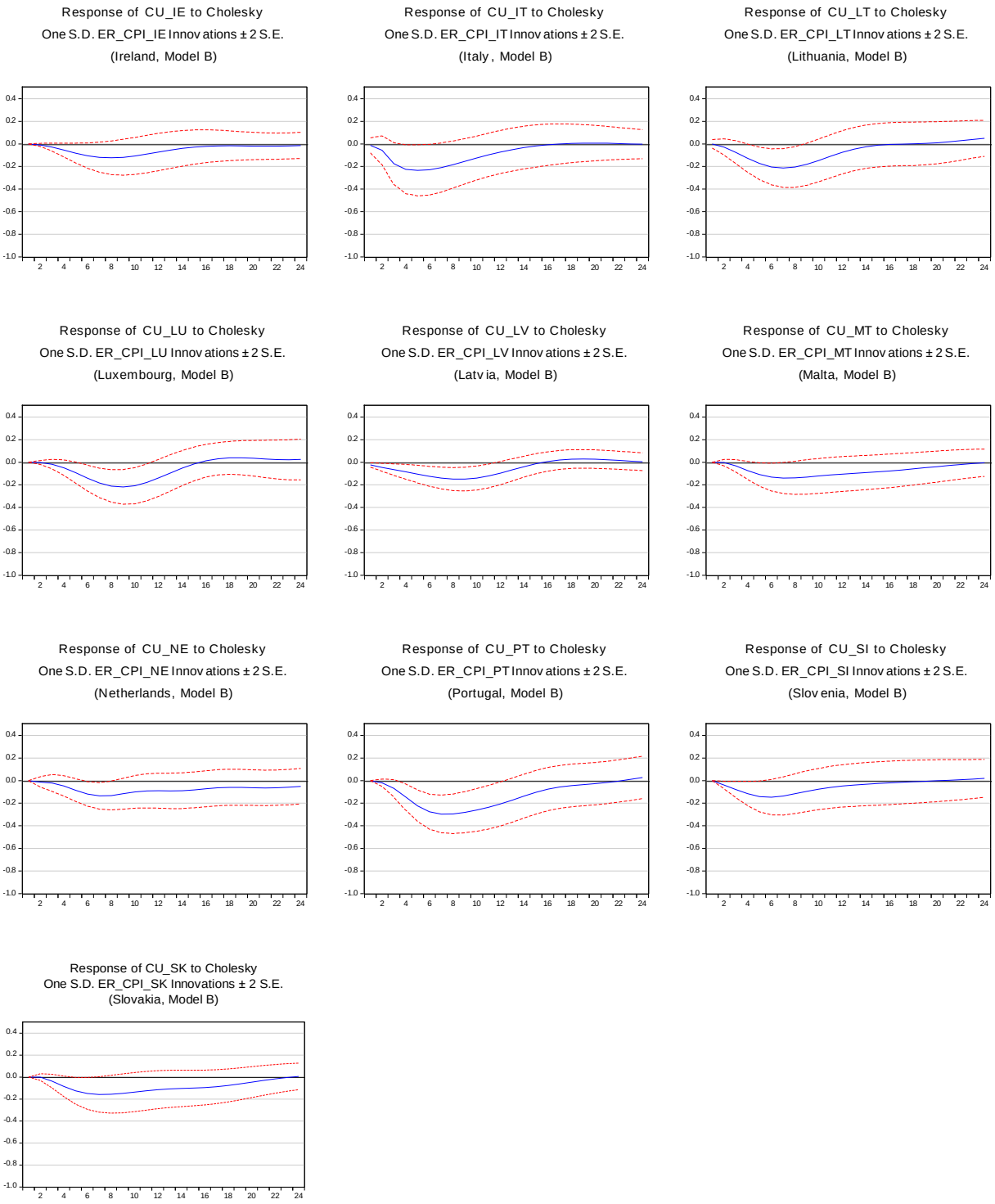
Estimated responsiveness of current accountsto the Cholesky positive one standard deviation REER shock (appreciation of the CPI based real exchange rate) revealed interesting implications of a reduced price-determined competitiveness in the Euro Area member countries during the pre-crisis period. Unexpected shift (increase) inREER was followed by the current account deterioration in each individual country. Negative effect of the shock culminated within the sixth and twelfth month since the shock followed by a converging trend in the current account to its pre-shock equilibrium. Exchange rate shock seems to be neutral in the long run and its effect on the current account was just temporary.

Moreover, we have examined just minor differences in the response pattern of current accounts between the core and periphery of the Euro Area. We suggest that generally higher dynamics in the price levelin the South of the Euro Area contributed to the reduction in the competitiveness of the periphery countries. However, similarity of the responsiveness of current accounts between core and periphery countries indicates that changes in competitiveness measured by real exchange rates (CPI based) played a less important role in explaining considerable asynchronous trend in current accounts between North and South of the Euro Area.

Responsiveness of current accounts to the positive CPI based real exchange rate shock in the new Euro Area member countries (from Central and Eastern Europe) that operated outside the Euro Area during the pre-crisis period was generally more dynamicthough not the highest from the whole group. It generally followed expected adjustment of the current account in the small opened economies.

In the Figure 8 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (CPI based) shocks in the model with time series for the extended period (model B1) in the Euro Area member countries.





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (CPI based) shock in each of the Euro Area member countries.

Source: Author's calculation.

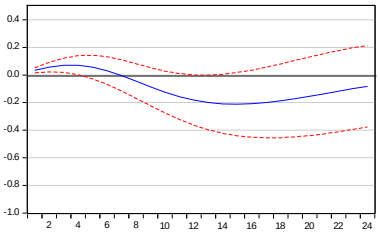
Figure 8. Responses of Current Account to REER (CPI based) Shocks (2000M1-2014M12) (Model B1)

Crisis period affected responsiveness of current accounts to the positive real exchange rate (CPI based) shock in both groups of countries as it has revealed some differences in its key characteristics. While the loading phase of the current account responses to the real exchange rate (CPI based) shock was quite similar to the results from the pre-crisis period (effect of the shock culminated within one year since the shock), the overall

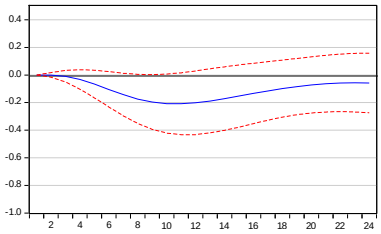
durability and intensity of the current account deterioration seems to be reduced in all countries. As a result, the overall exposure of current accounts to the exchange rate shock decreased in both core and periphery countries of the Euro Area. Similar pattern in the current account responsiveness was also investigated in the new Euro Area member countries. We suggest that the core countries experienced less dynamic deterioration in their current accounts that makes them less vulnerable to the price related drop in competitiveness induced by real exchange rate appreciation.

In the Figure 9 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (ULC based) shocks in the model with time series for the pre-crisis period (model A2) in the Euro Area member countries.

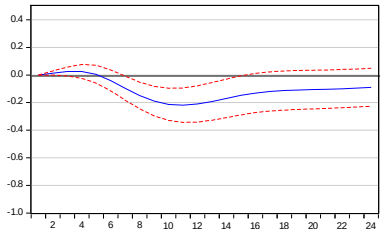
Response of CU_AT to Cholesky
One S.D. ER_ULC_AT Innovations ± 2 S.E.
(Austria, Model A)



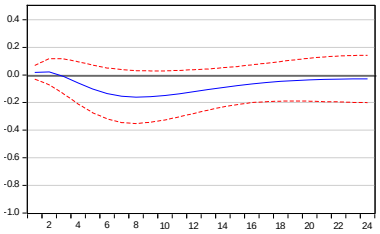
Response of CU_BE to Cholesky
One S.D. ER_ULC_BE Innovations ± 2 S.E.
(Belgium, Model A)



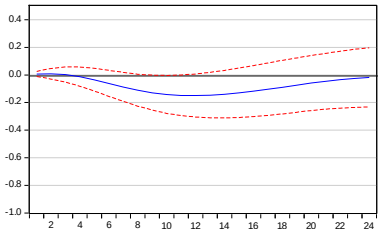
Response of CU_CY to Cholesky
One S.D. ER_ULC_CY Innovations ± 2 S.E.
(Cyprus, Model A)



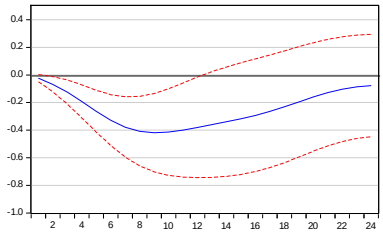
Response of CU_DE to Cholesky
One S.D. ER_ULC_DE Innovations ± 2 S.E.
(Germany, Model A)



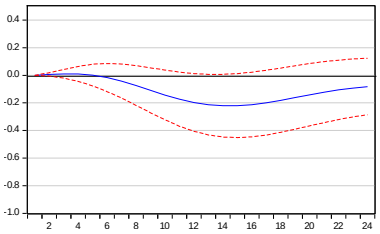
Response of CU_EE to Cholesky
One S.D. ER_ULC_EE Innovations ± 2 S.E.
(Estonia, Model A)



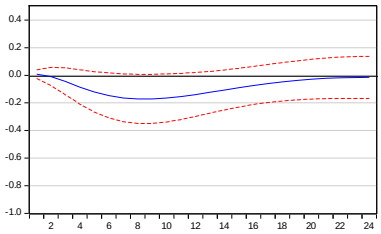
Response of CU_ES to Cholesky
One S.D. ER_ULC_ES Innovations ± 2 S.E.
(Spain, Model A)



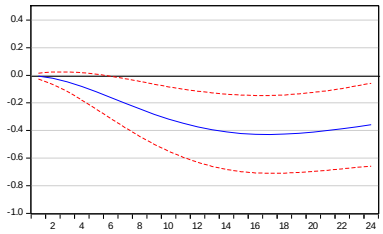
Response of CU_FI to Cholesky
One S.D. ER_ULC_FI Innovations ± 2 S.E.
(Finland, Model A)



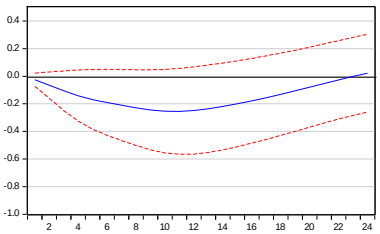
Response of CU_FR to Cholesky
One S.D. ER_UL_FR Innovations ± 2 S.E.
(France, Model A)



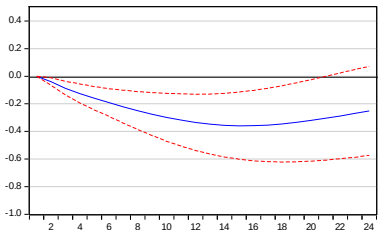
Response of CU_GR to Cholesky
One S.D. ER_ULC_GR Innovations ± 2 S.E.
(Greece, Model A)



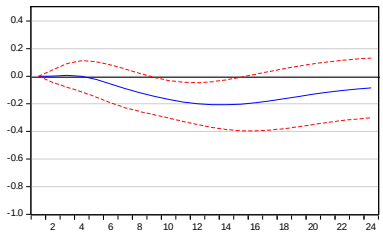
Response of CU_IE to Cholesky
One S.D. ER_ULC_IE Innovations ± 2 S.E.
(Ireland, Model A)

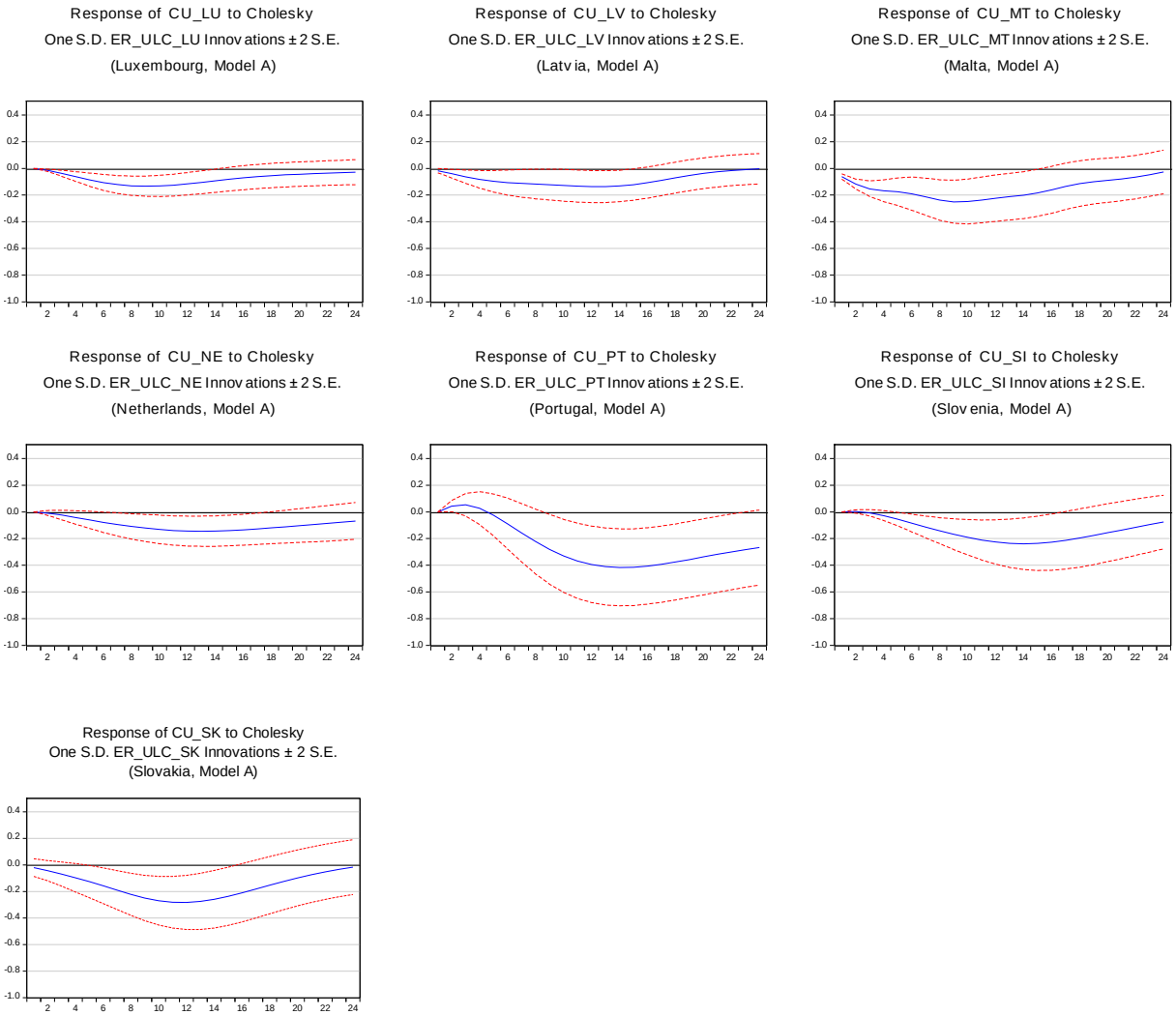


Response of CU_IT to Cholesky
One S.D. ER_ULC_IT Innovations ± 2 S.E.
(Italy, Model A)



Response of CU_LT to Cholesky
One S.D. ER_ULC_LT Innovations ± 2 S.E.
(Lithuania, Model A)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in each of the Euro Area member countries.

Source: Author's calculation.

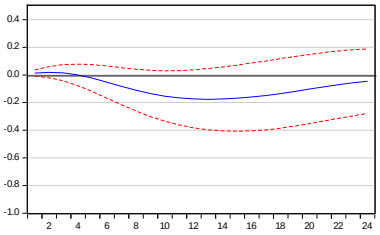
Figure 9 - Responses of current account to REER (ULC based) Shocks (2000M1-2007M12) (Model A2)

Estimated responsiveness of current accounts to the Cholesky positive one standard deviation REER shock (appreciation of the ULC based real exchange rate) revealed interesting implications of a reduced labor costs-determined competitiveness in the Euro Area member countries during the pre-crisis period. Unexpected shift (increase) in REER was followed by the current account deterioration in all countries. However, our results indicate significant differences in the current account response patterns between the core and periphery of the Euro Area (as well as considering our results for CPI based real exchange rate shocks). Loading phase of the drop in the current accounts in the periphery countries increased that is why the negative effect of the shock culminated within ninth and eighteenth month since the shock. The overall dynamics as well as durability in the current account responsiveness also increased in this group of countries. On the other hand, the core countries seems to be less vulnerable to the drop in labor costs-determined competitiveness as their current account deteriorated with clearly reduced dynamics after the positive real exchange rate shock. The overall durability of the current account convergence to its pre shock equilibrium was also much reduced in the core of the Euro Area.Exchange rate shock seems to be neutral in the long run and its effect on the current account was just temporary.

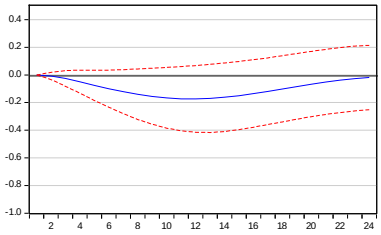
Responsiveness of current accounts to the positive ULC based real exchange rate shock in the new Euro Area member countries that operated outside the Euro Area during the pre-crisis period was generally less dynamic in Baltic countries than in Slovak republic and Slovenia.

In the Figure 10 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (ULC based) shocks in the model with time series for the pre-crisis period (model B2) in the Euro Area member countries.

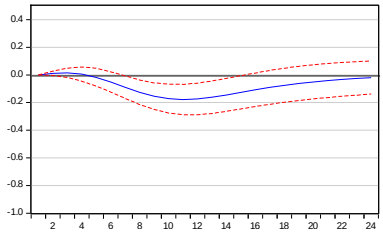
Response of CU_AT to Cholesky
One S.D. ER_ULC_AT Innovations ± 2 S.E.
(Austria, Model B)



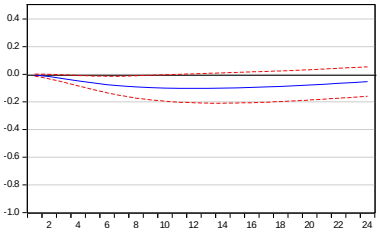
Response of CU_BE to Cholesky
One S.D. ER_ULC_BE Innovations ± 2 S.E.
(Belgium, Model B)



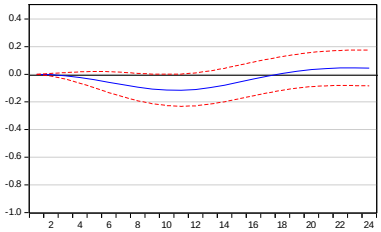
Response of CU_CY to Cholesky
One S.D. ER_ULC_CY Innovations ± 2 S.E.
(Cyprus, Model B)



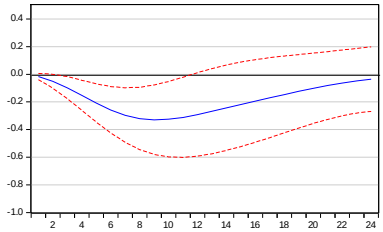
Response of CU_DE to Cholesky
One S.D. ER_ULC_DE Innovations ± 2 S.E.
(Germany, Model B)



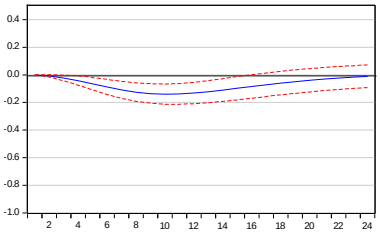
Response of CU_EE to Cholesky
One S.D. ER_ULC_EE Innovations ± 2 S.E.
(Estonia, Model B)



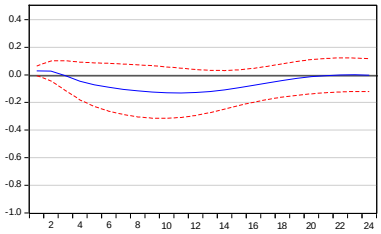
Response of CU_ES to Cholesky
One S.D. ER_ULC_ES Innovations ± 2 S.E.
(Spain, Model B)



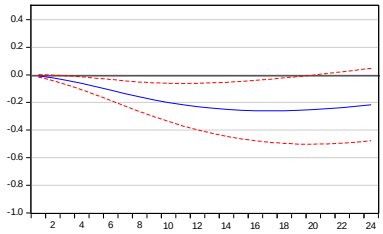
Response of CU_FI to Cholesky
One S.D. ER_ULC_FI Innovations ± 2 S.E.
(Finland, Model B)



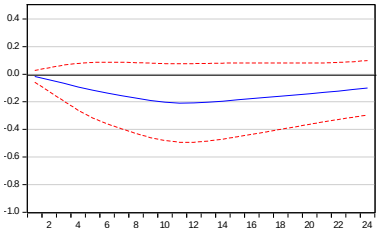
Response of CU_FR to Cholesky
One S.D. ER_UL_FR Innovations ± 2 S.E.
(France, Model B)



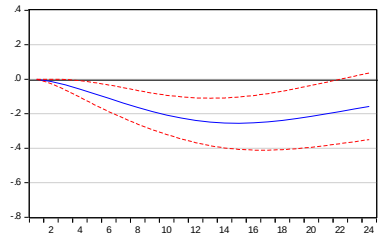
Response of CU_GR to Cholesky
One S.D. ER_ULC_GR Innovations ± 2 S.E.
(Greece, Model B)



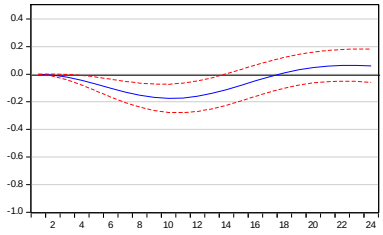
Response of CU_IE to Cholesky
One S.D. ER_ULC_IE Innovations ± 2 S.E.
(Ireland, Model B)

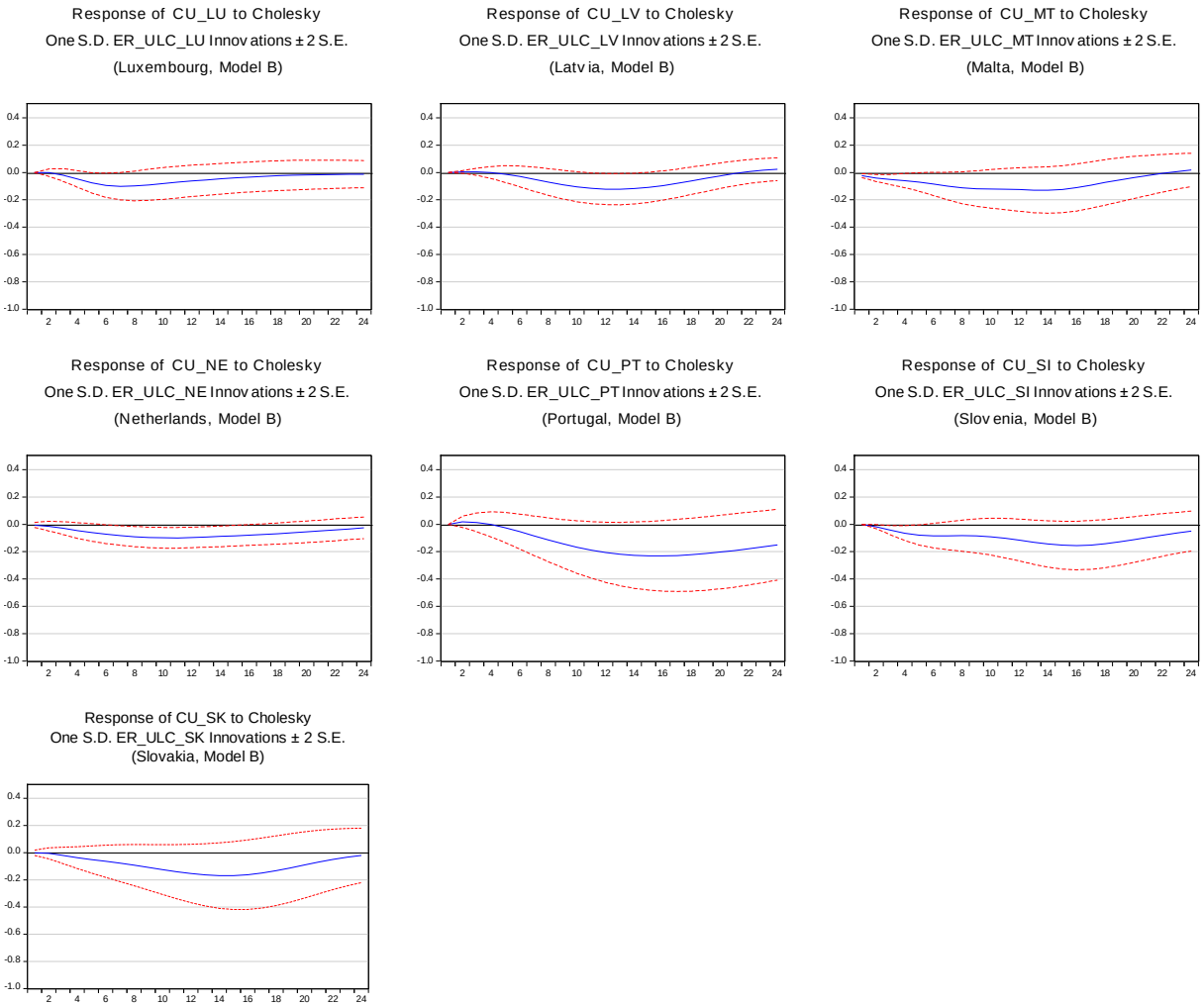


Response of CU_IT to Cholesky
One S.D. ER_ULC_IT Innovations ± 2 S.E.
(Italy, Model B)



Response of CU_LT to Cholesky
One S.D. ER_ULC_LT Innovations ± 2 S.E.
(Lithuania, Model B)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in each of the Euro Area member countries.

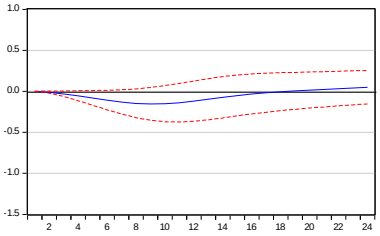
Source: Author's calculation.

Figure 10 - Responses of Current Account to REER (ULC based) Shocks (2000M1-2014M12) (Model B2)

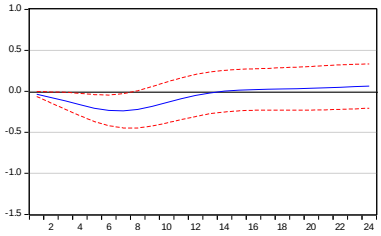
Crisis period affected responsiveness of current accounts to the positive exchange rate (ULC based) shock in both core and periphery of countries. Generally, the overall vulnerability of current accounts to the drop in labor costs-determined competitiveness decreased in all Euro Area countries. Reduced dynamics and durability of the current account deterioration in both groups of countries indicate less important role of the labor costs related determinants of competitiveness especially in countries that experienced just a minor improvement in their external imbalances (Italy). Similar pattern in the current account responsiveness was also investigated in the new Euro Area member countries. However, reduced vulnerability of current accounts to the labor costs-determined competitiveness in countries that experienced a significant improvement in their external imbalances (Portugal, Greece and Spain) indicates that internal (labor costs-driven) devaluation and related improvement in competitiveness does not represent a convenient vehicle for reducing their external imbalances.

In the Figure 11 we summarize results of impulse-response functions of current accounts to positive (appreciation) demand shocks in the model with time series for the pre-crisis period (model A3) in the Euro Area member countries.

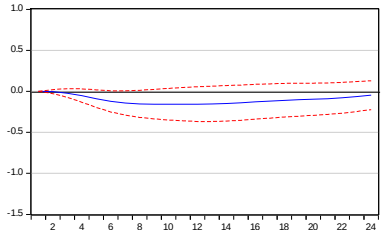
Response of CU_AT to Cholesky
One S.D. GDP_AT Innovations ± 2 S.E.
(Austria, Model A)



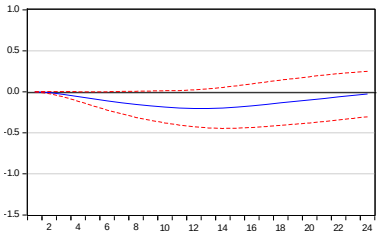
Response of CU_BE to Cholesky
One S.D. GDP_BE Innovations ± 2 S.E.
(Belgium, Model A)



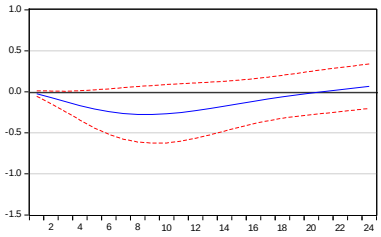
Response of CU_CY to Cholesky
One S.D. GDP_CY Innovations ± 2 S.E.
(Cyprus, Model A)



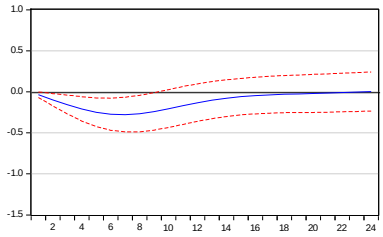
Response of CU_DE to Cholesky
One S.D. GDP_DE Innovations ± 2 S.E.
(Germany, Model A)



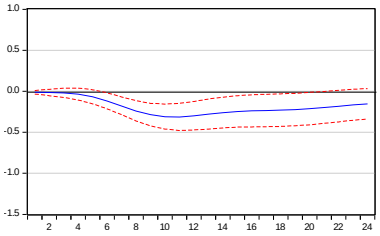
Response of CU_EE to Cholesky
One S.D. GDP_EE Innovations ± 2 S.E.
(Estonia, Model A)



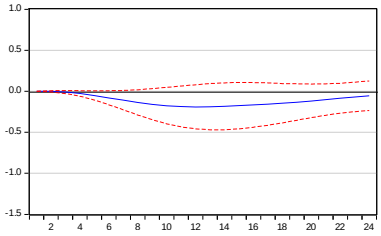
Response of CU_ES to Cholesky
One S.D. GDP_ES Innovations ± 2 S.E.
(Spain, Model A)



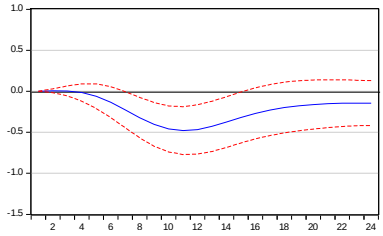
Response of CU_FI to Cholesky
One S.D. GDP_FI Innovations ± 2 S.E.
(Finland, Model A)



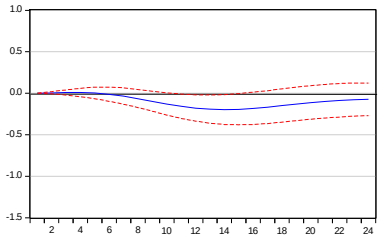
Response of CU_FR to Cholesky
One S.D. GDP_FR Innovations ± 2 S.E.
(France, Model A)



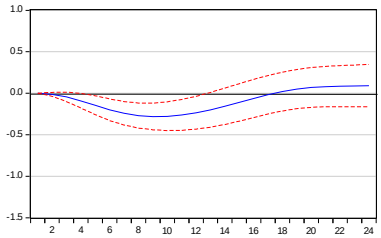
Response of CU_GR to Cholesky
One S.D. GDP_GR Innovations ± 2 S.E.
(Greece, Model A)



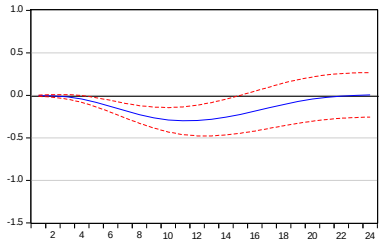
Response of CU_IE to Cholesky
One S.D. GDP_IE Innovations ± 2 S.E.
(Ireland, Model A)



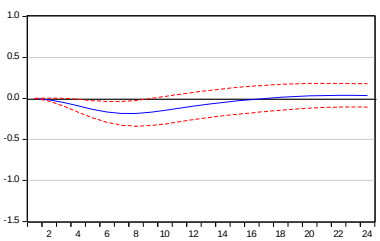
Response of CU_IT to Cholesky
One S.D. GDP_IT Innovations ± 2 S.E.
(Italy, Model A)



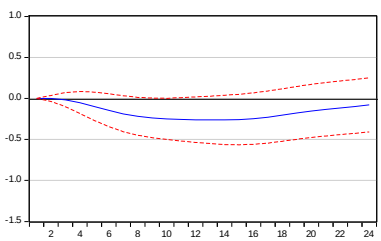
Response of CU_LT to Cholesky
One S.D. GDP_LT Innovations ± 2 S.E.
(Lithuania, Model A)



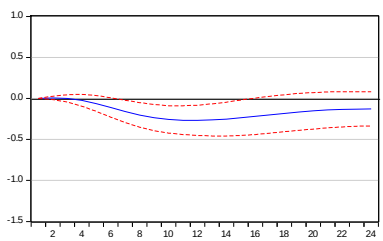
Response of CU_LU to Cholesky
One S.D. GDP_LU Innovations ± 2 S.E.
(Luxembourg, Model A)

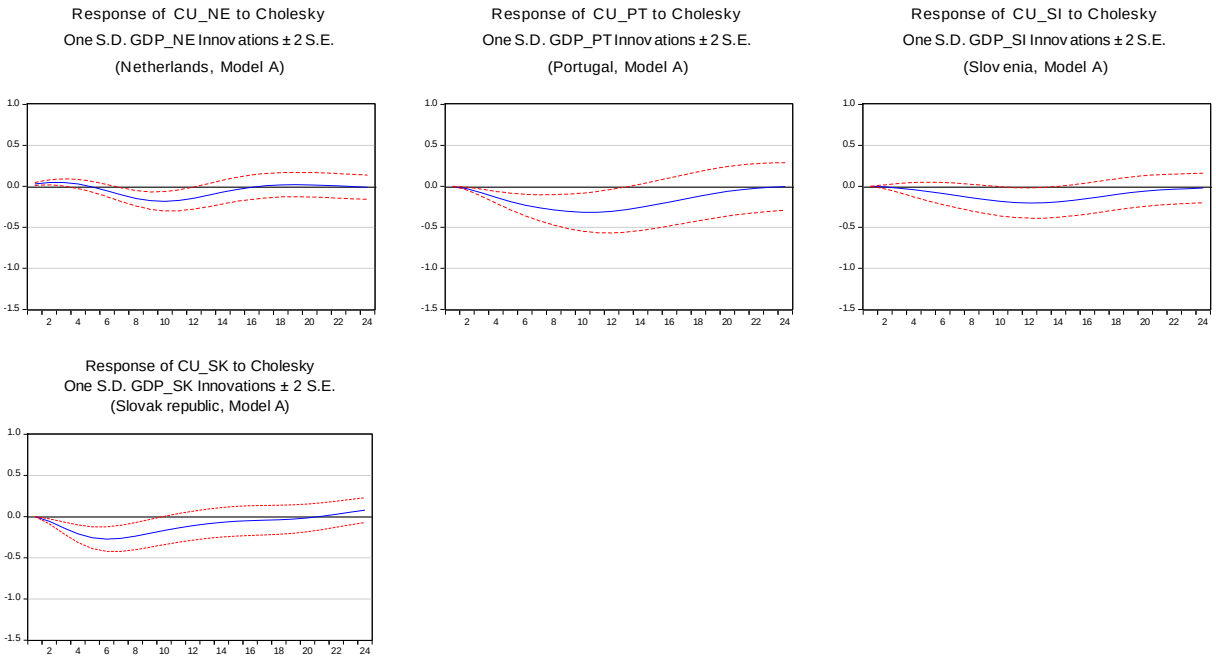


Response of CU_LV to Cholesky
One S.D. GDP_LV Innovations ± 2 S.E.
(Latvia, Model A)



Response of CU_MT to Cholesky
One S.D. GDP_MT Innovations ± 2 S.E.
(Malta, Model A)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in each of the Euro Area member countries.

Source: Author's calculation.

Figure 11 - Responses of Current Account to Demand Shock (2000M1-2007M12) (Model A3)

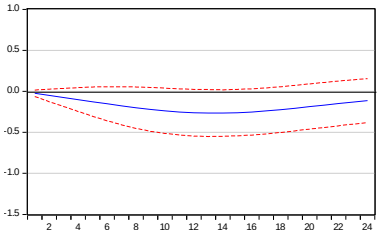
Estimated responsiveness of current accounts to the Cholesky positive one standard deviation demand shock revealed interesting implications of a demand driven external imbalances in the Euro Area member countries during the pre-crisis period. Unexpected shift (increase) indemand was followed by the current account deterioration in all countries. However, our results indicate significant differences in the current account response patterns not only between the core and periphery of the Euro Area but also within both sub-groups of countries. Together with different dynamics in the initial current account deterioration (generally higher in the periphery and all new Euro Area member countries but Slovenia; though countries operated outside the Euro Area during the pre-crisis period) we have also examined quite different length of the initial loading phase of the effect of the shock on the current account deterioration. Effect of the shock in the periphery countries had shorter durability (except for Greece and Portugal), culminated with reduced lag length and was followed by generally more dynamic current account deterioration. Demand shock seems to be neutral in the long run and its effect on the current account was just temporary in all countries.

Responsiveness of current accounts to the positive demand shock in the new Euro Area member countries that operated outside the Euro Area during the pre-crisis period was generally more durable though we have examined some differences in the length of the initial loading phase of the shock.

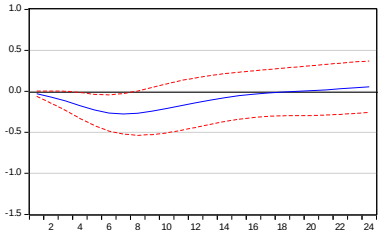
It seems that demand shocks contributed more to the current account imbalances in the periphery of the Euro Area (considering large current account deficits in the pre-crisis period) that in the core countries as suggested by Sanchez and Varoudakis (2013).

In the Figure 12 we summarize results of impulse-response functions of current accounts to positive (appreciation) demand shocks in the model with time series for the pre-crisis period (model B3) in the Euro Area member countries.

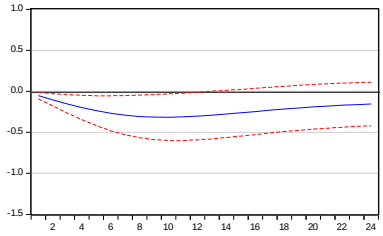
Response of CU_AT to Cholesky
One S.D. GDP_AT Innovations ± 2 S.E.
(Austria, Model B)



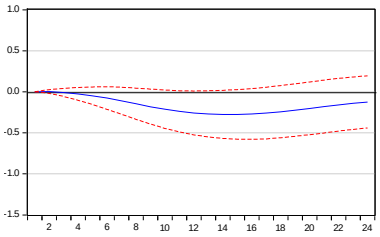
Response of CU_BE to Cholesky
One S.D. GDP_BE Innovations ± 2 S.E.
(Belgium, Model B)



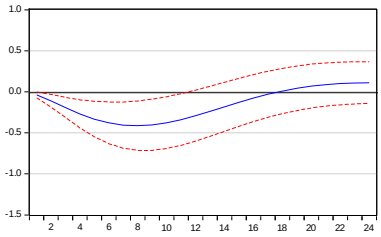
Response of CU_CY to Cholesky
One S.D. GDP_CY Innovations ± 2 S.E.
(Cyprus, Model B)



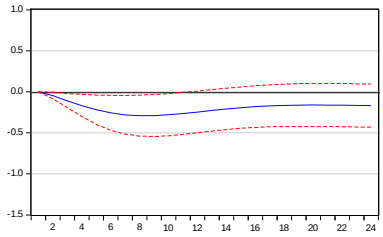
Response of CU_DE to Cholesky
One S.D. GDP_DE Innovations ± 2 S.E.
(Germany, Model B)



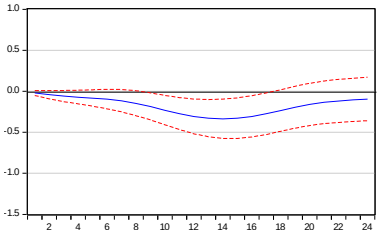
Response of CU_EE to Cholesky
One S.D. GDP_EE Innovations ± 2 S.E.
(Estonia, Model B)



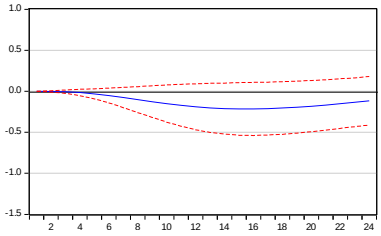
Response of CU_ES to Cholesky
One S.D. GDP_ES Innovations ± 2 S.E.
(Spain, Model B)



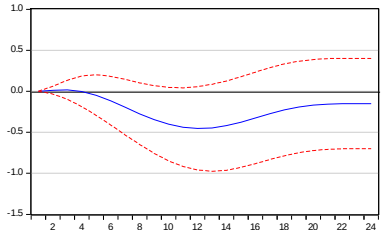
Response of CU_FI to Cholesky
One S.D. GDP_FI Innovations ± 2 S.E.
(Finland, Model B)



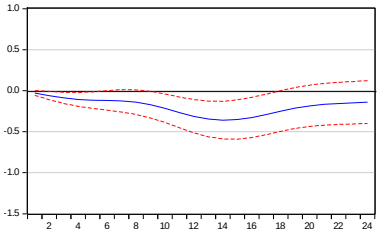
Response of CU_FR to Cholesky
One S.D. GDP_FR Innovations ± 2 S.E.
(France, Model B)



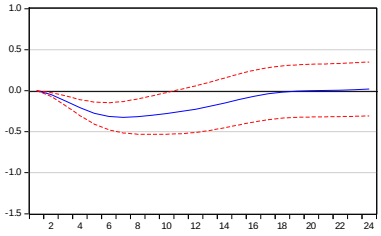
Response of CU_GR to Cholesky
One S.D. GDP_GR Innovations ± 2 S.E.
(Greece, Model B)



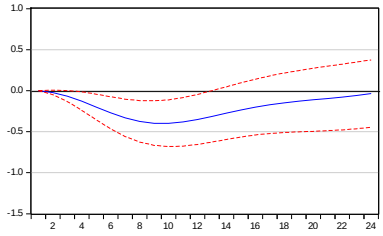
Response of CU_IE to Cholesky
One S.D. GDP_IE Innovations ± 2 S.E.
(Ireland, Model B)



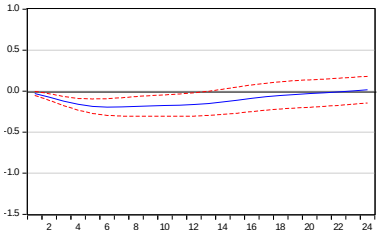
Response of CU_IT to Cholesky
One S.D. GDP_IT Innovations ± 2 S.E.
(Italy, Model B)



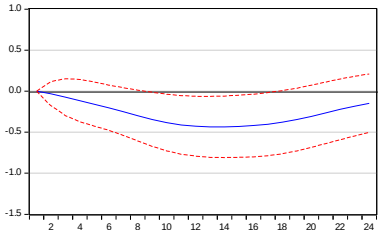
Response of CU_LT to Cholesky
One S.D. GDP_LT Innovations ± 2 S.E.
(Lithuania, Model B)



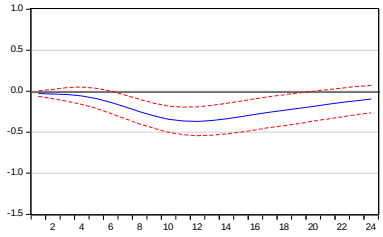
Response of CU_LU to Cholesky
One S.D. GDP_LU Innovations ± 2 S.E.
(Luxembourg, Model B)

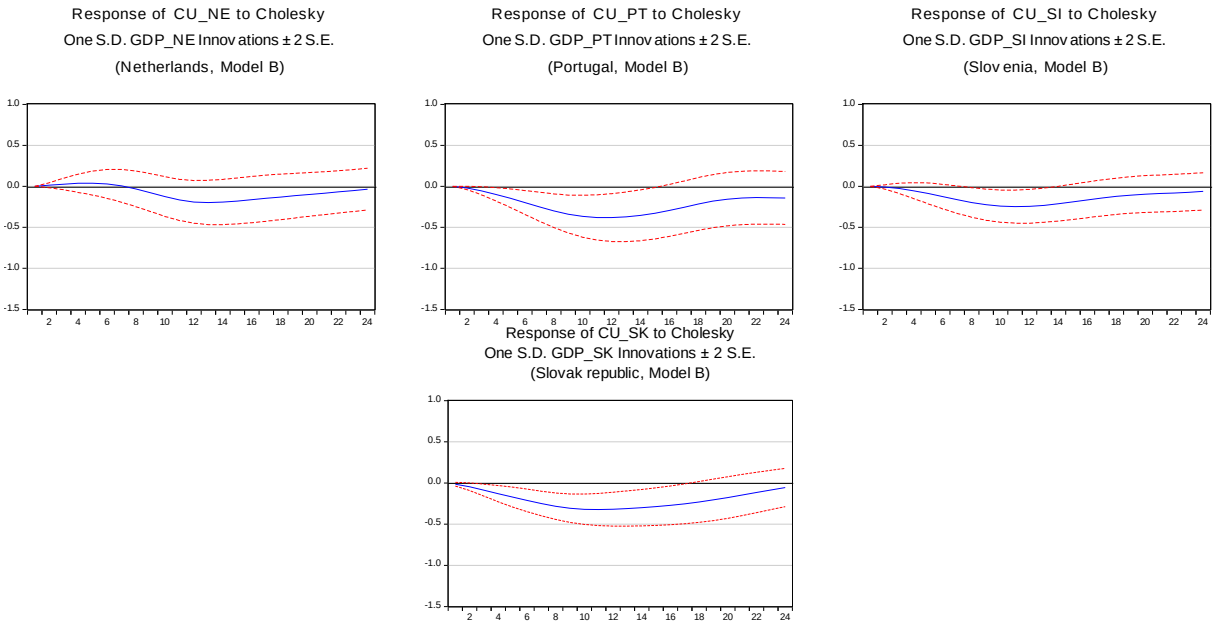


Response of CU_LV to Cholesky
One S.D. GDP_LV Innovations ± 2 S.E.
(Latvia, Model B)



Response of CU_MT to Cholesky
One S.D. GDP_MT Innovations ± 2 S.E.
(Malta, Model B)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in each of the Euro Area member countries.

Source: Author's calculation.

Figure 12 - Responses of Current Account to Demand Shock (2000M1-2014M12) (Model B3)

Crisis period affected responsiveness of current accounts to the positive demand shock in both core and periphery of countries. Contrary to our results for real exchange rates (both CPI and ULC based), current account responsiveness to the unexpected demand shock increased in both groups of countries during the crisis period. We have observed more dynamic and durable current account deterioration also in new Euro Area member countries.

We suggest that crisis period intensified demand driven redistributive effects that seems to have more important role on the current account determination that changes in price and cost related competitiveness. Significant reduction in demand during the initial stage of the crisis period contributed to general improvement in the current account imbalances between North and South of the Euro Area and as a result, in the Euro Area as a whole.

C. Variance decomposition

Table4 summarizes relative contributions of the CPI based REER shock, ULC based REER shock and demand shock to the conditional variance of current accounts in the Euro Area member countries during pre-crisis (model A) and extended (model B) periods.

Table 4 - Variance decomposition of current accounts (in %)

Austria							Belgium							Cyprus						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.23	1.89	0.00	0.00	0.06	0.31	1	0.00	0.00	0.12	0.00	0.00	0.00	1	1.61	2.12	0.00	0.00	0.00	0.03
6	8.56	7.93	8.03	6.19	0.99	1.40	6	9.98	8.05	8.96	10.48	1.33	1.58	6	11.36	10.01	9.61	8.81	0.96	1.47
12	14.63	12.48	17.24	12.56	9.74	9.82	12	13.94	9.56	12.40	15.00	8.67	10.32	12	14.73	13.09	14.28	13.60	13.10	14.90
24	18.36	16.38	20.32	17.46	18.39	24.27	24	12.78	9.48	13.60	12.87	16.61	21.54	24	18.37	15.12	19.77	18.91	18.75	24.05
Germany							**Estonia**							**Spain**						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.00	0.00	0.31	0.00	0.28	1	0.00	0.00	0.00	0.00	0.00	0.00	1	0.00	0.24	0.00	0.18	0.00	0.21
6	4.15	3.90	5.89	6.39	0.53	1.58	6	5.27	6.85	4.20	3.20	0.75	1.27	6	8.35	6.39	7.42	6.74	1.14	1.80
12	14.88	12.28	15.79	13.78	13.92	14.47	12	15.83	14.32	13.83	12.06	6.17	7.39	12	13.17	12.18	14.96	13.08	12.98	14.61

24	20.77	16.89	17.93	12.64	17.89	20.29	24	21.13	20.23	21.42	20.68	14.46	19.43	24	18.69	16.55	21.56	17.43	19.23	21.78
Finland							**France**							**Greece**						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.14	0.00	0.32	0.00	0.00	1	0.03	0.00	0.00	0.26	0.12	0.15	1	0.12	0.00	0.00	0.13	0.32	0.25
6	7.26	6.28	5.87	5.06	1.19	2.06	6	7.14	7.03	6.38	6.06	1.77	2.07	6	7.29	6.58	7.15	7.02	2.04	1.96
12	13.27	11.34	13.67	11.44	12.08	13.17	12	15.25	13.87	14.19	13.48	11.36	13.08	12	12.54	11.36	13.06	12.58	13.47	14.02
24	17.96	16.79	18.29	16.29	19.05	24.57	24	19.32	18.32	20.87	19.28	18.25	19.54	24	19.38	18.52	20.27	19.35	20.21	25.61
Ireland							**Italy**							**Lithuania**						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.18	0.00	0.14	0.21	0.28	1	0.00	0.00	0.00	0.00	0.17	0.14	1	0.15	0.00	0.00	0.00	0.27	0.15
6	6.83	5.91	6.04	5.87	1.36	1.27	6	7.27	7.01	6.31	6.22	1.94	2.04	6	4.24	4.15	4.01	3.76	1.78	2.08
12	12.17	11.64	11.63	10.39	11.14	12.75	12	14.84	13.35	13.84	13.05	9.65	11.38	12	15.85	14.87	14.73	14.35	7.48	7.89
24	17.46	16.30	16.49	16.09	18.53	22.43	24	17.28	16.43	16.39	15.89	17.45	19.51	24	22.14	21.53	20.51	19.59	16.39	19.99
Luxembourg							**Latvia**							**Malta**						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.00	0.14	0.18	0.00	0.00	1	0.00	0.00	0.14	0.11	0.00	0.00	1	0.00	0.27	0.00	0.31	0.00	0.00
6	5.21	5.16	5.49	5.27	1.17	1.65	6	5.44	5.02	6.22	6.07	1.78	1.94	6	8.75	8.23	7.33	7.10	1.11	1.39
12	13.84	13.22	14.38	14.75	9.14	9.49	12	12.78	12.43	14.52	14.80	8.45	8.76	12	13.89	13.47	12.76	12.25	10.38	11.23
24	17.89	16.43	18.49	17.94	14.76	18.54	24	19.58	19.04	20.14	19.32	17.59	21.48	24	19.51	17.39	19.36	18.24	17.31	20.56
Netherlands							**Portugal**							**Slovenia**						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.00	0.00	0.00	0.17	0.21	1	0.24	0.21	0.00	0.00	0.16	0.19	1	0.00	0.12	0.00	0.14	0.00	0.00
6	7.57	7.08	7.47	6.50	1.78	1.95	6	6.88	6.03	6.56	6.24	2.12	2.27	6	5.32	5.25	5.07	4.33	1.19	1.54
12	12.14	12.07	14.15	13.66	11.36	13.23	12	14.18	13.75	15.06	14.55	14.77	15.56	12	13.39	13.65	11.29	11.16	9.66	10.12
24	13.78	12.99	15.38	15.00	15.27	19.41	24	17.97	16.99	19.27	18.38	21.20	23.94	24	18.42	17.96	17.38	17.32	18.77	22.30
Slovak republic																				
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock															
	A	B	A	B	A	B														
1	0.31	0.25	0.00	0.00	0.15	0.19														
6	7.43	7.14	6.34	5.21	1.17	1.88														
12	12.39	11.87	11.84	11.25	12.23	13.15														
24	19.58	19.32	17.38	17.04	19.77	23.27														

Note: Relative contributions of structural shocks to the conditional variance of current accountsin models A (2000M1-2007M12) and B (2000M1-2014M12).

Source: Author's calculations.

Decomposition of conditional variance of current accounts in the Euro Area member countries revealed information about the relative importance of real effective exchange rate and demand shocks in determining external balances in the North and South of the Euro Area.

First, during first six months since the shocksboth CPI and ULC based REER shocks contributed into the adjustments of the current accounts with higher intensity (between 5 to 10%) than demand shocks in all countries. While the relative importance of both shocks slightly increased over time, their contribution steadily diminished in the long run. We did not observe any clear determination pattern that would enable us to make any reasonable differences between North and South of the Euro Area. Current accounts in the new Euro Area member countries were generally more vulnerable to the real exchange rate shocks than the average of the Euro Area.

Second, the relative contribution of the demand shock during first six month since the shock was generally negligible and did not determine current account adjustments with any significant magnitude. However, its importance significantly increased during the second half of the year since the shock in most countries. The relative importance of the demand shock became comparable to the real exchange rate shocks during the second year since shock and even dominated in some countries (Finland, Italy, Netherlands, Portugal, Slovenia and Slovak republic). Its importance even increased over longer period of time.

Third, crisis period slightly reduced the relative importance of prices and costs related determinants of external competitiveness in favor demand of drivers in all Euro Area member countries. As a result, the relative importance of both CPI and ULC based REER shocks moderately decreased over the whole observed period since shock (2 years). At the same time the relative importance of demand shock clearly increased in all countries though with higher intensity in smaller and more opened economies (new Euro Area members included).

Conclusion

Examination of the effects associated with changes in price and costs-determined competitiveness on current account deficits in the Euro Area member countries revealed interesting implications of existingdifferences in performance between the core and periphery on the external intra-Eurozone imbalances. Our results indicate that current accounts in the periphery countries was more vulnerable the exchange rate (both CPI and ULC based) shocks than in the core countries. However, differences are more significant in case of costs-determined changes in competitiveness induced by unexpected real exchange rate shifts.

Current accounts in the periphery countries of the Euro Area were also more vulnerable to the demand shocks in terms of both intensity and durability of the effect associated with the current account adjustments. Moreover, while the relative importance of the real exchange rate shocks dominated just within first six months since the shock, increased vulnerability to the demand shock over longer period of time reduces well expected benefits of the prices and costs related boost in competitiveness and associated reduction in the current account deficits. This idea is even more reasonable provided that crisis period generally reduced vulnerability of current accounts in the all Euro Area member countries to the real exchange rates shocks and increased their responsiveness to the demand shocks. Higher relative importance of demand shocks in explaining conditional variability of current accounts in the whole Euro Area during the crisis period even emphasizes these conclusions.

While competitiveness issues (higher dynamics of prices and labor costs) in the periphery countries can explain a significant deterioration in the external imbalances of the periphery countries during the pre-crisis period, decreased vulnerability of current accounts to the real exchange rate shocks during the crisis period reduces applicability of internal devaluation as a convenient vehicle for a reduction in external imbalances in these countries.

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Reserve Risk Analysis and Dependence Modeling in Non-Life Insurance: The Solvency II Project

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Abstract

The adoption of the new prudential directive "Solvency II" urges insurance companies to improve their internal models in accordance with their own capital stocks, reserve, Solvency Capital Requirement in order to manage properly their risks. The reserve risk is considered as the main risk in non-life insurance determining the solvency capital.

The aim of this paper is twofold: to model the reserve risk of a part of non-life portfolio and to evaluate the necessary capital to cover it under the internal model of the Solvency II project, taking into account the dependence between the branches. For this purpose, our analysis begins by assessing reserve risk over the ultimate horizon of payments development, using stochastic models and a simulation technique to determine the distribution of reserve, in the case of two insured risks; the motor damages and the motor third-party liability. Then, we use a copula theory modeling in order to detect the dependence between the two insurance business lines. Finally, we provide a comparative analysis of alternative schemes measuring adequately SCR under the independence and dependence cases for both standard and internal models.

Using original data collected on Tunisian Insurance companies, our results reveal that internal model provides better estimates of solvency funds.

Keywords: reserve risk, best estimate, generalized linear models, bootstrap, Copula, solvency capital requirement (SCR).

JEL Classification: C12, C14, C15, C53, G22.

1. Introduction

How to ensure the solvency of an insurance company? This is the central key issue to any actuary that aims to guarantee the sustainability of the company. An insurance company needs to be solvent, by fulfilling its financial obligations and having a "financial buffer" enough to cover all risks and losses without putting at risk the financial health of the company.

The importance of the amounts involved has led the European Union to establish prudential standards for controlling the solvency of insurance companies. For this purpose, the European Commission sets up a regulatory reform, known as "Solvency I", aim to guarantee the credibility of the insurer and the protection of the policyholders.

Nonetheless, the globalization of insurance groups and the development of financial techniques such as securitization, the multiplication of extreme risk and financial crises, make current prudential directive Solvency I unsuitable to and open to several inconvenience. It becomes necessary to review the regulation pattern of insurance industry by enacting a new solvency regime, called "Solvency II". This new regulation project incorporates the new developments in the areas of prudential supervision, risk management. Indeed, Solvency II takes into account a new approach of technical provisions computation, introducing "Risk Margin" in addition to the "Best Estimate".

Indeed, the requirement to determine a market value of the provisions, necessitate a radical change in the process of reserving by shifting from a deterministic environment (no method is needed to determine the amount of reserves) to a stochastic world. This stochastic dimension, making it possible to define the reserve volatility, is necessary to take into account the assessment of reserve risk.

Reserve risk stems from two sources:

- On the one hand, the Best Estimate of the claims provisions may be misestimated.

- On the other hand, because of the stochastic nature of future claims payouts, the actual claims will fluctuate around their statistical mean value.

The literature involves a range of techniques for calculating the best estimate of technical provisions, especially provisions for claims outstanding. These different methods are determined to capture the reliable actuarial method.

Mack (1993) has developed a stochastic model from the "reference" model Chain Ladder. Indeed, it is a non-parametric model, where no assumption on the distribution of the components of the triangle is made, conditional in the sense that it determines the means knowing the achievements of the upper triangle.

In essence, this technique estimates the volatility of the estimator of technical provisions i.e. by predicting reserves evaluation errors. No assumption is made on the form of distribution of the amount of claims or provisions. Therefore, it is possible to compute the gap instead of quintiles.

To overcome this drawback, Mack (1999) assumes that provisions follow a normal or a log normal distribution. However, an approximation by a normal distribution may not be appropriate since it could take negative values. Therefore a parametric approach will be preferred.

Introduced by Nelder and Wedderburn (1972) and further developed by Mc Cullagh and Nelder (1989), generalized linear models allow to study the link between a dependent or response variable and a set of explanatory variables. Unlike the Chain Ladder model, GLM models apply to triangles of incremental payments. It is known that liquidation triangles contain negative increments mainly due to the presence of recourses.

In this context, and to take into account the presence of negative increment, several solutions and corrections were proposed in the literature. In this respect, Mack (1994) considers these increments as missing data and proposes to omit them. Nevertheless, Verrall *et al.* (1993) add a constant to all the negative increment (before analysis), to make them positive and once the increments of future claims are estimated, the same constant is subtracted. Hence we argue that the solutions proposed set up restrictions on the number of negative increments observed in the triangle of liquidation.

The estimation of the variance is not sufficient to fully quantify the risk. It is therefore necessary to obtain a complete distribution to derive the statistical characteristics related to variability in the distribution. Therefore, simulation methods become a matter of necessity.

The bootstrap is a resampling technique, proposed at the end of the 1970s by Efron aiming to provide guidance as dispersion, confidence intervals, on a given statistic to know the accuracy of the estimates made. Due to its substantial advantages, such as bias reduction and the approximation of a complex analytic estimator distribution, this method is a powerful tool in insurance, particularly in the field of pricing including provision assessment. The bootstrap methodology, described by England and Verrall (1999), is a simulation technique that involves resampling residuals from a model and allows obtaining an estimate of the provisions distribution. Indeed, this method has the benefit of estimating the variability of predictions estimators of future payments or the empirical distribution of cadences.

Reserve risk is a key concept to determine solvency capital. In order, to cover this risk, it is necessary to mobilize additional financial resources. The evaluation principle of the reserve risk is mainly based on the calculation of the Solvency Capital Requirement (SCR), needed to protect against the most disastrous situations and thus reducing the risk of insolvency: it is the approach adopted by the Solvency II reform.

In this context, the European Commission (2010) introduces two options for the assessment of SCR reserve risk at one year, the standard formula common to all insurance companies or the internal model suitable for the own experience activity of the company and more adapted to the risks.

Moreover, the provisions computation calculation is usually carried out by branch of activities (motor damages, property damages, and motor third-party liability). We assume that these branches and risks are considered independent. Nevertheless, several real life instances tell us that this is not the case.

During last years, extreme claims and disasters are generated not only domestically but also internationally. The Storms of Lothar and Martin in December 1999 as well as industrial disaster AZF of Toulouse in September 2001 are examples of domestically extremes events that involving undeniable losses.

Internationally, the disaster of World Trade Center in September 2001 which showed that a high number of guarantees and branches could be brought into play by the occurrence of the same event, and the financial disasters of Enron and Worldcom (2001), which led to heavy damage increased and aggravated by underlying guarantees underwritten by these two.

Moreover, equity markets and the subprime crisis in 2007-2009, have drastically affected the American insurance market and especially American International Group "AIG, first insurer of the world. Major reinsurance companies, such as Switzerland-Re, Munisch-Re, Hannover-Re, have also been impacted.

The occurrence of these risks influence the entire technical and financial basis of insurance and reveals absolutely that when disasters occur, several guarantees are involved at the same time, therefore risks are not independent.

In fact, these events are "correlated" or stochastically dependent in a more rigorous terminology. Then, it is appropriate to propose models taking into account this dependence between risks such as copulas models. Copulas became a basic tool in the modeling of the multivariate distributions in finance and insurance. Introduced by Abe Sklar in 1959 as a solution to a problem of probability statement by Maurice Fréchet, developed by Paul Deheuvels (late 1970s) and Kimeldorf and Sampson (1975), the methodical study of copulas began in the 1980s, with the work of Christian Genest and its coauthors.

An important literature ought to be mentioned such as the work of Dhaene and Goovaerts (1996), Dhaene and Denuit (1999), Frees and Valedez (1998), Joe (1997), Schönbucher and Schubert (2001), Embrechts, McNeil & Straumann (2002), Juri and Wüthrich (2002, 2003), Charpentier and Denuit (2004), among others.

Recently, several studies of Antonin and Benjamin (2002), Cadoux and Loizou (2004), Krauth (2007), Embrechts (2009), Zhao and Zhou (2010), Diers *et al.* (2012), Zhang and Dukic (2013) show the relevance of this theory to model dependence between risks in non- life insurance issues.

Zhang and Dukic (2013) have focused on a novel Bayesian multivariate model based on the use of parametric copula to account for dependencies between various lines of insurance claims.

Diers *et al.* (2012) implement the Bernstein copula to model the dependence structures of non-life insurance. Accordingly, they recourse to a goodness-of-fit analysis and compare the Bernstein copula with other usually copula based on a value-at-risk and tail-value at-risk simulation study.

Furthermore, Zhao and Zhou (2010) propose copula models for fitting the insurance claim numbers with excess zeros and time-dependence. The first model fits two successive claims by a bivariate copula against the second model of Copula applies to the random effects of the conjoint numbers of successive claim.

Krauth's research (2007) is a complete description of different approaches to dependence by way of bootstrap, common shock and copulas. In addition, it exhibited that taking into account the dependence between categories does raise lowly the VaR to the 75% threshold. However, the effect of dependence is more obvious with extreme quantiles.

Cadoux and Loizeau (2004) adopt a dual approach linking a statistical estimate and an expert judgment. They use the Gumbel and Frank copulas. In order to select the best copula, the authors apply a chi-square fit test. However, this test requires a division into classes which limits its robustness. The search for more powerful multivariate tests applied to copulas may bring new alternatives for application.

Antonin and Benjamin (2002) find the estimated dependence between the branches to be positive, and the selected copula is the "Correlated Frailty" copula. However, they have criticized the copula model. Therefore, they recommended a model that combines both the credibility theory and the theory of copula, which may be realistically describe the dependence between the triangles line by line, not element by element.

In this research, we propose to answer the following questions:

- What is the impact of insurance branches dependence on the level of technical provisions and the level of economic capital?
- It is true that independence between branches is the main cause of insufficient funds to cover the load of disaster and Claims expense?

Under the new Solvency framework, insurance companies are committed to improve their internal models relating to its requirements as regards the own capital stocks and to set up a real piloting of risks, especially with the introduction of dependence of the insured risks.

2. Data description

For the purpose of the empirical research, we reconstruct historical claims settlement, from a Tunisian company of Non-Life insurance on a selection of cases consists of two branches:

2.1. Motor, third-party liability

This branch deals with a slow liquidation risk, in the sense that the time between the occurrence of the accident and full payment can take several years. This is explained partly by the fact that some claims are

sometimes determined by a decision of a court and on the other hand, some payments may not intervene before all the consequences in terms of health of the insured are known and stabilized.

2.2. Motor, damages

This branch deals with short development in the sense that once the claim is declared, it will be quickly resolved. Moreover, the motor risk is both a risk of mass, observable on a large number of individuals and a risk of frequency, having a very high probability of occurrence.

We have studied each of the branches based on cumulative payments relating to eleven accidents years from 2000 to 2010 and spanning over eleven years of development. Moreover, at the end of eleven years, all claims were declared, are entirely regulated.

Our data set has been processed as follows and presents the following characteristics:

- Homogeneous in time and their characteristics (not been impacted by a merger between various companies);
- deflated, i.e. the inflation effect is neutralized;
- nets of subrogation in order to use only the relevant data and presented in the form of liquidation triangles.

3. Basic claims reserving methods

3.1 Chain ladder algorithm.

The Chain Ladder method is a tool to predict the ultimate reserves. Based on the triangle of claims' cumulative amounts C_{ij}, with the accident year i (the row of triangle), and the development year j (the column of triangle), this technique consists to analyze how the claims were liquidated in the past through the development of the cumulative payments and to make the assumption that the claims settlement will be similar in the future.

The results associated with the motor, damages branch are as follows:

Tabel 1- Application of the Chain Ladder method to the motor, damages branch

	1	2	3	4	5	6	7	8	9	10	11	*Reserves*
2000	104089	150013	160244	202758	332025	333226	337600	337917	341839	345664	345700	**0.00000**
2001	124784	318073	490878	**481654**	556481	604129	740283	767618	768997	769260	769340.1	**80.11641**
2002	31209	129464	176312	196095	265400	265548	282547	337006	374556	375934.4	375973.6	**1417.56031**
2003	101142	354473	415064	708278	761302	800527	829479	883149	909383.1	912729.8	912824.8	**29675.82618**
2004	125120	321621	558087	661461	692134	775309	873015	927144.6	954685.6	958199.0	958298.8	**85283.75608**
2005	80509	247246	516609	771152	**664815**	775574	854892.9	907898.8	934868.2	938308.6	938406.3	**162832.32118**
2006	352881	738323	971908	1072949	1367461	1485376.3	1637287.5	1738804.3	1790455.9	1797045.0	1797232.1	**429771.10857**
2007	150310	181842	335456	427216	484111.2	525855.7	579635.6	615574.8	633860.6	636193.3	636259.5	**209043.53995**
2008	58009	109112	244388	304869.1	345470.5	375260.2	413638.5	439285.4	452334.4	453999.1	454046.4	**209658.36964**
2009	71105	385876	585425.7	730306.8	827566.5	898927.1	990861.4	1052297.9	1083556.6	1087544.2	1087657.5	**701781.46511**
2010	53882	131925.8	200149.2	249682.0	282933.8	307331.0	338762.1	359766.4	370453.4	371816.7	371855.4	**317973.39538**
ChainLadder factor $\hat{\lambda}_j$		**2.448420**	**1.517134**	**1.247480**	**1.133177**	**1.086229**	**1.102271**	**1.062003**	**1.029705**	**1.003680**	**1.000104**	
Sum of reserves / $\hat{R} = \sum_{i=1}^{n} \hat{R}_i$												***2147517***

According to this liquidation triangle, we could clearly observe that the payments adopted are treated as a measure of claims.

As can be seen in the table, the values of C_{ij} are only known for $i + j \leq n$ (upper triangle), whereas the values of the outstanding payments C_{ij} for $i + j > n$ (lower triangle) need to be predicted via the development factor:

$$\hat{\lambda}_j = \frac{\sum_{i=1}^{n-j} C_{i,j+1}}{\sum_{i=1}^{n-j} C_{i,j}} \text{ , with } j = 1,...,n-1 \text{ ,} \quad (1)$$

used to quantify the increase in the amount of the payments of the development year j to a development year $j+1$. For example, $\hat{\lambda}_2 = 1.517134$ means that the total payment after 3 years should be 51.7% higher than after 2 years for a given accident year. Thus, and after determining the various factors of development, it is possible then to obtain an estimate of the amounts of provisions:

$$\hat{C}_{i,j+1} = \hat{\lambda}_j \times \hat{C}_{i,j} \text{ and } \hat{C}_{i,n} = \hat{C}_{i,n-i+1} \times \prod_{k=n-i+1}^{n-1} \lambda_k \quad (2)$$

The ultimate reserve for the occurrence year i is expressed by the estimated cumulative payments to the ultimate minus the claims already settled,

$$\hat{R}_i = \hat{C}_{i,n} - \hat{C}_{i,n+1-i} \quad (3)$$

Hence, the total reserve for the motor, damages branch is equal to:

$$\hat{R} = \sum_{i=1}^{n} \hat{R}_i \quad (4)$$

After determining the various expected settlements for the motor, damages branch, we can obviously illustrate the pace of settlements relating thereto. This pace is only a representation of past and future settlements by accident year. Indeed, it reflects the dynamics in the settlements of the claims which have occurred.

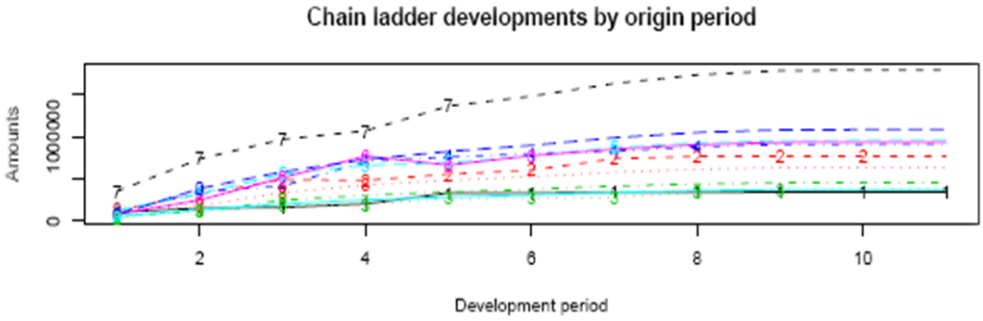

Figure 1 - Settlement cadence for the motor, damages branch

Also, we could easily discern that the pace of settlements is becoming more stable from the fifth year. This is due to the nature of the branch which is considered as short branch in the sense that claims are quickly regulated.

Finally, it is clear that the Chain Ladder method, allow to assess the ultimate reserve, doesn't provides any indication about the uncertainty relating to the calculation of the actual provisions. Only the Best Estimate of reserves is determined.To amend this shortcoming, stochastic models have been developed. These models make it possible to measure the variability and estimate the quadratic error of the estimate. Thus, it is then feasible to carry on with a semi- parametric method, namely Mack (1993, 1994).

3.2. Mack model: Stochastic Chain Ladder

The estimated values of the expected amount "Best Estimate" and the volatility of reserves, at the end of 2010, are given by the conditional model of Mack (1993) and Mack (1994). The assumptions of the model imply:

- **H1:** The cumulative claims amount C_{ij} of different accident years i are independent random variables.

That is: $\{C_{i1},...,C_{in}\}, \{C_{i'1},...,C_{i'n}\}$, for $i \neq i'$.

- **H2:** For j = 1, …, n-1. There exist development factors or link ratios, $\lambda_j > 0$ such that:

$$\mathrm{E}\left(C_{i,j+1}\middle|C_{i,1},\ldots,C_{i,j}\right)=E(C_{i,j+1}\middle|\mathrm{H}_i)=\lambda_j C_{ij}.$$

- **H3 :** $V(C_{i,j+1}\middle|\mathrm{H}_i\ )=C_{ij}\sigma_j^2$ for $1\le i,j\le n$ where $\hat{\sigma}_j^2=\frac{1}{n-j-1}\sum_{i=1}^{n-j}C_{ij}\left(\frac{C_{i,j+1}}{C_{ij}}-\hat{\lambda}_j\right)^2$, for $1\le j\le n-2$ The assumption (2.2) takes into account only the first moments, but provides everything needed to estimate conditional expected values of the future claims amounts. If one wants to model variability of such predictions, the assumptions on higher moments can be made. For further detail of an extended definition of the Mack model see Wüthrich and Merz (2008).

Under the preceding assumptions and the properties of the conditional expectation we can specify the model by studying the properties of development's coefficients and estimator's claims settlements using the following equations:

- $\hat{C}_{i,k}=\hat{C}_{i,k-i+1}\prod_{l=k-i+1}^{k-1}\lambda_l$ is an unbiased ultimate claims amounts 'estimator for accident year i, defined as: $E(C_{i,k}\middle|H_i)=C_{i,k-i+1}\prod_{l=k-i+1}^{k-1}\lambda_l$ (5)
- So the expected payments to the ultimate $E(C_{i,n}\middle|\mathrm{H}_i)=C_{i,n-i+1}\prod_{l=n-i+1}^{n-1}\lambda_l$, are estimated via $\hat{C}_{i,n}=\hat{C}_{i,n-i+1}\prod_{l=n-i+1}^{n-1}\lambda_l$. (6)
- The level of expected reserves on the accident year i, $E(R_i=C_{i,n}-C_{i,n-i+1}\middle|C_{i,1}.....C_{i,j})$ is evaluated through: $\hat{R}_i=\hat{C}_{i,n}-C_{i,n-i+1}$

Yet, the *best estimate* of total expected reserves $E(R=\sum_{i=1}^{n}R_i\middle|\mathrm{H}_i\ )$ is estimated by: $\hat{R}=\sum_{i=1}^{n}\hat{R}_i$. In the previous part we have only given an estimate for the mean (expected ultimate claim), nonetheless, no measure of the quality of the estimate is considered. To get an idea of this prediction error in the estimation of R_i by $\hat{R}_i$, the mean square error is calculated by conditioning over the set of historical data provided by the upper triangle. This error can be defined by:

$$m.s.e(\hat{R}_i)=\mathrm{E}\left[\left(R_i-\hat{R}_i\right)^2\ \middle|\ H_i\right] \quad (7)$$

Assessed by:

$$m.\hat{s}.e(\hat{R}_i)=\hat{C}_{in}^2\sum_{k=n+1-i}^{n-1}\frac{\hat{\sigma}_k^2}{\lambda_k^2}\left(\frac{1}{\hat{C}_{ik}}+\frac{1}{\sum_{j=1}^{n-k}C_{jk}}\right)=\left(se\left(\hat{R}_i\right)\right)^2 \quad (8)$$

with:

- $\hat{C}_{i,n-i+1}=C_{i,n-i+1}$ and $\hat{C}_{ik}$ are the estimated values of the lower triangle.
- *se(.) :* is the root mean square error, also called "standard error" of estimator's provision. Thereafter, we can determine the present uncertainty in the estimate of total provision $\hat{R}=\hat{R}_1+\ldots+\hat{R}_2$ given by:

$$m.\hat{s}.e(\hat{R}) = \sum_{i=2}^{n1}\left\{ m.\hat{s}.e(\hat{R}_i) + \hat{C}_{in}\left(\sum_{j=i+1}^{n}\hat{C}_{ij}\right)\sum_{k=n+1-i}^{n-1}\frac{\frac{2\hat{\sigma}_k^2}{\hat{\lambda}_k^2}}{\sum_{n=1}^{n-k}C_{nk}}\right\} \quad (9)$$

Note: So far, no assumption is made on the form of distribution of the claim's amount or provisions. Therefore we can calculate only the deviation and not quantiles.

The model results are presented as follows:

Tabel 2 - Application of the Mack (1993) model to the motor, Damages branch

```
> MackChainLadder(AUTO)
MackChainLadder(Triangle = AUTO)

       Latest Dev.To.Date  Ultimate       IBNR Mack.S.E CV(IBNR)
1     345,700       1.000   345,700        0.0       0      NaN
2     769,260       1.000   769,340       80.1  13,807  172.339
3     374,556       0.996   375,974   1,417.6   8,617    6.079
4     883,149       0.967   912,825  29,675.8  49,233    1.659
5     873,015       0.911   958,299  85,283.8  73,824    0.866
6     775,574       0.826   938,406 162,832.3 100,584    0.618
7   1,367,461       0.761 1,797,232 429,771.1 173,966    0.405
8     427,216       0.671   636,260 209,043.5 166,824    0.798
9     244,388       0.538   454,046 209,658.4 184,266    0.879
10    385,876       0.355 1,087,657 701,781.5 379,086    0.540
11     53,882       0.145   371,855 317,973.4 327,263    1.029

                  Totals
Latest:     6,500,077.00
Ultimate:   8,647,594.46
IBNR:       2,147,517.46
Mack S.E.:    717,815.06
CV(IBNR):           0.33
```

From this table, we illustrate that the Mack model provides exactly the same reserves to the ultimate (same Best Estimate) as the reference method Chain Ladder. We also note that for both branches of activities, the coefficient of variation is relatively low of order 0.33 for the motor, damage branch and 0.78 for the motor, third-party liability branch, which proves that the determined value of reserves is suitably appropriate. However, Mack (1993) doesn't check the consistency between the assumptions on the expected value and the conditional variance of claims nor to test them statistically. This is why a parametric GLM approach will be privileged in the follow-up. This approach makes it possible to test statistically the model and to associate a distribution of probability to each C_{ij} and therefore to associate a distribution of provisions, making it possible to calculate different measures risk.

3.3 Generalized Linear Model (GLM)

Introduced for the first time by Nelder and Wedderburn (1972) and further developed by Mc Cullagh and Nelder (1989), Generalized Linear Models allow to study the link between a dependent or response variable Y and a set of explanatory variables X_1 … X_k.

Unlike the Chain Ladder model, GLM models apply to triangles of incremental payments. Let Y_{ij} denote the incremental payments for accident year $i \in \{1,...,n\}$ until development year $j \in \{1,...,m\}$ and for simplicity, we assume that n = m.

Similarly, it usually arises that liquidation triangles contain negative increments. This is explained by the presence of recourses (or subrogation). A GLM consists of the following three components:

- *The response variable* are independent and belong to the exponential family distributions (Poisson, Gamma, Normale, Binomiale...) given by:

$$f(y_{ij};\theta_{ij};\varphi) = \exp\left\{\frac{y_{ij}\theta_{ij} - b(\theta_{ij})}{a(\varphi)}\omega_{ij} + c(y_{ij};\varphi;\omega_{ij})\right\} \quad (10)$$

Thus each observation has a different canonical parameter θ_{ij} but the scale parameter φ is the same across all observations. It is further assumed that the functions $a(\varphi)$, $b(\theta)$ and $c(y_{ij}, \varphi, \omega_{ij})$ are specified functions, also the ω_{ij} is a known prior weight. So each observation comes from the same class within the exponential family, but allowing θ to vary corresponds to allowing the mean of each observation to vary. For more specification of the parameters and the functions, see McCullagh and Nelder (1989).

Let Y_{ij} denote n independent observations. We treat y_{ij} as a realization of a random variable Y_{ij}. We assume that the distribution of Y_{ij} belongs to the exponential family with mean $\mu_{ij} = E(y_{ij}) = b'(\theta_{ij})$ and variance $V(y_{ij}) = a(\varphi)V(\mu_{ij}) = a(\varphi)b''(\theta_{ij})$.

- *The Systematic component:* The p covariates of $X_{ij}^{'}$ matrix are combined to give *the linear predictor* η, defined as: $\eta_{ij} = X_{ij}^{'}\beta$, where β is a vector of regression parameters. In our context, the adopted approach is to put the accident year and the development lag into the main effect model as:
  η_{ij} = *accident year* + *development lag*

- The relationship between the random and systematic components is specified via a monotonic differentiable *link function* $g(.)$ that is differentiable and monotonic. The link functions can be the identity, log, reciprocal, logit and probit.

$$g(\mu_{ij}) = \eta_{ij} = x_{ij}^{'}\beta \tag{11}$$

The prediction of future payment y_{ij} is given by: $E(y_{ij}) = \mu_{ij} = g^{-1}(\eta_{ij})$

The model parameters are estimated by the maximum likelihood method. The mean square error, which quantifies uncertainty about the reserve estimate for each accident year is given by: $mse\left(\hat{R}_i\right) = E\left(R_i - \hat{R}_i\right)^2$. Here, we employed the England and Verrall (1999) methods, which involves the variance-covariance matrix, so the mse of each occurrence year is measured as follow:

$$mse(\hat{R}_i) = \sum_{j>n+1-i} \varphi \hat{\mu}_{ij} + \sum_{j>n+1-i} \hat{\mu}_{ij}^2 V(\hat{\eta}_{ij}) + 2 \sum_{\substack{j,k>n+1-i \\ j<k}} \hat{\mu}_{ij}\, \hat{\mu}_{ik}\, \mathrm{cov}(\hat{\eta}_{ij}, \hat{\eta}_{ik}), \text{ with } 1 \le i \le n \tag{12}$$

And the mse of the total reserves is:

$$mse(\hat{R}) = \sum_{j>n+1-i} V(y_{ij}) + \sum_{j>n+1-i} \hat{\mu}_{ij}^2 V(\hat{\eta}_{ij}) + 2 \sum_{\substack{j,k>n+1-i \\ j<k}} \hat{\mu}_{i_1 j}\, \hat{\mu}_{i_2 k}\, \mathrm{cov}(\hat{\eta}_{i_1 j}, \hat{\eta}_{i_2 k}) \tag{13}$$

To model the amounts of incremental claims Y_{ij}, it is possible to undertake our study via discrete distribution or continuous distribution. The distribution most often used to model discrete data is the *Poisson*. This one has the advantage of being rather easy to use and we can show that it is in fact the law underlying the modeling of widespread Stochastic Chain-Ladder. Among continuous models, belongs the *Gamma* distribution, typically most applicable distribution. This distribution presents the characteristic of being simple and practical. We choose these two distributions because these distributions are fairly standard, in Non-Life insurance.

As well, we restrict our study to a *logarithmic link* function, underlined by Merz and Wuthrich (2008). The logarithmic link function is a canonical link for the Poisson and Gamma distributions and its use is very common in practice since the mean μ_{ij} has a multiplicative form and for the estimation purposes is more convenient to work with a linear structure.

In our case, the linear predictor η_{ij} is given by $\eta_{ij} = \ln(\mu_{ij}) = \lambda + \hat{\alpha}_i + \hat{\gamma}_j$ i.e.

$$E(y_{ij}) = \mu_{ij} = \exp(\lambda + \hat{\alpha}_i + \hat{\gamma}_j) \quad (14)$$

The parameters α_i and γ_j denote the effects of the $i-th$ accident year setting a $j-th$ development year, on the expected value (and variance) of the incremental claims counts Y_{ij} , for $\forall i, j$, respectively. λ is an insurance company's specific parameter.

Hence, from the estimated parameters, we complete the lower portion of the triangle being considered, even with the presence of negative increment. Note well that in order to solve the problem of negative increment, we propose the addition of a constant as a solution (see England and Verrall 1999).

4. Comparison of results

The following tables show the results of various adopted models (provision, prediction error and coefficient of variation). We consider the model Mack (1993) as being a benchmark model. Between the Poisson and the gamma models, we choose to retain the model that results in ultimate reserve is closest to that estimated by the reference model.

Tabel 3 - Best Estimate, Standard Error and coefficients of variation for the Motor Damage branch

	Mack (1993)			GLM Poisson			GLM Gamma		
Reserves to the ultimate	BE	S.E	CV	BE	S.E	CV	BE	S.E	CV
Motor, damage	2147,517.46	717,815.06	0.33	2147,496.70	665,723.76	0.31	2147,742.03	622,845.1	0.29
Motor, third-party liability branch	319,077.56	249,052.1	0.78	320,566.8	250,952.6	0.78	387,023.67	265,952.6	0.687

We compare in this table the estimated ultimate reserves and their estimated variability for both Poisson and Gamma approaches with those estimated by Mack (1993), we find that the results of three models lead to values substantially close, either the amount or the best estimate uncertainties on future payments.

Note that the value of "Prediction Error" in itself is not of great significance and it is necessary to report the amount to the ultimate provisions, to give an indication of the robustness models. So it is interesting to compare the results in terms of the overall variability (CV) of reserves.

We note that the coefficients of variation for Poisson and Gamma models are relatively lower than those of the Mack model; this leads us to conclude that the GLM model is more robust. For the motor, third-party liability branch, we also find that the Poisson model provides precisely the same amount of the Best Estimate of reserves to the ultimate that Mack model. However, we note that the Best Estimate of the Gamma GLM model is higher than the two Best Estimate obtained by Mack and the Poisson model.

Similarly, we note that the prediction error estimated by the gamma model reported to the amount of the ultimate reserves is 0687, lower than the Poisson and Mack model.

So, we could deduce that the GLM Gamma model is very sensitive to the variability of the Best Estimate, and see that the motor, third-party liability branch is a long development branch, so it presents an even higher risk, which is to give a rather cautious estimate to the best estimate of reserves to the ultimate. Despite the difference between the assumptions and techniques for the different models adopted, it is clear that the results obtained for the best estimate are fully converged and perfectly consistent. As far as the reserves estimated by the stochastic models GLM, we observe that whatever the industry, the Gamma model is closest to the Chain Ladder model.

5. Resampling techniques. Bootstraping

It is necessary to obtain a full predictive distribution of the reserve estimates, for each branch, to measure their variability and to study extreme events. So, it is legitimate to study the empirical distributions of provisions for each branch. We need to investigate extreme events. To properly carry out this study, we will apply the bootstrap approach, simulation technique, extendedly presented in Efron and Tibshirani (1993) and able to study the empirical distributions of provisions for both models GLM already treated (see for instance Shao and Tu (1995) or Davison and Hinkley (1997)).

The bootstrapping process in a development triangle has several steps:

- Estimation of the model parameters $(\lambda, \alpha_i, \gamma_j)$ for $i, j = 1, 2, ..., n$, and dispersion parameter ϕ, compute fitted values, $\hat{\mu}_{ij}$ ($i = 1,2,...,n$ and $j = 1,2,...,n+1-i$).
- Determine the scaled Pearson residuals of upper triangle components through the formula:

$$\hat{r}_{ij} = \frac{y_{ij} - \hat{\mu}_{ij}}{\sqrt{V(\hat{\mu}_{ij})}} \quad (15)$$

- Resample residuals with replacement, i.e. construct an upper triangle of bootstrapped residuals, which consists of n bootstrap sample.
- Compute a bootstrap triangle, where $y_{ij} = \hat{\mu}_{ij} + \hat{r}_{ij}\sqrt{V(\hat{\mu}_{ij})}$ (16)
- Fit the used model to the bootstrap triangle and obtain bootstrapped estimate.
- Calculate bootstrap values of the future triangle.
- Simulate a future claims amount, from the distribution of the underlying model with the mean and corresponding variance.
- Calculate the bootstrap reserves.

This approach of the bootstrapping in development triangles was well developed by England (2002). Note that the implementation of the simulation procedure is for a sample of 20000 realizations of the reserves.

Then, we present the results of the bootstrap approach for motor, damages and motor, third-party liability branches with Gamma and Poisson distribution.

Tabel 4 - Results with Bootstrap for the motor, damages branch and the motor, third-party liability branch

	Bootstrap for the motor, damages branch				Bootstrap for the motor, third-party liability branch			
	Poisson model		Gamma model		Poisson model		Gamma model	
	Mean IBNR	SD IBNR	Mean IBNR	SD IBNR	Mean IBNR	SD IBNR	Mean IBNR	SD IBNR
1	0	0	0	0	0.0	0	0	0
2	742	17,853	-3,301	121,415	-60.3	37,510	-1,523.9	44,974
3	2,346	21,635	1,034	33,659	221.8	14,353	17.9	10,276
4	30,402	66,492	25,624	183,916	2,602.7	64,488	58.1	94,533
5	89,972	105,016	81,511	233,556	22,407.6	675,251	31,686.8	262,498
6	163,650	134,945	168,598	180,126	-2,140.6	116,411	102.1	63,694
7	447,918	251,908	425,355	357,333	2,205.3	58,924	471.9	55,804
8	224,195	159,808	198,077	220,140	66,524.0	581,518	76,463.1	332,818
9	210,506	161,551	205,794	173,461	1,463.4	360,746	-2,668.4	457,995
10	709,347	392,632	716,141	403,979	28,257.8	209,043	28,222.6	185,982
11	343,259	396,997	346,470	398,901	212,711.5	965,974	198,538.4	1,203,623
TOTAL	2,222,338	827,913	2,165,305	1,532,023	334,193.0	2,838,977	331,369.0	1,938,600

For the motor damage industry, differences between the bootstrapped distributions are marked with a difference nearly to 57,033. While the Gamma model is always the most appropriate. Having a negative provision would remind our settlements. We are working on settlements, net of subrogation. So, it is expected.

Similarly, the difference between the two bootstrapped distributions for the motor, third-party liability branch is no longer surprising, see a difference of 2.824. Again, these results are also very similar to the results provided by the Chain Ladder method in terms of Best Estimate.

This result makes sense, according to the distribution of large numbers, the BE is an empirical mean and as we will resample on 20.000 data, then we'll simulate our sample from the actual average (BE on our own sample), so if *n* tends to infinity, the empirical mean tends towards the actual average of the sample.

We also note that the prediction error estimated by the gamma model reported the amount of ultimate reserves is 5.85, as low as that obtained by the Poisson model 8.49.

For the motor, third –party liability branch, it seems explicitly that the Gamma model is most appropriate. In conclusion, the reserves estimated by bootstrap for the two branches, motor damage and motor, third-party liability Motor, are comparable for both distributions. By calculating the expected cost of claims with these laws, we find practically the same "Best Estimate" of the Chain Ladder model.

Thus, we could examine the adequacy of these provisions distributions to these two classical laws: the Poisson and the Gamma, because it will allow us to describe the general characteristics of the distributions: asymmetry and thick tails. We start with a graphical approach by comparing the observations with quintile of the chosen distribution. Indeed, we test this fit with these two laws by studying the shape of the empirical and theoretical distributions and their *QQ-Plots.* Next, we will apply the *Kolmogorov-Smirnov test.* This test measures the maximum deviation between the empirical and theoretical distributions. It is therefore very sensitive to extremes.

We test the hypothesis H_0 that this variable follows a specified law (Poisson, Gamma). We recall that under the hypothesis H_0 the test statistic follows a certain distribution. The p-value represents, then, the probability that a variable following the law is greater than the test statistic obtained. We accept H_0 fitness for the law if this p-value is greater than 5%. The test results for the empirical distributions of provisions obtained by bootstrap are as follows:

The fit test for Poisson is rejected at the 5% threshold. This is explained by the fact that the Poisson distribution shows equality between the expectation and variance of the data, whereas in practice there is an over-dispersion, which means a higher variance than expectancy. The measures of model fit using this law are often unsatisfactory. Although the fit test at the Gamma is accepted at 5% threshold. This gives us information on the shape of the distribution of provisions: it is an asymmetric fat tailed distribution.

- *Computation of Value at Risk*

In the previous section, we have studied the difference between the two distributions on average (comparison of the best estimate); we will now study the difference between the extremes of distributions obtained by bootstrapping using certain risk measures, such as Value at Risk (VaR), defined in McNeil, Frey and Embrechts (2005). These measures are also useful when comparing performance of applied models. For each of the studied branches, we present in the tables the VaR at 75% and 99.5% (benchmark percentile for the Solvency II reform), calculated on both empirical distributions. We keep in mind that the VaR presented here is determined on a distribution of provisions to the ultimate while in Solvency II; economic capital is intended to ensure the solvency of the company for the following year only.

Tabel 5 - VaR 75% and VaR 99, 5% to the ultimate horizon for the motor, third liability branch and the motor, damages branch

	Poisson Distribution		Gamma Distribution		Poisson Distribution		Gamma Distribution	
	IBNR 75%	IBNR 99.5%	IBNR 75%	IBNR 99.5%	IBNR 75%	IBNR 99.5%	IBNR 75%	IBNR 99.5%
1	0.0	0	0	0	0	0	0	0
2	0.0	4,618	2.86e-06	6,249	0	1,444.4	0	5.95e+02
3	59.5	24,138	2.23e+01	16,807	0	0.1	0	0
4	51,654.0	160,174	5.31e+04	142,259	51.0	38,499.1	1.25e+02	4.77e+04
5	138,678.5	273,025	1.32e+05	291,841	60,467.5	246,526.4	4.57e+04	2.72e+05
6	239,614.5	434,752	2.37e+05	425,777	97.0	37,780.4	4.10e+01	3.38e+04
7	582,666.5	863,000	5.79e+05	948,245	5.5	35,774.5	5.01e+00	3.36e+04
8	298,668.0	527,225	3.03e+05	493,610	143,893.5	351,693.1	1.25e+05	4.05e+05
9	288,827.5	519,010	3.04e+05	529,252	9,460.0	110,085.1	1.10e+04	1.08e+05
10	946,539.0	1,428,837	9.67e+05	5 1,447,445	43,557.0	213,905.1	4.29e+04	2.24e+05
11	527,184.5	1,143,149	5.44e+05	1,037,347	350,086.0	803,539.7	3.49e+05	7.57e+05
TOTAL	2,678,338	3,660,457	2,729,683	3,660,478	622,647	1,334,852	600,202	1,314,822

For all the industry studied, the VaR at a confidence level of 75% is lower than the VaR with a 99.5% confidence level. Also, we note that the VaR increases, to an accident year to another. This is interpreted by the fact that recent years are the riskiest and most fortuitous years, and requiring a higher level of reserves.

In conclusion, the VaR of reserves is the risk measure favored by the Solvency II for the assessment of SCR related to reserve risk, either by the standard approach or the internal model. In fact, it guarantees the solvency of the insurance company while protecting its policyholders.

6. Dimensional modeling of dependence. Application of Copulas

Until today, the assumption of independence between the risks, in the industry of Tunisian insurance, was a dogma and a methodological necessity. However, this typical assumption, often used, leads to an underestimation of the real risks taken. Then, it is not possible to model separately the risks insured from each other: the risks *are not independent.*

In this purpose, we will dedicate this section for a practical implementation of this dependence among insured risks and will show its effects on the amount to be provisioned and the solvency capital in the following.

The dependences between the series are structured by Copulas offering dependence structures: nonlinear, cubic, non-monotonic, etc. An overall improvement of the Copulas is its applicability in statistical modeling since they give a promising and flexible tool to model dependence among random variables and non-Gaussian multivariate data. Standard references for an introduction are Embrechts *et al.* (2001, 2009), McNeil & Straumann (2002, 2005) and Frees and Valdez (1998). The readers may refer to the books of Joe (1997) and Nelsen (2006) for excellent expositions of the basics of copula theory.

Let X_1 and X_2 denote two random variables of our case corresponding respectively the claims amounts of the motor damage and of the motor third- party liability branch. $(Fx_1(.), Fx_2(.))$ represent the marginal cumulative distribution function's (cdf) of (X_1, X_2) with densities $(fx_1(.),(fx_2(.))$. Then a Copula model specifies the joint distribution function F(.,.) and density f(.,.) of (X_1, X_2) via a copula C(.,.) as follows:

$$F(x_1,x_2)=C\left(F_{X_1}(x_1),F_{X_2}(x_2)\right) \tag{17}$$

$$f(x_1,x_2)=c(F_1(x_1),F_2(x_2))\times f_1(x_1)\times f_2(x_2) \tag{18}$$

According to Sklar's (1959) theorem (see Nelsen (2006)), the joint distribution of normalized incremental claims X_1 and X_2 can be represented by a copula function as:

$C(u_1,u_2)=C\left(F_1(x_1),F_2(x_2)\right)=F(x_1,x_2)=F(F_1^{-1}(u_1),F_2^{-1}(u_2))$, a bivariate cdf, with density

$c(.,.)$ $c(u_1,u_2)=\dfrac{\partial^2}{\partial u_1\partial u_2}C(u_1,u_2)=\dfrac{f(F_1^{-1}(u_1),F_2^{-1}(u_2))}{f_1(F_1^{-1}(u_1))\times f_2(F_2^{-1}(u_2))}$ on $[0,1]^2$ (19)

Such that $C(1,u)=C(u,1)=u\ \ \forall u\in[0,1]$ and $C(u,0)=C(0,u)=0\ \ \forall u\in[0,1]$.

- Tail dependence

Another type of non-linear association is the tail dependence. Based on the copula *C*, the upper λ_U and lower λ_L tail dependence can be derived by:

$$\lambda_U=\lim_{u\to1^-}\mathrm{P}\left[U_1>u\middle|U_2>u\right]=\lim_{u\to1^-}\frac{\bar{C}(u,u)}{1-u}=\frac{1-2u+C(u_1,u_2)}{1-u}$$

$$\lambda_L=\lim_{u\to0^+}\mathrm{P}\left[U_1\le u\middle|U_2\le u\right]=\lim_{u\to0^+}\frac{C(u,u)}{u}$$

where $\bar{C}(u_1,u_2)$ denotes the associated survival copula $\bar{C}(u_1,u_2)=1-u_2-u_1+C(u_1,u_2)$

6.1. Examples of parametric Copula classes

We now introduce two standard classes of copulas which are recurrently used as benchmark. We start with the class of Archimedean that includes in particular the Franck, Gumbel and Clayton and we will focus later on Elliptical copulas which the most popular are the copula of the Student-t and the normal distribution function.

- Franck Copula

Introduced by Frank in 1979, this copula models both positive and negative dependence, but it has neither upper nor lower tail dependence, $\lambda_L = 0$ and $\lambda_U = 0$

It is defined as:

$$C(u,v) = -\frac{1}{\theta}\ln\left[1+\frac{(e^{-\theta u}-1)(e^{-\theta v}-1)}{(e^{-\theta}-1)}\right], \theta \neq 0 \quad (20)$$

- Gumbel Copula

The Gumbel copula (1960) captures only a positive dependence. It also asymmetric, exhibiting greater in the positive tail than in the negative, it is given by:

$$C(u,v) = \exp(-\left[(-\ln u)^{\theta} + (-\ln v)^{\theta}\right]^{\frac{1}{\theta}}), \quad \theta \geq 1 \quad (21)$$

where θ is the dependence parameter.

The Gumbel copula has upper tail dependence $\lambda_U = 2 - 2^{\frac{1}{\theta}}$ but has no lower tail dependence $\lambda_L = 0$.

- Clayton Copula

This copula family is introduced by Kimeldorf & Sampson in 1975 and Clayton in 1978. It used to model positive dependence, the structure is more pronounced on the lower tail.

Also, it includes only low intensity events, unlike that of Gumbel that captures high intensity events.

It is determined by: $C(u,v) = (u^{-\theta} + v^{-\theta} - 1)^{-\frac{1}{\theta}}$, $\theta \in [-1,\infty) \setminus \{0\}$ (22)

The Clayton copula has lower tail dependence with tail dependence parameter $\lambda_L = 2^{\frac{-1}{\theta}}$ and no upper tail dependence, $\lambda_U = 0$.

- Gaussian copula

The Gaussian copula is the copula associated with the two-dimensional normal distribution defined as:

$$C_{\rho}(u_1,u_2) = \phi_{\rho}\left\{\phi^{-1}(u_1), \phi^{-1}(u_2)\right\} \quad (23)$$

Or ρ is the correlation coefficient, ϕ_{ρ} is the standard bivariate normal distribution of correlation matrix and ϕ^{-1} is the inverse of the univariate standard normal distribution. For the Gaussian copula, the coefficients of lower tail and upper tail dependence are:

$$\lambda_U = \lambda_L = \begin{Bmatrix} 0 & if & \rho \prec 0 \\ 1 & if & \rho = 0 \end{Bmatrix}$$

This means, that regardless of high correlation ρ we choose, if we go far enough into the tail, extreme events appear to occur independently in X and Y.

- Student copula

Extracted in the same manner as the Normal copula, the Student Copula (or t-Copula), derived from the t-distribution is then defined by:

$$C_{\rho,v} = t_{\rho,v}(t_v^{-1}(u_1), t_v^{-1}(u_2)) \quad (24)$$

where: ρ - is a symmetric correlation matrix, positive defined with $diag(\rho)=1$.

$t_{\rho,v}$ - is the cumulative distribution function of a bivariate distribution of Student v degrees of freedom.

t_v^{-1} - is the inverse of univariate Student's distribution with v degrees of freedom.

6.2. Estimation of copulas:

It is sometimes difficult to discern and choose an appropriate copula. The most common approach adopted is:

- To Start from a parametric family
- To carry out, thereafter, an adjustment of parameter.

For that, we start in a first step by transforming the payments of two triangles into uniforms, using univariate distribution functions of software R. For the remainder of our study, we will use the elements of liquidation triangles modeled using Gamma distributions. We could initially trace the data of the motor, damages branch against the data of motor, third-party liability branch:

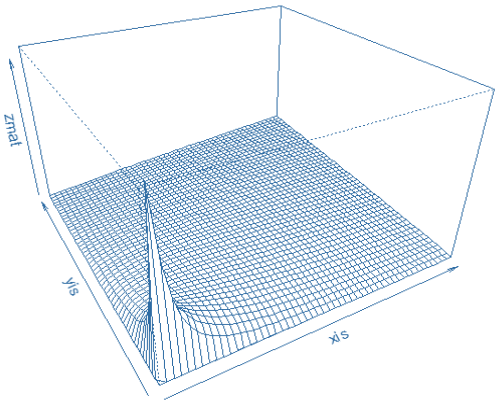

Figure 2 - Scatterplot of the empirical copula

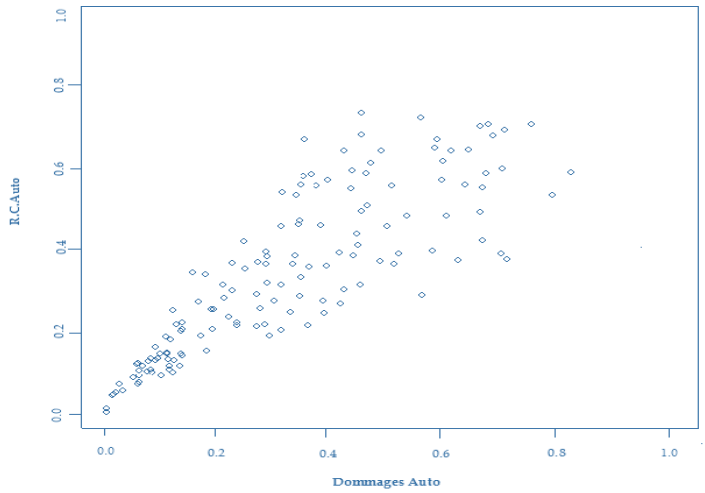

Figure 3 - Density of the Clayton copula

This chart provides better readability. We could easily identify areas of high concentrations as we can clearly show that the cloud of points is very close to the diagonal. It is very condensed at the lower level.

6.3 Estimating copula parameters:

In order to discern and choose the best copula, we use a parametric study relied on the elliptical and Archimedean copulas parametric. To do so, we begin by estimating the corresponding parameters using the

method of maximum likelihood, which serves to maximize the likelihood of the observations on all the parameters of marginal distributions and the copula parameter.

This joint estimation of parameters of functions and the marginal dependence structure is designed to find possible values such as density fits the data best available. Then, we compute the selection criteria (log likelihood). We obtain the following results:

Tabel 6 - Estimated parameters and log likelihood

Copula	Estimated parameters	Log likelihood
Frank	2.89	6.9867
Clayton	1.74	8.4678
Gumbel	1.87	5.3452
Student	0.8467	3.57778
Normal	0.715380	3.45679

From the table, the Copula which captures the best structure of dependence is the Clayton copula. Indeed, this is the copula that maximizes the log likelihood over. Among the studied families of copulas, Clayton is the family that maximizes the likelihood. So this family will be selected.

However, the criterion of maximum likelihood is not sufficient for the choice of the copula because it does not take into account the impact of the number of parameters of the copula. Indeed, the likelihood tends to grow when increasing the number of parameters. Therefore, it is necessary to make a series of statistical tests also confirm that this family is significantly better than the others.

Tabel 7 - Goodness of Fit Test

Copula	Statistics	p-Value
Frank	0,06578344	0,0212356
Clayton	0,07874312	0,1543289
Gumbel	0,06311593	0,011567

The results of the fit test at 5% threshold showed that only the Clayton copula present *p – value* higher than 5%, then only the Clayton copula is accepted, other copulas are all rejected. The Clayton copula is the most adequate copula to describe the dependence structure of two branches.

7. Evaluation of the Solvency Capital Requirement. Solvency II project versus dependent Case

To reflect the impact of differences between actuarial methods already applied (Stochastic Chain Ladder and GLM), it is therefore appropriate to compare the calculations of the SCR on our Non –Life portfolio, to ensure the consistency of these methods and to evaluate its effects on the financial health of this company.

As part of new prudential rules on solvency, the determination of the SCR under the reserve risk is settled via two methods, one is standard and the other is internal. However, in the dependent case, the evaluation of the SCR is using by the theory of copulas to model the corresponding best estimate.

7.1 Assessment of the Solvency Capital Requirement. Internal model versus standard model

- Standard Model: EIOPA (2010) (*European Insurance and Occupational Pensions Authority),* introduces a standard formula in the determining of the SCR, which is calculated as follows:

$$SCR = f(\sigma) \times V \tag{25}$$

This calculation requires the following: V : a volume measure corresponding to the best estimate; σ : The standard deviation for the combined ratio of aggregate reserves, expressing the relative volatility, assuming a lognormal distribution of the underlying risk; f : a function of the standard deviation. $f(\sigma)$: established such that the risk capital charge is consistent with the VaR 99.5% standard. The function $f(\sigma)$ is expressed as follows:

$$f(\sigma) = \frac{\exp(N_{0.995} \times \sqrt{\log(\sigma^2 + 1)})}{\sqrt{\sigma^2 + 1}} - 1 \quad (26)$$

with $\mathrm{N}_{0.995}$ = Quantile of the standard normal distribution.

Note that the standard deviation for the reserve risk σ is fixed, according to the EIOPA [2010], by industry according to segmentation similar to the valuation of the Best Estimate. The standard deviations and volume measures of reserve risk of each branch are aggregated into a measure of overall volume and a standard deviation σ_{global} of our global portfolio, such as:

$$\sigma_{global} = \sqrt{\frac{1}{V_{global}^{\ 2}} \cdot \sum_{i,j=1}^{2} \rho_{i,j} \cdot \sigma_i \cdot \sigma_j \cdot V_i \cdot V_j} \quad (27)$$

where: V_{global} : The overall best estimate is the sum of the Best Estimate of the different branches.

V_i (resp. V_j): is the best estimate by branch *i* (resp. *j*).

$p_{i,j}$: The correlation coefficient between the branches i and j . This coefficient is determined by EIOPA [2010] as a matrix of correlation between different segments of the branches.

The SCR of reserve risk of the overall portfolio, supporting both on the principles of aggregation and diversification between the different branches is determined by:

$$SCR_{agregate} = f(\sigma_{global}) V_{global} \quad (28)$$

However, this method reveals some shortcomings. It is common to all insurers regardless of risk profile of each company, this leads to inadequate capital requirements calculated relative to a liabilities of the company.

- Internal Model

Control authorities advocate insurance companies to use their own internal model for the evaluation of the SCR. Moreover, the unique technical specifications required by EIOPA: the internal model must be appropriate to the requirements of Solvency II, specifically a one-year horizon and a measure of risk for the VaR at level of 99.5% , with a probability of ruin of 0.5%.

In this case, loading capital is obtained by the excess of the VaR 99.5% calculated on the distribution of aggregate reserves of the underlying risk in relation to the Best Estimate. *Where*:

$SCR = VaR_{99,5\%} - BestEstimate$ (29)

In the same way as the standard method, the evaluation of the SCR is in two relays: first, we calculated, an SCR on each branch taken independently. Then there is the risk aggregation by computing a matrix product based on a series of volatilities and volumes, $\mathrm{M}\Sigma\mathrm{M}'$, where:

$$\mathrm{M} = (SCR_1, SCR_2) \text{ and } \Sigma = \begin{pmatrix} \sigma_1^2 & \rho_{12}\sigma_1\sigma_2 \\ \rho_{21}\sigma_2\sigma_1 & \sigma_2^2 \end{pmatrix}$$

$$SCR_{agregate} = \mathrm{M}\Sigma\mathrm{M}' = \sqrt{\sum \rho_{ij}\sigma_i\sigma_j SCR_i SCR_j} \quad (30)$$

with:

$\sigma_i (i = 1,2)$: The relative volatility evaluated by the internal model.

$\rho_{i,j} (i, j = 1,2)$: The correlation between the branches strengthened by the standard model.

This formula is valid only in a universe where the dependence relationship is linear between risk indicators and the SCR. Nevertheless, in case of a non-linear relationship and non-Gaussian risk, copula theory remains the most appropriate tool to address these constraints.

Tabel 8 - SCR evaluated by industry, in Total and Aggregate

	Standard Model				Internal Model			
	SCR Motor, damages	SCR Motor, 3rd-party liability	TOTAL SCR	Aggregate SCR	SCR Motor, damages	SCR Motor, 3rd-party liability	TOTAL SCR	Aggregate SCR
GLM POISSON	454.714	120.309	575.023	362.685	1495.152	1.000.659	2495.811	623.952
GLM GAMMA	466.690	119.293	585.983	382.745	1438.14	983.453	2421.593	605.398

Comparing the two tables, we can identify some findings:

- A convergence of results, whether for the SCR in aggregate or in total, regardless of the distribution used in modeling of Best Estimate.
- The SCR assessed for each branch by the internal model is higher than that estimated by the standard formula. This is reflected in the fact that the internal model is more suited to the risk actually incurred by the company so it is supported on internal data accurate and well quantified.
- Similarly, whatever the model studied standard or internal, we notice that the SCR in the aggregate is always lower than one in total. This is due to diversification between lines of business insurance. In fact, combining a risk with other risks to which it is not completely correlated reduces the overall level of risk and have a lower solvency capital.

In conclusion, the evaluation of the SCR under the internal model is proven than the standard model common to all insurers, as it provides a capital of coverage, convenience with the company's risk profile, ensuring solvency and protecting policyholders.

7.2. Dependent case

Taking into account the dependencies between the various business lines, will probably determine the risk associated with insurance business.

In order to assess the impact of taking into account the dependence between the triangles of liquidation, the total amount of claims will be evaluated by assuming that the branches are independent, then taking into account the dependence. Via the distribution chosen for the various elements of the triangles, it is possible to determine the distribution of total claims outstanding, and thus determine the level of provisions required and compare a number of risk measures.

The calculation of the amounts of claims distributions is quite complex, distributions have been obtained by simulation. Hence it is necessary to address in a first step, the simulation techniques of copulas.

- Copula and simulation

Simulate a bivariate copula C is equivalent to simulate the arguments u_1 and u_2 of the function drawn from a random vector of uniform law U = (U_1, U_2) of distribution C. Nevertheless, this simulation is relatively complex. We propose two different methods depending on the shape of the copula.

- Method of distributions

Where the F distribution (generated by the copula C) is easier to simulate than the copula C, we use the method of distributions. Then we have:

$$F(x_1, x_2) = C(F_1(x_1), F_2(x_2))$$

Simulate realizations of the random vector $U = (U_1, U_2)$ is equivalent to: simulate realizations of the random vector $X = (X_1, X_2)$ of distribution F, then, apply the transformation $U = (F_1(X_1), F_2(X_2))$.

- Method of conditional distributions:

When the copula does not following a bivariate distribution, it is impossible to use the before simulation method. An alternative is to use the method of conditional distributions which directly simulates the copula C and the algorithm is as follows: simulate two uniform and independent random variables (v_1, v_2); Ask $u_1 = v_1$;

Determine u_2 using the conditional distribution of the copula C knowing u_2. The latter is given by:

$$C_{2/1}(u_1,u_2) = \Pr(U_2 \le u_2 / U_1 = u_1) = \frac{\partial C(u_1,u_2)}{\partial u_1}$$

To determine u_2, we have to reverse the conditional distribution $u_2 = C^{-1}(v_2/u_1)$

8. Result interpretation

The following results were computed from a sample of 20,000 couples obtained by simulation as explained above.

Tabel 9 - Best Estimate, standard error and $VaR_{99,5\%}$, of Non-Life portofolio

Gamma Law	Independent case	Dependent case
BE	2,534,765	2,534,765
SE	831,675	954,324
$VaR_{99,5\%}$	3,875,300	4,643,245

Tabel 10 - SCR in the dependent case versus independent

Model	SCR Dependent	SCR Independent
Loi Gamma	675,845	375,467

According to the internal model of calculation of the SCR, it is clear that the loading of capital in the dependent case evaluated with the copula approach is much higher than that estimated in the independent case. Also, we note that the SCR, as assessed by the internal model with the copula approach is more appropriate and adapted to the risk profile of the company than the SCR evaluated by the internal model and based on the correlations required by Solvency II project. This proves that taking into account the real dependence in the evaluation of the SCR in an insurance company is more credible and reliable than the inclusion of a dependence based on experience. According to this study on a portfolio of a Tunisian insurance company, we note clearly that:

- The assessment of the overall risk of a portfolio of non-life insurer may be wrong if it doesn't take into account a possible dependence between the branches of activity.
- Taking into account of positive dependence (using the copula theory) between charges claims increases significantly the capital requirement of an insurer and it is more adapted to the nature of the branches and reflecting the true risk profile of the company.

This avoids an underestimation of the solvency capital, an underestimation of the level of provisions and thereafter guaranteeing the cover of the policy-holders.

Concluding remarks

The main focus of this research is to show the importance of actuarial methods in the determination of the amount of provisions for the Tunisian insurance companies under the new regulatory framework Solvency II. This leads insurance companies to make provisions for "dependence between branches", so to make an accurate Solvency Capital Requirement on adequacy with their proper risks. By way of invention, we propose a copula approach under the internal model of solvency II project to fully incorporate the impact of a potential dependence of claim's costs between different lines of business.

In this context, we show that the assumption that claim's costs are independent from one branch to another is not verified and may lead to underestimation of the Solvency Capital Requirement.

In this research, we analyze the implementation and the assessment of the Best Estimate of provisions for each insurance branch. We apply a variety of actuarial models as Chain Ladder, Mack and GLM, to hunt for the most reliable method. Results show that the Generalized Linear Model, and in particular GLM Gamma one, is more robust in term of the best estimate of reserves.

Moreover, we apply a bootstrap simulation approach to obtain a more complete empirical distribution of provisions for each LOB and required to measure their variability and able to study the extreme events.

Then, we model dependence structures of non-life insurance risks using a Copula approach. First, we carry out a goodness-of-fit analysis to assess the parametric copula's fit. Next, we use a blanket test based on the Cramer Von Mises test statistic and simulation context for approximation of p-values. Our results point out that there is a positive dependence between the two-LOB insurance companies as described by the Clayton's copula.

We believe that Copula theory is a better modeling alternative to existing techniques to assess dependence and provide a more reliable set of correlations used in the internal risk models involved by Solvency II project. This is even truer in the case where insurance data is not homogeneous, not highly correlated, and for small size data base. In addition, different risk measures, such as Value-at-Risk, illustrates that non appropriate modeling may yield to underestimation of the risk situation compared to the standard approach.

Our results are valid for insurance companies and regulators who rely upon stochastic models to determine the amount of technical provisions and solvency capital requirements under Solvency II. Indeed, the inclusion of positive dependence between claims's charges increases significantly capital requirements of an insurer and may be considered as more appropriate to the nature of the branches and reflects the true risk profile of the company. We believe that this approach is, more suitable than correlations analysis carried by the Solvency II project and in piloting the ''Own Risk and Solvency Assessment'' suggested by Solvency II reform.

Although our results' analysis was satisfactory, the presented study is only a first step of modeling dependence between two lines of business. There exist several suggestions to improve the underlying theory of the claims reserving question hence the analysis of the solvency of a non-life insurer. For example, this research could be pursued by analyzing all the risks incurred by the company as premium risk and catastrophe risk and taking into account several lines of business. Moreover, it could be interesting to study and develop new techniques of dependence such as conditional frailty models. Similarly, it will be easily to recourse to Credibility theory.

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Economical Exclusion and Indebtedness as a Financial Strategy of Poor Roma Households in Slovakia

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Abstract:

According to the empirical findings and experience of social workers working with Roma, the problem of high indebtedness of Roma families in Slovakia is becoming bigger and bigger and it is an obstacle in achieving the goals of the programs for social inclusion. The decision making process is limited by the situation in life as well as the other aspects of life in extremely poor and socially excluded areas and it is incomprehensible by people that are not confronted with a situation like this. The aim of this research is to help people understand the problems, because understanding is essential to finding a good solution. Our qualitative study provides some room for casting more light on the life experience of people, therefore the authors of the project VEGA 1/0206/13 have chosen the combination of qualitative and quantitative methods to study social support and social networks of poor Roma. The work provides an interpretation of the main findings from the two in-depth studies and its aim is to give an insight into experience of respondents - members of the homes involved in the study, related to the loan-taking process and to give a realistic picture of the consequences.

Keywords: Roma, Roma communities, poverty, economic decisions, debt.

JEL Classification: D12, D14.

1. Introduction

Roma belong to the one of the biggest European minorities, they have lived here since the Middle Ages and their population is estimated to be from 10 to 12 million, from which 6 million are living in the countries of the European Union. Despite the evident diversity in Roma population living in Europe, the problems related to poverty are well-known to many Roma. On the website of the EU parliament, there is stated: *"The European Roma frequently face numerous problems. They face racism and discrimination, they don't have an equal access to education, health care and accommodation as the rest of the population".* (The parliament of the EU)

Like in other countries, in Slovakia the Roma belong to the people most affected by poverty and social exclusion (*i.e.* Radičová 2001, 2002, 2004; Džambazovič 2007, Vašečka and Džambazovič 2000, and others). Indebtedness is considered to be one of the direct consequences. Numerous qualitative studies (*i.e.* Filadelfiová 2013, Rusnáková *et al.* 2011) and a lot of experience of social workers point at the seriousness of the situation and the urgency for solutions to the indebtedness and overextension of the poor Roma families. The understanding and knowledge about the loan-taking processes is therefore an inevitable step towards a systematic solution and help on the level of individual cases.

2. Roma in the Slovak Republic

The Slovak Republic belongs to those countries where the absolute number and as well as the relative number of living Roma is the biggest. After the Slovak majority and the Hungarian minority, the Roma minority is surely the third biggest ethnic group in the country. This minority is experiencing the most dynamic growth in population of all. Approximately 53.5% of Roma live in ethnically homogeneous settlements, called Roma communities. The figure is one of the numerous findings resulted from mapping the Roma communities in Slovakia and was published in the book called Atlas rómskych komunítna Slovensku 2013 *[Atlas of Roma communities in Slovakia 2013]* (Mušinka *et al.* 2014). According to the very same source, the estimated number of Roma living in Slovakia is 402, 840, so the percentage of Roma is 7.45% of the total population in Slovakia.

From the point of view of the sub-ethnic differentiation, there are two main groups of Roma. The autochthon "Rumungro" Roma (more than 90% of the total Roma population), that have lived in a settled way of life since the 18th century. The other group is formed by the so-called "Vlachike" Roma. They came to Slovakia in the middle of the 19th century as nomadic tribes from the area of today's Moldavia and Romania (Mann 1992). "*Differences between the particular Roma groups are huge. Their history, traditions and the way of life differ so much, that it is impossible to cover the truth with some kind of theoretical similarity*". (Raichová 2001)

3. Poverty and social exclusion of Roma in Slovakia

Poverty is a complex multidimensional phenomenon affecting all the aspects of a man's life. According to Mareš (1999) we can understand it as an extreme inequality or as an exclusion of a particular part of population from the rich, or even the rest of the population. There is no mutual consent on how to define poverty. However, the issue of poverty is very well described in numerous documents, publications, research reports, studies (including those that illustrate its consequences using stories of the poor) and many more authors of great virtue deal with the questions related to defining poverty. (*i.e.* Atkinson 1998, Towsend 1979, Sen 1983, Mareš 1999, and others)

Today we already know that a "static" definition of poverty (emphasizing mostly the material well-being and sufficient finances) is not enough to understand it. In accordance to the recommendation of the EU, the member states adopted a concept of social exclusion, that documents its dynamics, or the transition in time and new characteristics that accompany poverty and we can classify this approach as a relativistic approach to understanding poverty.

Many authors in their works deal with defining the concept of social exclusion (*i.e.* Abrahamson 1995, Atkinson 1998, Atkinson 2000, Berghman 1995, Mareš 2000, and others). They agree on the fact, that social exclusion is a result of unequal approach of individuals or groups of people to the fundamental resources of humankind, and their exclusion from participating on the life of the society and it manifests on various levels and dimensions that may be characterised and identified in a specific geographical location. It emphasizes the dynamics and processes that cause deprivation, multidimensionality in the process of disadvantaging and various aspects of relations. A lot of research has been carried out in the last few years that provides evidence on poverty and social disadvantaging of Roma. *(i.e.* Gavurová *et al.* 2014a, 2014b), (Soltés *et al.* 2014, Rosinský 2006, Klein, Matulayová 2007, and others)

The above-mentioned process of mapping from the year 2013 gives us numerous figures on living conditions in Roma community. According to the results of the research, 4,134 Roma families live in a hut, 528 in a prefabricated housing unit made of plywood, 400 in a log cabin, 60 in mobile homes, 262 in non-residential objects. Up to 11% of the homes are without access to drinking water and 9% of them don't have access to electricity (First results of the book Atlas of Roma communities in Slovakia 2013). The poverty and social exclusion combines with geographical isolation mainly in segregated Roma settlements (remote from towns and villages). The poverty in those areas is extreme; however this phenomenon is not characteristic for the majority of Roma living in the marginalised locations (Radičová 2001). The Roma in Slovakia are concentrated in 233 segregated communities (18.4% of the total Roma population) and the average distance of these communities from nearby villages or towns is about 900m.

3.1. Economical exclusion

The issues of social exclusion of Roma in Slovakia are dealt in many publications of authors such as Radičová *et al.* 2002, Filadelfiová and Gerbery 2012, Filadelfiová, Gerbery, Škobla 2006, Džambazovič and Jurásková 2002. The last two of the mentioned authors defined social exclusion of marginalised Roma from the point of view of their economical, cultural, symbolical, political and geographical background (including limited access to services). According to them, the typical character of their poverty is its entanglement with social exclusion and economical exclusion plays an important role in it.

Economical dimension is one of the key "dimensions of integration" (Vlemincky, Berghman 2001 in Džambazovič – Gerbery 2005) and those individuals that don't have a strong connection to all of them, become prone to social exclusion (Atkinson 1998, Percy – Smith 2000, and others.). As explained by Džambazovič and Gerbery (2005) – according to Atkinson (1998) and Baumann (1996) social exclusion most probably means material poverty, exclusion from activities related to consumption and a gradual loss of opportunity to participate on the social and political life of community. Mareš (2000) considers economical exclusion as the fundamental cause of poverty and marginalisation on the job market. *"Economical exclusion is the cause of poverty... (especially due to marginalisation on the job market and unemployment)."* R. Levitas (2005) in Palovičová 2013 emphasizes the close relation to participation on the job market *"...unemployment leads not only to a lower income, but also to the loss of relations from work that is part of the causal process of exclusion."* (Palovičová 2013)

According to the selective study of the UNDP from the year 2010 (a final report published in 2012 by Filadelfiová, Gerbery), there had been 723 Roma households interviewed with the following results: the employment rate of Roma men was only 20% and Roma women only 11%. The rates of unemployment were

72% for men and 75% for women. The situation of Roma living in other states of the Central and Eastern Europe was very similar – only 20%-43% employed men at productive age and only 9-26% employed women (The situation of Roma in 11 EU member states 2012).

3.2. Indebtedness as a financial strategy of poor Roma households

Some of the basic human rights are directly or indirectly derived from a man's position on the job market and from a potential absence of finances. As written by Baumann (1996), the absence of finances means limited consumer choice, that is considered as one of the forms of freedom.Many Roma are dependent on social security benefits but the payments are not high. In the context of national average standard and the bottom line of sufficiency the benefits are more or less substandard. Up to 73% of the households studied in our research in 2010 (Filadelfiová and Gerbery 2012) received an income in form of social security benefits. According to Filadelfiová (2013) (resulting from monitoring 100 households of Roma communities), the average income of a household was 597,60 euro and 112,75 euro per each person.The findings of the above-mentioned studies confirm that the households have a tight or even insufficient budget resulting in indebtedness. *"The empirical data suggest that a big part of households from an excluded community are in debt – loan repayments represented the third biggest bill of the month."* (Filadelfiová 2013) During the monitored month, up to 27% of households borrowed some money and in 68% of the cases the repayments had an impact on their budget.

Slow indebtedness that might lead to over extension, or incapacity to repay the loans and its consequences are described in the two following paragraphs. We have decided for two case-studies that were part of the research dedicated to perceived social support and social networks of poor Roma in Slovakia (VEGA no. 1/0206/13).

4. Indebtedness as a financial strategy – results of a qualitative study

The main goal of the ongoing research on social support and social networks carried out by the researchers at the University of Constantine, the Philosopher in Nitra (2013-2015) is to study the qualitative and quantitative characteristics of the perceived social support of poor Roma considering the sources and types. The research was carried out in two stages:

Qualitative: half-structured interviews with the representatives of selected Roma households (approx. 40), including in-depth case-studies in two of the households consisting from interviews, comparing and analysis of documents. The aim was studying the understanding and defining the "crisis" and stressful situations from the point of view of the respondents.

Quantitative: the method of questionnaires (approx. 450 respondents) with the aim of studying and clarifying the sources of the perceived social support.

The studied samples consisted of representatives of Roma households from all kinds of Roma communities. Big part of the respondents stated in the interviews that they considered the situations related to repayment of loans as stressful. For illustration we provide the following statements:

- *"The income would be good enough, if we did not have a lot of loans. We can't afford basic necessities".* (Dagmar, 30)
- *"The banks take decisions about our money".* (Michaela, 42)

Therefore the team of researchers decided to add two in-depth case-studies with the aim of understanding the loan-taking process in the studied households and to clarify its consequences (and contexts). The households did not belong to the poorest in their village according to their perception (proven by their income, netto, compared to the rest of the households participating in the research). Both of the homes were visited repeatedly in a 6-months' time in the years 2014 and 2015 by the researchers, who attended the interviews, accompanied them to pawnshops, were present at some of their appointments at non-banking companies and had a chance to study some of their loan agreements from non-banking companies.

5. Two stories – case studies

The households are represented by two women – Milada (35) and Dorota (33). Both of them live with their families in the same village with the population of approximately 600 people, 20 km away from the county seat (a region that belongs to the top in the unemployment charts of Slovakia), in ethnically mixed neighbourhood. There are their relatives living in the same village as well.

Milada lives in a one-bedroomed house with her mother (64), a single sister (44) and a daughter. She has never owned a place. Since her daughter was born, she has lived at her partner´s mother in the neighbouring

county. *„...nothing can be done with it, we can't afford anything better."* Her partner has been away for long, the insecure job he has got makes him travel to different counties or even abroad, to the Czech Republic. *"He comes home at public holidays and summers, twice a year. Because he can't take a holiday, if he does, they will fire him. He works shifts of twelve hours."* The house is simple, single-bedroomed, equipped with basic appliances and furnished with new furniture, television and a computer connected to the Internet. According to the respondents, they are leasing the appliances; part of them was being repaid even during the period of our study. Milada was the only one possessing a mobile phone.

The other family in our research is represented by a divorced Dorota (33), who lives with her unemployed parents (55, 57) and a daughter (11). *"I have nowhere to go. Without my parents I would not survive."* They live in a two-bedroom house that is furnished with oldish furniture, appliances, TV and a notebook with access to the Internet. Dorota took a loan, too, to be able to buy all the newer appliances.

6. Economy, income and expenses

Both homes deal with money collectively. The Milada's family puts all the money into one jar and the mother holds the accounts. *"...everything goes to the collective jar, we keep all our money together".* The economical situation does not allow them to divide the household, Milada claims she doesn't have the resources to live independently in the first place, but also the absence of the income of one of them might cause a collapse of the entire household as well. "*I pray that my mother keeps her good health, not just because she is my mother, but also for the fact that without her pension we would be finished*". All the family members keep the accounts transparent. Everybody knows how much they spend on expenses, such as food, loans, rent, Internet, phone bills and education for the daughter. The trips and excursions are not paid for the daughter and she usually does not attend them with the rest of her class. The family buys clothes only in the case of emergency, mostly for the child. Just to mention, Milada's older sister responded that she had not bought clothes in years. If there are bigger expenses (such as burning wood) or something unexpected happens (normally connected to family events, illnesses), the family usually borrows money from relatives, acquaintances, or even take a loan from non-banking financial companies. Every month they take use of an "I.O.U." (or "I owe you") agreement when shopping at a local grocer's (buying on the store credit). ,, ... *yes, we do shop in there, because we have loans. But if go, we mostly don't take goods for more than 40 euro, mostly for meat and so on..."*

Dorota works for the nearby county seat and she keeps the pay (approx. 500 euro), but she does not have the privilege to decide what to do with it, because the family loans and food expenses consume almost all of it so she has to borrow some money for her travel costs and other expenses mostly related to medication and so on... They travel only occasionally. Milada has no cash on most of the days in a month, except for 2 – 3 days that follow the day of the social security benefits payment. She keeps a little pocket money; she does not keep money with her otherwise. Both of her parents are unemployed with a minimum income. The father is an alcoholic, day-by-day he gets deeper into debt. When he borrows some money for alcohol, he never pays it back. Numerous executors have filed an appeal for execution against him. Their home doesn't have a clear and transparent economy. They are not very organized when shopping; they do it impulsively, mostly soon after the day of the social security benefits payment. They don't possess cash on most of the days in a month. They usually buy goods on an „I owe you" agreement at the local grocery shop. At the time of our research they had some unpaid bills for water, taxes and waste management. Neither this family buys clothes for its adult members. *„I can't afford to buy shoes for myself and neither can I buy the things my daughter would like to have".*

7. Indebtedness – history and present days

Both of the studied homes involved in the research have been fighting the economic problems for years. Milada and Dorota are the victims of a process where poverty is being passed on from generation to generation. *"Both of my parents come from a Roma settlement and from very poor families, so they had to start from scratch. We used to belong to the poor, more or less, but after the velvet revolution (the fall of communism followed by a transition to capitalism) my parents lost their jobs."* (Milada) Frugality, social security benefits, paid jobs and occasional loans from non-official sources kept the accounts of the family relatively balanced, even with no accumulated reserves. *"We used to have some little money but the parents gave it all to the sister when she was getting married"* (Milada) The families had to deal with the loss of their jobs and had to adjust to the lower income they were getting. Shopping on the store credit became part of their life. *"I remember that we used to owe money to the shop all the time".* (Dorota)

The respondents relate their overextension (represented as accumulation of loans which they could not pay back) to concrete life situations. In Milada's case a critical situation (a disease of her father followed by death) was followed by a series of wrong decisions taken in haste. Milada was working at a local pub at that time and was feeling lucky playing slot machines that resulted in debt, she owed to her employer. She borrowed some money from her family and took a loan from a non-banking company as well. *„I did not have money, so I wanted to win and the death of my father, I was kind of...I was not being sensible..."*

Dorota moved to the grandparents of her husband after her marriage. She could not afford an independent household that would mean having expenses exceeding the income of the young family with a baby. She took her first loan the second month after she had moved out from her parents, who did not support her financially, for their family budget was too tight. *"...I would buy only food and clothes for the baby...we would never have enough money, so I would repay one loan and take another one, when it was possible."* Today when she looks back she is critical, but admits that the effect of the unfavourable situation on her decisions was strong. After she had divorced her husband and left back to her parents, her loans accumulated to such extent she was unable to manage. *"I took a loan for a new house, but we did not manage to buy it in the end. It was more than 200.000 Slovak crowns* (approximately 35.000 RON)*...I did not have time to realize how much I was spending...*"

Dorota took some time to think about her readiness and ability to deal with such amount of money during one of our interviews (her family had never had such amount of money), that was left after her plans had not worked out. *"I did not even know how to deal with the money. I had never seen so much money in my life...."*

Both events that our respondents link to the beginning of their indebtedness, from which they have not been able to snap out until today, happened 10 years ago.

Dorota has been paying back the big loan from the bank all these years. The sum of money for the repayments represents more that one fifth (20%) of her total income. Along with this loan, she took about 15 other smaller loans from non-banking companies. These „informal loans" were very typical for her at the time of our research. She requested for them usually for two reasons – she needed money to pay back the loan from the bank (she wanted to avoid late payment penalties) and she needed money for basic necessities and bills to cover the monthly leasing payments on her electrical appliances and windows. She did not know any details about the loans of her father and her mother was paying the monthly leasing payments on her cooker and a loan from a non-banking company during the period of our study.

Whenever there was an urgent financial situation, Milada went for a quick loan from a non-banking company or to her extended family. *"I told myself that I was done. I could not carry on anymore. That was one of the worst situations, I was helpless...I did not know what to do, who would help me."* (Milada) But the period of exorbitant indebtedness carried on for two more years. *"Then we had to pay the repayments and it was piling and piling...some of them could not be paid at all...and then we received mails with execution appeals."*

Milada left her job; her partner took a more active role in the situation. He found a job and left about 200 km away from home. He has been travelling for job reasons ever since. He travels around the country and abroad as well, to the Czech Republic. However, his financial situation is not positive either. Low income and high repayments make him trapped in a vicious circle of paying back and taking more loans. Milada's mother is repaying some loans, too – one of them is a result of a family event she had to take part in and the rest is the result of leasing payments for the appliances, windows and burning wood for heating. They managed to agree on scheduled payments for some of the loans. They requested for remission of penalties and fees, but were not successful.

8. Banks or non-banking companies

Loans from banks are generally unavailable for the unemployed or for people with a low income in Slovakia. When the non-banking companies entered the Slovak market, people accessed a new source of loans, for high interests, though (according to the loan agreements we have studied they are more than 60% higher than it is offered by banks). For example, the family of Milada has to pay back more than double the amount owed (according to her calculation), including the fees related to the execution appeals, trial fees and penalties for late payments. Both of the studied families have been utilizing this service for more than 10 years. *"The non-banking companies give us money. And in case I have already taken too many, they give it to my mother or vice-versa."* (Dorota)

Neither of the families have a good overview of the rates on interest and the remaining amount of money they owe to the non-banking companies. The loan agreements are written vaguely, when we compare the list of payments, it is clear that it does not correspond with the information written in the loan agreement. Dorota finds

out about it after a researcher notices the differences (she has already paid it back), despite all that she considers the service as more convenient, for their availability. *"...when you need money urgently, you don't want to think where to go, who to ask...You come to a bank and they make you fill out piles of forms and in the end they send you away with no results."* With the quick loans form the non-banking companies, a lot of paperwork drops out. A representative comes to the client's home. *"...any time of day, on Saturdays, Sundays, mornings, evenings, whenever she comes, the following day we have the money, or if she comes in the morning, later in the afternoon the money is there."* The representative is nice, she comes for the payments personally and in case of need, she is willing to agree on prolonging the repayment period or on lower payments.

9. Impacts, survival, future

In both of the cases, the repayments have a huge impact on their income which is not high. They have to subject everything to them, even the decision-making about expenses and bills. Frugality and limiting the expenses for food and bills is often not enough and the families reach out for new loans repeatedly.

They relate most of their worries, doubts and insecurity about the future to the loans. They are incapable of becoming independent from their parents and to divide the income, unable to find an official job due to execution appeals (they are stopped if a person with no property on his name becomes unemployed). The following extracts from various interviews suggest, how different and subjective are their perception of a similar situation:

- *"I want a better life for my daughter, unlike the life I have got. But I am unable to do it; I don't know how to put it. I can't do anything about it. Everything worries me..."*(Milada)
- *"I am an unsuccessful person, I have not achieved anything, I don't have anything, and I am surviving. I can't even imagine that I would live with no debt. Because I have lived this way for years. I want to get rid of it badly, but it is not possible. It would be a great life without them...*" (Dorota)

Conclusion

The strategy based on an operative loan-taking is very common in the studied families and generally well-spread among the families from Roma communities. It is not always effective, though. The repayments have a considerably strong impact on their budget and often result in further indebtedness or even overextension – the families solve their incapacity to cover the monthly payments by taking another loan. *"Overextension affects mostly socially disadvantaged individuals or socially disadvantaged groups of people and it is one of the most significant factors that trigger their exclusion from the normal life of the majorities thus resulting in a very difficult inclusion back into the society".* (Nováková, Sobotka 2011)

As written by Filadelfiová (2013), loans help the families with lower income to balance their monthly budget. If they did not borrow some money during the month, their balance would be worse. On the other hand, their financial situation would be better if they owed less. The incapacity to pay energy bills or buy food is a very frequent cause of indebtedness. Filadelfiová (2013) emphasizes that 44.5% of studied households had *"nothing to feed their children with".* It turned out that another cause of indebtedness was reconstruction of the house or unexpected illness and travelling to the doctor, or for medication. Mainly the most vulnerable – members of segregated Roma communities - fall victims to usurers, non-banking companies, insurance companies... According to the social support workers, debts and execution appeals belong to the most frequent problems in the marginalised Roma communities they usually deal with involving the cooperation of their clients.

Working with loans is one of the greatest challenges in the field of social support in the marginalised communities these days for the systematic solutions and for a properly addressed help to clients. The issue of debt is complicated and difficult for the helping professionals (social support workers and lawyers), it is therefore no surprise that for the poor debtors it is not easy to orientate in their debts, resulting in taking steps leading to even deeper indebtedness.

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Determinants of Supplier Selection in E-procurement Tenders

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Abstract:

Nowadays, new electronic solutions within global e-supply chain allow business partners to obtain and utilize new form of information for business decision making. New e-procurement tools provide competitive advantage and power of purchasing companies to push on supply side. Although, new kind of information from global e-supply chain tools can support suppliers to improve decision making more efficiently. In the paper we are examining the significance of particular information as internal and global ratings, loyalty etc. for decision making to win the procurement tender. For the study, the simulation game was realized and analyzed through decision trees techniques. We have examined different results as from standard correlation tests and show interesting rules for decision making in different situation of suppliers.

Keywords: Decision making, procurement, supplier, evaluation, simulation game.

JEL Classification: M21.

1. Introduction

Supply chain management has been recognized as one of the most important business process and management functions for achieving higher business efficiency and competitive advantage. The fact that suppliers play a key role in affecting firms' performance has been well recognized in the literature (Donlon 1996, Min and Mentzer 2004, Kannan and Tan 2006, Li *et al.* 2006, Koh *et al.* 2007). According to Ford (2003), the high costs of purchased goods and services typically account for around 70% of the total cost.

One of the most crucial points of effective strategic supply chain management, the procurement function is considered (Talluri and Sarkis 2002). In line with procurement process innovation, advances in information and communication technology (ICT) support companies to achieve substantial economic benefits within business processes. (Devaraj *et al.* 2007, Doucek *et al.* 2010, Dorčák and Delina 2011, Dorčák and Pollák 2011, Sudzina, *et al.* 2011, Delina and Tkac 2010, Hill and Scudder 2002)

Todays, e-procurement applications impact companies by costs reduction, increases of overall profitability, or generally improve procurement practices and economic benefits (Olson and Boyer 2003). According to Delina and Tkáč (2010), one of the crucial factors how to increase efficiency of cooperation with suppliers and how to increase procurement efficiency is trust building in electronic business environment with special attention on reputation evaluation. (Delina 2009)

However, procurement is a complex process involving sourcing, analyzing, negotiating and assessing. The ICT support for analytical and evaluation phases are crucial for better decision making and recognizing the value of e-procurement innovation (Novotný 2008, Gavurova 2011, Prídavok and Delina, 2013, Zgodavova, and Bober 2012). To fully utilize effects of ICT in business processes, Doucek (2010, 2011) consider the human aspect and e-skills as crucial.

In this paper, we are examining factors determined winner selection in procurement tenders considering the utilization of ICT solutions for access to global market data as important factor for business decision making (Delina 2012). Nowadays, ICT adoption within procurement processes call for suppliers' decision making support. For this purpose we have realized procurement simulation game to identify decision rules for suppliers suitable for optimization of their price bidding strategies.

2. Methodology

General research problem

eSupply chain management, esp. for e-sourcing and e-procurement provides strong tools for procurement managers to push on prices and general business conditions. In this situation, suppliers need to obtain support for their decision making to better optimize their bidding strategy within electronic environment. This e-environment can provide information from global market or their historical behavior with relevant purchasing company. For the better understanding, how the usability of relevant data from global market or internal

procurement/selling solutions can affect suppliers' decision making following experiment was proposed, realized and analyzed to answer our research questions:

- *What factors are crucial for winning the procurement tender with the access to global and local business data?*

Design of the experiment

For the analysis, data from experiment based on simulation business game was used according to our study in Szabo *et al.* (2013). Greenlaw *et al.* (1962) define a business game (or business simulation) as a sequential decision-making exercise structure around a model of a business operation, in which participants assume the role of managing the simulated operation. In our simulation game, we asked purchasing managers to make a winner selection decisions within different simulated tender situation. Each manager had approx. 30 rounds to select the winning suppliers, where each round provided business offers by three suppliers with several parameters:

- *Price*;
- *Internal rating* – representing general satisfaction of the company in all examined issues of already realized business transactions with particular supplier;
- *Global market rating* - representing general satisfaction of the global market (all companies on the market with historical experiences with particular business partner);
- *Internal history* – representing the frequency of business transactions historically realized with particular business partner within purchasing company;
- *Global market history* – representing the frequency of business transactions within global market (if the company is new on the market, or has already realized transactions with companies on the global market, not with examined purchasing company);
- *Financial stability* – representing the financial situation of the supplier, liquidity or other problems reflecting potential financial bankrupt/insolvency;
- *Satisfaction with the communication with relevant seller* – representing overall satisfaction with direct person (seller), which is responsible for the communication with relevant purchasing company.

The value for each parameter in each round was generated in the uniform frequency way. Each parameter is the best with the value "5" and worst with the value "1". Each supplier within one round was then ordered from 1 (the best = the winner) till 3 (the worst).

Sample description

Within the experiment, more than 400 companies (one purchasing representative for each company) from Czech and Slovak Republic were asked to join the business simulation game. The basic description of our sample used is provided in Table 1.

Table 5 - Description of experiment and sample

Number of total rounds	13.161
Number of suppliers in one round	3
Number of selection criteria	7
Number of companies involved	455

Research results

For the analysis, in the first step we have applied correlation test to describe the statistical relationship between the various parameters of the winner selection process. To ensure that our sample is not from normal distribution, we have conducted K-S normality test. According to results, we see that for correlation tests we have to use non parametric tests.

Table 6 - Test of normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Price1	,160	16708	,000
Internal_rating1	,163	16708	,000
External_rating1	,342	16708	,000

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Internal_loyalty1	,342	16708	,000
External_loyalty1	,224	16708	,000
Financial_health1	,223	16708	,000
Satisfaction		16708	,000

Note: [a]Lilliefors Significance Correction

From Spearman's rho test presented in next table we can identify the basic relations between particular factors/parameters and final rank of suppliers. We see the highest correlation between price and rank. This shows traditional view on supplier selection process, although internal rating and internal loyalty is considered as significant from our point of view.

Table 7 – Correlation matrix

	Price	Internal rating	External rating	Internal loyalty	External loyalty	Financial health	Satisfaction	Rank
Price	1,000 -	,005 ,288	,008 ,233	,004 ,470	-,006 ,288	0,13 ,009	-,004 ,507	-,476 ,000
Internal rating		1,000 -	-,008 ,193	,726 ,000	-,003 ,552	,006 ,232	-,010 ,111	-,263 ,000
External rating			1,000 -	-,001 ,873	-,004 ,482	-,002 ,735	,009 ,225	-,076 ,000
Internal loyalty				1,000 -	,001 ,908	,007 ,183	,002 ,793	-,234 ,000
External loyalty					1,000 -	-,005 ,315	-,001 ,872	-,117 ,000
Financial health						1,000 -	,006 ,315	-,122 ,000
Satisfaction							1,000 -	-,046 ,000
Rank								1,000

Although, the complexity of different procurement situations follow us to utilize knowledge discovery techniques, esp. decision trees to identify deeper causalities and rules based on patterns in procurement managers' behaviour. Together, we assume that procurement selection parameters may be causally mutually determined in decision process. For that purpose we have applied C5.0 algorithm in SPSS Clementine to generate decision trees with rank as the output.

Table 8 - Decision rules

Price = 1 [Mode: 3] => 3 (7,474; 0.649)
Price = 2 [Mode: 3] (7,541)
Internal_loyalty = 2 [Mode: 3] => 3 (2,582; 0.654)
Internal_loyalty = 3 [Mode: 2] (2,422)
External_loyalty = 2 [Mode: 3] => 3 (796; 0.509)
External_loyalty = 3 [Mode: 2] => 2 (843; 0.502)
External_loyalty = 4 [Mode: 2] (783)
Financial_health = 2 [Mode: 3] => 3 (287; 0.474)
Financial_health = 3 [Mode: 2] => 2 (259; 0.486)
Financial_health = 4 [Mode: 2] => 2 (237; 0.447)
Internal_loyalty = 4 [Mode: 2] (2,537)
External_loyalty = 2 [Mode: 3] (833)
Financial_health = 2 [Mode: 3] => 3 (283; 0.548)
Financial_health = 3 [Mode: 2] => 2 (270; 0.481)
Financial_health = 4 [Mode: 2] => 2 (280; 0.45)

External_loyalty = 3 [Mode: 2] => 2 (819; 0.503)
External_loyalty = 4 [Mode: 2] => 2 (885; 0.47)
Price = 3 [Mode: 2] (7,502)
Internal_loyalty = 2 [Mode: 3] (2,445)
External_loyalty = 2 [Mode: 3] => 3 (790; 0.595)
External_loyalty = 3 [Mode: 2] (817)
Financial_health = 2 [Mode: 3] => 3 (285; 0.488)
Financial_health = 3 [Mode: 2] => 2 (233; 0.472)
Financial_health = 4 [Mode: 2] => 2 (299; 0.458)
External_loyalty = 4 [Mode: 2] => 2 (838; 0.464)
Internal_loyalty = 3 [Mode: 2] => 2 (2,575; 0.462)
Internal_loyalty = 4 [Mode: 2] (2,482)
Financial_health = 2 [Mode: 2] => 2 (805; 0.514)
Financial_health = 3 [Mode: 2] (834)
External_loyalty = 2 [Mode: 2] => 2 (259; 0.548)
External_loyalty = 3 [Mode: 2] => 2 (292; 0.455)
External_loyalty = 4 [Mode: 1] => 1 (283; 0.505)
Financial_health = 4 [Mode: 1] (843)
Internal_rating = 0.000 [Mode: 1] => 1 (0)
Internal_rating = 1.000 [Mode: 2] => 2 (154; 0.506)
Internal_rating = 2.000 [Mode: 2] => 2 (167; 0.443)
Internal_rating = 3.000 [Mode: 1] => 1 (143; 0.531)
Internal_rating = 4.000 [Mode: 1] => 1 (183; 0.536)
Internal_rating = 5.000 [Mode: 1] => 1 (196; 0.551)
Price = 4 [Mode: 1] (7,532)
Internal_loyalty = 2 [Mode: 2] (2,506)
External_loyalty = 2 [Mode: 3] => 3 (800; 0.431)
External_loyalty = 3 [Mode: 2] => 2 (858; 0.457)
External_loyalty = 4 [Mode: 2] => 2 (848; 0.419)
Internal_loyalty = 3 [Mode: 1] => 1 (2,505; 0.547)
Internal_loyalty = 4 [Mode: 1] => 1 (2,521; 0.62)
Price = 5 [Mode: 1] => 1 (7,568; 0.636)

From C5.0 model it is able to identify little bit different results or interpretation as from correlation tests. We consider this approach as practically more exploitable. According to these results, extreme values in prices with strong support definitely show that the price is one and only significant factor to make a procurement selection decision. Differently from correlation test, we see that the second most important factor is the internal loyalty supported by external loyalty and financial health in some cases. Although, the decision rule emerged as a first rule to win the tender was in the situation, when the price is neutral for decision. It means, that for the company which has higher then medium external history, neutral financial health but with higher internal loyalty, it is enough to offer medium interval price for tender winning. In the case of lower external history, higher internal rating is important to be able to win with medium price within this company situation. If the company has higher internal loyalty level, to win the tender it will be enough to offer higher price than medium without considering other parameters.

Conclusion

Current development of e-procurement tools determines efficiency of procurement processes. On the one hand, to utilize innovative tools for better decision making as ratings, analysis of company's history, satisfaction etc. can help procurement managers to decide more effectively. On the other hand, utilizing new information can help also suppliers to improve their decision making more efficiently. According to our results, such an analysis can help suppliers to make a better decision for price negotiation to balance the impact of new e-procurement tools.

Our research results shows, that supplier can optimize his price according to other procurement factors if known and possibly obtained from e-negotiation and networked solutions. For example, internal ratings and

loyalty (history of relation with the procurement company) have high impact on the possibility to offer the price better for supplier as the best price from the market (best price from all invited suppliers). It means that suppliers can estimate optimal price in current situation. It is interesting, that for Slovak and Czech countries still trust more to internal information as to information from external environment. Nowadays, new transparency of supply chain is visible in reverse auctions or other innovative e-procurement forms which can be used not only for procurement but also for supply side. Better e-marketplace functionalities and business data analysis can help to optimize the market price contrary to current B2B purchasing power resulting from usage of innovative e-procurement tools.

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Transfer of the Reference Rate for Lending and Deposit Rates: The Case of Mexico, 1995-2013

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Abstract

This paper[1] examines whether a lag in the adjustment of lending is and deposit interest rates due to changes in monetary policy rate. We use an asymmetric error correction model to study the responses of interest rates since the lending and deposit rates adjust with different dynamics to the equilibrium level due to changes in the reference rate. Specifically, the asymmetric model allows examining differences when the interest rates are on or below their equilibrium level. Finally, we find a statistically significant relationship between lending and borrowing rates with the reference rate; the relationship is positive and slightly higher for the lending rate than for the deposit rate.

Keywords: Econometric modeling, lending and deposit interest rates, monetary policy.

JEL Classification: C18, C12, E52.

1. Introduction

This research aims to investigate how monetary policy is transmitted through bank loans. This can be measured by the degree of transfer between the monetary policy, particularly the reference rate, and the lending and deposit rates of commercial banks. Specifically, this research shows that there are lags in the response of the lending and deposit rates by changes in the reference rate. This research uses the methodology proposed by Scholnick (1996) to quantify the degree of influence or transmission of monetary policy through bank loans. The lag in the adjustment of lending rates refers to the weak response of interest rates of commercial banks from movements in the interest rate in the money market; see, for instance, Berstein and Fuentes (2002). Additionally, we also find out whether there are asymmetries in the degree of response of lending and deposit rates considering an equilibrium level due to changes in the reference interest rate. From these results, it is possible to examine if there are asymmetries, and if so, we could then elucidate on the economic causes related to the observed asymmetry.

The above two issues are interrelated in what refers to the transmission mechanism of monetary policy in Mexico. According to the literature on this regard, Scholnick (1996) performed an empirical study using standard econometric time series models, and we attempt to extend Scholnick's research (1996), for the Mexican case, by using symmetric and asymmetric error correction models. Subsequently, we examine differences when interest rates are on or below their equilibrium level.

The findings of this research show that, in average, the lending rate changes takes about four and a half months to adjust the equilibrium after movements in the reference rate. This contrasts with approximately two months that the deposit rate takes. Moreover, there is a positive relationship and slightly higher towards the lending rate to the deposit rate (0.55% and 0.49%, respectively). In terms of asymmetry, it is found that for the deposit rate is statistically significant. However, there is not statistically significant evidence of asymmetries for the lending rate.

This research is organized in three more sections. The next section presents the methodology and model specification that will be used to analyze whether there are asymmetries in the adjustment of the lending and

[1] The opinions expressed herein are those of the authors and not necessarily those of Banco de Mexico

deposit rates to changes in monetary policy. The third part shows the descriptive statistics of the data to be used in the estimation model. The fourth section provides the estimation results. Finally, conclusions are presented and limitations are stated.

2. Methodology and model specification

We extend Scholnick's (1996) research for the Mexican. To do this, we use symmetric and asymmetric error correction models. Then, we examine differences when the interest rates are on or below of its equilibrium level, and analyze how long does it take (in months) for the lending and deposit rates react to changes in the policy rate. Therefore, the null hypotheses are given by:

H_0: There is no statistical relationship between the transfer of the reference rate and the borrowing and lending rates of banks in Mexico.

H_0: There is no statistical relationship in asymmetric lending and deposit rates to changes in the reference rate.

To implement the asymmetric error correction model is necessary to make some econometric tests before applying this approach: The first of these tests is to ensure that the analyzed series are integrated of order one *I*(1), *i.e.*, are non stationary. To verify this, two common used unit root tests are proposed, the augmented Dickey and Fuller's (1976) and the Phillips-Phillips and Perron's (1988) tests. Another necessary econometric test is that of cointegration of the series. This test checks whether there is a linear equilibrium relationship of the series in the long run. In order to test cointegration it is used the method of Johansen (1988). According to the methodology proposed by Scholnick (1996) the asymmetric error correction model is explained as follows. First, the model of error correction according to the usual procedure (Engle and Granger 1987) is stated to examine the dynamics of the variables in the short term (using the same notation Scholnick 1996):

$$\Delta i_t = \delta_0 + \delta_1 \Delta w_t + \delta_2 R_{t-1} + e_t \quad (1)$$

where i_t is the interest rate on loans (or deposit), w_t is the reference rate of monetary policy, R_{t-1} is the residual cointegration vector between the lending rate (deposit) and the monetary policy rate, e_t is the vector of errors of the regression with the assumption of i.i.d., Δ is the first difference operator, and δ_0, δ_1, δ_2 are all parameters. According to Doornik and Hendry (1994), the average lag model is:

$$ML = \frac{1 - d_1}{d_2} \quad (2)$$

The above is interpreted as the lag of adjustment for a symmetrical pattern. To adapt to the asymmetric case, for example, there is a setting when the level of the interest rate is above (or below) the equilibrium level. The following is proposed Scholnick (1996). First, the residual *R* series is divided into two separate sets R^+ and R^- in such a way that:

$R^+ = R$, if $R > \mu$ $\qquad$ $R^- = R$, if $R < \mu$

and,

$R^+ = 0$, if $R < \mu$ $\qquad$ $R^- = 0$, if $R > \mu$.

Here, μ stands for the mean of *R*. The division of the *R* series can be seen as a dummy variable type that is included in the new specification to control for asymmetries. Note that the variable may have a bias error that depends on the interest rate since the dynamics of the rates with higher levels far from zero may show different dynamics compared with the rates with low levels close to zero. The proposed asymmetric error correction model is given by:

$$\Delta i_t = \delta_0 + \delta_1 \Delta w_t + \delta_2 R^+_{t-1} + \delta_3 R^-_{t-1} + \varepsilon_t \quad (3)$$

where the asymmetric average lags are defined as:

$$ML^+ = \frac{(1 - \delta_1)}{\delta_2} \quad (4)$$

$$ML^- = \frac{(1 - \delta_1)}{\delta_2} \quad (5)$$

Now, it is possible to estimate two lags of adjustment, one for the case of the series being less than its average (R^-) and the other for the case of being higher than its average (R^+) series.

Once equation (3) is estimated, we use the coefficients obtained from the Wald Test, with $X^2(1)$ distribution, to test the statistical constraint $ML^+ = ML^-$. That is, there is no asymmetry. These results will allow deciding whether the null hypotheses will be rejected. Subsequently, for completeness, we estimate the Vector Error Correction Model (VECM). Given the structure of this type of models, impulse response functions (IRP) can be implemented, and through estimation of coefficients in the IRP it can be seen the statistical effect of a dependent variable as a result of a shock to the system.

3. Descriptive statistics of the used data

We use the 28-day CETES, as a "proxy" for the reference interest rate. The rate of lending and deposit interest rates will be the weighted average of the Mexican banking system. For the lending rate, we will be using the representative implicit credit rate from commercial banks to the private sector. The analysis period is from June 2004 to August 2013 for the weighted lending rate, and December 2001 to August 2013 for the implicit lending rate. The data frequency is monthly for a total of 111 observations for the weighted lending rate and 141 observations for the implicit lending rate (in aggregate terms).

The weighted lending rate used corresponds to a weighted average interest rate of new loans from commercial banks to firms. The aforementioned new loans are identified individually. The interest rate applicable to such loans is taken and multiplied by a weighting factor, which is obtained from the ratio of the amount of individual credit between the total portfolios of new loans. Finally, the sum of all these rates multiplied by the weighting give the weighted average rate.

An implicit lending rate that is related to all loans from commercial banks to the private sector will be also used. This rate is defined in terms of the ratio of monthly income of current interests and daily average outstanding balances. The current average daily balance considers the total (amount) of these loans from commercial banks to private enterprises. The portfolio includes commercial bank credit to non-financial private companies, consumer and housing. The rate is expressed in terms of as a simple annual percentage (implied market). It is noteworthy that the databases that are managed to the aforementioned implicit lending rate is also broken down into segments of non-financial private companies, consumer and housing; however, this study only considers the implicit rate of commercial bank credit to the private sector since it is considered as an aggregate representing other sectors rate.

For the weighted average deposit rate in the Mexican banking system we have considered the following information. The deposit rate is the cost of deposits to term liabilities in domestic currency (CCP). This rate (CCP) is the cost of collection, including term liabilities in national currency by commercial banks, excluding liabilities arising from subordinated susceptible conversion to capital, which guarantees and operations among lending institutions. The CCP began publishing in February 1996, and details of the methodology for calculating the weighted average deposit rate are referred to the Official Gazette of February 13, 1996. The sample for the deposit rate is from December 2001 to August 2013, for a total of 141 monthly observations. We are considering that all the rates used in this study are short-term representative. This will be useful to obtain consistent estimates. Note that the sample size and the dates considered in lending rates depend of the availability of data. Finally, the dynamics of the reference interest rate and the lending and deposit rates in levels and first differences are presented in Table 1.

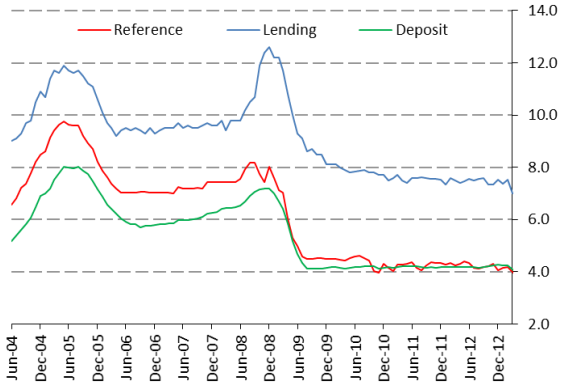
Table 1. Descriptive Statistics Series Analyzed Interest Rates in Levels and First Differences - (%) (s/u)

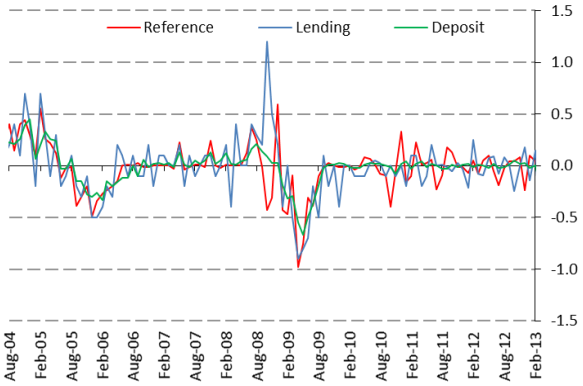
Rate in Levels	Mean	Median	Std. Standard	Bias	Kurtosis	Jarque-Bera	*N*
Reference	6.23	6.81	1.73	0.16	1.77	9.31***	139
Lending	9.19	9.40	1.49	0.46	2.18	6.560**	106
Deposit	5.47	5.76	1.24	0.28	1.78	10.42***	139
First Difference							
Reference	-0.02	0.00	0.45	-1.43	11.56	468.67***	138
Lending	-0.02	0.00	0.29	0.33	6.14	45.06***	105
Deposit	-0.02	0.01	0.28	-1.72	12.56	593.62***	138

Source: Authors' estimates using data from Banco de Mexico.

Note: *** / ** Represents rejection of the null hypothesis of normality at 99% and 95% confidence level respectively by X^2 test (df). *N* = total number of observations.

After viewing the descriptive statistics, it can be seen that the mean and the kurtosis of the lending rate are at levels higher than the other rates, which is more intense in the levels of the series that have higher kurtosis. In analyzing changes in the first differences, the only series that presents a positive bias is the lending, rate but with lower kurtosis. Note that no series come close to the normal distribution according to the Jarque-Bera statistic. This is a stylized fact in financial variables, particularly in inters rates.



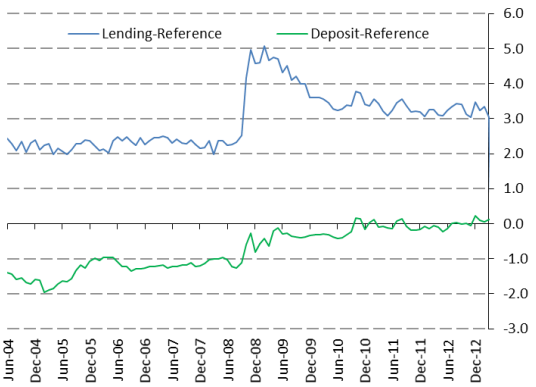


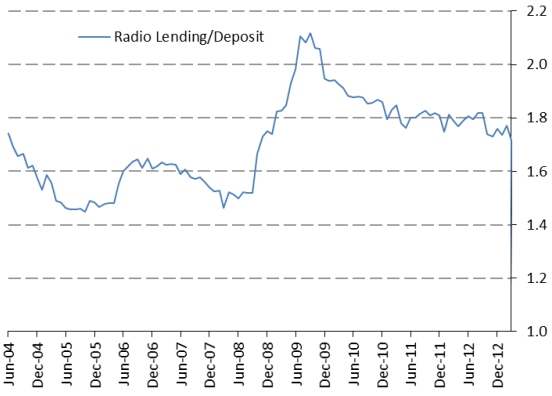
Source: Banco de México

Figure 1. Interest Rates %

Figure 2. First Differences %

It can be observed in Figures 1 and 2 that the series have a relatively similar behavior. Each level rises in the mid-2000s and subsequently decreases. In 2008, we observe an increase in levels during the crisis, and, subsequently, a lower level is reached. After the crisis, reference and deposit rates increase their synchronization staying in a similar level. Figure 2 shows the series in first differences, it can be seen that the series are stationary. By performing the corresponding unit root tests (see Table 2), it is confirmed that they are *I*(0). Notably a significant increase in the lending rate in October 2008 is observed (the beginning of the global financial crisis of 2008-2009). The change in the lending rate is remarkably higher than that of the other rates, however, after that period it also tends to stabilize.





Source: Banco de México.

Figure 3. Spread between Rates %

Figure 4. Radio between Rates s/u

Figures 3 and 4 provide descriptive statistics. Figure 3 shows the spread between lending and deposit rates and the reference rate. As expected, the difference between the lending and reference (upper curve) is higher in level than the spread between the deposit rate and the reference (lower curve). The lending rate charged by banks and deposit which is used to pay for its acquisition, hence the level difference between lending and deposit differentials can be considered as a margin. Figure 4 shows the ratio of the deposit and lending rates. The ratio has increased from 2009 to an all new level of approximately 170 basis points, which is higher than the levels observed prior to 2009 with approximately 155 basis points on average.

4. Analysis of empirical results

In this section, we present the results of unit root and cointegration tests of the analyzed series, as well as results of the error correction models having as dependent variables the lending rates (weighted and implicit), and

the deposit banks. We also discuss the results of the VECM and the impulse-response functions for both lending implicit weighted rate and deposit rate.

Table 2. Unit Root Tests Interest Rates in Levels and First Differences (s/u)

Rate	ADF	PP	*N*
Levels			
Reference	-1.59	-1.40	139
Lending	-1.65	-1.35	106
Deposit	-1.91	-1.81	139
First Differences			
Reference	-9.77***	-9.72***	138
Lending	-4.06***	-7.01***	105
Pasive	-7.83***	-7.96***	138

Source: Authors' estimates using data from Banco de Mexico

Note: ADF = Augmented Dickey-Fuller test; PP = Phillips-Perron Test. The ADF and PP tests include a constant in the specification. ***/Represents rejection of the null hypothesis of normality at the 99% confidence level considering MacKinnon critical values for one-tailed. N = total number of observations.

Table 2 shows, as expected, that the series in levels are non stationary unable to reject the null hypothesis derived from augmented Dickey-Fuller statistic. However, one difference can be seen stationary for all series. After corroborating that the series are *I*(1), we estimate a cointegration test. As it is well known, if variables are non stationary as they are cointegrated, it is necessary to apply an error correction model.

Table 3. Cointegration Test Interest Rate Levels (s/u)

Johansen Cointegration Test				
Number of Cointegration Equations (r)	Eigen Value Test H_0: *r=0* and H_0: *r<=1*	Test Stand. Trace H_0: *r=0* and H_0: *r<=1*	Critical Value Eigen	Critical Value Trace Stand.
0*	36.3036	40.6845	21.1316	29.7971
1	3.6435	4.3809	14.2646	15.4947

Note: Proof of Johansen (1995). Lag interval is 1 to 2 and includes an intercepts. * - Represents rejection of the null hypothesis of r cointegrating vectors at the 95% confidence level considered critical values of MacKinnon-Haug-Michelis (1999).

Table 3 shows the cointegration test. It can be seen that the null hypothesis of no cointegrating vectors is rejected in favor of the alternative of the existence of at least one cointegrating vector. This can be seen using the eigenvalue and trace statistics. Both statistics are greater than the critical values at 95% confidence level ($r = 0$).

Next, the estimated error correction model for the lending rate and its statistical relationship with the reference rate is analyzed. To do this, Table 4 shows that, except for the constant, the estimates of the error correction model for the lending rate coefficients are statistically significant. The magnitude of the regressor associated with the impact to the reference lending rate is approximately 0.55. This indicates that upside movements in the aforementioned interest rate cause a positive relationship with the lending rate of approximately 0.55%. The coefficient associated with error correction term (δ_2) is negative and less than one, which indicates convergence in the relevant parameter of the equation. The average lag adjustment (ML) is 4.46 months to return to equilibrium in the model. The latter can be interpreted as the average time that takes the lending rate to return to a balance considering a short-term shock to the reference rate.

Table 4. Results of Estimates of Error Correction Models (s/u)

Coefficient	Lending	Deposit
δ_0	-0.0048 (0.0237)	-0.0103 (0.0111)
δ_1	0.5525*** (0.1091)	0.4938*** (0.0253)
δ_2	-0.1003** (0.0399)	-0.2675*** (0.0392)
R^2	0.3239	0.7835

F-statistic (*F*(2, d.f.))	24.4294***	244.2988***
Average adjustment lag (*ML*) in months.	4.46***	1.89***
Asymmetries		
δ_0	-0.0499 (0.0408)	0.0146 (0.0174)
δ_1	0.5483*** (0.1087)	0.4986*** (0.0252)
δ_2	-0.0587 (0.0503)	-0.3791*** (0.0715)
δ_3	-0.2780** (0.1373)	-0.1555** (0.0717)
R^2 *F*-statistic (*F*(3, d.f.))	0.3359 17.0289***	0.7889 166.9695***
Average adjustment lag ML^+ ML^- Wald (*Chi*-square) H_0: $ML^+=ML^-$	 7.70 1.62*** 1.8301	 1.32*** 3.22** 3.4487*

Note: Following the method estimates Scholnick (1996). d.f. = degrees of freedom. Equal test Wald coefficients is performed with $X^2(1)$ distribution. The critical value at 10% confidence level for $X^2(1)$ is 2.706. ***/**/* Statistical significance at 1%, 5% and 10% respectively. N=105 for the lending rate, N=138 for the deposit rate.

Source: Authors' estimates using data from Banco de Mexico.

Notice now that we have the same speed of adjustment when the lending rate is found above or below the equilibrium level, *i.e.*, the answer would be symmetrical. There is some literature, which document asymmetric adjustments depending on the position of the lending rate from equilibrium, *i.e.*, differences in the speed of adjustment when the rate is above or below the equilibrium level; see, for instance, Hannan and Berger (1991), Neumark and Sharpe (1992), and Scholnick (1996).

The second performed error correction model estimates the parameters that measure the response of asymmetric adjustment. According to the results, it can be seen that the speed of adjustment in the lending rate is asymmetrically not statistically significant. This, as in the Wald test of equal coefficients cannot reject the null hypothesis of no presence of asymmetries. The Wald statistic, presented at the bottom of Table 4, is 1.8301, which is less than the critical value of the $X^2(1)$ equals 2.706, leading to not reject the null hypothesis. Thus, it follows for the lending rate that the speed of adjustment, given a shock on the reference rate, is 4.46 months, and there was no statistical evidence, in terms of speed, that there is a difference in the cases having the lending rate above or below the equilibrium rate. In this regard, it is important to point out that there is some international evidence that shows longer average adjustment for the speed of adjustment of lending rates; for example, in the study of Scholnick (1996), the adjustment speed for Malaysia and Singapore was 11.4 and 7.5 months, respectively.

Regarding the estimated error correction model, the deposit rate and its statistical relationship with the reference rate is analyzed. Again, Table 4 shows that, except for the constant, the estimated coefficients on the error correction model for the deposit rate are statistically significant. The magnitude of the impact of the associated regressor of the reference rate to the deposit rate is approximately 0.49. This indicates that upside movements in the aforementioned interest rate cause a positive relationship with the lending rate, approximately 0.49%. Remarkably, according to the magnitude of the estimated coefficients for both rates, the magnitude of the transfer is greater for lending than that for deposit rate (0.5525>0.4938). The average lag adjustment (ML) is 1.89 months to return to equilibrium in the proposed model. The latter can be interpreted as the average time that takes the deposit rate to return to the equilibrium considering a short-term shock to the reference rate. Notice that if the deposit rate is found above or below the equilibrium level (symmetric responses) there is also evidence of asymmetric responses, according to equations (4) and (5). In the results on asymmetric responses, we have that there is statistically significant evidence that the response the deposit rate is asymmetric (the null hypothesis is rejected in the Wald test). If the deposit rate is above the equilibrium level return to equilibrium lasts, it takes 1.32 months; while, if the deposit rate is below the equilibrium level the response is 3.22 months.

The intuition in the asymmetric response is that banks take longer to raise rates paid (deposit rate) when these rates are below the equilibrium (3.22 months). If the rate is above the equilibrium level, banks are quicker to adjust the rate paid taking on average 1.32 months less than the upward adjustment of 3.22 months. This

behavior have to do with the convenience of banks to be faster in lowering the rate paid in response to changes in the reference rate.

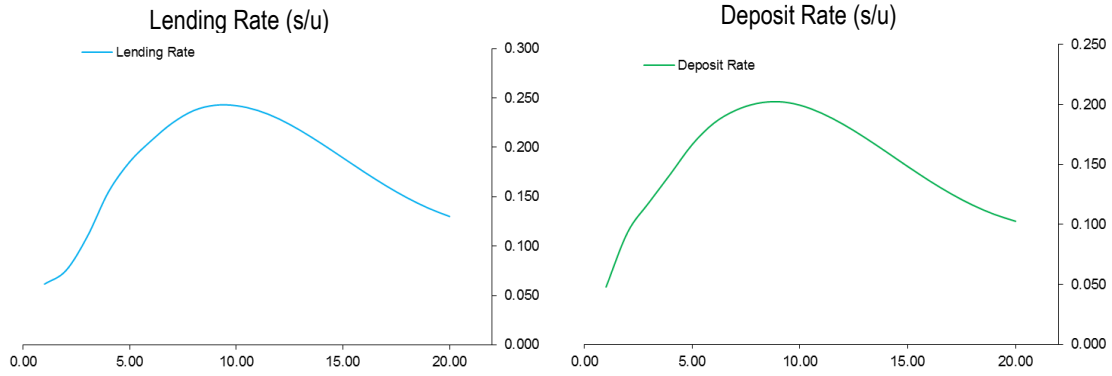
Notably, the literature on asymmetry in interest rates could be compared with the asymmetry in prices. The latter is a stylized fact and so far has been tested in empirical research in most markets (Peltzman 2000, Wlazłowski 2003, Meyer and von Cramon-Taubadel 2004, Tappatá 2008). In fact, this concept is known in the literature as the "rockets and feathers' hinting that prices go up as fast as rockets and down as slowly as feathers. The problem with this concept is that, until recently, there is a theoretical framework that explains the basics of asymmetry in price changes. In most cases, the theory of prices in market structures assumes that the price movement is symmetrical.

In the pioneering work of Tappatá (2008), a model with partially-informed and rational consumers, and competitive firms, in which asymmetrical movements occur is innovative in the sense that before this modeling, the literature showed a limited development in terms of theoretical foundations. In general, the aforementioned work explains that consumers seek and obtain their optimal price relative to past prices and not necessarily to current prices. Firms take advantage of this behavior and set prices for consumers minimizing their search. When costs fall below the prices, firms lower prices slightly for consumers, however, when costs rise firms are left with no choice but to adjust the price quickly. In this model, collusion is not necessary in the asymmetries. The above results conform to a more traditional, but controversial theory of collusion proposed by Hannan and Berger (1991), and referenced in Scholnick (1996). The rigidity to raise rates given the costs associated with setting the deposit rate seems to be an action of “collusion” between the banks; there would be a cost in tacit agreements between banks if there are unsynchronized movements in deposit rates.

Under the above theory one would expect that the speed of adjustment of the rate that banks pay (deposit rate) would be greater to the upside than to the downside.The results, at the same time, do not support the theory of consumer reaction in Hannan and Berger (1991) and Scholnick (1996). The latter predicts some rigidity in lowering the deposit rate, and that customers might be unhappy, and, therefore, banks could lose customers. According to the results, we can see that not only banks lower the deposit rate, if they do not make fast adjustment to the rise (1.32 months *vs*. 3.22 months).

Note that, up to now, there is no consensus on the theoretical foundations of the dynamics of prices (or interest rates), so in this research, as in Tappatá (2008), collusive behavior produces asymmetries; see Hannan and Berger (1991) and Scholnick (1996).

In what follows the estimation results for the VECM are presented. Again, the estimates are made for completeness considering how informative it is to see the reactions of the relevant variables before the system crashes using analysis of IRP.



Source: Authors' estimates using data from Banco de Mexico

Figure 5 - Impulse-response functions

According to the results of the IRP, the impact of the shock for both series, will gradually increasing and then began to decrease, also gradually. The intuition behind this result could be related to a transmission mechanism of interest rates in Mexico, which works in the short to medium term (one to nine months). As shown in Figure 5, the decrease in the impact of the shock begins to dissipate after the ninth month, which is considered closer to medium term decline.

In Appendix A, we show the results of the estimates for the implicit lending rate in the VECM. Estimating the transfer rate refers to the implicit lending rate of banks in Mexico. Notably, the implicit lending rate shows on average around nine months to adjust to equilibrium after movements in the reference rate. This contrasts with

approximately two months that takes the deposit rate. In terms of asymmetry, it is found to be statistically significant for both lending and deposit rates. That is, the speed is different if the rate is above or below its equilibrium level. For the lending rate to reach equilibrium when it is above its average level takes about 2.4 months. For the deposit rate to reach equilibrium when it is above the level of the average takes about 1.32 months. Finally, regarding the IRP for the lending rate implicit representative it appears that the results are qualitatively similar to those obtained for weighted lending rate.

Conclusions

The findings of this study to estimate the transfer reference rate to lending and deposit banking rates in Mexico are summarized below: A statistically significant relationship between lending rates for new loans from commercial banks to firms, the borrowing rate and market reference rate. The relationship is positive and slightly higher towards the lending rate to the deposit rate (0.55 and 0.49, respectively). The average lending rate shows about four and a half months to adjust to equilibrium after movements in the reference. This contrasts with approximately two months it takes the deposit rate.

In terms of asymmetry, it is found to be statistically significant for the deposit rate. However, there is statistically significant evidence of asymmetries for the lending rate. That is, for the deposit rate, the speed of adjustment is different if the rate is above or below its equilibrium level.

For the deposit rate to reach equilibrium when it is above the level of the average takes about 1.32 months, remaining below the equilibrium 3.22 months. This result is intuitive, since it tells us that banks are faster to cut rates paid (towards its equilibrium level) to upload (1.32 *vs*. 3.22 months, respectively). This is consistent with the theory of collusion but not for consumer reaction (Scholnick: 1996). Finally, there was statistically significant asymmetry in the case of deposit and not in the case of the lending. The results are qualitatively similar to those reported for the weighted lending interest rate on new loans from commercial banks to firms.

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APPENDIX A

The following Appendix shows the details of the econometric results of the estimates for the implicit lending rate in the VECM. It is also shown the behavior of impulse-response functions.

Figure 6 - Comparison between sets of benchmark interest rates, active and deposit implicit in levels and first differences

Table 5 - Descriptive statistics series analyzed Interest Rates in Levels and First Differences (%) (s/u)

Rate	Mean	Median	Std. Standard	Bias	Kurtosis	Jarque-Bera	N
Levels							
Reference	6.23	6.81	1.73	0.16	1.77	9.31***	139
Lending	14.05	14.10	1.75	-0.88	3.90	22.41***	139
Deposit	5.47	5.76	1.24	0.28	1.78	10.42***	139
First Differences							
Reference	-0.02	0.00	0.45	-1.43	11.56	468.67***	138
Lending	0.02	0.10	0.74	0.03	11.45	410.22***	138
Deposit	-0.02	0.01	0.28	-1.72	12.56	593.62***	138

Note: *** / ** Represents rejection of the null hypothesis of normality at 99% and 95% confidence level respectively by $\chi 2$ test (df). N = total number of observations.
Source: Authors' estimates using data from Banco de Mexico.

Table 6 - Unit Root Tests Interest Rates in Levels and First Differences (s/u)

Rate	ADF	PP	N
Levels			
Reference	-1.59	-1.40	139
Lending	-2.10	-2.39	139
Deposit	-1.91	-1.81	139
First Differences			
Reference	-9.77***	-9.72***	138
Lending	-16.41***	-19.08***	138
Pasive	-7.83***	-7.96***	138

Note: ADF = Augmented Dickey-Fuller test; PP = Phillips-Perron Test. The ADF and PP tests include a constant in the specification. *** / Represents rejection of the null hypothesis of normality at the 99% confidence level considering MacKinnon critical values for one-tailed. N = total number of observations.
Source: Authors' estimates using data from Banco de Mexico.

Table 7 - Cointegration Test Interest Rate Levels (s/u)

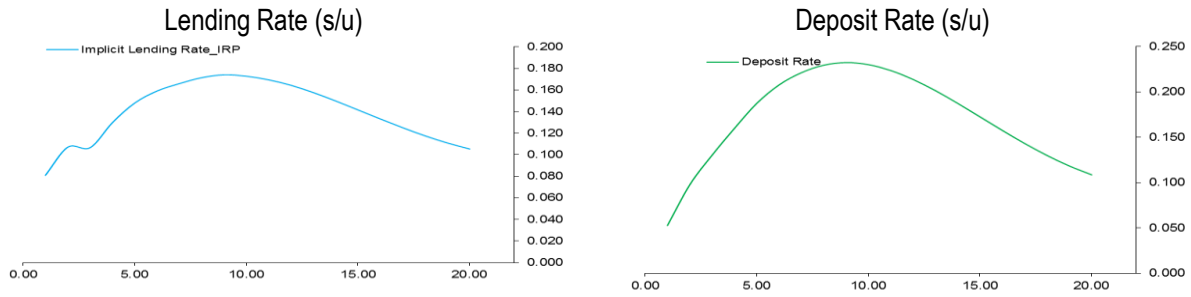
Johansen Cointegration Test			
Number of Cointegrating Equations	Eigen Value	Statistical Trace	Critical Value
0*	0.1515	38.2852	29.7971
1*	0.1094	16.4393	15.4947
2	0.0077	1.0316	3.8415

Note: Proof of Johansen (1995). Lag interval is 1 to 2 and includes a intercepts. * / Represents rejection of the null hypothesis of r cointegrating vectors at the 95% confidence level considered critical values of MacKinnon-Haug-Michelis (1999). Total number of observations N = 133 after adjustments for lags.
Source: Authors' estimates using data from Banco de Mexico.

Table 8 - Results of Estimates of Error Correction Models (s/u)

Coefficient	Lending	Deposit
δ_0	-0.0048 (0.0237)	-0.0103 (0.0111)
δ_1	0.5525*** (0.1091)	0.4938*** (0.0253)
δ_2	-0.1003** (0.0399)	-0.2675*** (0.0392)
R^2 *F*-statistic (*F*(2, d.f.))	0.3239 24.4294***	0.7835 244.2988***
Average adjustment lag (*ML*) in months.	4.46***	1.89***
Asymmetries		
δ_0	-0.0499 (0.0408)	0.0146 (0.0174)
δ_1	0.5483*** (0.1087)	0.4986*** (0.0252)
δ_2	-0.0587 (0.0503)	-0.3791*** (0.0715)
δ_3	-0.2780** (0.1373)	-0.1555** (0.0717)
R^2 *F*-statistic (*F*(3, d.f.))	0.3359 17.0289***	0.7889 166.9695***
Average adjustment lag ML^+ ML^- Wald (*Chi*-square) H_0: $ML^+=ML^-$	 7.70 1.62*** 1.8301	 1.32*** 3.22** 3.4487*

Note: Following the method estimates Scholnick (1996). d.f. = degrees of freedom. Equal test Wald coefficients is performed with a $\chi 2$ (1) distribution. The critical value at 10% confidence level for $\chi 2$ (1) is 2.706. *** / ** / * Statistical significance at 1%, 5% and 10% respectively. N = 105 for the lending rate, N = 138 for the deposit rate.
Source: Authors' estimates using data from Banco de Mexico.



Source: Authors' estimates using data from Banco de Mexico

Figure 7 - Impulse-Response Functions

Appendix B

For the long-term relationship, the errors of the cointegrating vector are obtained. The specification is given by $i_t = \alpha + \beta w_t + U_t$ where i_t represents the interest rate of lending or deposit and w_t stands for the reference interest rate in the market. The U_t term represents the error vector (cointegration). Under the assumption of white noise, the results are:

For weighted lending rate:
$i_t = 4.5677 + 0.7432 w_t$
(0.2249) *** (0.0347) ***

For implicit lending rate:
$i_t = 12.1922 + 0.2984 w_t$
(0.5345) *** (0.0826) ***

For weighted deposit rate:
$i_t = 1.1284 + 0.6960 w_t$
(0.0924) *** (0.0143) ***

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Between Entrepreneurship and Law - Direct Action in the Matter of Contractor Agreement in the New Romanian Civil Code

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Abstract

The phrase direct action is the product of case law. If in the old Romanian Civil Code of 1864 there was no article of law to make reference to this expression, but only two derogations in articles 1488 and 1798 pointed out, the new Romanian Civil Code - entered into force on 1 October 2011 and considered one of the significant milestones of the legislative reform unparalleled in Romania's juridical history of the past twenty-five years, after the fall of communism - allots the notion two articles - no. 1856 and 2023 and, moreover, article 1807 stipulates the actions that may be taken against a subtenant.

Apart from the fact that the concept is defined according to the old Romanian Civil Code, with some references to the old Romanian Civil Code, and compared with other countries' way of considering the institution of direct action, the paper approaches a case of its practical application allowed by Romanian law - direct action in the matter of contractor agreement.

Keywords: direct action, right, debtor, creditor, contract, new Romanian Civil Code.

JEL Classification: L26.

Introduction

Referred to as the right of individual to act directly against any of the parties of a contract in relation to which he is third party, and which he claims in his favour, having yet, in another contract, the capacity of creditor of the other part of the contract invoked, direct action is, therefore, an arrangement operating with three actors: *the creditor as holder of the direct action, his direct debtor* (intermediate debtor) *and the intermediate debtor's debtor* (sub-debtor). The mechanism assumes the existence of two legal relationships of obligations: one between the creditor and the intermediate debtor and one between the intermediate debtor and sub-debtor. In the latter one the intermediate debtor has the capacity of creditor.

Direct action, as opposed to the indirect one, allows the intermediate debtor's creditor, third party in the contract concluded by the two, to demand payment of his claim directly from sub-debtor, who is his debtor's debtor.

The Romanian legislator considers there is a category of creditors which are preferred and in favour of whom some exceptions to the general rules were allowed. The new Romanian Civil Code contains no express regulation of direct action, but some derogatory statements have been stipulated in articles 1856 - "Direct action of workers", 2023 - "Substitution by trustee" and 1807 - "Effects of sublease. Action against subtenant". The last one provides in paragraph (1) that "In case of non-payment of rent due under the lease, the lessor may follow the subtenant up to the retrieval of the rent that the latter owes. Advance payment of rent to the principal tenant cannot be opposed to the lessor "; in paragraph (3) it is also provided that "The lessor may also take direct action against the subtenant to compel him comply the further obligations of the sublease contract".

2. Theorists' outlook on the concept

Some of the Romanian doctrinarians (Motica and Lupan 2008) consider that: „*direct action* is the right individuals have to take action in specific cases, expressly and exhaustively provided by law, against any party to a contract, invoking the contract in their favour although they are unrelated to it in their capacity of third party", others (Dogaru and Drăghici 1999) reckon that „it denotes the right of people to act, for their benefit, in certain cases provided by law against any party to a contract, to which they themselves are third party" or that "it designates those cases where, as per law, a person (the plaintiff) calls to court another person (the defendant) with which he is not in contractual relations, though he is in contractual relationship with another person with which the defendant is, too. (Boroi and Anghelescu 2011)

From the point of view of some (Pop 2009) theorists „*direct action* is the right of a creditor to take action on his behalf and in his own interest, to obtain payment of his claim, against his debtor's debtor, between the two

being no relationship obligation, while in others' view (Hamangiu *et al.* 1996) it is admissible in exceptional cases, enabling the creditor to act on his own behalf against his debtor' debtor, so that the value pursued to pass directly from the third party patrimony into that of the pursuant creditor without competition of other creditors, or „on the grounds of *direct action*, brought by creditor on his behalf, the amount involved, goes, from the third party, directly in the patrimony of the pursuant creditor, without other creditors' competition. (Filipescu and Filipescu 2000)

There are theorists (Stătescu and Bîrsan 2008) who acknowledge in favour of a third party, alien towards the contract, the right to *act,* in some cases stipulated by law*, directly* against one of the parties of the agreement, who (Safta-Romano 1994*,* Ungureanu 2012) consider that, under express provisions of law, a creditor, may act in order to pursue the enforcement of his claim directly from his debtor's debtor, although he was not a party of the contract concluded between his debtor and his debtor's debtor or who (Ungureanu 1999) assert that direct action shall allow a third party to exercise certain rights directly against one of the contracting parties.

As far as our opinion is concerned, *direct action* represents that legal mechanism by which the creditor may request his debtor's debtor, with whom he has not entered into any contractual relationship, to carry out an obligation, by which the value pursued by the creditor goes directly to his patrimony.

Foreign legal doctrinaires also regard the concept of *direct action* multifariously.

German theorists (Corbisier *apud* Ghestin and Fontaine, 1998) for instance reckon that the only permissible *direct action* is in the matter of vehicles compulsory insurance. Unlike the general provisions relating to liability insurance or to the compulsory liability insurance, in the matter of vehicle insurance, the third party concerned has the right to act directly against the insurer of the perpetrator of the damage, according to a law of 1965.

From the Belgian ideologists' point of view *direct action*, an effect of the law which derogates from the principle of relativity (Dalcq *apud* Ghestin and Fontaine, 1998) is characterized by the fact that its holder has a personal right which he exercises against the defendant. The holder is alien towards the contract concluded by his debtor, who becomes a creditor of the defendant according to law.

In Spanish legal literature *direct action* is regarded as a possibility the creditor has to claim the execution of liability from his debtor's debtor. *Direct action* must be granted by law and cannot be extended to other situations by an extensive interpretation. (Lasarte 2007)

French doctrinaires (Calastreng 1939) defined the concept as an action for payment restitution that is exceptionally granted by law to a creditor so that may he act, on his behalf and interest, against his debtor.

In the American system *direct action* denotes the right of a third party who has a claim against the insured to act directly and immediately against the insurer because the insured has been declared bankrupt or became insolvent. (Circa 2009)

3. Direct action in the matter of contractor agreement

Article 1856 New Romanian Civil Code establishes this case of direct action by the stipulation that: "If not paid by the entrepreneur, persons who, under a contract concluded, worked for providing the services or carrying out the work contracted, may take direct action against the beneficiary, up to the retrieval of the amount that the latter owes to the entrepreneur at the moment the action is taken".

This right, an entrepreneur' workers have, to take action against the person who commissioned the work, unless paid can be traced back to the French Civil Code, source of inspiration for the old Romanian Civil Code or the Civil Code of 1864 which, in article 1488, also stipulated that workers employed in performing a work, may claim their payment from the authorized representative, in so far as he owes the entrepreneur at the time of complaint. Considering the text of the old Romanian Civil Code - as well as that of its source of inspiration - it appears that legislators have granted employees a pathway to act directly against the customer, in his capacity of beneficiary of the respective work, in case he did not pay the entrepreneur the price set in the contractor agreement.

Action is direct even if there are no contractual legal relations between workers and beneficiary arising from the contract. Two legal relationships bound the three entities involved in this transaction: on one hand there is a relationship arising from a contract between the two parties - workers and the entrepreneur, who may be bound by a contract of employment or a contract for services, and on the other hand there is a contractual relationship between customer and entrepreneur which has its source in the contractor agreement concluded by the two. Within these relationships the entrepreneur is the employees' immediate debtor for providing the services or carrying out the work contracted, and the client-beneficiary is the entrepreneur' debtor for the price of the work performed.

We note that both the entrepreneur and the client-beneficiary assumes the same type of prestation namely to make a payment. The entrepreneur assumes the obligation to pay for the work performed by workers, and the client-beneficiary undertakes to pay for the work performed by the entrepreneur.
Legal relationship specific for direct action arises between workers and the work beneficiary. In this relationship, the workers will have the capacity of creditors, as holders of direct action, and the debtor will be the beneficiary of the work, that is the customer in the contractor agreement, named sub-debtor. The entrepreneur will maintain his quality of main debtor towards workers. The object of the obligational relationship shall consist in the beneficiary sub-debtor duty to pay the creditor-workers directly, so that the price of in work shall not go into the patrimony of the main-entrepreneur debtor.

As, according to article 1280 of the new Romanian Civil Code, the contract takes effect only between the parties, unless the law provides otherwise, workers are given the right, granted by art. 1856, through direct action, to be paid from the amount receivable that the contractor holds against his client (the work beneficiary). In order to be able to exercise this direct right workers must meet the conditions of having provided certain services or carrying out the work contracted and not having been paid by the contractor. Following the direct action of workers against the beneficiary, this will be bound only to the amount that he owed the entrepreneur when action was taken.

Since according to article 1854 paragrafhs (1) and (2) new Romanian Civil Code, the amount of money represents the price of the work performed, which must be reliable and determined or at least determinable, where the contractor agreement does not stipulate clauses relating to price, the beneficiary owes the price provided by or calculated according to law or, unless law provides, the price determined in relation to labour and costs implied to carry out the work or the service, taking into account the existing consuetude [article 1854 paragraph (3) new Romanian Civil Code].

Moreover, in order to guarantee payment of the price due for the work, the new Civil Code provides that the contractor benefits from a legal mortgage upon the work, created and preserved under the law. Pursuant to direct action, workers have priority over other creditors of the entrepreneur and they will not have to bear the entrepreneur´s possible state of insolvency or bankruptcy as the amount receivable will go directly to the holders. On the other hand, by virtue of direct action workers take no precedence over other creditors of the client-beneficiary following that will not have to compete with other creditors of the client-beneficiary.

According to our opinion, despite the fact that both the old and the new Romanian Civil Code enact the direct action in what workers are concerned, the current wording of regulation, by comparison, is more appropriate and better in at least two respects. Firstly, because the use of the term *persons* that replace the occupations listed (such as builders, craftsmen and other workers), widens the field of those who will benefit from the direct right. Thus, the category of persons for whom the right is acknowledged is not restricted to persons employed by the contractor under a contract of employment, but extends to others who have contributed to work achievement, but who have not concluded a contract with the entrepreneur, as the case stand with the subcontractor. Secondly, because under the new Civil Code, individuals will have a pathway of direct action against the beneficiary if "[...] they have worked for providing services or carrying out the work contracted [...]" and not only for "[...] the building of an edifice or another work leased out [...] "as stipulated by the old regulation. Thus the scope of the contract is extended in the sense that direct action will be valid with any contract, whether of work or services.

Conclusions

The institution of *direct action* is found in the legislation of several countries on the continent or in North America, conceptualized by Duranton Alexandre and introduced in some articles of the French Civil Code source of inspiration for the old Romanian Civil Code.

As a legislative instrument which the creditor has at hand to pursue the enforcement of his claim directly from a debtor of his debtor, although he was not part in the contract agreed by the debtor with his debtor, direct action entitles workers to recover, in their favour, the equivalent value of their work from one of the parties to a contract to which they are not related, having the advantage of priority over other creditors of the entrepreneur.
People who, under a contract concluded with an entrepreneur carried out a contracted work, performed a working activity, or provided services and received no payment for the activity performed have the right granted by law, and stipulated by both the old and the new Romanian Civil Code to take direct action against the beneficiary of the work and recover amount of money that the latter owed the contractor.

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