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Analysis of Threats to the Macroeconomic Stability in Visegrad Group Countries

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Abstract:

The paper determines evolution of various macroeconomic indicators of the V4 with special focus on the field of business environment. The results highlight economic prognoses of the Visegrad region for the upcoming years, which are in harmony with general forecasts of international organizations (EU, OECD, UNCTAD, IMF or Eurostat). Objectives of the work are summarized in a SWOT analysis including major threats to the V4 macroeconomic stability. All in all, Visegrad countries belong to the most dynamic regions of the European Union and are predicted to progress smoothly. The crucial challenges include slowing export in the Czech Republic, political instability in Hungary, labour returns from the UK to Poland and over-dependency on car and export industries in Slovakia. Furthermore, our findings revealed that negative FDI inflow will represent an obstacle for economic progress of the V4 Group.

Keywords: macroeconomic situation; economic indicators; threats analysis; Visegrad Four; V4

JEL Classification: E02; E69; F49

Introduction

All four Visegrad countries (V4) are situated in the Central Europe region. Even though an overall macroeconomic overview of the V4 countries is positive and the V4 group belongs to the most prosperous regions in the European Union (EU), every country disposes of local failing areas. Because every country requires different economic tools to reach stability, we offer some examples of difficulties that V4 countries currently face.

In this regard, our paper aims at identifying the most criticised factors inside each economy of V4 group. Our main goal lies in elaborating analysis of potential threats to the countries, while we primarily focus on macroeconomic indicators of business environment. Firstly, we examine several macroeconomic indicators of the V4 countries with special focus on business environment. Secondly, the paper offers economic prognosis for Visegrad countries in the near future. Based on these findings, we elaborate a SWOT analysis, which reveals possible threats to the economies. To sum up, results show that the Czech Republic suffers from decreasing exports and investment, Hungary is a centre for tax evasion, Poland will have to handle labour returns from the UK and Slovakia faces first outcomes from over-dependency on automotive and export industry.

1. Literature review

Given that studies of macroeconomics include plenty of theories, we have selected just specific areas that are associated with our findings. Thus we primarily analyse impacts of potential threats regarding the field of export, tax evasion, youth labour market and FDI.

Lipková (2011) points out that the growth of foreign trade through rising volume of exported goods expresses an effective use of domestic economic sources. Higher export allows a country to increase the level of specialisation, while to decrease unit costs of production at the same time. What is more, foreign trade stabilises prices by keeping demand and supply stable (Kuman 2005). According to Tielmann (2010) export markets maintain

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higher competitiveness resulting in better-quality products. At the same time, decreasing volume of export limits generating of job opportunities.

Baláž (2010-2011) defines basic characteristics and factors of international human resources management. The studies of Tait (2013) assume that salaries of fresh university graduates (even those with sufficient experience) are lower than hiring experts.

Green and Shearman (2011) argue that education ensures higher standards of living in future. Baker and Jones (1998) suggest that a country benefits most once the fresh graduates return back to the home country with technical and professional knowledge acquired in advanced economies. In fact, there is a growing tendency of transnational corporations (TNC) to hire fresh graduates with foreign experience in the V4 region. It is often a critical moment when deciding where to allocate TNC's new branch or a factory (UN 2003).

From a developmental perspective, FDI provides the country with new technologies, they decrease transfer costs and support infrastructure projects (Lipková 2011). However, there is a risk of over-dependency of local economy on TNC production, FDI sources and export-oriented industry (Ghosh 2001). Baláž (2010) proposes numerous theories of foreign direct investment's importance for the host country. Creating new job opportunities, stimulating productivity, more effective allocation of production factors and spill-over effect of labour belong to the most valuable advantages of TNC (Dixon and Boswell 1996).

While some scholars provide an overview of negative impacts of tax avoidance (Gravelle 2010), other authors reveal different ways to combat tax evasion (Prosser 2012). On the basis of McGee (1998) we will set the analysis of how taxes boost economy and how to minimize tax evasion in the context of Hungary.

2. Methodology

In this paper, we summarize macroeconomic data in order to define current economic situation of the Visegrad Four countries. Firstly, we begin with an overview of the position of the countries in regional and international economic relations. We examine various existing analysis of the current macroeconomic situation of the Czech Republic, Hungary, Poland and the Slovak Republic. Secondly, we aim at collecting details in order to create a most probable projection of the Visegrad region for the upcoming years. Our prognosis are in harmony with existing predictions of international organizations, such as the European Commission, OECD, United Nations Conference on Trade and Development (UNCTAD), IMF or Eurostat. Thirdly, we determine major threats to every V4 economy by elaborating a SWOT analysis. The SWOT method is based on macroeconomic and business-related indicators that are discussed in the paper. Fourthly, the main objective of the paper is to provide critical analysis of impacts of threats in accordance with the macroeconomic theories. In addition, comparative studies are applied in each section of the research putting emphasis on the common and most different features of the Visegrad countries.

The analyses are created in accordance with the macroeconomic theories of researches and academic professionals. Literature review was selected after having determined concrete macroeconomic problems in the V4 countries. In order to demonstrate complete overview of the macroeconomic situation in Visegrad countries, we offer SWOT analysis and main findings resulting from it.

3. Brief overview of macroeconomic situation in Visegrad Four Countries

This section offers a real view of the current macroeconomic situation of the V4 countries and it brings 2-year statistical assumptions. The first subsection aims at an international trade sector and briefly indicates the level of openness of the Visegrad group. The next chapter covers conditions for evaluating the quality of doing business in the countries, as well as employment factors that have significant impact on companies operating in the country. All numerical information, tables and charts are based on the documents published by international organizations.

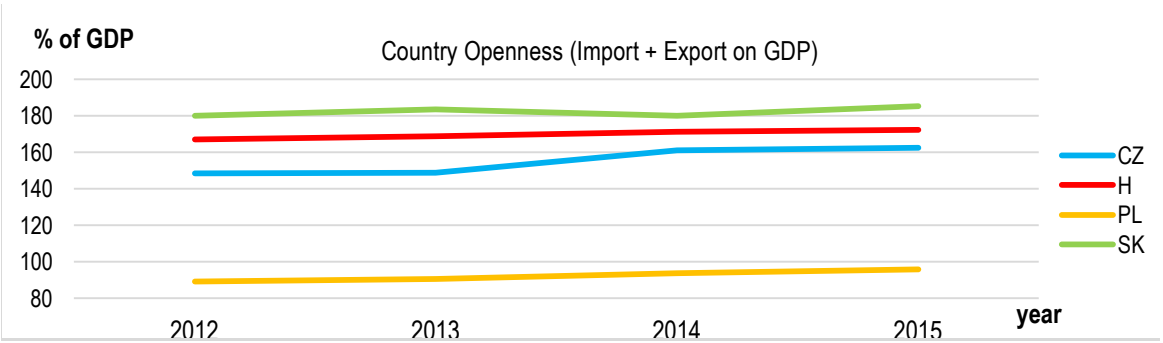
3.1. International trade

During the modern process of globalization, various trade contracts have been agreed between countries and between a country and multinational corporations. Free trade areas and industrial zones have been created by almost every country. The V4 region is not an exception, the Czech Republic, Hungary, Poland and Slovakia

represent major business partners and keep very close cooperation in the field of investment, but also in the fields of culture, sport events, economic politics, geopolitics, etc.

All four economies are highly open, but Slovakia is recognized as a leader within V4. It has the 3rd biggest ratio of import and export value to the GDP in the European Union - after Luxembourg and Ireland (World Bank 2017). Beginning with Poland, it is a relatively big and resource-independent country of V4. It is the only V4 with openness less than 100% of its annual GDP volume (Eurostat 2017b). By contrast, Slovakia reaches doubled international trade volume than is able to produce and absorb domestically (IMF 2016). Import and exports annually grow, except the year 2013 when V4 economies could not keep the truck from the previous year's massive recovery from financial crisis (UNCTAD 2017). At that time, foreign trade was not supported by economic policies and financial institutions. What is more, newly industrialized Asian nations and China dominated world trade, which put EU states aside.

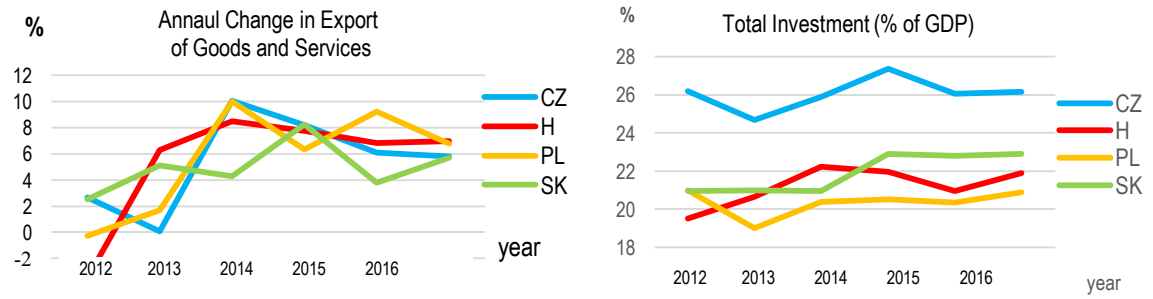
Figure 1. International trade indicators



Source: Eurostat (2017c), IMF (2016).

Figure 2 provides data for Total Investment in a V4 group, which reaches 19 - 23% of GDP, particularly Czech annual investment of 27% of its GDP in 2015. If export decreases significantly in the Czech Republic, national investment will become a dominant factor of growth (Ghosh 2001).

Figure 2. International Economic Relations Indicators



Source: Eurostat (2017c), IMF (2016).

Visegrad Four countries represent a highly attractive destination for foreign direct investment. It is the most dynamic EU region with well-developed infrastructure and availability of skilled and relatively cheap labour force. What is more, countries dispose of high concentration of suppliers, contractors and subcontractors that is appreciated by multinational corporations and foreign investors. Because Poland is the biggest V4 economy, it reasonably invests the highest volume of financial resources abroad. However, Slovakia is a special case when dealing with FDI. Since 2013, capital withdrawal of foreign investors in Slovakia was larger than their new investments (see negative data in the table below). The reason was a change in international capital flows away from emerging markets in 2013 and later. Before that time in 2012, the volume of FDI inflow into Slovakia was $3 billion (UNCTAD, 2017). Hungary has experienced negative trend in FDI inflow for 2 years, as well. We can see

from Table 1, that Poland is the highest recipient of FDI among V4 states. The volume of investment flowing into the country is even more than doubled in comparison to the sum of other 3 Visegrad economies (the Czech Republic, Hungary and Slovakia together).

Table 1. Foreign Direct Investment flows

FDI Inflow (mil. USD)				
	2013	2014	2015	2016
CZ	3,639	5,492	465	1,223
H	3,402	7,753	-14,804	-5,314
PL	3,625	14,269	13,472	11,358
SK	-604	-512	-196	-295

FDI Outflow (mil. USD)				
	2013	2014	2015	2016
CZ	4,019	1,620	2,487	984
H	1,886	3,780	-15,972	-8,823
PL	-451	2,898	3,216	6,436
SK	-313	42,8	-183	248

Source: UNCTAD (2017).

3.2. Business efficiency environment

Business environment of the country reflects its successful story in international trade and participation in the world economy. The more convenient business policies and offer of production factors, the more entrepreneurs choose this country as a location of their manufacturing operations, service providing, financial seat and research parks.

Table 2. Expenditure spent on R&D by private and public sector

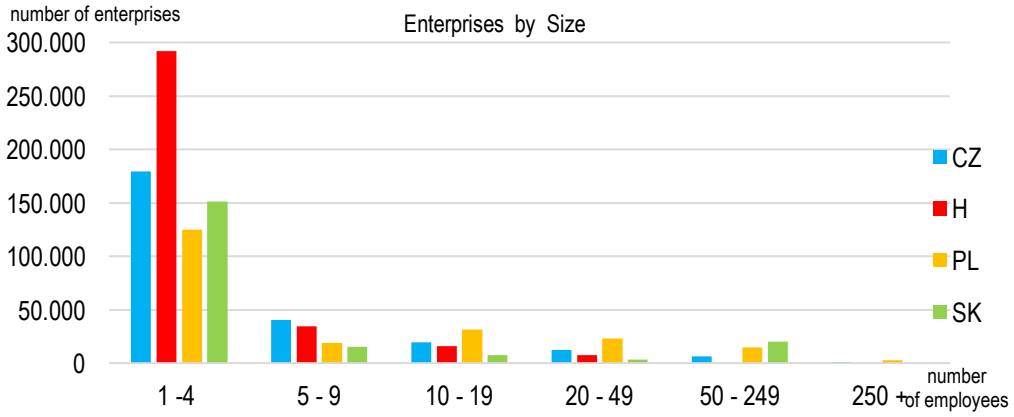
Business enterprise R&D expenditure (€/inhabitant)				
	2011	2012	2013	2014
CZ	134.6	146.8	154.2	164.5
H	75.3	83.1	99.2	103.5
PL	22.5	33.5	39.4	47.3
SK	32.3	44.8	52.2	45.5

Gross Domestic Expenditure on R&D (% of GDP)				
	2011	2012	2013	2014
CZ	2.97	3.00	3.06	3.05
H	1.20	1.27	1.40	1.37
PL	0.75	0.88	0.87	0.94
SK	0.67	0.81	0.83	0.89

Source: Eurostat (2017c).

In the beginning, it is reasonable to distinguish V4 states according to the number of enterprises in the economy. Even though Poland is the biggest V4 economy by nominal GDP, the highest number of enterprises is in Hungary, from which 84% are small businesses with 1 to 4 employees (Eurostat, 2017c). Admittedly, Slovak economy is 5-times smaller than Polish, but both countries dispose of similar number of business units. In fact, Figure 3 proposes that Slovakia has the highest number of large companies with 50-249 employees (10% of all, while this number circles around 2% elsewhere). Most business organizations with 5-9 employees can be found in the Czech Republic (15% of all Czech businesses), while Poland dominates the medium-size companies of 10-19 employees, as well as companies with 20-49 employees (15+15% share of all domestic employees).

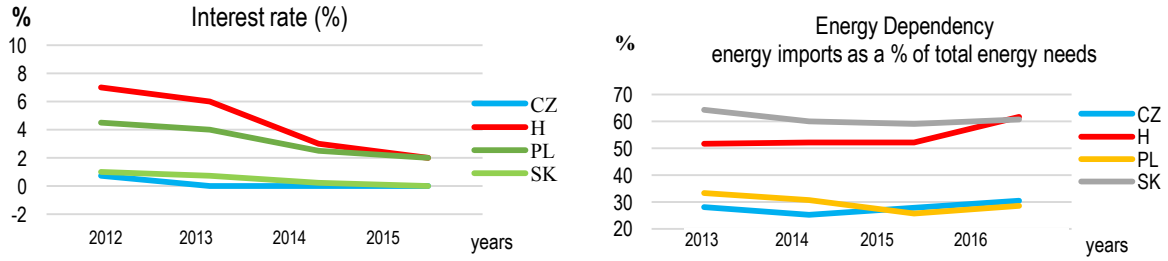
Figure 3. Business environment indicators



Source: Eurostat (2017c).

Energy sources represent a crucial factor in the production process. In Poland, coal industry employs about 100 000 workers as the government tries to reach self-sufficiency energy strategy. In fact, Poland regularly overpasses EU limits on pollution, which is a current subject to the EU Court of Justice (Greenpeace 2015). Interest rate is changing over years reaching 0 % in the Czech and Slovak Republic, while 2% in Hungary and Poland (see Figure 4).

Figure 4. Indicators Influencing the Business



Source: Eurostat (2017c).

4. Short-term economic forecasts for Visegrad Four States

The group of Visegrad Four is a well performing region in the European Union and belonged to the most rapidly recovering regions of the world in the post-crisis period. The V4 countries today represent economies with a huge potential to prosper and to achieve relatively strong and robust growth in the near future. As Visegrad economies are identically oriented and possess more-or-less the same economic characteristics, all four countries are influenced by external factors. Geopolitical tensions (mainly Russia-Ukraine, Turkey) and migration crisis, western trade sanctions on Russia, a recent slowdown of US economy, unstable growth of Chinese, Russian and Brazilian economy and ineffective banking sector of problematic Eurozone members (mainly Portugal and Italy) belong to the strongest risks to the region. The last but not least factor impacting V4 prognosis includes an issue of Brexit and its so-far-unpredictable outcomes and possible complications for close trading partners, and for the whole EU27. All data used in prognosis are based on the research of the European Commission (2017c) and are added by personal understanding.

Bearing in mind the possible risks arising from the globalization and situation in the world economy, all four countries are expected to consistently rise and to keep the positive trend of macroeconomic indicators in the period of years 2017 – 2018. Contrary, there are also factors with a positive impact on the future macroeconomic situation in the V4, mainly low commodity and energy prices, recovery of Eurozone and expansive monetary policy of the Eurozone and national banks of non-Eurozone countries.

Short-term prognosis for the Czech Republic covers above-mentioned risks. The demand for Czech products from the UK will decrease, global supply chains with China will be unstable, Russia represents an important export market for Czech economy and migration crisis may negatively influence future arrangement of the country with the EU and Schengen. Nevertheless, the economic forecast seems to be positive, putting the sector of public investment, rising domestic demand and export capacity to the leading positions. The economic growth is projected to 2.6% of GDP for the rest of the year 2017, which is a drop from record 4.7% growth in 2015 because of decreased tax on tobacco products, reduced tax on medicine, books and childcare, use of EU funds and drop in the energy prices. In 2018, Czech economy will rise by 2.7% – a slight rise due to massive investment (European Commission 2017c). A steady growth in 2017 - 2018 will bring financial stability and increased standards of living (GDP pc is expected to rise to 88% of EU average). The Czech Republic is proud of having second lowest rate of unemployment (after Germany) in the EU reaching 4% in 2015, a respectable female and older workers labour participation and 100,000 newly-opened job positions (MZVaEZ SR 2016, 32). A negative point in the prognosis for the Czech Republic is introducing a new national holiday “Good Friday”, which will cause annual decrease of 0.24% of GDP (€420 million) and an additional public finance burden of €144 million *p.a.* (MZVaEZ SR 2016, 43). However, Czech ministry of finance has managed to keep budget surplus, so Good Friday does not represent a threat to the macroeconomic stability.

The macroeconomic situation in Hungary seems to be plausible despite its GDP growth prognosis is below V4 average. The country shall await relaxation of the EU funding, a decrease in announced investment and a projected rise in salaries in 2017, mainly in construction, industry and services because of labour shortages or absence of workers´ skills. The engine of growth will be new EU funds, planned private investment projects in automobile industry and additional corporate tax reductions that will boost business. In case of public budget management, a long negative trend of -2.3% of GDP will persist also in 2017 and 2018 as a result of shifting tax burden from labour to consumption in the form of lowered flat income tax to 15 % since 2016, new doubled family tax allowances (Ministry of National Economy of Hungary 2015). In 2018, Hungarian government plans to combat tax evasions as the shadow economy reaches 10-17% of GDP (Daily News Hungary 2016). Some anti-fraud measures have already been accepted, such as obligatory online cash registers, electronic system to track goods route, value added tax obligation to taxi services, wellness and fitness, automotive repairs and medical services. Further measures represent a political and economic threat to the country, as the government has become instable. On the other hand, lower social benefits will be paid and the government already scheduled state land sales to receive temporary fiscal revenues in 2017 – 2018 (Ministry of National Economy of Hungary 2015).

Poland is the largest economy in Central Europe and various experts assume it will become a regional economic power in the middle of the 21st century. A short-term analysis includes positive internal factors for its economic growth in 2017 and 2018, such as higher productivity of labour, mobilization of domestic resources and massive investment from EU funds. By far, Poland is the largest recipient of EU subsidies. It received PLN 403 billion in the programme 2007-2013 and PLN 441 billion in the period 2014-2020 (Ministry of Treasury of the Republic of Poland 2013). As far as we are concerned, Poland has the 6th largest energy industry in the EU which is likely to become even stronger in coming years. What is more, the country is a major food supplier for Europe and 3rd largest process manufacturer in the EU (McKinsey 2015). What is more, Poland has recently experienced rapid increase in number of high-school and university students. Furthermore, Polish remittances are highest in the region. They amounted 1.24% of GDP (€4 billion) in 2013 (Ministry of Treasury of the Republic of Poland 2013). However, they are expected to fall by 3 % as a consequence of Brexit and potential excluding of Polish workers from the UK labour market. In 2015 Poland was described as a green island with high prosperity of almost 4 % of GDP (OECD 2016). In the long-term, we estimate a slight slowdown in Poland, but growth still resists among strongest ones in the EU. The engine of economy will consist in strong domestic consumption, stable employment rate, low prices of energy, easy credit conditions and higher fiscal revenues*, e.g.* from green tax (European Commission 2017c). In the field of foreign direct investment, high solid profits and low interest rates are being offered at present and new retailers plan to invest more in 2017 and 2018 (boom in supermarkets and retail chains). Additional costs to the economy will be caused by thousands of workers returning home from the UK.

The Ministry of Finance of the Slovak Republic counts with external risks noticed above and with intern risks in regard of massive outflow of entrepreneurs due to specific sectoral taxes, tax licences and tax on dividends in the period of years 2016 - 2018. Up to the end of 2016, the impact of Brexit was neutral for the Slovak economy as the country experienced high economic growth of 3.3 % GDP in 2016 (European Commission 2017c). However, we count with a high uncertainty for the upcoming years in the form of decreased demand for Slovak-made cars in the United Kingdom (UK) and moving out a part of the British production from Slovakia. When mentioning the quality of economy, the IMF predictions say that Slovakia will overtake Czech Republic in the field of GDP pc until 2020, the European Commission predicts until 2024 (The Slovak Spectator 2015). Furthermore, expansive monetary policy will allow easy credit lending. The rate of unemployment was relatively high in 2016, but is predicted to fall as 84 000 new jobs will be created by 2018, (National Bank of Slovakia 2015). On the other hand, average wage seems to be rising, which will cause higher production costs resulting in negative FDI inflow. The government target is to boost public investment starting with construction of Bratislava bypass D4/R7 in 2017 and 2018. Likewise, to boost private investment (mainly in automobile industry – PSA, Jaguar Land Rover, Volkswagen) and to boost domestic consumption and net export value also belong to the official targets (Ministry of Finance of the Slovak Republic 2016).

5. Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis

We use a SWOT method in order to get an organized list of V4 countries´ strong and weak economic sides, so as to determine easily their actual macroeconomic situation. The SWOT ananlysis is based on data from international organizations listed in the paper, as well as economic forecasts for Visegrad Group countries (see paragraph 2 and paragraph 3).

Table 3. Strengths, Weaknesses, Opportunities, and Threats analysis

SWOT analysis				
	Strengths	Weaknesses	Opportunities	Threats
CZ	1. Highest gdp pc 2. Highest total investment (% of gdp) 3. Highest part of public expenditure into r&d 4. The only v4 country with 2016 budget surplus 5. 2nd lowest rate of unemployment in the eu 6. Capital for starting doing business - 0 % of income, while oecd average is 9,6% (oecd 2016)	1. Weak e-interaction with authorities 2. Lowest gdp growth prediction 3. Export dependency on Germany	1. Interest from foreign investors 2. Growth in eurozone (export markets) 3. Prediction of moderate appreciation of czk exchange rate 4. Increasing interest in innovations 5. Best performance in the business environment quality indices (global competitiveness index and economic freedom)	1. Brexit (UK important export market for CZ) 2. Prognosis of GDP growth below V4 average 3. Negative impact of new national holiday Good Friday on GDP
H	1. Relatively high business investment into R&D 2. Biggest number of smes 3. Modest growth of minimum wage 4. The most SMEs	1.Most criticized and unstable government 2.Poor access to credit 3.Highest interest rates on mortgages 4.100% of income spent on mortgage 5.Highest debt 6.High energy dependency 7.Only v4 country with less than 40 hours worked p.c./week (Eurostat 2017c)	1. Positive GDP growth prognosis 2. Effective strategy to combat shadow economy (to increase national income) 3. Growth in Eurozone (export market)	1. Political impact of migration crisis 2. Rise in tax evasion 3. Increasing number of workers with minimum wage (so far highest share of min. Wage earners) 4. Worst position in business environment indices
PL	1.Biggest V4 economy (in terms of nominal GDP) 2.Biggest recipient of EU subsidies 3.Highest volume of remittances 4.Highest FDI inflow 5.Highest expenditure into the education	1.Relatively low GDP pc (68 % of EU average) 2.Relatively low country openness 3.Lowest expenditure into R&D sector	1. Positive GDP growth prognosis 2. Huge potential source of shale gas 3. Strong geopolitical ambitions (the USA, NATO) 4. The highest concentration of large firms (<10 employees) 5. Relatively small household savings	1.Brexit in terms of national labour force abroad 2.Fewest smes 3.Relatively a high-speed increase in minimum wage 4.Strong lobbying
SK	1.High economic performance in post-crisis period	1.Highest youth and long-term unemployment	1.Positive GDP growth prognosis	1.Brexit (huge export market for Slovakia-made cars)

SWOT analysis				
	Strengths	Weaknesses	Opportunities	Threats
	2.High labour productivity 3.Highest share of employees working sundays 4.High degree of trade openness 5.The only eurozone member country 6.Highest commuting efficiency	2.Highly corrupted government 3.Low transparency of authorities 4.Missing west-east highway 5.High energy dependency 6.Car overuse 7.Highest costs of living	2.Newly opened job vacancies 3.OECD prediction to overtake Czech economy by 2020 4.Negative FDI outflow (investment back to Slovakia)	2.Ukraine conflict near SK borders 3.EU sanctions on Russia 4.FDI outflow 5.High-speed increase in average salary 6.Over-dependency on car industry

Source: Author's own processing based on OECD (2016), World Bank (2016) and Karelová (2016).

6. Main findings and discussion

Based on the research, we can assume that all four Visegrad countries are fastest-growing economies in the region. They progress swiftly in a smart way while respecting innovative and modern technical parameters. Obviously, they are not yet as developed as a western and northern part of the EU, but we strongly believe that their economic future is auspicious. To sum up, Visegrad countries are the engine of EU growth and tend to grab a greater and greater share of the member states´ economic success. In this part, we will try to define potential threats with considerable impact on macroeconomic situation in every Visegrad country, which is the major objective of the research. The statement is based on the macroeconomic indicators and analyses summarized in the paper.

6.1. Czech Republic

We can see in SWOT analysis that the Czech Republic is a well-performing economy with high standards of living and potential of increasing influence in the region. Its strong factors include industrial orientation, strategic location near an EU economic giant Germany, relatively cheap and well-educated workforce. Moreover, macroeconomic indicators remain on a solid growth path.

Our results broadly support previous findings that while Czech inhabitants have been historically more educated with higher standards of living, Slovak citizens tend to be more productive nowadays. We have noticed that the Czech Republic is vulnerable because of over-dependency on external markets (especially German) and dependency on manufacturing (mainly automotive industry and related sectors). Analysists consider the country as "an assembly line of Europe" as it produces semi-finished goods of low added value, which are further processed in Germany and exported to the US.

Therefore, the Brexit issue probably presents a potential threat for so-far-positive evolution of Czech economy. Bearing this in mind, we assume that the biggest challenge for the Czech Republic will be falling UK and China demand for Czech exports. Another potential negative impact may arise from introducing "Good Friday" as a national holiday which is most likely to decrease GDP pc by CZK 1 100 (€ 41). In fact, both challenges are easily to be managed with budget surplus reached in 2016 and 2017. The government is planning to support domestic consumption and to boost state investments properly. Public spending will thus be the source of the growth. In this context, we predict promising future for the Czech economy, but dependent on secondary sector investment situated near German boarders (Ústí nad Labem and Karlovarský region).

6.2. Hungary

In brief, Hungarian economy is in a relatively stable situation. However, what matters more is a political situation that is nowadays sorely broken in the country. As we have already mentioned before, Hungarian government is currently one of the most criticised in the EU. The Prime Minister Victor Orbán has been viewed controversially by the EU, western countries and the US (mainly before Donald Trump´s inauguration). It seems that Hungarian government tries to establish a right wing state. Amnesty International describes their new laws introduced last year as a threat to freedom and democracy. It is our firm belief that unless the country improves political

background, foreign investors will not be interested in allocating projects in the country. Nor the combat against tax frauds and tax evasion can be successful. What is more, above-mentioned phenomenon contributes to wide-spreading Euroscepticism and collective anti-immigration and anti-NATO violence protests. We are convinced that as long as the political situation is not stable and safe, economic environment of Hungary is in a mortal danger.

Therefore, we are afraid that Hungary has not rigorous potential for business expansion in the EU. In our point of view, until the government is stable and adopts supportive strategies, business cannot prosper. So far, macroeconomic indicators remain at the bottom of tables in the V4 comparison. It is worth noting that Hungary definitely receives the worst ratings among V4 countries in the world indices of the quality of business environment (Karelová 2016).

6.3. Poland

Our findings regarding macroeconomic situation of Poland are consistent with studies by international organizations. We confirm that Poland belongs to the countries that will expand dramatically in the future, as the country profits from strong combination of well-targeted national strategies and stable political background. The country provides lucrative and convenient conditions for doing business. This is the reason why the biggest number of large companies is located in Poland.

In regard to the potential threats to the economy, there are some challenges that attract domestic attention. First, Poland disposes of just few small and medium sized enterprises in comparison to other V4 countries. Second, Poland represents the biggest V4 economy by the value of its nominal product, but its GDP pc is almost at the bottom within V4 comparison. Third, returning labour force from the UK may become a heavy economic burden to the state. Fourth, the number of university graduates overpasses the demand, so they are rather an economic burden. However, Poland is nowadays an important destination of offshored business services where relatively cheap but multilingual university-educated Polish workforce is a key factor.

The research provides strong evidence that future economic success belongs to Poland, as it will be primarily focused on pharmaceutical sphere (biosimilars and clinical trial) and intelligent mines with high added value. We see Poland as a potential future economic power of Eastern Europe. Its cooperation with the US, NATO alliance and other strategic countries makes Poland a strong and politically influential country. In other words, we believe that if a new coalition is created in the region, it will be definitely led by the Republic of Poland.

6.4. Slovak Republic

Research conducted on macroeconomic situation of the Slovak economy suggests that there is a high probability that the country becomes more competitive in the field of international business, mainly due to rising volume of production sent abroad. Among Visegrad Four countries, Slovakia disposes of comparable advantage of convenient policy strategies, investment-friendly conditions and competitive business environment. In our point of view, Slovakia remains an economic tiger within Eurozone area with annual GDP growth above EU average. Consequently, Slovakia is estimated to overtake Czech economy by 2020.

In contrast, studies show no benefit from single orientation on the automotive manufacturing branch and heavily dependency on foreign demand and energy import. Nevertheless, automotive industry creates a potential threat to macroeconomic stability in Slovakia. In the long run, national analysts expect FDI inflows to fall and foreign investors leaving the country to increase. In fact, Slovakia is the biggest car producer per capita in the world. Therefore, we would suggest to diversify major economic sectors and to put more emphasis on the service sector. Otherwise, the country is likely to follow Detroit-like scenario, as the US state rose and fell with automotive industry ending with large municipal bankruptcy due to global competition. However, a new car manufacturing company Jaguar Land Rover (JLR) has been agreed to set up a new plant in Slovakia. National government believes JLR will create sufficient job vacancies in the Nitra region, stimulate infrastructural projects and bring more suppliers and contractors to the country.

To extend the conclusion of this study, future research can also look into impacts of a slowing Chinese economy, which may negatively influence the total foreign demand for Slovak goods. This may represent the

second crucial threat to the macroeconomic stability not only of the Slovak Republic, but the stability of the whole region.

Conclusion

On the basis of the main findings and SWOT analysis, we can assume that macroeconomic situation of Visegrad countries is plausible and is expected to keep stable economic growth in the near future. In fact, Visegrad Four is perceived as one of the most dynamic regions in the European Union. According to the various economic ratings and indices of business environment published by respected international agencies (*e.g.* World Bank, World Economic Forum, Heritage Foundation, Transparency International), Hungary, Poland, the Czech and Slovak Republic belong to the fast-growing economies with a prognosis of huge potential to improve their position in the world economy. The main findings confirm that countries are probable to boost domestic consumption, rise volume of net export and to start already-agreed government projects. What is more, there are thousands of new jobs announced to be created in Slovakia and Hungary in 2017 and 2018. The paper has showed that it remains an open question whether all V4 economies are going to implement new trade measures promoting business in the region. We are conscious that more research is needed to examine countries' credibility of promising ambitions to combat corruption, inefficient administration and trade barriers.

With respect to the economy of the Czech Republic, positive economic evolution is forecasted as a result of the high saving rate of households, robust public investment and low unemployment rate. Results of the paper proves that the state succeeds in eliminating inefficient administration. What is more, the unemployment rate is the second lowest among EU countries (after Germany).

The EU and the OECD are also positive about the future of Hungarian economy that targets to become one of the most prospering EU members. However, the government is supposed to be focused more on eliminating public debt below the EU-allowed limit of 60 % of GDP, diminishing a long-term trend of paying minimum wage to workers and also decrease the volume of needed financial capital to start a business. The research has releaved many problematic areas where Hungary is behind EU average, such as high funding costs or poor access to credit.

The article highlights estimated growth of Poland at a fast pace with enhancing all sectors of economy. Being the biggest recipient of EU subsidies and remittances from abroad, shifts the country right direction to the economic prosperity. Nevertheless, Poland is required to establish independent fiscal council and to promote higher labour mobility within the cities. The most crucial issue on Polish "To do List" is low GDP pc which reaches only two thirds of EU average.

Last, but not least, high rate of youth unemployment remains a big macroeconomic challenge for the government of the Slovak Republic. What is more, results of the paper are consistent with a widely recognized issue that Slovakia absorbs many non-transparent tender frauds. On the plus side, Slovakia is one of the most open economies in the world and it reaches the highest global production of automobiles per capita. On the minus side, this increases so-far-high dependency on the global economy and trading partners. Moreover, multinational corporations operating in the Slovak environment are capable of influencing government policies and new acts that have currently been prepared and considered. Nonetheless, we submit that a rising level of youth and long-term unemployment belong to the negative factors of the Slovak economy.

In conclusion, it is vital to mention individual initiative of EU member states to promote their economy and reach inclusive growth for the upcoming period of time. According to the National Reform Programme (NRP), which belongs to the agenda of Europe 2020 the region of Visegrad Four is described as a center of recent economic expansion in the EU and its recovery has been mostly stable in the post-crises period.

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A Linear Model of Economic and Technological Shocks in Science-Intensive Industries

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Abstract:

This work deals with the important problem of risk management of high-tech industries. The primary goal of this work is to study the influence of uncertainties on the economic subject status. The paper describes the role and strategy of the Central Bank in the process of maintaining balance through the regulation of growth of the nominal wage over the tools of its monetary policy. The authors present the models of economic actors in the form of consumers of high technology products; companies producing science-intensive products; enterprises producing sub-products. The model of symmetric market equilibrium, taking into account inflation, the rate of release of high technology production and other factors, is presented. The authors create a linear model of economic and technological shocks and analyze the behavior and patterns of influence of macroeconomic shocks on the economic system. The economic model of the system in the form of the econometric strategy of the state-oriented production of high-tech products is obtained. The impact of shocks on the sustainability of the growth trajectory of the economic system is analyzed. The paper also presents the analysis of the dependence of the output growth of high-tech products from shocks monetary policy of the Central Bank, charge shocks, preference shocks and the degree of their influence on the result.

Keywords: risk; management; riskology; flow; model of an economic shock; monetary policy; economic-mathematical modeling; model of the economic entity; uncertainty; inflation

JEL Classification: C6; G32

Introduction

High-tech industries are sources of economic growth. High-tech industries include industries, which use cutting-edge science and technology and regularly update their products and services. In the period of unfavorable global conjuncture, when a country has to get out of a slump on its own, these industries are able to make the transition from an export model to the development of the domestic market (Chursin and Danyluk 2014).

One of the peculiarities of the enterprises of this sort is the focus on creation, utilization and exploitation of breakthrough technological innovations, which as a result provide the launch of competitive innovative goods. However, the innovative activity has a high level of uncertainty of the outcome (Chursin *et al*. 2015). Moreover, this uncertainty is typical not only for the stage of creation and utilization of innovation, but also for the stage of

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exploitation. The presence of uncertainty in obtaining positive results leads to significant risks that arise in almost all phases of the innovation life cycle (Drogovoz and Popovich 2009). Therefore, in the framework of forming the strategy of sustainable development of enterprises of high-tech sector of the economy it is necessary to provide the establishment of risk management system (Yusufov 2011).

High importance and insufficient development of the risk management issues of high-tech industries determine the relevance of this study (Kulikov 2011, Gertler and Karadi 2014). In the context of globalization and international integration the economies of the countries are becoming more open, which leads to an increase of their vulnerability to external macroeconomic shocks occurring in the world (Cobham 2010, Carrillo 2007, Fève, Matheron and Sahuc 2010). Therefore, currently, the researchers pay a lot of attention to studying the impact of macroeconomic shocks on the production and volume of supply (Christiano, Eichenbaum and Evans 2005, Castelnuovo 2013).

1. Methods

The primary goal of this study is to investigate the impact of uncertainty factors on the status of economic entities (Cobham Cosci and Mattesini 2008, Calza, Monacelli and Stracca 2013).

1.1. The importance and strategy of the Central Bank

We will assume that Central Bank policy is conducted by the following law to ensure the observance of the balance:

$$r_t - r_{t-1} = \rho_\pi \pi_t + \rho_g g_t + \rho_x x_t + \varepsilon_{rt}, \quad t = 0,1,\ldots, \tag{1}$$

Thus, the Central Bank increases or decreases the growth of the nominal wage $\hat{r}_t$ in accordance with inflation fluctuation, π_t the speed g_t of the increase in production of science-intensive goods and the difference x_t between the optimal and factual production from the equilibrium value (Chursin and Makarov 2015).

So, the Central Bank is responsible for the stable inflation rate π, an also determines the indexes ρ_π, ρ_g, and ρ_x. It is worth noting that in this model the parameters involved are both the speed of growth of production of high-tech products (which is the value directly calculated by the Central Bank) and the difference between optimal and actual production (which is the value, largely connected with the welfare of individuals). The indicator of innovation development ε_{rt} is a random variable, distributed according to the normal law with zero mathematical expectation and dispersion σ_r, for which there is no autocorrelation.

1.2. Consumers of science-intensive goods

Let us assume, that the budget of individual consumers of high-tech products by the beginning of the period t = 0,1, …, is the sum of the cash amount M_{t-1} and stock amount B_{t-1} at the beginning of t - period Central Bank sends the consumers a lump-sum payment T_t, stock repayment of amount B_{t-1} is reaching the deadline, and the consumers obtain new stock amount B_{t-1} / r_t, where r_t is the nominal interest rate, valid in the t - period up to (t + 1) period. During the t - period individuals offer human resources amount h_t to the enterprises manufacturing the intermediate products, having the revenue $W_t h_t$, where W_t is a nominal wage amount. Consumers also consume C_t pieces of the final product, bought at the nominal price P_t. Finally, at the end of t - period the consumers get profit D_t From the enterprises, producing the intermediate goods. Thus, by the beginning of the (t + 1) – period the volume of cash, owned by consumers, amounts to M_t, and the budget limitation can be written as follows:

$$M_{t-1} + B_{t-1} + T_t + W_t h_t + D_t \geq P_t C_t + B_t / r_t + M_t, \quad t = 0,1,\ldots, \tag{2}$$

Taking into consideration the limitations (2) the consumers try to maximize the utility function:

$$E \sum_{t=0}^{\infty} \beta^t \left[\alpha_t \ln\left(C_t\right) + \ln\left(M_t / P_t\right) - \left(1/\eta\right) h_t^\eta \right], \tag{3}$$

where: $1 > \beta > 0$ and $\eta \geq 1$, and α_t is the economical preference shocks of the consumers of science-intensive goods, which are presented in the Figure 1.

The behaviour of these shocks is described by the autoregressive process:

$$\ln(\alpha_t) = \rho_\alpha \ln(\alpha_{t-1}) + \varepsilon_{\alpha t}, \quad t = 0,1,\ldots, \tag{4}$$

where: $1 > \rho_\alpha \geq 0$, and $\varepsilon_{\alpha t}$ is the index of innovation development of enterprises, which is a random variable, distributed according to the normal law with zero mathematical expectation and dispersion σ_r, for which there is no autocorrelation.

In order to have the model, which represents balanced growth, the utility function must be additive-separable and also it must reflect the dependence on the expenses in logarithmic form (Chari, Christiano and Eichenbaum 1998). Optimality conditions of the first degree include relevant to the current period condition, which links the real wage with the marginal rate of substitution of leisure time and expenditures:

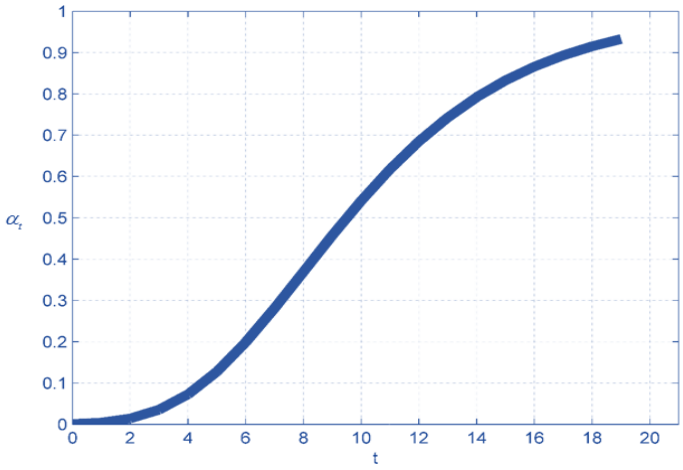
$$h_t^{\eta-1} = (\alpha_t / C_t)(W_t / P_t), \quad t = 0,1,\ldots, \tag{5}$$

and relevant to the current and next period condition, which links the real interest rate with the marginal rate of substitution:

$$\alpha_t / C_t = \beta r_t E\left[(\alpha_{t+1} / C_{t+1})(P_t / P_{t+1})\right], \quad t = 0,1,\ldots, \tag{6}$$

The equality budget limitation (2) and the optimality condition of the monetary reserve, which reflects the demand for money (Mumtaz and Zanetti 2013), are also considered to be the conditions of the first degree. It should be noted that the rule of formation of the interest rate reflects only the amount of money that the Central Bank needs to allocate to ensure equilibrium in the market for a given interest rate r_t. Later on we are not going to take this aspect into consideration, as well as all of the connections with the variable M_t.

Figure 1. The behaviour of economic shocks according to (4)



1.3. Enterprise, producing science-intensive goods

During the t-period the enterprise, which manufactures the final science-intensive product, buys $Y_t(i)$ items of science-intensive goods from each of i-enterprises at the nominal price $P_t(i)$ and then produces the final science-intensive product with the use of technology with the constant returns scale depending on the production volume:

$$\left[\int_0^1 Y_t(i)^{(\theta_{t-1})/\theta_t}\, di\right]^{\theta_t/(\theta_{t-1})} \geq Y_t,\ t = 0,1,\ldots, \tag{7}$$

where: θ_t is the index, which reflects the behavior in the conditions of elasticity of supply on the production from each of the i - enterprises.

Thus, θ_t can be the index of the economic margin shock, whose behavior is described by autoregressive process:

$$\ln(\theta_t) = (1-\rho_\theta)\ln(\theta) + \rho_\theta \ln(\theta_{t-1}) + \varepsilon_{\theta t},\ t = 0,1,\ldots, \tag{8}$$

where: $\theta > 1$, $1 > \rho_\theta \geq 0$, and $\varepsilon_{\theta t}$ is the indicator of innovative development, which is a random variable, distributed according to the normal law with zero mathematical expectation and dispersion σ_θ, for which there is no autocorrelation.

The enterprise, which produces the final science-intensive goods, aims at maximizing its profit, buying $Y_t(i) = \left[P_t(i)/P_t\right]^{-\theta_t} Y_t,\ i \in [1,N],\ t = 0,1,\ldots,$ of items of production from *i*-enterprise. This variation once again proves that θ_t characterizes the elasticity of supply for the production of *i* -enterprise. In the conditions of the competitiveness, the profit of the manufacturer of the final science-intensive production will tend to zero, and the price P_t will equal $P_t = \left[\int_0^1 P_t(i)^{1-\theta_t} di\right]^{1/(1-\theta_t)},\ i \in [1,N],\ t = 0,1,\ldots.$

1.4. Enterprises, manufacturing intermediate product

During the t-period the manufacturer of the intermediate product *i* hires $h_t(i)$ units of labour from the individuals to produce $Y_t(i)$ the items with the use of technology with the constant production scale:

$$Z_t h_t(i) \geq Y_t(i),\ i \in [1,N],\ t = 0,1,\ldots, \tag{9}$$

where: Z_t is the complex technological shock, whose behavior is described by the random walk with comprehensive technological shock with a positive offset:

$$\ln(Z_t) = \ln(z) + \ln(Z_{t-1}) + \varepsilon_{zt},\ t = 0,1,\ldots, \tag{10}$$

where: $z > 1$, and ε_{zt} is the indicator of innovative development, which is a random variable, distributed according to the normal law with zero mathematical expectation and dispersion σ_z, for which there is no autocorrelation.

We will assume, that during the production of the final goods the intermediate product is not replaceable, and therefore all of *i* enterprises occupy a monopoly position in the market. During the period *t*, *i* - enterprise sets the price $P_t(i)$ for its products, the price should meet the demand of the enterprise, which produces the final science-

intensive goods. Apart from that, when forming the final product price, one should take into consideration the necessary expenditures, which are as follows:

$$\frac{\phi}{2}\left[\frac{P_t(i)}{\pi P_{t-1}(i)}\right]^2 Y_t,\ i\in[0,1],\ t=0,1,\ldots, \tag{11}$$

where: $\phi > 0$ is an index, which determines the corrective price value, and $\pi \geq 1$ is the inflation rate in equilibrium state of market.

As we can see, the function of corrective price is of quadratic form, so the model of i-enterprise, which produces intermediate goods, can be considered as dynamic.

So, each of i enterprises is aimed at finding such a sequence of prices $P_t(i)$, which will maximize the current market value $E\sum_{t=0}^{\infty}\beta^t\left(a_t/C_t\right)\left[D_t(i)/P_t\right],\quad i\in[0,1]$, where $\beta^t\left(a_t/C_t\right)$ – is the marginal utility for domestic economy from the additional profit unit, obtained during the t-period, and

$$\frac{D_t(i)}{P_t}=\left[\frac{P_t(i)}{P_t}\right]^{1-\theta_t}Y_t-\left[\frac{P_t(i)}{P_t}\right]^{-\theta_t}\left(\frac{W_t}{P_t}\right)\left(\frac{Y_t}{Z_t}\right)-\frac{\phi}{2}\left[\frac{P_t(i)}{\pi P_{t-1}(i)}-1\right]^2 Y_t,\quad i\in[0,1],\ t=0,1, \tag{12}$$

Is the profit, which takes into account the linear production technology (9) and fixed price $P_t(i)$ throughout *t* - period.

The first-grade terms for this problem is the following equation:

$$\begin{aligned}&(\theta_t-1)\left[\frac{P_t(i)}{P_t}\right]^{-\theta_t}\left(\frac{Y_t}{P_t}\right)=\\&=\theta_t\left[\frac{P_t(i)}{P_t}\right]^{-\theta_t-1}\left(\frac{W_t}{P_t}\right)\left(\frac{Y_t}{Z_t}\right)\left(\frac{1}{P_t}\right)-\phi\left[\frac{P_t(i)}{\pi P_{t-1}(i)}-1\right]\left[\frac{Y_t}{\pi P_{t-1}(i)}\right]+\\&+\beta\phi E_t\left\{\left(\frac{a_{t+1}}{a_t}\right)\left(\frac{C_t}{C_{t+1}}\right)\left[\frac{P_{t+1}(i)}{\pi P_t(i)}-1\right]\left[\frac{Y_{t+1}}{P_t(i)}\right]\left[\frac{P_{t+1}(i)}{\pi P_t(i)}\right]\right\},\quad i\in[1,N],\ t=0,1,\end{aligned} \tag{13}$$

In case $\phi=0$ the frost-grade conditions will change to:

$$P_t(i)=\left[\theta_t/(\theta_t-1)\right](W_t/Z_t),\quad i\in[1,N],\ t=0,1, \tag{14}$$

From the economical point of view, the condition $\phi=0$ means the absence of price correction, that is when the i-enterprise, which manufactures the intermediate product sets the margin on the maximum expenses W_t/Z_t margin $\theta_t/(\theta_t-1)$, where θ_t is the elasticity of supply of i-enterprise. The index θ_t can also be understood as the shock of desired margin: the factual margin will be different from the desired, but it will aim to be equal with time.

1.5. Symmetric equilibrium

In the conditions of symmetric equilibrium, the activity of all the enterprises, producing the intermediate goods, is described with the following characteristics:

$$Y_t(i) = Y_t,\ h_t(i) = h_t,\ P_t(i) = P_t,\ D_t(i) = D_t,\ i \in [1, N],\ t = 0, 1, \tag{15}$$

Moreover, in the market there will be the terms of equilibrium:

$$M_t = M_{t-1} + T_t \text{ и } B_t = B_{t-1} = 0,\ t = 0, 1, \tag{16}$$

Following these equilibrium conditions and considering (5), (9) and (12) it is possible to find the factual wage W_t/P_t, the amount of working hours h_t and profit D_t/P_t.

It is necessary to note that budget limitation (2) can be rewritten as aggregate resource limit:

$$Y_t = C_t + \frac{\phi}{2}\left(\frac{\pi_t}{\pi} - 1\right)^2 Y_t, \quad t = 0, 1, \quad , \tag{17}$$

equation (6) as:

$$a_t/C_t = \beta r_t E_t\left[\left(a_{t+1}/C_{t+1}\right)\left(1/\pi_{t+1}\right)\right], \quad t = 0, 1, \quad , \tag{18}$$

and the first-grade conditions (13) as:

$$\begin{aligned}(\theta_t - 1) = \theta_t\left(\frac{C_t}{a_t}\right)\left(\frac{Y_t}{Z_t}\right)^{\eta-1}\left(\frac{1}{Z_t}\right) - \phi\left(\frac{\pi_t}{\pi} - 1\right)\left(\frac{\pi_t}{\pi}\right) + \\ + \beta\phi E_t\left[\left(\frac{a_{t+1}}{a_t}\right)\left(\frac{C_t}{C_{t+1}}\right)\left(\frac{\pi_{t+1}}{\pi} - 1\right)\left(\frac{\pi_{t+1}}{\pi}\right)\left(\frac{Y_{t+1}}{Y_t}\right)\right], \quad t = 0, 1, \quad ,\end{aligned} \tag{19}$$

where: $\pi_t = P_t/P_{t-1}$ is the inflation rate. Thus, there is a possibility to analyze the market equilibrium.

1.5. The difference between the optimal and factual science-intensive goods production

Let us explain the obtained market equilibrium conditions from the economical point of view. We will examine the *t* - period and define the amount of staff units of domestic economies by $n_t(i)$, hired to manufacture *Q(i)* production items by the *i* -enterprise, which produces the intermediate goods (Kollmann 2008). All these goods are used to manufacture Q_t units of the final science-intensive products (Caporale B. and Caporale T. 2008, Hofstetter 2008). Enterprises of both types follow the previously described technologies with the constant returns to the production scale.

So, the domestic economy is aimed at finding the values of Q_t and $n_t(i),\ i \in [1, N],\ t = 0, 1,$ in order to maximize its welfare:

$$E\sum_{t=0}^{\infty}\beta^t\left\{a_t \ln(Q_t) - (1/\eta)\left[\int_0^1 n_t(i)\,di\right]^{\eta}\right\} \tag{20}$$

considering the limitations:

$$Z_t\left[\int_0^1 n_t(i)^{(\theta_t-1)/\theta_t}\,di\right]^{\theta_t/(\theta_t-1)} \geq Q_t, \quad t = 0, 1, \tag{21}$$

The first-grade condition determines the optimal value of production $Q_t = a_t^{1/\eta} Z_t, \quad t = 0, 1, \quad ,$ which increases either after the significant economic shock of a_t preferences, or after the technological Z_t and does not depend on the margin shock θ_t. Thus, x_t, which is the difference between the optimal and factual production, is calculated as follows:

$$x_t = \left(1/a_t\right)^{1/\eta} \left(Y_t / Z_t\right), \quad t = 0, 1, \tag{22}$$

2. Results

2.1. Linear model of economic and technological shocks

We will consider, that in the equations (4), (8), (10), (17)–(22) five characteristics Y_t, C_t, π_t, r_t and x_t are endogenous, and economic shock characteristics a_t, θ_t and Z_t are exogenous. The equation (10) for technological shocks Z_t shows that in equilibrium state there is only one solution for the production Y_t and one solution for the expenses C_t.

On the other hand, random processes $y_t = Y_t / Z_t$, $c_t = C_t / Z_t$ и $z_t = Z_t / Z_{t-1}$ are fixed, as well as the difference x_t between the optimal and factual production and speed g_t of production increment equals:

$$g_t = Y_t / Y_{t-1}, \quad t = 0, 1, \tag{23}$$

It is necessary to notice, that in the conditions of the shock absence the economy is on a steady growth trajectory with constant characteristics $y_t = y$, $c_t = c$, $\pi_t = \pi$, $r_t = r$, $x_t = x$, $g_t = g$, $a_t = 1$, $\theta_t = \theta$, $z_t = z$, $t = 0, 1,$ Let $\hat{y}_t = \ln\left(y_t / y\right), \quad \hat{c}_t = \ln\left(c_t / c\right), \quad \hat{\pi}_t = \ln\left(\pi_t / \pi\right), \quad \hat{r}_t = \ln\left(r_t / r\right), \quad \hat{x}_t = \ln\left(x_t / x\right),$ $\hat{g}_t = \ln\left(g_t / g\right)$, $\hat{a}_t = \ln\left(a_t\right)$, $\hat{\theta}_t = \ln\left(\theta_t / \theta\right)$ and $\hat{z}_t = \ln\left(z_t / z\right)$ be the deviation of each characteristic from its sustainable value.

Considering the defines characterstics, the resource limitations (17) suggest $\hat{c}_t = \hat{y}_t$, and formulas (4), (8), (10), (17)–(23) change into:

$$\hat{a}_t = \rho_a \hat{a}_{t-1} + \varepsilon_{at}, \quad t = 0, 1, \quad , \tag{24}$$

$$\hat{e}_t = \rho_e \hat{e}_{t-1} + \varepsilon_{et}, \quad t = 0, 1, \quad , \tag{25}$$

$$\hat{z}_t = \varepsilon_{zt}, \quad t = 0, 1, \quad , \tag{26}$$

$$\hat{x}_t = E_t \hat{x}_{t+1} - \left(\hat{r}_t - E_t \hat{\pi}_{t+1}\right) + \left(1 - \omega\right)\left(1 - \rho_a\right)\hat{a}_t, \quad t = 0, 1, \quad , \tag{27}$$

$$\hat{\pi}_t = \beta E_t \hat{\pi}_{t+1} + \psi \hat{x}_t - \hat{e}_t, \quad t = 0, 1, \quad , \tag{28}$$

$$\hat{x}_t = \hat{y}_t - \omega \hat{a}_t, \quad t = 0, 1, \quad , \tag{29}$$

$$\hat{g}_t = \hat{y}_t - \hat{y}_{t-1} + \hat{z}_t, \quad t = 0, 1, \tag{30}$$

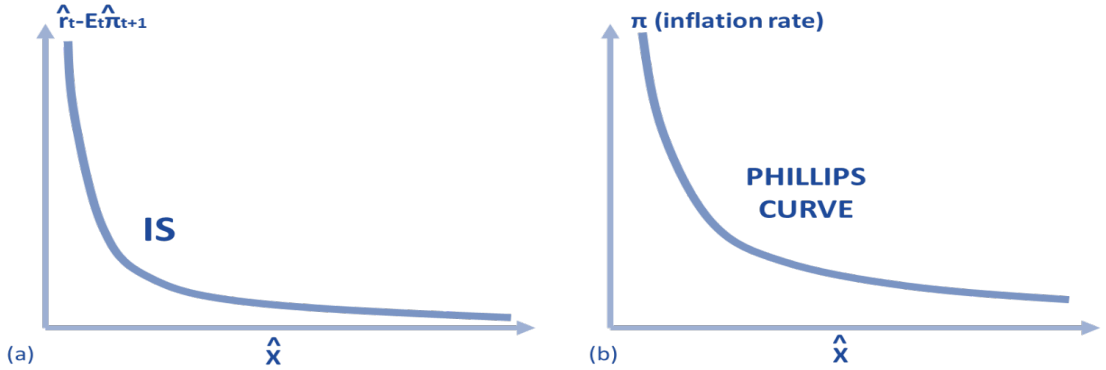
For convenience, the equations (27) и (29) have a new characteristic $\omega = 1/\eta$, equation (28) has a characteristic $\psi = \eta(\theta - 1)/\phi$. Moreover, (28) now has the modified margin shock $\hat{e}_t = (1/\phi)\hat{\theta}_t$, chosen in such a way, that in (25) $\rho_e = \rho_\theta$, and ε_{et} is the indicator of innovative development, which is which is a random variable, distributed according to the normal law with zero mathematical expectation and dispersion $\sigma_e = (1/\phi)\sigma_\theta$, for which there is no autocorrelation.

So, we have found a linear model, where equations (24) – (26) describe the economic shocks behaviour of preferences $\hat{a}_t$, margin $\hat{\theta}_t$, and also the technological shocks $\hat{z}_t$, and equations (29) and (30) set the difference $\hat{x}_t$ between the optimal and factual production and the speed $\hat{g}_t$ of production increment.

It is worth noting, that the equation (27) sets the expected curve IS, presented in Figure 2-a, and the equation (28) sets a new Keynes-Phillips curve, shown in Figure 2-b. Let us notice, that in spite of the fact that preference shocks $\hat{a}_t$ and $\hat{z}_t$ are not in the function, which sets the Phillips curve, explicitly, they take part in defining $\hat{x}_t$ implicitly.

It is obvious, that during the analyses of the behaviour of Phillips curve, we can distinguish shocks, which have an impact or have no impact on the natural unemployment rate (Anzuini, Lombardi, and Pagano 2012, Galí 2015). Similarly, equation (28) shows that shocks $\hat{a}_t$ and $\hat{z}_t$ have an impact on the optimal production, and shocks $\hat{e}_t$ have no impact (Bekaert, Hoerova and Duca 2013, Bruno and Shin 2015).

Figure 2. (a) Curve IS (the correlation between the interest rate and the difference between optimal and factual production (b) Phillips curve (the correlation between the interest rate and difference between optimal and factual production)



It is also necessary to note that in the conditions of the absence of margin shocks $\hat{e}_t$ IS curve (27) and Phillips curve (28) suggest that the Central Bank has the power to stabilize the inflation rate and the difference between the optimal and factual production with the help of the change in monetary policy in such a way that the real market interest rate $\hat{r}_t - E_t\hat{\pi}_{t+1}$ will be close to the natural interest rate $(1-\omega)(1-\rho_a)\hat{a}_t$. The shocks in particular are the main cause of the need to draw corrections to the monetary policy of Central Bank (Bernanke and Mihov 1998, Rey 2015), defining the balance between stabilization either inflation, or the difference between the optimal and factual production (Kimura and Nakajima 2016, Gambacorta, Hofmann and Peersman 2014).

3.2. State econometric strategy

So, we have a system of equations (24),(1) with three endogenous characteristics: speed $\hat{g}_t$ of science-intensive production increment, inflation $\hat{\pi}_t$ and nominal wage $\hat{r}_t$, – the two exogenous characteristics: science-intensive production $\hat{y}_t$ and the difference $\hat{x}_t$ between the optimal and factual science-intensive good production – and four

exogenous shocks: preference shock $\hat{a}_t$, margin shock $\hat{e}_t$, technological shock $\hat{z}_t$ and monetary policy shock ε_{rt}.

The solution of the system is an econometric model in the economic system conditions, aimed at producing science-intensive goods (Altig *et al.* 2011, Narin, Hamilton and Olivastro 1997). To assess the model's characteristics, we can use the kalman filter and the maximum plausibility method based on the three endogenous characteristics we can obtain the information on the exogenous ones.

During our research we tested several numerical examples. The test showed the robustness of the model and its possibility to reflect the influence of various shocks. The calibration of the model to the data of real countries' economies is the aim of our current research.

Conclusion

In the study, we have built a model, which let's assess the system-forming risks of the general risk flow based on the economic and technological shocks and financial instability. We have taken into consideration four types of shocks: domestic economy preference shocks, desired by the enterprises margin shocks, Central Bank monetary policy shocks and technological shocks.

The conducted analyses showed that the increase in the science-intensive production is explained largely by the Central Bank monetary policy shocks. Margin shocks are usually the cause of inflation fluctuations, and the nominal interest rate depends on the preference shocks.

When making strategically important decisions, the risk analyses is a very popular tool of management analyses, as it combines significant analytical properties with easy practical use. Proved by rigorous economic-mathematical calculations, the decisions, taken by management representatives, become significantly more accurate and feasible due to the adequate use of quantitative mathematical models.

Implementing the introduced model lets significantly adjust system-forming risks of the general risk flow and focus on the dominant factors of the currently analyses process. It is also worth noting, that continuous technologies development and constant scientific-technological race forms regular flow of innovations, which, in their turn, necessarily bring radically new types of risks. This property of risk flow permanence demands a system of continuous dynamic analyses of existing, expected and unknown risks.

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Money Supply Influence on Gross Domestic Product throughout Stock Markets in United States and European Union

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Abstract:

Stock and capital markets are undoubtedly part of an economy. The aim of the paper is to find link between GDP development, stock markets performance and money supply in two stages. Firstly, identify possibility to predict GDP development in the US and the EU using main stock market indices evolution via applying Granger causality testing. In line with literature we achieved results confirming uni directional causality from index values to GDP. Secondly, to determine if there is link between money supply change and indices development, we use linear regression models. By those two approaches, we attempt to prove, that change in money supply have effect on stock market development, and subsequently, this development will be followed by GDP evolution. In line with our expectations, models prove statistically significant influence of money supply on indices. According to our tests, we consider linkage money supply-stock markets-GDP strong. Also we observed contradictory relationships of money supply and index performance in the EU and the US. This should be substantial point for next research, and also for monetary authorities, especially during extremely accommodative monetary policy that uses unconventional instruments such as QE. We consider those contradictory results as a sign of different level of development of stock and capital markets in the US and the EU.

Keywords: stock market development; money supply; quantitative easing

JEL Classification: E44; E51; E52; G15

Introduction

We consider GDP as a crucial and the most frequently used attribute to express status of economy. In many literature empirical explanatory variables for economic growth (GDP evolution) such as savings and investment, the quality of financial institutions, the degree of financial stability, trade openness, and government spending on financial infrastructure can be found. The aim of this paper is to drag attention to a link between economic growth (expressed in GDP) and stock market development, i.e. to find causality between stock market returns and GDP development in the EU and the US. After supporting this theory broadly stated in literature, we focus on influence of money supply on stock markets. In post-crisis period, we witnessed several unconventional monetary policy instruments both in the US and the EU, where boosting money supply via quantitative easing toke major part with aim to support economy.

First bank that came with quantitative easing (QE) as an unconventional monetary policy was the Bank of Japan back in 2001. Since then we witnessed many waves of quantitative easing also in the UK, USA, and from March 2015 there is a large scale purchasing program of the ECB, too. This unconventional monetary policy step is used to raise money aggregate M1/M3 (according to OECD, M1 includes currency *i.e.* banknotes and coins, plus overnight deposits, and broad money - M3 - includes currency, deposits with an agreed maturity of up to two years,

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deposits redeemable at notice of up to three months and repurchase agreements, money market fund shares/units and debt securities up to two years). Several studies estimate first and main impact of QE as decline on bond rates, such as Neely (2010). Others estimates raising assets prices through regression, *e.g*. Meaning, Zhu, 2012 or in the UK Joyce *et al*, 2011 explore effect of QE spreading widely on asset prices such as corporate debt, equities etc.

Effects of QE are still not clearly revealed, with dominating approach focused on bond yields, therefore in line with first part we try to define whether money supply affects stock market performance, *i.e*. influence of money supply on GDP via stock markets.

1. Literature review

We came across various approaches in literature, logically expecting positive relationship between economic growth and stock market on both sides of pacific. Barro and Sala-i-Martin (1995) consider stock market development as an endogenous part of economic growth. In other studies, Tsouma (2009), Enisan and Olufisayo (2009), Kolapo and Adaramola (2012) and Nieuwerburgh, Buelens, and Cuyvers (2006) claims that stock market development leads to economic growth. However, Canova and De Nicolo (2000) claims that stock market performance has only negligible impact on real economic growth.

Considering direction between stock markets and economic growth, there are two main literature strands representing uni or bi-directional linkage. Cavenaile, Gengenbach and Palm (2014) reports cointegration between vectors representing financial markets and economic growth, mentioning possibility of little bi-directional causality. Pradhan, Arvin, Hall and Bahmani (2014) even suggest to in line with their findings to support stock markets that will have strong positive effect on economic growth. In more complex studies, Deltuvaitė and Sinevičienė (2014) reports strong significant linkage between financial and economic development taking in account not even stock market development, but also banking and insurance sector, *i.e*. sectors very sensitive to money supply and monetary policy. Some authors, such as Li, Richardson and Tuna (2014) consider reverse relationship, and they construct models to predict excess stock returns using macro data such as GDP, unemployment etc.

Going even deeper in interdependencies, Kajurová and Rozmahel (2016) recommend prudential monetary policy, with respect to investors, which activity on stock markets will promote economic growth. Pradhan Arvin and Ghoshray (2015) give even further evidence of interdependence between stock markets, economic growth, and also real interest rates and monetary policy.

We have to mention, that those studies were made on different samples, mainly taking data from separate countries. We decided to find these interdependencies in large regions, such as the US and the EU. Our results would show whether these channels work, and in which way, so that could be point for monetary authorities how effective their extremely accommodative monetary policy (especially QE in recent years) could be in order to stimulate economy.

2. Methodology and data

To find out of there is linkage from money supply to economic growth via stock market development, we chose two stages. In first, we use Granger causality test, to determine if there is a linkage between economic growth (represented by GDP) and stock market performance (represented by main stock indices). In second stage, we try to estimate effect of money supply changes to those indices. Granger causality test (Granger 1969) reveals whether current values of x (*i.e*. GDP) are explained by lagged values of *y* (index value), *i.e.* whether *y* causes *x*. We test null hypothesis that: y does not Granger cause x against the alternative one that: *y* Granger causes *x*. Granger causality test is based on the regression:

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \cdots + \alpha_m x_{t-m} + \beta_1 y_{t-1} + \beta_m y_{t-m} + \varepsilon_t \quad (1)$$

This equation expresses that *x* is a function of its m lagged values (*m* is number of lags) and simultaneously function of *m* lagged values of *y*. We do not reject null hypothesis that:

$$\beta_1 = \beta_2 = \beta_3 = \cdots = \beta_m = 0 \quad (2)$$

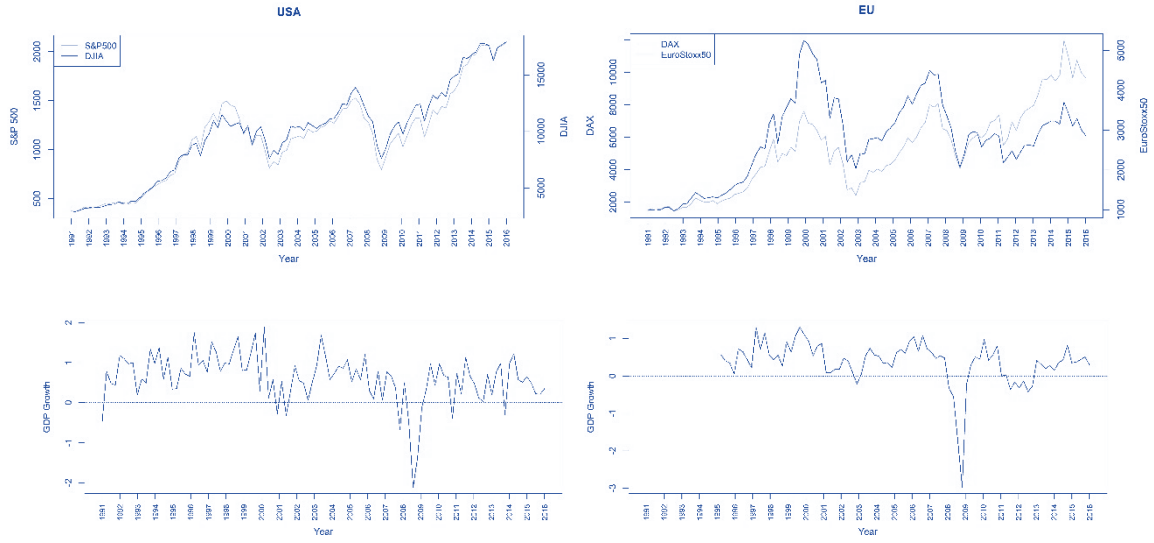
Number of lags weakens the test, however, impact of stock market performance on GDP could be delayed, and therefore we consider 4 lags in our testing. We assume, that GDP (USA/EU) can be predicted by main stock indices development. We have chosen the Dow Jones Industrial Average (DJIA) and The Standard and Poor's 500 (S&P500) for US GDP, and DAX and EuroStoxx 50 (EU50) for Eurozone GDP as main indices for this paper. To confirm this hypothesis, we applied Granger causality testing to test causality relations between indices and GDP. We expect that causality is following: The evolution of main index of chosen region Granger causes the evolution in GDP of same region. In that case the evolution of main index can predict the evolution of GDP. Null (H0) and alternative (H1) hypothesis are therefore formulated as it follows: H0: The evolution of main index (DAX, EU50/DJIA, S&P500) does not Granger causes the evolution of GDP in the USA/Eurozone. H1: The evolution of main index (DAX, EU50/DJIA, S&P500) Granger cause the evolution of GDP in the USA/Eurozone. Granger causality testing is performed for the time period 1991Q1-2016Q2. Secondly we use linear regression model:

$$y_t = \beta_0 + \beta_1 . x_{t1} + \cdots + \beta_k . x_{tk} + u_t \quad (3)$$

where: index value (DJIA/S&P500/DAX/EU50) is a dependent variable and unemployment, inflation, M1, M3 (money aggregates) as explanatory variables.

We use quarterly data. GDP and stock market indices are in nominal values. Inflation and unemployment are applied as percentage change and M1 and M3 are measured as a seasonally adjusted index based on 2010=100. Aim is to determine whether index development could be determined by money supply change on significance level 0.05. In Figure 1 we show main indices performance and GDP changes from 1991 to 2016.

Figure 1. Evolution of GDP (EU/US) and indices (DAX, Eurostoxx50, DJIA, S&P500)



Source: Yahoo Finance (2016)

There are four graphs in Figure 1, where in the first graph we show DJIA and S&P500 performance, in second performance of DAX and Eurostoxx50. In third graph we show GDP development in the US, and GDP development of the EU is shown in fourth. According to Figure 1 it is obvious that correlation between the US indices is much stronger than in the case of the EU while we can also observe strong drawdowns in 2008 – 2009.

In Table 1 and Table 2 we show descriptive statistics of used time series:

Table 1. Descriptive statistics for data representing the US

	SP500	DJIA	GDP	Unemployment	CPI	M1	M3
Mean	1,124.3446	9,788.1355	0.6130	6.0938	2.4215	87.7830	75.8555
Standard Eerror	45.8455	408.2345	0.0600	0.1565	0.1181	3.5613	3.2201
Median	1,147.7350	10,380.8203	0.6597	5.6667	2.6317	74.6664	70.2982
Standard Deviation	463.0166	4,122.9661	0.6062	1.5810	1.1811	35.7904	32.5211
Sample Variance	214,384.3867	16,998,849.6401	0.3674	2.4995	1.3951	1,280.9558	1,057.6203
Kurtosis	-0.4630	-0.5687	4.0626	-0.1805	1.5433	0.6737	-0.7934
Skewness	0.1764	0.0512	-1.2026	0.8363	-0.5566	1.3750	0.6186
Minimum	371.1600	2,906.7500	-2.1126	3.9000	-1.6234	48.7635	38.4651
Maximum	2,098.8601	17,929.9902	1.8885	9.9333	5.3028	184.3546	148.1795
Sum	114,683.1494	998,389.8259	62.5252	621.5660	242.1474	8,866.0868	7,737.2561
Count	102	102	102	102	100	101	102

Source: own elaboration

Table 2. Descriptive statistics for data representing the EU

	DAX	EU50	GDP	Unemployment	CPI	M1	M3
Mean	5,225.0979	2,749.7111	0.3676	9.7357	2.1337	66.0274	70.4230
Standard Eerror	255.8158	105.0131	0.0638	0.2232	0.1047	3.5547	2.7594
Median	5,154.9651	2,801.9500	0.4366	10.0245	2.1870	57.1811	65.1396
Standard Deviation	2,583.6127	1,060.5804	0.5880	1.5137	1.0474	35.7244	27.8688
Sample Variance	6,675,054.5162	1,124,830.7481	0.3457	2.2912	1.0971	1,276.2343	776.6717
Kurtosis	-0.5235	-0.4788	12.9915	-1.1515	0.1551	-0.9393	-1.5145
Skewness	0.3932	0.1090	-2.7061	-0.2758	-0.1118	0.5138	0.2074
Minimum	1,466.4000	968.5800	-2.9737	7.1837	-0.3620	22.8528	31.7257
Maximum	11,966.1699	5,249.5500	1.3071	11.9890	4.6512	147.2040	119.0118
Sum	532,959.9897	280,470.5300	31.2461	447.8410	213.3670	6,668.7630	7,183.1486
Count	102	102	85	46	100	101	102

Source: own elaboration

We point out, that median GDP growth in the US was 0.65% while in EU it was only 0.44%, also in line with unemployment, the US performed much better in this period, with median unemployment 5.66%, while in the EU median unemployment was little above 10%. We consider unemployment (for further research that connects unemployment and stock market see *f.i.* Holmes and Maghrebi 2016, Feldmann 2011, Zoega 2012) and CPI (for further research that connects CPI and stock market see *f.i.* Cai, Chou and Li 2009, Cenedese and Mallucci 2016) later as explanatory variables for stock indices together with M1 and M3, while our main goal is to estimate if money supply (M1, M3) has significant effect on stock market performance-indices (for other approach how to evaluate stock indices see *f.i.* Leung, Daouk and Chen 2000).

3. Results and discussion

Firstly, we applied Granger Causality test. Our expectation, that indices will be able to predict GDP development, is based on fact that GDP is a macro indicator, calculated ex post (in our occasion), while index price is expected to reflect events on market, taking into account every available information discounting every future expectation. In Table 3 we present results, with respect to uni-directional causality from index prices to GDP growth, while reverse relationship has not been discovered in our testing.

Table 3. P-values for Granger Causality test

	p-value			
	1 lag	2 lag	3 lag	4 lag
GDP(USA) ~ DJIA	0.0080 (**)	0.3855	0.0501	0.0176 (*)
GDP(USA) ~ SP500	0.0173 (*)	0.2268	0.0485 (*)	0.0144 (*)
GDP(EU) ~ DAX	0.0258 (*)	0.3968	0.5567	0.1106
GDP(EU) ~ EU50	0.0791	0.3968	0.3973	0.0868

Note: we display p-values; H0: The evolution of index prices in the EU (US) does not cause the evolution of GDP in the EU (US); light blue colour: if p-value is less than 0.05, *i.e.* if we do not accept H0, then the evolution of index prices in the EU (US) causes the evolution of GDP in the EU (US)

Source: own elaboration

As stated before, bi-directional causality has not been observed, as well as causality between Eurostoxx50 and GDP in the EU. On the other hand, S&P500 and Dow Jones in the US seem to be able to predict GDP, same as DAX in the EU. Both narrow indices, DJIA and DAX have statistically significant ability to predict GDP 1 quarter ahead, DJIA also 4 quarters ahead. US broader index, S&P500 gives statistically significant outlook for one, three and four quarters ahead, and brings us to solution, that S&P500 could predict solidly economic performance.

After testing causalities, we attempted to estimate a linear regression models both for the EU and the US indices, where these indices are explained by unemployment, CPI, M1 and M3. Our aim is to evaluate influence of money supply on those indices.

Table 4. Coefficients estimated in regression models

	Estimates			
	EU50	DAX	S&P500	DJIA
(Intercept)	9,062.675 ***	6,809.32 ***	1,029.202 ***	7,008.050 ***
unemployment	-407.038 ***	-551.63 ***	-146.909 ***	-1,061.656 ***
CPI	-67.041	20.61	-20.349	-110.484
M1	53.656 ***	182.02 ***	-1.781	-32.294 **
M3	-73.253 ***	-125.58 ***	15.834 ***	163.703 ***
R-squared	0.6522	0.7743	0.8934	0.9274

Note: ***, **, * denote significance levels on 1, 5 and 10% respectively. Residuals are normally distributed according to Jarque-Bera Normality Test, Breusch Pagan test show presence of heteroscedasticity in model explaining DAX, in other models there is no heteroscedasticity.

Source: own elaboration

Firstly, we have to point out, that model constructed for DAX was burdened by heteroscedasticity, and therefore we do not consider this model as significant for our study. Our regression models show in every case, that there is statistically significant negative relationship between unemployment and indices performance, which we consider logical, an in line with literature. Also for indices development both in the US and the EU, CPI has performed as statistically insignificant.

In the US, broad money supply (M3) has positive effect on both tested indices performance, thus increase in M3 aggregate should lead index prices to rise. On the other hand, M3 in EU performed as statistically significant but with negative coefficient, which means that decrease in M3 money supply is supposed to have positive impact on Eurostoxx50 index. Another anomaly we observe in M1, statistically significant in models for Dow Jones and Eurostoxx50, but positively imply Eurostoxx and negatively imply Dow Jones.

To sum up, we can claim, that M1 and M3 have statistically significant effects on stock indices performance, but those different performances of M1 and M3 in the EU and the US we consider very interesting. These results suggest, that there must be significant differences between EU and US capital and stock markets.

Conclusion

The aim of the paper was attempt to determine linkage between money supply, stock market performance and GDP evolution in two stages in the US and the EU. Firstly, to detect and confirm broadly researched dependence between stock market performance and economic growth expressed in GDP, with attempt to be able to predict GDP evolution based on stock market evolution. Secondly, to estimate influence of money supply on stock market performance.

Using Granger causality test, we can conclude, that GDP could be predicted (and is followed) by performance by Dow Jones and S&P500 in US, and by DAX in the EU. Reverse relationship has not been discovered in our testing, nevertheless several authors published this causality. We consider our results in line with other studies, concluding significant interdependence between stock markets and GDP evolution.

More interesting are results provided by regression models, where those stock indices are explained by money aggregates. There are various studies presenting implications between money supply and inflation, bond yields, etc. in various countries, also stock returns explained by many variables, however we attempted to find out how significant are changes in money supply on stock market performance. For Dow Jones and Eurostoxx50, both M1 and M3 were statistically significant, while for S&P500 only M3 was statistically significant. On one hand, this brings us to conclusion, that money supply has significant impact on stock markets. On the other hand, our study reveals contradictory results for the US and the EU. While broader money aggregate M3 positively implies stock market returns in US, it implies negatively performance of the EU index. But narrower money aggregate M1 has positive effect on stock returns in the EU, while it has negative effect on stock returns in the US.

This anomaly should be starting point for further research focused on relationship between money supply and stock markets, and also point for monetary authorities, which are controlling those aggregates. This causality should be taken very serious especially in terms of very accommodative monetary policy rules, where unconventional instruments such as QE are used.

We suggest that these results are caused by different level of development of capital and stock markets in the US and the EU. Capital Market Union concept, recently presented by European Commission, has in its objectives improving capital and stock markets in the EU. Because of our results, we consider further study on capital flows, and money supply impact on stock markets as a crucial in order to successfully implement this concept on European markets.

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Competitive Capacity of Companies as a Major Goal of National Monetary Policy in the Context of Financial Globalization

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Abstract:

Monetary policy is assessed in different ways, including one of assessing the efficiency of inflation and unemployment control and business performance. Financial environment of business and its development is especially important to program in the context of intensifying and diversifying international cash flows. Arguably, the overwhelming majority of central banks have changed the goals of their monetary policy in terms of isomorphism towards national business. Obviously, goals of economic growth and high employment are linked, since the expansion of money supply is necessary to ensure employment. Money supply function is a basis for transmission channels, since they can negatively affect the competitive capacity of business. Monetary policy plays a huge role in ensuring economic stability, stimulating investment, increasing economic activity. This allows fighting the recession and managing the house exchange rate. The choice of methods of monetary regulation depends on the object and purpose of regulation. Stable price level is a traditional expectation of the real economy sector, because it allows predicting the economic situation and forming an investment climate. In this regard, our article provides an autoregression model and a panel analysis for investigating the relationship between inflation, exchange rate, currency replacement, monetary aggregate volatility, competitive capacity of organizations and monetary policy parameters. The subject of regulation includes the macroeconomic characteristics of credit use and the structure of enterprise's working capital, used by the central bank to influence the economy of the country, current consumption and accumulation sphere, as well as to ensure the banking system liquidity. The central bank achieves the desired macroeconomic effect by using the levers of economic influence, adjusting economic motivation of financial organizations.

Keywords: competitive capacity; inflation; unemployment; currency replacement; monetary aggregate; isomorphism; working capital.

JEL Classification: E50; F60.

Introduction

Monetary policy transmission is defined as a transfer mechanism used by the central bank to affect the economy (Osipov *et al.* 2017). Its structure involves channels that are "bundles" of macroeconomic variables, transmitting the impulse of changes, generated by a financial regulator: exchange rate channel; replacement channel; bank lending channel; income and cash flow channel and the welfare channel (Leonteva 2013). Monetary policy effects are examined by checking how tight the relationship between the changes in money supply and GDP is (Prasad *et al.* 2005).

Currently, most of the transmission channels in Russia cannot function effectively for one reason or another. In Russian banking system, currency channel if the most effective. However, its possibilities have been exhausted since 2011. We have compared the parameters of currency impulse on the basis of a standard monetary model with flexible prices for 1998-2005 (Moiseyev 2002, Deryugina 2015) (Table 1 and Table 2).

Table 1. Regression parameters for 2002-2010

Parameters	Values	Standard deviation	t- statistics, but β=0	P-value	Acceptance of a hypothesis with a 5% confidence interval
Coefficient CPIt-1	0.565	0.049	11.39	000	Rejected
Money	0.053	0.014	3.7	0.001	Rejected
Currency $_1$	0.391	0.005	79.53	000	Rejected
Currency $_2$	-0.172	0.018	-9.49	000	Rejected
Constant	0.317	0.109	2.92	0.05	Rejected

Note: R=0.996

They considered the following criteria: CPIt-1 consumer price index in a year (t-1); Money – M2 money aggregate; Currency1,2 – exchange rate for Dollar and Euro to Russian Ruble, respectively. This analysis gave significantly different results for 2007-2017.

Table 2. Regression parameters for 2007-2017 (performed by the authors)

Parameters	Values	Standard deviation	t- statistics, but β=0	P-value	Acceptance of a hypothesis with a 5% confidence interval
Coefficient CPIt-1	-0.19033	0.045236	12.51842	0.714009	Rejected
Money	0.78530	0.049610	0.696713	0.991109	Rejected
Currency $_1$	0.808376	0.014636	2.228139	0.505719	Rejected
Currency $_2$	0.820513	0.005352	11.39	0.0011	Rejected
Constant	0.24	0.018975	3.7	0.003	Rejected

Note: R=0.972379

Currently, bank lending channel is being "forced" to work. As we stated, Russian banking system is based on the currency channel. Other monetary signals have not yet been noticed by economic agents, or remain unused due to structural underdevelopment of financial markets and the monetary system itself.

It is pertinent to point out that banking system reorganization is conditioned by the needs of real economy experiencing a credit shortage. Banking regulator management has repeatedly declared that the bank lending channel must be subject to the requirements of enterprise's competitive capacity. The idea of a bank lending channel was first put forward by Ruz in 1951 and supplemented by Tobin (1978). The idea is that the central bank reduces the amount of reserves available to commercial banks, thereby forcing them to reduce the supply of loans. Firms and households, largely dependent on bank loans and having no alternatives to them, have no choice but to put down their costs or to use "gray" schemes to find affordable loans as it is done in Russia. Monetary policy of the Bank of Russia strives to exert a significant influence on bank lending and the competitive capacity of companies.

On can note that liquidity provided by the regulator had determining influence on bank lending, but not its cost (Juurikkala, Karas and Solanko 2009, Eichengreen 2015). The panel analysis (Perevyshina 2015) of individual

bank balance sheets (2011) allowed revealing the impact of repo auction rate on the size of private sector loan portfolio: an increase in borrowing cost leads to a decrease in aggregate debt to commercial banks.

Financial welfare channel does not work because market entities, especially households, did not become full participants in operations on financial markets. The balance channel stands idle for the same reason, since consumer loans are too expensive and unpopular, and credit cards do not provide bonuses, are poorly adopted for use and unreliable. Commercial banks are trying to stimulate the work of this channel. In addition, low inflation is necessary that the slightest change of interest would affect consumer loans. Income and cash flow channel requires developed financial markets and a large share of enterprise investments made by means of external sources. However, the absence of normal capital markets and the lack of external financing are still a problem in Russian economy. As a result, there are only three channels of a transmission mechanism: exchange rate channel, bank lending channel and a monetary one. The lending channel is the most relevant among them; the main objective of the Bank of Russia is to reduce inflation.

Price stability plays a special role in creating a favorable investment climate. Natural inflation turns into an economic disaster for many reasons specific in each country. This makes such models as autoregression, VAR, DSGE and cointegration popular. Inflation increases risks for economic agents that can lead to a decreased belief in national currency and exceed the role of financial sector. This will lead to currency replacement, capital flight and a threat of liquidity loss.

1. Materials and methods

In the real sector of economy, optimum liquidity is the most important reference point in activity of any enterprise, since the risk of losing liquidity is a risk of business interruption. The working capital growth decreases the liquidity risk (Figure 1) (Van Horn 2005). Thus, we can define the simplest version of monetary policy impact on the organization (enterprise) through indicative live capital management, which involves minimization of liquidity loss risk. We can consider determination of acceptable volume and structure of current assets aimed at ensuring the efficient production and financial performance, as well as the identification of funding sources and the ratio between them, as a prerequisite for ensuring the competitive capacity of the organization.

There is also a relationship between the net working capital and profitability. Production activity of an enterprise with low NWC is financed by short-term liabilities. This contributes to a reduction in company's financial costs because short-term funding sources are generally cheaper than long-term liabilities and own funds that are the most expensive.

Simplifying, the value of NWC can be considered as long-term funding source of current assets. However, higher NWC will also lead to unnecessary costs to finance current assets. This will negatively affect profits. Thus, a compromise between company's ability to repay short-term obligations in a timely manner and ensuring an acceptable level of profitability is required (Figure 2).

Figure 1. Ratio of liquidity risk to net working capital

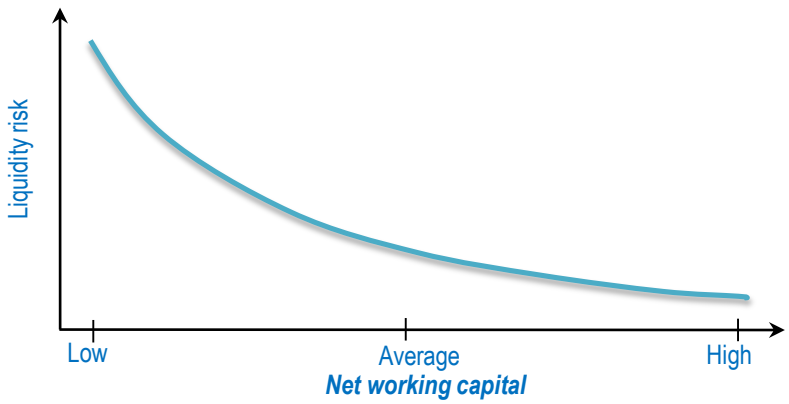
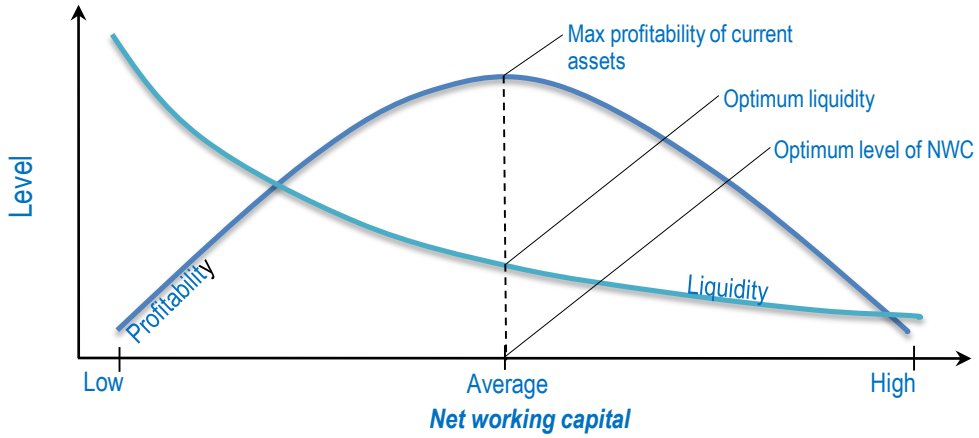


Figure 2. The relationship between NWC, risk levels and liquidity

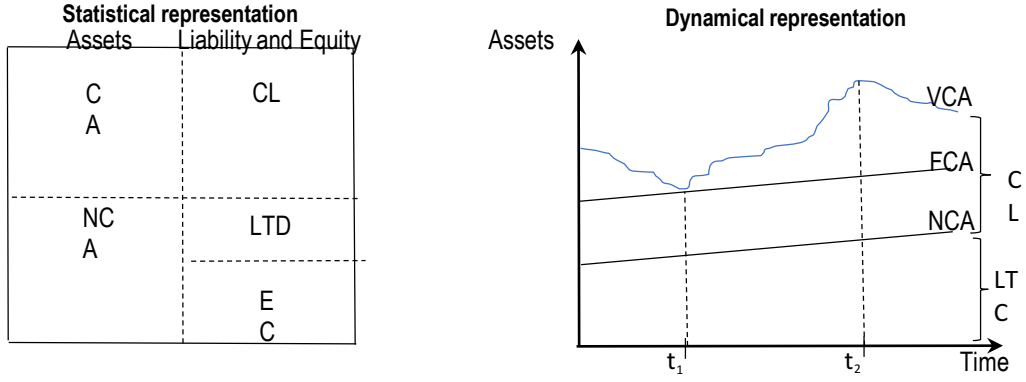


These targets are achievable by taking into account the industry lag, which is about an interest rate on loans. The formalized model of financing current assets (Figure 3) is based on a basic accounting equation, analytical data sheet. It should include the following elements:

$$CA = VCA + FCA \quad (1)$$

where: VCA – variable part of current assets; FCA – fixed part of current assets; NCA – non-current assets; LTD – long term duties; CL – short-term liabilities; EC – equity capital; LTC – long-term funding sources.

Figure 3. A) analytical data sheet. B) elements of financing current assets



A B

Model of financing current assets can be obtained by modifying the main accounting equation:

$$LTC = NCA \text{ or } CL = FCA + VCA \quad (2)$$

and by using the *NWC* = 0 dependence to determine the internal ROR as a benchmark of interest rates. Naturally *share of elements in the structure will be different depending on the chosen strategy: aggressive, conservative or compromise*.

1.1. Bank lending channel modeling

Macroeconomic environment with desired properties is of particular importance for the monetary policy. To confirm the results, we have conducted a panel study on seven sectors of economy using data of bank balance sheets.

This approach to assessing the impact of monetary policy on bank lending was popularized by Sokolov (2009), Mishkin (2010), Gerberding, Seitz and Worms 2017). It is about evaluating the equation based on individual bank balance sheets:

$$ln(loans)_{i,t} = \mu_i + ln(loans)_{i,t-1} + \delta * X_{i,t} + \varphi * r_t + kZ_{t-j} + \omega * r_t * X_{i,t} + \varepsilon_{i,t} \quad (3)$$

where: i – bank index, i=1,...,N; t=1,..., T – time index; μ_i – vector of fixed effects for banks included in the sample; $ln(loans)_i$ – logarithm of bank loan portfolio volume; Z_{tj}– vector of control macroeconomic variables (exchange rates, monetary aggregate, GDP growth rate) that determine the demand for bank loans; X_{it} – individual banking characteristics that affect the supply of loans (capital adequacy, liquidity); r_t– indicator of monetary policy in maintenance or terminal period of time; $\alpha, \delta, k, \omega, \psi$ –estimated parameters; ε_{it} – casual error.

These equations for obtaining correct results are estimated with dynamic panel data method. This methodology was used to study the influence of the Bank of Russia monetary policy (Drobyshevsky *et al.* 2008, Sokolov 2009, Juurikkala *et. al* 2009). Thus, the real interest rate on interbank loans had a statistically significant impact on the amount of debt on loans to legal entities and organizations in 2000-2010. However, named authors did not answer the question about the nature of this impact on bank lending in Russia. The results of (Juurikkala *et al.* 2009) indicate that in 1999-2007, volume of lending to firms was affected by monetary aggregates, but not by interest rates set by the Central Bank of the Russian Federation. This is a logical result, since the Central Bank had no independent interest policy then. Therefore, discount rate cannot be considered as a policy instrument. The monetary base can be considered as an indicator that approximates the actions of a central regulator, since the policy was basically to operate in the foreign exchange market during the period under review. This should directly affect the amount of money supply. Money supply impact on loans also does not contradict the logic, since it includes deposits in national currency, which amounts to a great part of a resource base of the Russian banking sector. Objective patterns of socio-economic relationship development are laid by participants in market relations. The more global are the markets and the more complex are the financial products used on them – the more important are the consequences of monetary policy regulation. Accordingly, transmission mechanism designed to ensure the macroeconomic stability and competitive advantages of national business becomes more complicated.

In this paper, we used a system:

$$E_t f\left(y_{t+1}, y_t, y_{t-1}, A_t, A_{t-1}, \varepsilon_{t+1}, \varepsilon_t, \epsilon_{t+1}, \epsilon_t\right) = O_{(n_y+n_A)} * 1^{`} \quad (4)$$

with the last $n_A$equal to:

$$A_t = A_{t-1} + \epsilon_t \quad (5)$$

where: A_t – stochastic trends of interaction between the monetary policy and competitive capacity of companies: reproductive function of the monetary policy; choice of competitive capacity elements; economic indicators of the interaction between the monetary policy and competitive capacity of companies; financial components of competitive capacity; financial indicators of competitive capacity and company dynamics in the context of global economy (Cims and Wotson 1990, Hsing 2013).

If the values of stochastic trends are known, we can uniquely determine the parameters of the system (4). For simplicity, we believe there is a unique solution for each trend in particular sector.

2. Results and discussions

Interaction the monetary policy and competitive capacity of companies involves the analysis of credit channel effects and of elements characterizing the competitive capacity of companies. Competitive capacity of companies is a kind of potential to generate their values at all stages of business processes and depends on working capital mobility and structure. We have considered seven economy sectors. Our choice was determined by the type of servicing banks – they have a banking license, namely, a small capital. (In Russia, there are still discussions on whether the small banks are viable. Supporters claim that they are required at the local level to provide affordable

loans to all market actors and to maintain competition in the banking sector). We obtained the following values for functions, presented in Figures 1, 2, 3, for different sectors of economy.

Table 3. Formalized description of optimum level of current assets in the capital structure of enterprises

Economy sector	Accounting equation of models		Strategy	Loan proceeds
	Long-term financing	Short-term financing		
Mechanical engineering	*LTC=1NCA+1PCA+0,15VCA; NWC=1PCA+0,15VCA.*	*CL=0,51CA; CL=0,85VCA+0PCA.*	Aggressive-compromise	0.8
Science and Innovation	*LTC=1NCA+1PCA+0VCA; NWC=1PCA+0VCA.*	*CL=0,62CA; CL=1VCA+0PCA.*	Aggressive	0.6
TCF	*LTC=1NCA+1PCA+0,32VCA; NWC=1PCA+0,32VCA.*	*CL=0,44CA; CL=0,68VCA+0PCA.*	Aggressive-compromise	0.4
Metals and mining	*LTC=1NCA+1PCA+0,21VCA; NWC=1PCA+0,21VCA.*	*CL=0,5CA; CL=0,79VCA+0PCA*	Aggressive-compromise	0.8
Oil and gas	*LTC=1NCA+1PCA+0,12VCA; NWC=1PCA+0,12VCA.*	*CL=0,6CA; CL=0,88VCA+0PCA*	Aggressive-compromise	1.3
Telecommunication service	*LTC=1NCA+0,62PCA+0VCA; WC=0,62PCA+0VCA.*	*CL=0,82CA; CL=1VCA+0,38PCA*	Ideal Aggressive	1
Consumer products	*LTC=1NCA+1PCA+0,24VCA; WC=1PCA+0,24VCA.*	*CL=0,44CA; CL=0,76VCA+0PCA*	Aggressive-compromise	0.6

Table 4. Liquidity ratio under normal distribution (three sigma rule)

Indicator	-3σ (0,022)	-2σ (0,136)	-1σ (0,341)	$\overline{k_{CR}^{liquidity}}$	+1σ (0,341)	+2σ (0,136)	+3σ (0,022)	Plowback rate
Mechanical engineering	1.4	1.60	1.80	1.96	2.10	2.30	2.50	4
Science and Innovation	0.9	1.17	1.40	1.60	1.88	2.11	2.35	2
TCF	1.66	1.87	2.10	2.30	2.53	2.74	2.96	3
Metals and mining	1.04	1.36	1.69	2.00	2.33	2.66	2.98	6
Oil and gas	1.00	1.23	1.45	1.68	1.90	2.13	2.36	8
Telecommunication service	0.30	0.61	0.91	1.22	1.53	1.83	2.14	5
Consumer products	1.32	1.61	1.89	2.20	2.47	2.76	3.04	6

In the context of globalization and an open economy, such economic phenomena as monetary policy and competitive capacity of companies are closely related (Mishkin 2010, Wagner 2016). Their interaction is ensured by a mechanism of direct contacts and feedback (Cims and Wotson 1990, Jonas 2000).

Monetary policy interaction with the competitive capacity of organizations is conditioned by a transmission process in macro- and microeconomics.

Time factor is considered as an important one: short-, medium- and long-term balance of money demand and supply (Gerberding, Seitz and Worms 2017, Jonas 2000). De Mello and Pisu (2009) as well as Salmanov and Zaernyuk (2015) call for money supply dominance in this channel. It is pertinent to point out that isomorphism of many characteristics makes it possible to balance the analysis of macro- and micro-levels (Ivanova, Kamenskikh and Yudaeva 2010). In choosing the instruments for monetary policy modeling, alternative criteria can be used. For example, the currency replacement and inflation can be regarded as the main ones in any transmission channel (Trunin, Bozhechkova and Vashchelyuk 2014, Wagner 2016).

Conclusions

Monetary policy impact on the reproduction process is determined by the ability of monetary resources to stimulate business activity both in financial markets and in the real sector of economy, accelerating the redistribution processes.

The mechanism of monetary policy interaction with the competitive capacity of the company is a set of processes that provide links between cash flows. Monetary policy indicators, affecting the competitive capacity of companies, are: monetary aggregates; inflation; liquidity and interest rate; capital adequacy ratio, exchange rate. The dynamics of these indicators is determined, firstly, by market fluctuations; secondly, by a system of measures carried out by the money authority to stabilize the market environment.

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Assessing the Productivity of Insurance Companies in Indonesia: A Non-Parametric Approach

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Abstract:

This study empirically explores the contributions of technical and efficiency changes to the growth of productivity in the Indonesian insurance industries by applying the generalized output-oriented Malmquist index based on the non-parametric approach of Data Envelopment Analysis (DEA) during the period 2012 to 2015. In measuring the productivity of nine general insurance firms, two inputs (i.e., commission and management expenses) and two outputs (*i.e.,* premium and net investment income) were utilised. The study documented that, on average, the total factor productivity of the insurance companies in Indonesia was mainly contributed by the technical change rather than the efficiency change. The study also found that the main source of the efficiency change was due to the pure efficiency rather than scale efficiency. These findings implied that in order to enhance the productivity of the firms, the manager should be able to selectively combine the existing inputs to produce outputs in the least cost way, supported by the adoption of the advanced technology.

Keywords: efficiency; insurance; data envelopment analysis; Malmquist index; Indonesia

JEL Classification: G2; G22; G34; L11

Introduction

The efficiency of the financial institution in all economic sectors has been studied widely and intensively in the last few decades. Earlier studies have measured efficiency using traditional approaches based on the financial ratios (Farrell 1957). However, recent studies have adopted the frontier approach, comprising parametric and non-parametric approaches to measure firms' efficiency. While there have been many studies investigated the efficiency of the insurance industry in the US (Gardner *et al*. 1993, and Meador *et al.* 2000) and other developed countries (Eling and Luhnen 2010, Berger *et al.* 1997), however, limited similar studies conducted in the emerging Asian countries, particularly in Indonesia. Comparing to the vast-growing of insurance companies in Indonesia to the other Asian countries, empirical studies on the productivity of insurance companies in the country has been limited. *T*hus, this study is hoped to fill up the previous studies' shortcomings and provides the latest empirical evidence on the relative productivity level of the insurance companies in Indonesia. Specifically, it attempts to empirically explore the contributions of efficiency and technical changes to the Total Factor Productivity (TFP) of general insurance companies in Indonesia during the period 2012-2015 by using the DEA and Malmquist index. The use of the

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Malmquist index enables the study to identify the detailed sources of firms' efficiency, comprising technical efficiency, pure efficiency, and scale efficiency.

The findings of the study are expected to shed some lights for the companies in designing their policy to improve their productivity level, for the public to identify the companies with the better performance, and for the regulators or the government, in particular the relevant institutions such as the Financial Services Authority in designing the effective policies measures to promote the growth of the insurance industry in Indonesia.

The rest of this study is organised as follows. Section 2 reviews the selected relevant and recent studies on the issue investigated. Section 3 highlights the data utilised and empirical model of the DEA and Malmquist index. Section 4 presents the empirical results and discussions. Finally, Section 5 concludes the paper.

1. Selected literature review

As a non-bank financial institution, the insurance company has been playing an important role in the financial industry in Indonesia. The insurance industry has contributed 1.98% to the national economy during the last ten years. During the same period, on average, the numbers of insurance companies in Indonesia and their gross premium have respectively increased by 0.02% and 18.0% annually (Financial Service Authority of Indonesia 2016). The number of businesses supporting insurance companies, such as insurance brokers, reinsurance brokers, actuarial consultants and insurance agents has also continued to increase yearly. According to Rahim (2013), conducive regulatory and government policies supporting the insurance industry as well as stable national economic condition have contributed to the increase in the number of insurance companies in Indonesia.

Based on the above positive trends, it is predicted that the insurance industry in Indonesia will continue to grow in line with the national economic growth. Indonesia is one of the countries in Asian regions that have been experiencing positive growth in addition to India and China. In fact, Indonesia has been categorised as the middle-income country based on the Global Competitiveness Report of the World Economic Forum in 2011 (Rahim 2013). Obviously, this creates an opportunity as well as challenges for the insurance industry to continue increasing its market share both in terms of the number of the insured and the yearly accumulated premiums. One potential target market that is potential to be captured by the companies is residents in the category of the middle class through disseminating a variety of financial schemes related to the benefits and risk management they could offer. However, to grasp this opportunity, the company has to be able to face the competitive challenges so as to maintain and improve its performance. Thus, the insurance company should be professionally managing for the sake of enhancing its efficiency and productivity levels.

The efficiency of the financial institution has been studied widely and intensively in the last few decades (Yuengert 1993, Saad *et al.* 2006, Omar *et al.* 2006, Omar *et al.* 2007, Majid *et al.* 2010, 2012, Ismail *et al*. 2013, Syamni and Majid 2016). According to Berger *et al*. (1993), efficiency denotes an enhancement in profitability, a lot of funds disbursed, price and better quality services to customers, and greater security in terms of increased capital buffers in managing the risk of financial institutions. In earlier studies, measuring the productivity of the firm was mostly conducted using traditional approaches that used financial ratios, such as the Return on Assets (ROA), Return on Equity (ROE), and the ratio of operating expenses to operating income (Farrell 1957). However, the measurement of productivity could also be performed using the frontier approach, comprising parametric and non-parametric approaches (Majid *et al.* 2006). Parametric approach includes the Stochastic Frontier Approach (SFA), the Distribution Free Approach (DFA) and the Thick Frontier Approach (TFA), while the non-parametric approach that most commonly used was the Data Envelopment Analysis (DEA) and the Free Disposable Hull (FDH) (Cummins *et al.* 1999, Cummins and Zi 1998).

Of those approaches, the DEA was the most widely adopted model to measure the productivity of the institutions in all economic sectors in the developed countries. Some of them have been used to measure the aggregate productivity of the firms in agricultural sector (Tauer 1998, and Mao and Koo 1996), telecommunications (Asai and Nemoto 1999, and Calabrese *et al.* 2001), banking (Tulkens and Malnero 1996, Rodolfo and Negrin 2005, and Sufian 2007), and university (Avkiran 2001). Specifically, the measurement of productivity of insurance companies using the DEA has been conducted by Berger *et al.* (1997), Cummins *et al*. (1999), and Meador *et al.* (2000) in the US, Fukuyama (1997) in Japan, Cummins *et al.* (1996) in Italy, and Cummins and Rubio-Misas (2001)

in Spain. Additionally, Diacon (2002) compared the efficiency of insurance companies across the UK, Spain, Sweden, and Denmark, while Rees and Kessner (2000) comparatively investigated the productivity of insurance companies in the European countries.

While there have been many studies investigated the efficiency of the insurance industry in the US (Gardner *et al.* 1993, and Meador *et al.* 2000) and other developed countries (Eling and Luhnen 2010, Berger *et al.* (1997), however, limited similar studies could only be found in Asian countries. These studies included Dutta and Sengupta (2010) in India, Sabet and Fadavi (2013) in Iran, Mansor and Radam (2000) and Majid *et al*. (2006) in Malaysia, Saad and Idris (2011) in Malaysia and Brunei, and Makmun (2002) in Indonesia.

In their study, Mansor and Radam (2000) have measured the productivity of 12 life insurance industry in Malaysia using the DEA and Malmquist Index during the period 1987 to 1997. They found that, although the industrial productivity performance was increased, but their growths were relatively lower when compared to the economic growth of Malaysia. Technical efficiency and technical progress contributed to an overall increase in productivity growth in the insurance industry. Majid *et al.* (2006) investigated both the Islamic and conventional insurance companies in Malaysia with a comparative treatment. Using non-parametric approach of the DEA and Malmquist index, they found that the overall productivity growth in the insurance industry in Malaysia during the period 2002-2005 was contributed most by the technical efficiency. In their study on insurance companies in Malaysia and Brunei, Saad and Idris (2011) documented that the productivity of companies in the two countries was positively related to economic growth that was largely due to the technical and scale efficiency improvements.

Comparing to the vast-growing of insurance companies in Indonesia to the other Asian countries, empirical studies on the productivity of insurance companies in the country has been limited. Among the studies on the efficiency of firms in Indonesia include Makmun (2002), Viverita and Ariff (2008), Prabowo and Cabanda (2011), Cabanda and Viverita (2012), Abidin and Cabanda (2011). In their studies, Makmun (2002) and Abidin and Cabanda (2011) examined the performance of insurance companies in Indonesia using the DEA approach. However, these studies did not analyze the contribution of components of efficiency changes to the productivity of insurance companies, but only focused on the analysis of the level of efficiency of the government insurance. The studies found that, on the average, the insurance companies in Indonesia were efficient. Viverita and Ariff (2008) only explored the efficiency of 141 state- and non-firms in Indonesia, but not the insurance companies. Prabowo and Cabanda (2011) investigated the Indonesian firm efficiency using stochastic frontier analysis, but excluding the insurance firms from their analysis. Iswati and Anshori (2007) investigated the influence of intellectual on insurance company's performance in Indonesia, while Cabanda and Viverita (2012) examined the managerial efficiency, innovation, and productivity of the Indonesian life insurance industry during the global financial crisis. In their studies, they measured the performance of the firms by using a traditional approach of financial ratios, which has a drawback in measuring the performance of the firm accurately and comprehensively.

In view of the above survey of literature, thus this study is hoped to fill up the previous studies' drawbacks and provides the latest empirical evidence on the relative productivity level of the insurance companies in Indonesia. Specifically, it attempts to empirically explore the contribution of efficiency and technical changes to the Total Factor Productivity (TFP) of general insurance companies in Indonesia during the period 2012-2015 by using the DEA and Malmquist index. The use of the Malmquist index enables the study to identify the detailed sources of firms' efficiency, comprising technical efficiency, pure efficiency, and scale efficiency.

2. Empirical framework

2.1. Data

This study adopts the DEA and Malmquist index to measure the productivity of the general insurance companies in Indonesia during the period 2012 to 2015. Of 11 general insurance companies listed on the Indonesian Stock Exchange, only 9 companies were selected to be analysed in this study due to their data availability. These companies include: PT Asuransi Bina Dana Arta Tbk (ABDA), PT Asuransi Bintang Tbk (ASBI), PT Asuransi Dayin Mitra Tbk (ASDM), PT Asuransi Harta Aman Pratama Tbk (AHAP), PT Asuransi Jasa Tania Tbk (ASJT), PT

Asuransi Multi Artha Guna Tbk (AMAG), PT Asuransi Ramayana Tbk (ASRM), PT Lippo General Insurance Tbk (LPGI), and PT Panin Insurance Tbk (PNIN).

Secondary data of the annual reports of the insurance companies were utilised in the study gathered from the website of the Indonesian Stock Exchange (www.idx.com). In order to measure the companies' productivity, the input-output data were needed. Following Worthington and Hurley (2000) and Majid *et al.* (2006), this study utilised two inputs (*i.e.,* management and commission expenses) and two outputs (*i.e*., net premium and net investment income) in measuring companies' productivity.

A management expense is one of the most important expenses used to pay the salary and finance the operational management, while the commission expense is provided to pay for the commission. Furthermore, the net premium is gross premium income minus both the reinsurance and unearned premiums, while the net investment income is an income earned by the companies from their investment activities (Majid *et al*. 2006).

2.2. Data Envelopment Analysis (DEA)

The DEA is a non-parametric method, which is based on the linear programming, used to analyze the functions of production through production frontier mapping (Trick 1996, Ramanathan 2003, and Anderson *et al*. 2004). The DEA has been the most widely adopted approach to measure productivity in a wide range of scientific disciplines and various operational activities (Cooper *et al.* 2000) that was firstly introduced by Charnes *et al*. (1978). The DEA has been used by more than 400 studies measuring efficiency and productivity of the organisation worldwide over the last few decades (Ali and Seiford 1993). The DEA is superior compared to other approaches to measure productivity, as it enables to identify the input or output of a company that is used as a reference to identify the sources of inefficiency (Hadad *et al.* 2003). In addition, the DEA takes into account all inputs-outputs as well as differences in technology, capacity, competition, and demographics, it then compares the individual company with the best-practice (efficiency) frontier among the investigated companies.

Thus, the generalized output-oriented Malmquist index (or so called Total Factor Productivity), developed by Fare *et al.* (1989), is adopted in this study. The Malmquist indexes are constructed using the Data Envelopment Approach (DEA) and estimated using Coelli's (1996) DEA Program. The Malmquist index was selected as there are a number of desirable features suited to this particular study. Not only does the DEA not require input prices or output prices in their construction, which makes the method particularly useful in situations where prices are not publicly available or non-existent, it also does not require a behavioural assumption such as cost minimization or profit maximization in the case where producers' objectives differ, are unknown or unachieved. Thus, the DEA is a suitable approach to be adopted in this study to measure the productivity of the insurance companies in Indonesia.

Following the study by Fare *et al.* (1994), the formulation of changes in productivity based on the output-oriented Malmquist index could be written as follows:

$$M_o\left(x^t, y^t, x^{t+1}, y^{t+1}\right) = (a)x(b) \tag{1}$$

where: $a = \dfrac{D_o^t(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)}$; and $b = \left[\left(\dfrac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})}\right)\left(\dfrac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)}\right)\right]^{1/2}$

where: M_o is the Malmquist index of total factor productivity; D_o is the distance function; *x* and *y* represent input and output for *t* and *t + 1* periods, respectively; *a* is the technical change; *b* is the efficiency change.

In this regards, efficiency change (EFFch) shows how well is the production process of converting inputs into outputs between *t* and *t + 1* periods, while the technical change (TECHch) represents the improvement of the technology involved in the production process, between *t* and *t + 1* periods.

Following Fare *et al.* (1994), this study further decomposes the Malmquist total factor productivity index of the EFFch into two sub-components, namely: pure technical efficiency change (PEch) and scale efficiency change (SEch). PEch highlights on how well the managerial performance in managing the inputs into outputs in the production process, SEch indicates the management's ability to choose the optimum production scale that is able to achieve

expected production levels. The optimum scale is related to the size of the company, if the scale of a company is too big or too small, it can lead to inefficiencies in the company. In view of this, thus components of Total Factor Productivity (TFP) of the Malmquist index could be further rewritten as follows:

$$M_o\left(x^t, y^t, x^{t+1}, y^{t+1}\right) = (a)x(b) = (a)x(cxd) \quad (2)$$

where: $a = \left[\left(\frac{D_o^{t+1}(x^t, y^t)}{D_o^t(x^t, y^t)}\right)\left(\frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^{t+1}, y^{t+1})}\right)\right]^{1/2}$; $c = \left(\frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^{t+1}, y^{t+1})}\right)$; and

$d = \left(\frac{D_{oc}^{t+1}(x^t, y^t)}{D_o^{t+1}(x^t, y^t)} \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_{oc}^{t+1}(x^{t+1}, y^{t+1})} \frac{D_{oc}^t(x^t, y^t)}{D_o^t(x^t, y^t)} \frac{D_o^t(x^{t+1}, y^{t+1})}{D_{oc}^t(x^{t+1}, y^{t+1})}\right)^{1/2}$; *a* is the technical change (TECHch); *b* is the efficiency change; *c* is the pure efficiency change (PEch); *d* is the scale efficiency change (SEch).

3. Results and discussion

3.1. Descriptive statistics

Table 1 reported the descriptive statistics for the investigated insurance companies in Indonesia during the period 2012-2015. The table showed that the highest value of outputs, both premiums and net investment income were owned by PT Panin Insurance Tbk with the values amounting to IDR 2.536,193 trillion and IDR 1.193,636 billion, respectively. Meanwhile, PT Asuransi Bintang Tbk and PT Asuransi Dayin Mitra Tbk recorded the lowest values of output amounting to IDR 59,951 billion and IDR 1,340 billion, respectively. Meanwhile, as for the inputs, PT Asuransi Harta Aman Pratama Tbk recorded the highest value of commission expenses of IDR 86,790 billion and PT Panin Insurance Tbk recorded the highest value of management expenses of IDR149,423 billion. On the contrary, the lowest value of inputs for the commission and management expenses amounting to IDR 0,510 and IDR 16,000 were, respectively recorded by PT Asuransi Dayin Mitra Tbk and PT Asuransi Harta Aman Pratama Tbk. On the average, the premiums and net investment income were IDR 404,857 billion and IDR 100,400 billion, respectively. Meanwhile, the average values for inputs of the commission and management expenses were IDR 28,482 billion and IDR 65,492 billion, respectively. The standard deviation for the outputs was found to be higher than that of inputs.

Table 1. Descriptive statistics (in Million IDR)

	Output		Input	
	Premium	Net Investment Income	Commission Expenses	Management Expenses
Mean	404,857	100,400	28,482	65,492
Median	222,014	20,345	21.869	53,751
Std. Dev.	578,386	271,528	20,944	32,277
Minimum	59,951	1,340	0,510	16,000
Maximum	2.536,193	1.193,636	86,790	149,423

The Geometric mean is calculated to measure the overall companies' productivity. It is the most useful measures to calculate the average change in percentages, ratios, index, or rate of growth over time (Lind *et al.* 2011). The value of 1.000 in the table indicated that the company is on the frontier line or efficient, while the value of lesser than 1.000 indicated that the companies are technically inefficient (not being at the frontier).

Referring to Table 2, only PT Panin Insurance Tbk was found to be efficient, both based on the CRS and VRS models. This is simply shown by the greatest output value of the company over the period of study amounted of more than a trillion IDR, while their inputs were comparable to the other companies. On the other hand, PT Asuransi Harta Aman Pratama Tbk and PT Asuransi Dayin Mitra Tbk were found to be efficient only under the VRS model, but not under the model of CRS. On the contrary, PT Asuransi Jasa Tania Tbk recorded the lowest efficiency value, and its efficiency level continued declining during the study period based on the model of CRS. Meanwhile, under the model of the VRS, PT Asuransi Ramayana Tbk is found to be the lowest efficient company as compared to the other

insurance companies in Indonesia. As for PT Asuransi Multi Artha Guna Tbk, the company was able to achieve its efficiency level in the last two years of 2014 and 2015 as their values achieved 1.000.

Values of geometric mean in Table 2 showed the percentage of realised output levels compared to the maximum potential output level the companies could achieve at a given input. For example, in 2012, PT Asuransi Bina Dana Arta Tbk recorded the level of potential output by 41.0% and 48.7% based on the CRS and VRS models, respectively. These figures further implied that the company could improve its productivity to the maximum level by 59.0% and 51.3%. Overall, the average of productivity levels of the whole company was lower and almost stagnant under the CRS model, but instead showed a relatively higher productivity scores and significant increased each year in the model of the VRS during the 2012-2015 period.

Table 2. Mean of Productivity Scores for the Insurance Companies in Indonesia based on the CSR and VRS

No.	Insurance Company	Year				Geometric Mean
		2012	2013	2014	2015	
1.	PT Asuransi Bina Dana Arta Tbk	(0.410) [0.487]	(0.522) [0.588]	(0.365) [0.394]	(0.593) [0.674]	(0.464) [0.525]
2.	PT Asuransi Harta Aman Pratama Tbk	(0.381) [1.000]	(0.428) [1.000]	(0.277) [1.000]	(0.478) [1.000]	(0.383) [1.000]
3.	PT Asuransi Multi Artha Guna Tbk	(0.403) [0.473]	(0.361) [0.426]	(0.605) [1.000]	(0.611) [1.000]	(0.482) [0.670]
4.	PT Asuransi Bintang Tbk	(0.106) [0.249]	(0.107) [0.297]	(0.141) [0.323]	(0.175) [0.718]	(0.129) [0.362]
5.	PT Asuransi Dayin Mitra Tbk	(0.642) [1.000]	(0.368) [1.000]	(0.531) [1.000]	(0.131) [1.000]	(0.358) [1.000]
6.	PT Asuransi Jasa Tania Tbk	(0.181) [0.399]	(0.165) [0.389]	(0.099) [0.230]	(0.215) [0.770]	(0.159) [0.407]
7.	PT Asuransi Ramayana Tbk	(0.212) [0.213]	(0.163) [0.163]	(0.140) [0.142]	(0.159) [0.160]	(0.167) [0.168]
8.	PT Lippo General Insurance Tbk	(0.308) [0.528]	(0.351) [0.589]	(0.614) [0.872]	(0.443) [0.537]	(0.414) [0.618]
9.	PT Panin Insurance Tbk	(1.000) [1.000]	(1.000) [1.000]	(1.000) [1.000]	(1.000) [1.000]	(1.000) [1.000]
Geometric Mean		(0.405) [0.594]	(0.385) [0.606]	(0.419) [0.662]	(0.423) [0.762]	(0.405) [0.653]

Note: Figures in the bracket (.) showed the Geometric Mean of the Productivity Scores based on the CRS, while the Figures in the squared bracket [.] showed the Geometric Mean of the Productivity Scores based on the VRS.

3.2. Analysis of Total Factor Productivity (TFP)

Tables 3 to 5 reported the scores of Total Factor Productivity Changes (TFPch) and its two sub-components, *i.e.*, technical change (TECHch) and efficiency change (EFFch) of the insurance companies in Indonesia for the period 2012 to 2015. The scores were calculated based on the Malmquist TFP Index. If the score was lesser than one, it implies a reduction in the productivity of the company, while the value of greater than one, indicating that improvements in the productivity of the company. Finally, if the value is equal to one, it implies no changes in the TFP level and its components.

As observed from Table 3, PT Asuransi Bina Dana Arta Tbk and PT Asuransi Harta Aman Pratama Tbk documented a consistent positive growth in their TFP during the study period with an average annual increase of 43.5% and 15.1%, respectively. Although the TFP for PT Asuransi Multi Artha Guna Tbk, PT Asuransi Jasa Tania Tbk, and PT Asuransi Ramayana Tbk have decreased in 2012-2013 and 2014-2015, but their TFP had experienced an increase in 2013 -2014. Meanwhile, PT Asuransi Bintang Tbk and PT Lippo General Insurance Tbk experienced an increase in their TFP at the beginning of the year, but their TFP showed a decrease in 2014-2015. In contrast, PT Asuransi Dayin Mitra Tbk and PT Panin Insurance Tbk showed a decrease in their TFP during the period 2012-2013, but the firms managed to increase the value of TFP changes in the years 2013-2014 and 2014-2015. Overall, during

the study period, the highest score for the TFPch of 43.5% was recorded by PT Asuransi Bina Dana Arta Tbk, followed by the PT Asuransi Bintang Tbk (22.3%) and PT Asuransi Multi Artha Guna Tbk (21.6%). The TFP, on average, only showed an increase by 0.7% in the period 2012-2013, and by 48.5% in the period 2013-2014. However, during the 2014-2015, the TFP declined to 11.5% below the frontier.

Table 3. Total factor productivity changes of the insurance companies in Indonesia

No.	Insurance Company	2012- 2013	2013-2014	2014-2015	Geometric Mean
1.	PT Asuransi Bina Dana Arta Tbk	1.400	1.363	1.550	1.435
2.	PT Asuransi Harta Aman Pratama Tbk	1.202	1.021	1.243	1.151
3.	PT Asuransi Multi Artha Guna Tbk	0.959	1.942	0.965	1.216
4.	PT Asuransi Bintang Tbk	1.088	1.419	0.323	1.223
5.	PT Asuransi Dayin Mitra Tbk	0.647	1.529	1.000	1.043
6.	PT Asuransi Jasa Tania Tbk	0.978	1.949	0.230	1.130
7.	PT Asuransi Ramayana Tbk	0.824	1.171	0.142	0.968
8.	PT Lippo General Insurance Tbk	1.220	1.796	0.872	0.865
9.	PT Panin Insurance Tbk	0.956	1.211	1.000	0.956
Geometric Mean		1.007	1.485	0.885	1.098

Furthermore, Tables 4 and 5 reported the sub-components of the Malmquist TFP index, namely the technical and efficiency changes. Table 4 showed the index value on the advancement and technical changes as measured by the average changes of best practice frontier over the study period. The findings indicated that none of the company experienced an increase in technical change in the period 2014-2015. During the period of 2012-2013, only PT Panin Insurance Tbk (PNIN) showed a regress on the technical changes, while during the similar period, 6 of the 9 companies recorded the same value of technical change of 7%. These companies were PT Asuransi Harta Aman Pratama Tbk, PT Asuransi Multi Artha Guna Tbk, PT Asuransi Bintang Tbk, PT Asuransi Jasa Tania Tbk, PT Asuransi Ramayana Tbk, and PT Lippo General Insurance Tbk. PT Asuransi Dayin Mitra Tbk (ASDM) recorded the highest technical changes of 12.8% during the period.

Table 4. Technical changes of the insurance companies in Indonesia

No.	Insurance Company	2012- 2013	2013-2014	2014-2015	Geometric Mean
1.	PT Asuransi Bina Dana Arta Tbk	1.098	1.951	0.955	1.269
2.	PT Asuransi Harta Aman Pratama Tbk	1.070	1.579	0.719	1.067
3.	PT Asuransi Multi Artha Guna Tbk	1.070	1.160	0.955	1.058
4.	PT Asuransi Bintang Tbk	1.070	1.084	0.955	1.034
5.	PT Asuransi Dayin Mitra Tbk	1.128	1.922	0.831	1.770
6.	PT Asuransi Jasa Tania Tbk	1.070	1.579	0.719	1.067
7.	PT Asuransi Ramayana Tbk	1.070	1.364	0.826	1.064
8.	PT Lippo General Insurance Tbk	1.070	0.456	0.924	0.767
9.	PT Panin Insurance Tbk	0.956	1.211	0.756	0.956
Geometric Mean		1.066	1.444	0.843	1.091

Furthermore, during the period 2013-2014, PT Asuransi Dayin Mitra Tbk was able to increase its technical changes from 12.8% to 92.2%. The highest technical change of 95.1% was recorded by PT Asuransi Bina Dana Arta Tbk (ABDA) during the period. In 2014-2015, PT Asuransi Harta Aman Pratama Tbk and PT Asuransi Jasa Tania Tbk have recorded the lowest negative value of technical changes by -28.1%. Overall, the highest value of the technical change during the study period was obtained by PT Asuransi Dayin Mitra Tbk (77.0%), followed by PT Asuransi Bina Dana Arta Tbk (26.9%), and PT Asuransi Harta Aman Pratama Tbk (6.7%). In short, the technical efficiency showed an increase at the beginning of the study periods (from 2012-2013 to 2013-2014) and then decreased from the period

2013-2014 to 2014-2015. Overall, the technical changes of the companies have increased yearly, indicating the advancement of technology experienced by the insurance companies in Indonesia.

Next, Table 5 reported the changes in efficiency level of the insurance companies during the period 2012-2015 in Indonesia. The study documented that only one company, *i.e.*, PT Panin Insurance Tbk where its efficiency level has not changed over the study period. The highest changes in efficiency level were recorded by PT Asuransi Bintang Tbk (18.3%), followed by PT Asuransi Multi Artha Guna Tbk (14.9%) and PT Bina Dana Arta Tbk (13.1%). Meanwhile, a negative value of efficiency change was recorded by PT Asuransi Ramayana Tbk recorded (-9.1%) and PT Asuransi Dayin Mitra Tbk (-41.1%). Overall, during the period of study, some companies recorded positive and negative changes in efficiency levels. In 2012-2015, the efficiency level of the companies has increased from -5.5% in 2012-2013 to 5% in 2013-2015.

Table 5. Efficiency changes of the insurance companies in Indonesia

No.	Insurance Company	2012- 2013	2013-2014	2014-2015	Geometric Mean
1.	PT Asuransi Bina Dana Arta Tbk	1.275	0.699	1.624	1.131
2.	PT Asuransi Harta Aman Pratama Tbk	1.124	0.647	1.728	1.079
3.	PT Asuransi Multi Artha Guna Tbk	0.896	1.675	1.011	1.149
4.	PT Asuransi Bintang Tbk	1.017	1.310	1.242	1.183
5.	PT Asuransi Dayin Mitra Tbk	0.574	1.440	0.248	0.589
6.	PT Asuransi Jasa Tania Tbk	0.914	0.601	2.163	1.059
7.	PT Asuransi Ramayana Tbk	0.770	0.859	1.136	0.909
8.	PT Lippo General Insurance Tbk	1.141	1.747	0.721	1.129
9.	PT Panin Insurance Tbk	1.000	1.000	1.000	1.000
Geometric Mean		0.945	1.028	1,050	1.007

In the TFP Malmquist index, the changes in efficiency were further contributed by the two sub-components, namely pure efficiency change (PEch) and scale efficiency change (SEch). The findings of these two components of the efficiency changes were reported in Table 6.

Table 6. Pure Efficiency Changes (PEch) and Scale Efficiency Change (SEch) of the Insurance Companies in Indonesia

No.	Insurance company	2012- 2013		2013-2014		2014-2015	
		PEch	SEch	PEch	SEch	PEch	SEch
1.	PT Asuransi Bina Dana Arta Tbk	1.207	1.056	0.670	1.043	1.710	0.950
2.	PT Asuransi Harta Aman Pratama Tbk	1.000	1.124	1.000	0.647	1.000	1.728
3.	PT Asuransi Multi Artha Guna Tbk	0.899	0.997	1.350	0.713	1.000	1.011
4.	PT Asuransi Bintang Tbk	1.193	0.852	1.088	1.204	1.222	0.559
5.	PT Asuransi Dayin Mitra Tbk	1.000	0.574	1.000	1.440	1.000	0.248
6.	PT Asuransi Jasa Tania Tbk	0.976	0.936	0.590	1.018	1.349	0.646
7.	PT Asuransi Ramayana Tbk	0.767	1.004	0.868	0.989	1.129	1.006
8.	PT Lippo General Insurance Tbk	1.115	1.023	1.480	1.181	1.616	1.172
9.	PT Panin Insurance Tbk	1.000	1.000	1.000	1.000	1.000	1.000
Geometric Mean		1.009	0.937	1.029	0.999	1.274	0.824

The study documented that only PT Panin Insurance Tbk has a stable efficiency level with the score of 1.000, both for PEch and SEch during the study period. Meanwhile, PT Asuransi Harta Aman Pratama Tbk and PT Asuransi Dayin Mitra Tbk recorded a stable PEch with the score of 1.000 (unchanged) during the 2012-2013 period. However, these companies registered the lowest decline in the SEch. In 2012-2013, PT Asuransi Dayin Mitra Tbk experienced the lowest deterioration in its SEch by -42.6% as compared to other companies, but its value again increased by 44% in 2013-2014, and then decreased to the lowest level by -75.2% in 2014-2015. Furthermore, the highest increase in the SEch during the period 2012-2013 and 2014-2015 was documented by PT Asuransi Harta Aman Pratama Tbk, with an increase by 12.4% and 72.8%, respectively, while during the period 2013-2014, the SEch decreased by -

35.3%. In terms of the PEch, the highest increase was achieved by PT Asuransi Bina Dana Arta by 20.7% and 71% in 2012-2013 and 2014-2015, and PT Lippo General Insurance Tbk by 48.0% in the period 2013-2014. Overall, the decline in overall efficiency changes was dominated by the scale inefficiencies as it shown by the value of scale efficiencies was lower than the pure technical inefficiency.

Finally, Table 7 reported the entire Malmquist TFP index of the insurance companies in Indonesia during the period 2012-2015. Based on Table 7, the study found that PT Asuransi Bina Dana Arta Tbk recorded the highest TFP value of 43.5%, where its EFFch and TECHch increased by 13.1% and 26.9%, respectively. In contrast, PT Lippo General Insurance Tbk recorded the lowest TFP value of 13.5%, contributed primarily by its technical change of -23.3%. On the average, the growth of TFP of the insurance company industry in Indonesia was generally contributed by the technical change (9.1%) as compared to the contribution by the changes in efficiency (0.7%). These findings implied that the innovation in technological components has played an important role in enhancing the productivity of insurance industry in Indonesia. To further enhance the productivity of the company, more attention should be given to the advancement of technical components, such as technology and information system as it provides convenience and speed in the provision of insurance services to its customers. Thus, the use of information and communication technology to produce a good service to consumers should be enhanced. This empirical finding was in harmony with the study by Mansor and Radam (2000) on the performance of the insurance companies in Malaysia.

Table 7. Malmquist TFP Index of the Insurance Companies in Indonesia

No.	Insurance Company	TFPch	EFFch	TECHch	PEch	SEch
1.	PT Asuransi Bina Dana Arta Tbk	1.435	1.131	1.269	1.114	1.015
2.	PT Asuransi Harta Aman Pratama Tbk	1.151	1.079	1.067	1.000	1.079
3.	PT Asuransi Multi Artha Guna Tbk	1.216	1.149	1.058	1.283	0.896
4.	PT Asuransi Bintang Tbk	1.223	1.183	1.034	1.423	0.831
5.	PT Asuransi Dayin Mitra Tbk	1.043	0.589	1.770	1.000	0.589
6.	PT Asuransi Jasa Tania Tbk	1.130	1.059	1.067	1.245	0.851
7.	PT Asuransi Ramayana Tbk	0.968	0.909	1.064	0.910	1.000
8.	PT Lippo General Insurance Tbk	0.865	1.129	0.767	1.005	1.123
9.	PT Panin Insurance Tbk	0.956	1.000	0.956	1.000	1.000
Geometric Mean		1.098	1.007	1.091	1.098	0.917

Furthermore, the changes in the components of efficiency were dominated by changes in pure efficiency (9.8%) as compared to the changes in scale efficiency (-8.3%). These findings indicated that the ability of insurance company's management to choose the optimum size of the input to produce the expected production level (Kumar and Gulati 2008) in Indonesia was improper as the companies experienced diseconomies of scale as shown by the negative value of the SEch. Most of the insurance company in Indonesia operated on a small scale, thus it was unable to enhance the efficiency level of the companies. Thus, mergers between small-scale companies would strengthen the company's capital structure and economies of scale. Additionally, the merger was often considered as one of the business strategies to win the competition (Abidin and Endri 2009). These findings contradicted the findings by Majid *et al*. (2006) and Saad and Idris (2011) on the insurance company in Malaysia, where the value of SEch was found to be greater than that of the PEch.

Conclusion

This study empirically investigated the contributions of technical and efficiency changes to the growth of productivity in the Indonesian insurance industries by applying the generalized output-oriented Malmquist index based on the non-parametric approach of Data Envelopment Analysis (DEA) for the year 2012 to 2015. In measuring the productivity of nine general insurance firms, two inputs (*i.e.,* commission and management expenses) and two outputs (*i.e.,* premium and net investment income) were utilised. The study documented that, on average, the total factor productivity of the insurance companies in Indonesia was mainly contributed by both efficiency and technical changes. The study also found that the main source of the efficiency change was pure efficiency rather than scale efficiency.

These findings implied that in order to enhance the productivity of the firms, the manager should be able to selectively combine the existing inputs to produce outputs in the least cost way, supported by the adoption of the advanced technology. The managerial performance to manage inputs into outputs in the production process has greatly enhanced the efficiency of the insurance companies in Indonesia. It is also suggested for a small-scale company to expand the size of the company by mergers.

This would hopefully contribute towards enhancing the scale efficiency so that it would be in a better position to gain competitive edge of the insurance companies over their competitors. As there were only 9 insurance companies investigated in this study, the findings might only be indicative and definitely not conclusive for the entire insurance industry in the country as a whole. Since there have been more insurance companies existed in the country, further comprehensive studies are suggested to empirically explore the productivity of entire companies in the Indonesian insurance industry. It is also suggested for the future study to investigate the Islamic insurance companies and compare it to their conventional counterparts to provide a better picture of the performance of the insurance industry in Indonesia.

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About the System of Hybrid Forecast Models for Regional Situational Centers

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Abstract:

An effective system of public strategic management is the basis for forming a competitive economy. There is a monitoring system implemented in the public management of the Russian Federation that ensures the successful implementation of strategic plans at all public management levels. The monitoring includes the situation analysis and the construction of short-term development forecasts. The article presents a system of hybrid models and software tools for short-term forecasting of the socio-economic indicators of the Russian Federation. The system of hybrid forecast models includes a set of regression models and an expandable set of intelligent models, including artificial neural networks, decision trees, etc. Regression models represent systems of regression equations describing the behavior of the forecast indicators of the Russian economy development in the system of national accounts. The functioning of the equations system is determined by the specified expert scenario conditions. Indicators for which it is not possible to build qualitative forecasts based on the regression model are forecasted using a module of intelligent models. The authors' methodology of a hybrid approach to forecasting the indicators of the social and economic development of the Russian Federation is described to provide federal and regional levels of the Russian economy with the means of analysis and forecasting. The advantages of the system are its openness and adaptability. The system can be implemented in situational regional and municipal centers.

Keywords: forecasting systems; hybrid models; situational centers; regional development.

JEL Classification: O10; O18

Introduction

Building a competitive economy is based on innovative solutions in the field of management. At present, an effective system of public strategic management is being created in the Russian Federation. The implementation of the

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strategic management system is based on strategic planning and coordination of all public management levels: federal, regional and municipal. The legal principles of strategic management are established in the Federal Law "On Strategic Planning in the Russian Federation" (Federal Law No. 172-FZ 2014).

The regional development strategy meets the objectives set in the federal strategic plan and is aimed at achieving a high level of quality of life for all regions, convergence of indicators of social and economic development of regions, and balanced development of each region.

For the successful implementation of strategic plans, a monitoring system operates at all public management levels, allowing a rapid response to negative situations and based on forecasts to determine the realism of the specified targets and development dynamics.

Monitoring, analysis and forecasting of social and economic processes at the federal and regional levels are carried out by the Ministry of Economic Development of the Russian Federation (Monitoring and Forecasting the Development of the Regional Sector, *n.d.*), as well as by official rating agencies (see, for example, (Agency RIA Rating, *n.d*)). For the purposes of monitoring the regions, groups of indicators characterizing the socio-economic development of the region are used; the effectiveness of ongoing reforms; management effectiveness. For these groups of indicators, regional integrated assessments and ratings are calculated.

A key role in the monitoring system of social and economic development is played by situational centers (SC), which are currently deployed at all public management levels: municipal, regional and federal.

Historically, the first strategic SC was introduced as a means of managing the economy and associated with the name of British cyberneticist Stafford Beer (Beer 1994, Beer 1998). Beer's key project, which became the prototype of all SCs in the world, is the Cybersyn project (see the modern site of the project (*Project CyberSyn/Cybernetics Synergy*, *n.d*), the implementation of which was led by Beer at the personal invitation of the Socialist Chilean President S. Allende in 1971. The project showed high efficiency as a means of automated management of the country's economy. Now there are several hundred active SCs in the world, and their number is still growing (see, for example, (Bohn 2003, Raikov 1999, *General Information and Situation Center of the Federal Center and the Lands of Germany, n.d.*) Creating SC is today one of the most urgent tasks for improving the effectiveness of the management activities both at the state level and at the level of commercial organizations.

The most important functions of the federal and regional SC are the assessment of the activity effectiveness of the Russian Federation subjects and their investment attractiveness, as well as the forecasting the crisis situations.

The functioning of SC is realized by means of modern SMART systems providing support for managerial decision-making in the sphere of public management.

The main tasks being solved by regional SMART systems are:

- forecasting of achieving target indicators of strategies and programs of social and economic development of regions;
- assessment of investment attractiveness of regions;
- assessment of trends in the region development;
- assessment of crisis situations occurrence risks.

SMART systems provide comprehensive information and analytical support to the processes of making managerial decisions by the top officials in the region. The implementation of the decision in the activities of regional authorities allows consolidating the disparate information, provides its analysis, as well as forecasting and expert assessment using modern modeling and forecasting tools. The use of the system in conjunction with the specialized equipment of the situational center (video wall, interactive visualization tools) increases the efficiency of reviewing and making managerial decisions through conducting collective analytical sessions.

The purpose of this study was to create a hybrid system of models and an intelligent complex for forecasting the indicators of the social and economic development of the Russian Federation in order to ensure the federal and regional levels of the Russian economy with analysis and forecasting means. The advantages of the system are its openness and adaptability. The system can be implemented in situational regional and municipal centers.

1. Methodology

The methodology of the Ministry of Economic Development for calculating the rating of regions is based on 25 indicators related to the main directions of development: economy state, population income level, employment and unemployment, housing and communal services, security, *etc*.

The effectiveness of the executive bodies is calculated on the basis of aggregate indices for such indicators as life expectancy, unemployment rate, investment volume, consolidated budget revenues of a constituent entity of the Russian Federation, etc.

To assess the work effectiveness of the heads of the Russian Federation constituent entities, the target indicators reflecting the conditions for the development of entrepreneurship and small business in the region are used. They are determined by the business community of a region on the basis of the assessment of the conditions for carrying out business activities. The main assessment areas are: investment climate; creation of high-productive jobs, attraction of investments; development of medium and small business.

Currently, a methodology for assessing regions and special indicators characterizing the current state of affairs in the region and their rating among other Russian Federation constituent entities are developed. The indicators reflect the following scopes of activities of the regions: I. Economy, II. Population incomes, III. Labor and employment, IV. Demography and health, V. Education, VI. Providing citizens with housing, VII. Housing and public utilities, VIII. Creating an auspicious and safe living environment, IX. Physical culture and sports, X. Interethnic and interfaith relations.

In total, 44 indicators for each constituent entity of the Russian Federation are taken into account. Based on the calculation results, the rating of the regions is compiled both separately for each scope of activity (*e.g.* the rating for the life quality, for investment attractiveness, *etc*.), and for the regions as a whole. The ratings are developed by specialized institutions under the President of the Russian Federation and by official rating agencies such as the National Rating Agency, the Agency for Strategic Initiatives, ExpertRA, RIArating and others. The final ratings for various scopes of activity, as well as for the regions as a whole, are published by the Ministry of Economic Development of the Russian Federation.

The initial data for the calculation of indicators are provided by the Russian Federal State Statistics Service (Rosstat), Federal Treasury, the Ministry of Education and Science of the Russian Federation and FSO. 85 constituent entities of the Russian Federation participate in the annual assessment.

The final rating of the regions includes a system of assessments of two components: the assessment of heads of federal executive bodies and heads of the Russian Federation constituent entities. The methods of the presented assessments are fixed in Decrees of the Government of the Russian Federation No. 1142 of November 3, 2012 and No. 570-r of April 10, 2014 (Decree No. 1142 of the Government of the Russian Federation, 2012; e of the Government of the Russian Federation No. 570-r, 2014*)*.

The assessment of the effectiveness of the executive bodies of the Russian Federation constituent entities is calculated according to the formula (1):

$$K = 0.5 \cdot \frac{Ii2+Ii3+Ii4+Ii6+Ii7}{5} + 0.3 \cdot \frac{Ii1+Ii5+Ii8+Ii9+Ii11}{5} + 0.2 \cdot Ii10 \quad (1)$$

where: Ii1 is aggregate indicator value index – Life expectancy at birth; Ii2 is aggregate indicator value index – Volume of investments in fixed assets (excluding budgetary funds), correlated with the population index; Ii3 is aggregate indicator value index – Turnover of products (services) produced by small enterprises, including microenterprises, and individual entrepreneurs, correlated with the population index; Ii4 is aggregate indicator value index – Volume of tax and non-tax revenues of the consolidated budget of a Russian Federation constituent entity, correlated with the population index; Ii5 is aggregate indicator value index – Average unemployment rate for one year; Ii6 is aggregate indicator value index – Real disposable money incomes of the population; Ii7 is aggregate indicator value index – Share of the total installed area of residential buildings against the total housing stock area; Ii8 is aggregate indicator value index – Share of students in state (municipal) general education organizations studying in one shift in the total number of students in state (municipal) general education organizations; Ii9 is aggregate indicator value index –

Mortality of the population (without mortality from external causes)*;* Ii10 is ranked indicator value index – Population's assessment of the activities of the executive bodies of a RUSSIAN FEDERATION constituent entity; Ii11 is aggregate indicator value index – Share of children left without parental care, including those transferred to non-relatives (adoptive families, adoption, trusteeship (guardianship), family children's homes and foster families) located in state (municipal) institutions of all types.

The methodology for assessing the effectiveness indicators of the heads of the Russian Federation constituent entities is the calculation of target indicators (until 2018). The indicators considered herein reflect the conditions in the regions for the development of entrepreneurship and small business (Agency RIA Rating, *n.d*):

- Assessment by the business community of general business conditions, including improvement of the investment climate;
- Presence of the basic components of the standard of activity of executive bodies of the Russian Federation constituent entities on maintenance of favorable investment climate in region and an assessment by an business community of realization efficiency for these components;
- Creation and modernization of high-performance jobs, improving the labor productivity;
- State of the labor market, training and retraining of highly qualified personnel;
- Quality and accessibility of production and transport infrastructure;
- Investment activity, attraction of investments;
- Development of medium and small business;
- Improvement of the business climate in construction;
- Increasing the availability of energy infrastructure;
- Promotion of competition development based on the standard of competition development in the Russian Federation constituent entities.

The final rating of the regions includes 2 components: comparison of target and actually presented indicators and determination of the region position depending on the average Russian indicators.

2. Results.

SC and SMART systems of regional and municipal management should be able to forecast socio-economic development indicators at the federal, regional and municipal levels, to provide modeling and forecasting for the prediction of crisis situations, targeted management and performance management.

For 15 years, the Academic Department of Informatics of Plekhanov Russian University of Economics has been working on the development of an econometric simulation model system and a software and technological complex for forecasting the Russian socio-economic indicators (Kitova, Kolmakov, Potapov and Sharafutdinova 2012, Grishin, Zarova, Kitova, Tikhomirova *et al*. 2013, Kitova, Kolmakov, Dyakonova, Grishina, Danko and Sekerin 2016).

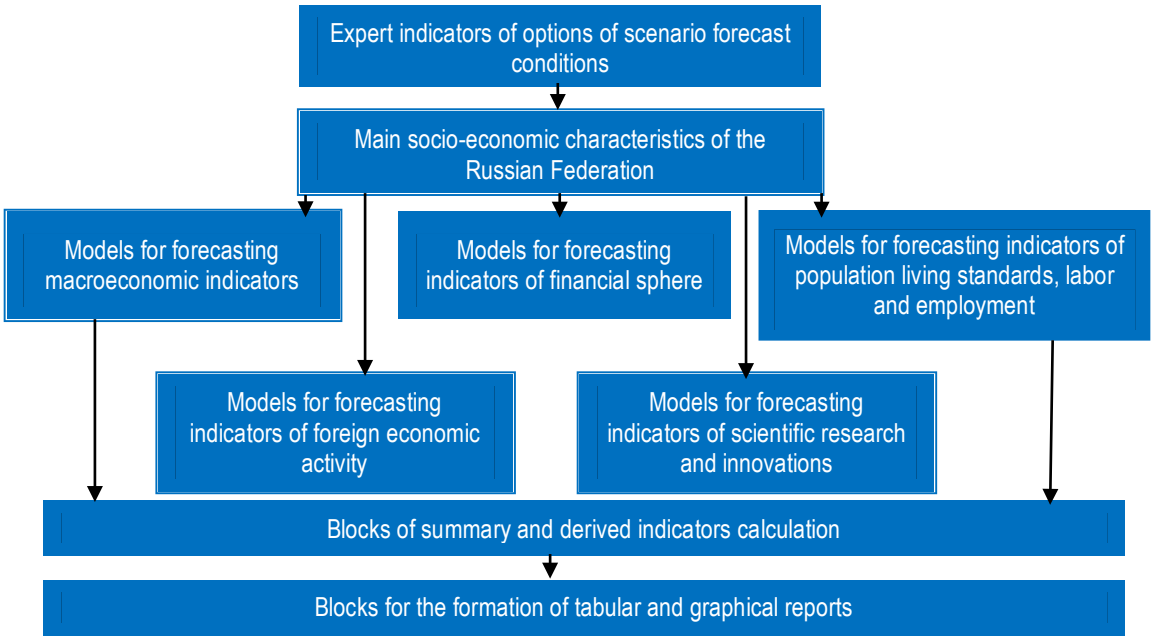
The models are presented in the form of regression equation systems describing the behavior of the forecasted indicators of the Russian economy development in the system of national accounts. The functioning of the equation system is determined by specified expertly scenario conditions.

The calculation trajectory is determined by scenario indicators which are external in relation to the system. Based on mathematical experiments, the structure of the equations is refined and economically justified statistically significant arguments are selected for each equation. The ability to conduct "what-if" scenario analysis with the operational calculation of forecast options is an important advantage of the system considered.

The described system of models is based on the use of the system of national accounts (SNA); principles of econometric simulation modeling, as well as the system of expert assessments. The calculation of indicators is based on the methodology and data of the Rosstat and the Central Bank of Russia.

The system of forecasting models at the conceptual level is shown in Figure 1.

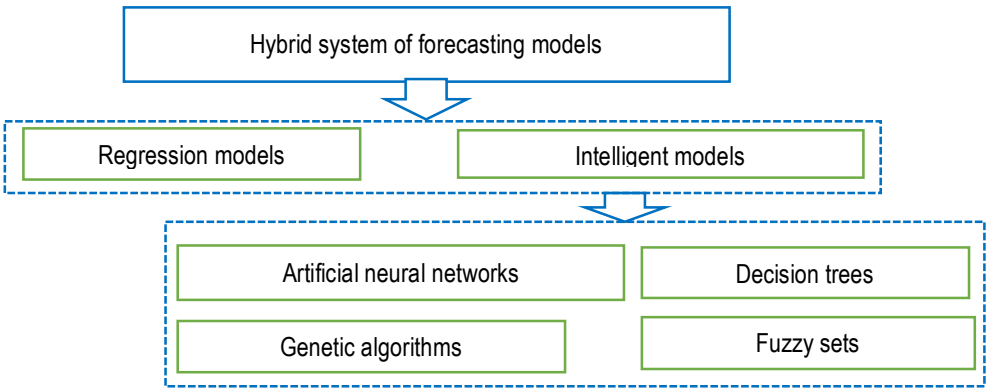
Figure 1. Conceptual scheme of the forecasting models system of the Russian Federation social and economic development indicators



The development of the system is carried out in the direction of increasing the accuracy and quality of the individual indicator forecast through the hybrid models using neural networks, system-dynamic models, cognitive maps, *etc*.

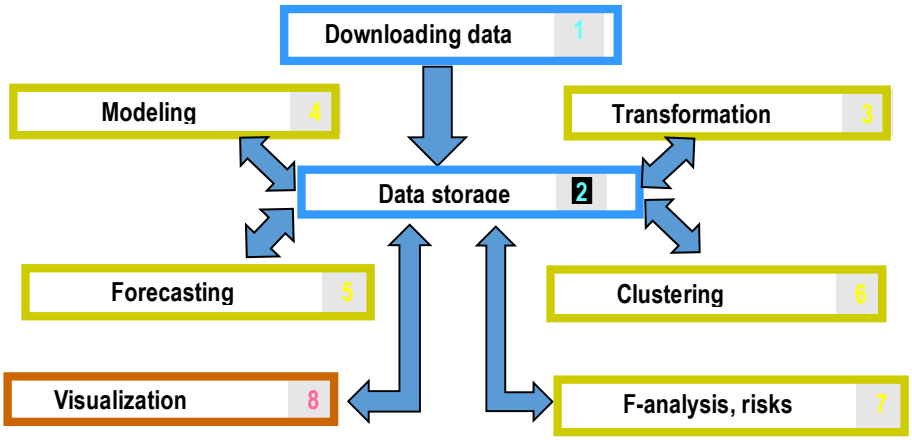
The components of the developed Hybrid Forecasting Model are presented in Figure 2. The constructed hybrid model system is open and allows the inclusion of new models and indicators (Kitova, Kolmakov, Dyakonova, Grishina, Danko and Sekerin 2016, Kitova, Kolmakov and Penkov 2016, Kitova and Krivosheeva 2016). At present, on the basis of the hybrid system constructed, complexes of short- and medium-term forecasting models are developed for the operational monitoring of socio-economic development indicators of the Russian Federation regions. This system of models can become an integral part of the information system of the situational center of the federal, regional and municipal management.

Figure 2. Structure of the hybrid system of forecasting models



The main modules of the information system of the situational center, including the forecasting module, are presented in Figure 3.

Figure 3. Main modules of the situational center information system



The system allows:

- automated loading of initial data from the Internet servers of the Federal State Statistics Service, federal, regional and municipal structures;
- monitoring, forecasting and comparison of development indicators of Russian Federation regions, constituent entities and Russia as a whole;
- analysis and forecasting of achieving the target indicators of the development strategy and programs of regions;
- identification of homogeneous (typological) groups of regions on the basis of cluster and multivariate factor analysis of the Russian Federation constituent entities;
- identification and assessment of threatening trends and risks of crisis situations in the development of Russian Federation constituent entities

3. Discussion

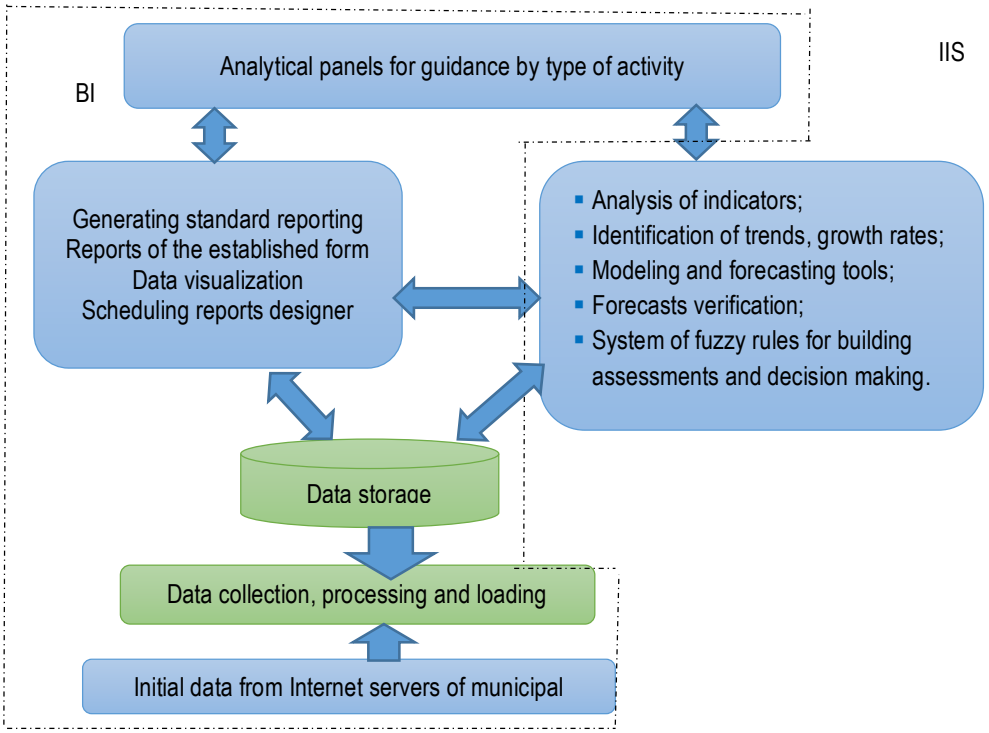
In connection with the growing need for regional development, the concept of "Situational Center" or "SMART System" assumes increasing importance. Such a system can be realized as a result of the integration of the BI platform and intelligent expert decision-making support system (Figure 4).

SMART systems provide comprehensive information and analytical support to the processes of making managerial decisions by the top officials in the region. The implementation of the decision into the activities of regional bodies allows consolidating the disparate information, provides its analysis, as well as forecasting and expert evaluation using modern modeling and forecasting tools. The use of the system in conjunction with the specialized equipment of the situational center (video wall, interactive visualization tools) increases the efficiency of reviewing and making managerial decisions though conducting collective analytical sessions.

Currently, there are a number of solution providers for SC on the market, such as Polymedia (http://www.polymedia.ru), Technoserv Consulting (http://www.tsconsulting.ru) and others. The main advantages of the system offered by the authors in comparison with commercial solutions are its openness and adaptability:

- open documented methodology;
- open modular architecture;
- open extensible set of models for solving forecasting problems, cluster and multivariate analysis;
- focus on open source software;
- advanced data visualization tools on maps and graphs with the ability to export developed reports;
- automated data loading;
- possible integration with other systems.

Figure 4. SMART system components



The proposed expert system will allow forecasting the data, calculating the deviations of the values of the actual indicators from the target ones included in the development programs of the regions, which will allow identifying crisis situations and problem scopes of the activity of the Russian Federation constituent entities. At the moment, the system already allows calculating the number of indicators that are taken into account when forming the rating of Russian Federation regions: Life expectancy at birth (years), Average unemployment rate per year (percent), Mortality (excluding mortality from external causes) (number of deaths per 100 thousand people), Share of children left without parental care, including those transferred to non-relatives (adoptive families, adoption, trusteeship (guardianship), family children's homes and foster families) in the public (municipal) institutions of all types (%), etc. In the long term, the system will be supplemented by missing indicators for a full assessment of the effectiveness of the Russian Federation constituent entities.

Conclusions

Modern approaches to Performance Management (Abdikeev and Kitova 2015) require setting targets and comparing them with those actually achieved. The offered system of models allows carrying out forecast calculations of target indicators on the basis of which it is possible to set planned values or to make conclusions regarding the correctness of the set directive planned values.

To prevent threats, it is important to monitor such socially significant indicators as real incomes of the population, quality of life, inflation. The analysis of the forecast values of socially-significant indicators in the dynamics will allow predicting and preventing crises in the Russian Federation regions in a timely manner.

The described system of models and software tools can become the basis for the creation and development of regional SC and SMART systems of regional and municipal management in Russia.

Currently, it is planned to implement the developed system of models and software components in the Situational Center of Plekhanov Russian University of Economics to provide all types of educational activities (individual assignments, project works, term papers, diploma projects) and perform scientific and research developments by the scientific teams of the university.

Acknowledgments

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On Equilibrium of the Financial Flows within the System of Compulsory Pension Insurance in the Russian Federation

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Abstract:

The widening imbalances in the financial flows of the Russian State Pension Fund was caused by such a factors as: narrowing of the base for compulsory insurance premium collection due to the economic problems, dynamically changing the structure of the labor market, rising labor migration within the country and overseas, the steady aging of the population. This article reviews the suggestions on elaborating the policy of compulsory pension insurance rates in the Russian Federation aimed at enhancing the equilibrium of financial flows within the system and providing exercise of pension rights without attracting the lacking funds from the federal budget.
Authors suggested that the problem of financial stability of pension system in the short run has to be solved only by changing the pension insurance tariff policy, *i.e.* due to the growth in pension system's revenues. We believe that the current government proposals, aimed at settlement of the mandatory pension insurance system's expenditure (*i.e.* by decreasing the size of pensions and their indexation) lead to falling of pension insurance coverage.

Keywords: public pensions; financial sustainability; compulsory pension insurance system; state pension fund; reform; contribution rates.

JEL Classification: H55; H69; J26; J38

Introduction

Recently, national pension systems of a number of countries have faced with common challenges, which can have described as dilemma: "how to ensure financial sustainability of the pension system together with the adequacy of pensions?" The search for ways for overcoming these challenges have already leaded many countries to various pension reforms. During the last 5 years, efforts were mostly driven by the widespread need for fiscal consolidation, and a majority of countries indeed implemented reforms to improve the financial sustainability of their pension systems. Some countries have done so while maintaining or improving retirement income adequacy, at least for some population groups.

The system of compulsory pension insurance is unique and cannot be replaced by analogues. Despite its inertness–the system is related to demographic processes that cannot be fast-paced by their nature – it might be sensitive to changes in social and economic conditions: for instance, in crises basic pensions (as a rule, funded by

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the government budget) take on a greater importance while during the period of economic growth and improvement in people's welfare their significance decreases.

1. Literature review

Currently, most countries faced the need to optimize the pension expenses under the public pension insurance systems. In this regard, may be useful to study international experience to identify optimization opportunities.

"The economies of scale are dominant in explaining differences in costs across pension schemes" and collective schemes are always more cost efficient compared to private (Steenbeek and Lecq 2007).

Auerbacha and Leeb (2011) analyzed the "abilities of the public pension systems in different countries (as actual and hypothetical) absorb the risks arising from demographic and economic challenges (as for a particular generation as across generations)". The, they "estimate expected utility for generations based on simplifying assumptions and incorporate these expected utility calculations in an overall social welfare measure". In the result, they found, that "actual Swedish system smoothes stochastic fluctuations more than any other by accumulating a buffer stock of assets that alleviates the need for frequent adjustments". However, "this accumulation of assets leads to a lower average rate of return that more than offsets the benefits of risk reduction".

Heijdraa and Rompe (2009) in their research studied "effects of demographic shocks on the macroeconomic performance". They simulated impacts of early retirement provisions on the macroeconomic performance of a number of advanced economies. Their findings demonstrate, that "pension reform must have any effects on the retirement behavior of workers" and stimulate (motivate) individual agents to retire at a normal pension age.

Another similar research performed by Hernæsa *et al*. (2016) was devoted to consequences of Norwegian pension reform, connected to the increased work incentives for the elderly and removing earnings test on pensions. They found that "increasing the returns to work is a powerful policy: the removal of an earnings test, implying a doubling of the average net take-home wage, led to an increase in average labor supply by 30-40%".

Kudrna (2016) also developed the topic, devoted to effects of means-tested pensions. In this research was "applied an overlapping generations model stylized to the Australian economy, with the capacity to investigate tightening the existing means test (by increasing the taper rate at which the pension is withdrawn) and increasing the pension access age".

Godínez-Olivaresa *et al. (*2016) approached to creation of "an automatic balancing mechanism (ABM), which absorbs economic and demographic changes through the key-variables of the pension system (such as contribution rate, normal retirement age and indexation of pensions)". They implemented optimization techniques indiscrete-time (Generalized Reduced Gradient Method (GRG)). "Sustainability ABM proposed restores the sustainability of the PAYG system according to the difference in present value between spending on pensions and income from contributions". The findings of the research demonstrated, that "model presented in this paper could be an alternative to the traditional parametric reforms of the PAYGO systems around the world".

The system of government compulsory pension insurance is unique and cannot by replaced by analogues Soloviev (2015). Despite its inertness – the system is connected to demographic processes that cannot be fast-paced by their nature – it might be sensitive to changes in social and economic conditions: for instance, in the time of crises basic pensions (as a rule, funded by the government budget) take on a greater importance while during the period of economic growth and improvement in people's welfare their significance decreases (Mesa-Lago and Bertranou 2016, Roik 2015).

Under conditions of the new social and economic challenges and significant macroeconomic uncertainty the importance of a stable pension system as a source of investment resources in the economy and securing the guaranteed social standards grows. Due to that the study of the theoretical basis of transformation of the existing pension system of the Russian Federation is quite relevant with the purpose of improving its equilibrium on the one hand and increasing the effectiveness of creation of pension rights on the other hand.

This article reviews the suggestions on updating the policy of compulsory pension insurance rates in the Russian Federation aimed at enhancing the equilibrium of financial flows within the system and providing exercise of pension rights without attracting the lacking funds from the federal budget.

2. Methodology

Russia is not the only country that faces the challenge of securing the pension system's equilibrium in the long term: the population ageing processes have become an objective factor of the pension schemes restructuring in many countries. Other factors defining the misbalance of the pension system are the decrease in number of employees with simultaneous growth of the self-employed individuals, a large number of people occupied in the informal economy along with a relatively low unemployment rate (typical of Russia only), the slowdown in economic growth rates and the reduction of the payroll budget as a result, a relatively low retirement age threshold (typical of Russia only). The influence of the mentioned factors makes some countries restructure the existing models of the pension system or their selected elements while others seek additional resources by tightening the fiscal policy and attracting inter-budget transfers from the federal (state) budget.

Some economists identify the problem of resource scarcity within the Russian pension system as a technical one as the joint liability of the state with regard to the liabilities of the Pension Fund of the Russian Federation (PFR) is stipulated. At the same time, the existence of this kind of liability has led to the PFR's dependence on the federal budget funds due to the measures taken by the government in the sphere of compulsory pension insurance (it concerns the compulsory funded pensions and decisions regarding the tariff policy in the first place). In addition, the decisions are funded in full measure during the period of strong economic growth, but in the time of crisis that leads to certain negative consequences (like the funded pensions' freeze in 2014-2017 or the incomplete indexation of insurance pensions in 2016). Hence, it can be said that the problem of misbalance of the Russian pension system brings forth the misbalance of the federal budget itself which has been especially clear since 2014 with the beginning of a recession in the Russian economy (see Table 1).

Table 1. The dynamics of the transfer for funding the deficit of Pension Fund of the Russian Federation (in respect of compulsory pension insurance) in 2011-2019

Year	PFR revenues, RUB billion	Transfer from the Russian federal budget for compulsory pension		
		RUB billion	% of PFR revenues	% of GDP
2011	5,255.60	924.41	17.59	1.65
2012	5,890.40	1,033.14	17.54	1.54
2013	6,388.40	942.81	14.76	1.33
2014	6,159.10	336.32	5.46	0.43
2015	7,126.60	814.18	11.42	1.01
2016	7,528.80	810.50	10.77	0.98
2017	8,101.53	984.50	12.15	1.13
2018	8,536.38	961.20	11.26	1.04
2019	8,931.35	957.10	10.72	0.97

Source: Made by authors on the basis of federal laws on execution of the PFR budgets (2011-2015) and on the PFR budgets (2016-2019)

In view of the mentioned above, the essence of the pension system's equilibrium should be evaluated both through the lens of securing the balance of the PFR's budget and with due account for the possibilities of covering the total state pension liabilities of a particular reporting period with total contributions received in the framework of state pension scheme. In the first case the pension system's equilibrium will be determined by the principle of equilibrium of any budget of the Russia's budget system (article 33 of the Budget Code of the Russian Federation). That implies covering the costs by revenues and sources of funding to the full extent which secures the authority meeting the budget commitments. In this case in the sources of covering the budget commitments of PFR both transfers from the federal budget and the sources of funding its deficit will be accounted for. If the equilibrium of the pension system is construed in this manner, its deficit might be minimized via building up inter-budget transfers even if the compulsory contributions received for pension insurance decrease.

In the second case it is necessary to adjust the financial flows of benefits from the pension system basing on its own capabilities in respect of mobilization of the desired source of revenues. This determines the use of other

approaches to securing the equilibrium of the pension system; therefore, the following types of it can be distinguished:

- the absolute equilibrium attained via the compulsory pension insurance contributions received by the PFR only;
- the controllable equilibrium attained via own revenues of the PFR budget and transfers (financial aid) received from the federal and other budgets of the budget system of the Russian Federation;
- the reserve equilibrium attained via the use of resources of a sovereign wealth fund established especially for these purposes (in the case of Russia it is the National Wealth Fund the purpose of which is co-financing the pension benefits and compensating the shortfalls in receipts of the Pension Fund of the Russian Federation);
- the general equilibrium attained via repayable financial resources for funding the resulting deficit.

As of 2017 and until the end of 2019 the insurance contributions are to be paid by the employer in the amount of 22% of the payroll budget up to the limit value of the base for accrual of insurance contributions; at the same time the limit value of the base depends on the average monthly accrued wages of the employees of the country (with due account for multipliers) and is reconsidered by the Government of the Russian Federation on the annual basis; in 2017 it amounts to RUB 876,000. Also the insurance contributions are accrued to the earned income in excess of the established limit value of the base at the rate of 10%.

For the period 2017-2025 the multipliers shown in the Table 2 are stipulated:

Table 2. The values of the multipliers applied in establishing the limit base for accrual of compulsory pension insurance contributions.

	2017	2018	2019	2020	2021 and further
Values of multipliers	1.9	2.0	2.1	2.2	2.3

Source: The Federal law from 24.07.2009 N 212-FZ (as amended on 19.12.2016) "On insurance contributions to the Pension Fund of the Russian Federation, Fund of social insurance of the Russian Federation, Federal Fund of compulsory medical insurance"[9].

We shall now determine the limit value of the base for accrual of compulsory pension insurance contributions for 2017-2019. The resulting values will be rounded up to thousands of rubles in accordance with the statutory provisions (see Table 3).

Table 3. Calculation of the limit value of the base for accrual of compulsory pension insurance contributions for the period 2017-2025

Year	Nominal average monthly accrued wages, RUB	Values of multipliers	Limit value of the base for accrual of compulsory pension insurance contributions, RUB	Average monthly accrued wage rate not exceeding the limit value of base for accrual of compulsory pension insurance contributions, RUB[10]
2017	38,433.71	1.9	876,000	73,000.00
2018	40,796.39	2.0	979,000	81,583.33
2019	43,099.65	2.1	1,086,000	90,500.00
2020	45,893.79	2.2	1,212,000	101,000.00
2021	48,882.49	2.3	1,349,000	112,416.67
2022	51,797.40	2.3	1,430,000	119,166.67
2023	54,782.53	2.3	1,512,000	126,000.00
2024	57,815.69	2.3	1,596,000	133,000.00
2025	60,850.04	2.3	1,679,000	139,916.67

[9] Available at: http://www.consultant.ru/document/cons_doc_LAW_89925/ (accessed March 1, 2017)

[10] This rate is different from the product of the nominal average monthly accrued wages and the multiplier which is the result of rounding of the values of limit value of the base for accrual of compulsory pension insurance contributions

Sources: The forecast of Russia's social and economic development for the year 2017 and for the planning period of 2018 and 2019 (including the data calculated for the period until 2025) made by the Russian Ministry of Economic Development; The Federal law from 24.07.2009 N 212-FZ (as amended on 19.12.2016)

Self-employed individuals pay insurance contributions according to the level of their own revenues. If the income does not exceed RUB 300,000 per year the contributions are paid in the fixed amount, otherwise the variable part is added (see Equation (1)):

$$\mathrm{IC}^{\mathrm{self-employed}} = \mathrm{IC}_{\mathrm{fixed}}^{\mathrm{self-employed}} + \mathrm{IC}_{\mathrm{fixed+1}}^{\mathrm{self-employed}} \quad (1)$$

where: $\mathrm{IC}^{\mathrm{self-employed}}$– insurance contributions paid by self-employed individuals; $\mathrm{IC}_{\mathrm{fixed}}^{\mathrm{self-employed}}$– insurance contributions paid by self-employed individuals in case their income does not exceed RUB 300,000 per year; $\mathrm{IC}_{\mathrm{fixed+1}}^{\mathrm{self-employed}}$– insurance contributions paid by self-employed individuals in case their income exceeds RUB 300,000 per year.

In their turn, insurance contributions paid by the self-employed individuals whose income does not exceed RUB 300,000 per year are calculated as follows in Equation (2):

$$\mathrm{IC}_{\mathrm{fixed}}^{\mathrm{self-employed}} = \mathrm{Minimum\ wage} * 26\% * 12 \quad (2)$$

where: Minimum wage is established by the Russian law and is effective throughout the whole of the country; at the same time, the regional authorities have the right to determine the minimum wage in the federal subject with due account for the specific social, economic and geographical features.

It is worth noting that the self-employed individuals are the only category of insurance contribution payers who pay the full rate of 26% whereas the contributions for the employees are accrued on the basis of the rate 22% + 10%.

If the income of the self-employed individuals exceeds RUB 300.000 per year, a contribution of 1% of the revenue exceeding RUB 300.000 per year is paid in addition to the contribution paid in the fixed amount. At the same time the law states that the contributions paid with 1% should not exceed the following value: 7 * Minimum wage * 26% * 12. In other words, the maximum rate of insurance contribution for self-employed individuals is calculated as it is shown in Equation (3):

$$\mathrm{IC}_{\mathrm{max}}^{\mathrm{self-employed}} = 8 * \mathrm{Minimum\ wage} * 26\% * 12 \quad (3)$$

Certainly, the most important underlying equilibrium of the pension system in the period of developing its model and tariff policy in respect of the compulsory pension insurance contributions should be the absolute equilibrium. Therefore, the elaboration and justification of the objective system of rates with due account for the interests of the employers, insured persons and the budget system in general is of great importance

In the most general terms the equilibrium of financial flows within the compulsory pension insurance system can be described by the following thesis "the revenues of the Pension Fund of the Russian Federation must not be lower than the funds payable" and the following in Equation (4):

$$\sum \mathrm{IC}_{\mathrm{CPI}} + \sum \mathrm{Tr} - \mathrm{t}_{\mathrm{FB}} \geq \sum \mathrm{IP} + \mathrm{C}_{\mathrm{burial}} + \mathrm{C}_{\mathrm{system}} \quad (4)$$

where: $\sum \mathrm{IC}_{\mathrm{CPI}}$ - the sum of compulsory pension insurance contributions due; $\sum \mathrm{Tr} - \mathrm{t}_{\mathrm{FB}}$ – the sum of inter-budget transfers related to compulsory pension insurance from the federal budget to the budget of the Pension Fund of the Russian Federation; $\sum \mathrm{IP}$ – the sum of costs of insurance pension benefits (regardless of the grounds they were awarded on); $\mathrm{C}_{\mathrm{burial}}$ – costs of funding the allowance for burial and burial-related services in accordance with the catalogue of such services guaranteed to the deceased pensioners who were beneficiaries of insurance pension or accumulated pension and who were unemployed at the date of death; $\mathrm{C}_{\mathrm{system}}$– administrative costs of the Pension Fund of the Russian Federation (personnel costs, occupancy costs, construction, personnel training, R&D ordering etc.).

The formula does not contain the revenues and costs related to funding the social benefits paid out by the Pension Fund of the Russian Federation or the revenues from investment of unobligated assets of the Fund or mulcts and fines received, both those not related to compulsory pension insurance and those having insignificant impact on the subject of this study.

3. Case studies

When making forecast calculations the authors used the data provided in the forecast of Russia's social and economic development for the year 2017 and for the planning period of 2018 and 2019 (including the data calculated for the period until 2025) made by the Russian Ministry of Economic Development[11]; the authors applied the statistical forecasting methods (simple exponential smoothing method, ARIMA, Holt's method) as well.

The authors' calculations show that during the period 2017-2025 the system of compulsory pension insurance will remain misbalanced (see Table 4).

Table 4. Forecast of financial sustainability of the compulsory pension insurance system for the period 2017-2025

Year	Revenues ($\sum IC_{CPI} + \sum Tr - t_{FB}$), RUB billion	Expenses ($\sum IP + C_{burial} + C_{system}$), RUB billion	Equilibrium of the financial flows of the compulsory pension insurance system	
			RUB billion	%
2017	5,745.88	6,448.05	- 702.17	89.11
2018	6,100.06	6,809.43	- 709.36	89.58
2019	6,442.68	7,175.91	- 733.23	89.78
2020	6,857.60	7,470.68	- 719.11	91.79
2021	7,230.17	7,868.37	- 757.29	91.89
2022	7,575.79	8,272.29	- 827.94	91.58
2023	7,933.21	8,682.10	- 887.73	91.37
2024	8,288.80	9,103.73	- 959.72	91.05
2025	8,654.65	9,536.13	- 1,032.7	90.76

Source: Authors' calculations

It is obvious that drastic actions are required in order to transform not only the existing system of compulsory pension insurance contributions, but the selected elements of the pension system as well, such as retirement age threshold and mechanisms of pension capital accumulation in the first place. However, the modern discussion on the new face of the pension system revolves around nothing but its fiscal aspects. The ultimate goal of all the measures suggested by the Russian Ministry of Finance, Russian Ministry of Economic Development, Ministry of Labor and Social Protection and even the Bank of Russia is not attaining the long-term equilibrium of the budget of the Pension Fund of the Russian Federation, but lowering the volume of transfers from the federal budget. However, the fact that the pension system is a source of long-term funding that the Russian economy needs so badly for restoring its growth and introducing structural changes, is completely ignored.

One should bear in mind that the problem of improving the financial sustainability of the pension system can be solved in the short term and in the long term.

In the short term it can be solved only by introducing changes into the tariff policy which should lead to the growth of the revenue side of the budget of Pension Fund of the Russian Federation (Gryanchenko 2015, 112). In the authors' opinion, the suggestions aimed at settlement of the expense side of the compulsory pension insurance system lead to either a decrease in the number of people covered by pension insurance and their transfer to the social security system or to a further increase in costs.

The analysis of the tariff policy in compulsory pension insurance allowed determining the main problem areas that the efforts aimed at the increase of the financial sustainability of the pension system should be focused on. They are as follows:

[11] Forecast of the socio-economic development of the Russian Federation for 2017 and for the planned period 2018 and 2019 by Ministry of the Economic Development of the Russian Federation [accessed 2017 May 24] http://economy.gov.ru/minec/activity/sections/macro/2016241101

- the rate of compulsory pension insurance is unreasonably low;
- the insured persons do not participate in creation of pension rights;
- a certain part of insurance contributions is used for non-personified payments related to insurance coverage;
- there are exemptions concerning payment of insurance contributions for employers in certain sectors of the economy.

At present there is no direct correlation between the decrease in social contribution rates and the growth of wages, increase in investment in human capital and boosting the attractiveness of certain sectors. Nevertheless, due to introduction of exemptions in Russia the principles of social insurance are violated. In most countries the opposite tends are observed when at the state level the attractiveness of certain sectors is increased by improving the quality and skills of employees and introduction of new technologies and innovations.

The measures aimed at improving the financial sustainability via the tariff policy are as follows:

- changing compulsory pension insurance contribution rate through dividing the rate into fixed and variable parts;
- making the payment of insurance contribution by the insured persons obligatory;
- canceling the funding of the defined benefit through insurance contributions and introducing a separate contribution for funding it;
- replacing the reduced contribution rates in compulsory pension insurance with federal subsidies;
- increasing the base of fixed payment for compulsory pension insurance for self-employed individuals from 1 to 2 minimum wages with simultaneous introduction of subsidies for the amount of base increase.

Having integrated the open source data, one can assume that in the Russian Federation the contribution rate in respect of compulsory pension insurance of employees is calculated as follows in Equation (5):

$$\mathrm{Rate}_{\mathrm{CPI}}^{\mathrm{employees}} = \frac{\mathrm{C_{IP}}+\mathrm{C_{burial}}+\mathrm{C_{system}}-\sum \mathrm{IC}_{\mathrm{self-empl.}}^{\mathrm{CPI}}}{\mathrm{PB}*\mathrm{R_{income}}*\mathrm{R_{highlypaid}}} \quad (5)$$

where: $\mathrm{C_{IP}}$– the costs of funding the insurance pension after deduction of costs of funding the defined benefit; $\mathrm{C_{burial}}$ – costs of funding the allowance for burial and burial-related services in accordance with the catalogue of such services guaranteed to the deceased pensioners who were beneficiaries of insurance pension or accumulated pension and were unemployed at the date of death; $\mathrm{C_{system}}$ – administrative costs of the Pension Fund of the Russian Federation (personnel costs, occupancy costs, construction, personnel training, R&D ordering *etc.*); $\sum \mathrm{IC}_{\mathrm{self-empl.}}^{\mathrm{CPI}}$–the sum of compulsory pension insurance contributions paid by self-employed individuals; PB – pay roll budget on the nationwide scale; $\mathrm{R_{income}}$– compulsory pension insurance contributions and defined benefit contributions income ratio; $\mathrm{R_{highlypaid}}$ - ratio registering the percentage of employees to whose salaries the compulsory pension insurance contributions will be accrued to the full extent.

The introduction of the insurance contribution rate in respect of the defined benefit is suggested. It will increase transparency of the financial flows in compulsory pension insurance, because as of today this non-personified benefit is funded at the expense of a proportion of compulsory pension insurance contributions. As a result, there is a threat of growth of transfers from the federal budget when the insured persons for whom the contributions are being paid now, will retire. It is also suggested that insurance contributions in respect of the defined benefit should be paid by the insured persons directly. For employees it will be calculated as follows in Equation (6):

$$\mathrm{Rate}_{\mathrm{DP}}^{\mathrm{employees}} = \frac{\mathrm{C_{FP}}-\mathrm{IC}_{\mathrm{DP}}^{\mathrm{self-employed}}}{\mathrm{PB}*\mathrm{R_{inc}}} \quad (6)$$

where: C_{FP} – costs of funding the defined benefit for the insurance pension; $IC_{DP}^{self-employed}$- insurance contributions paid by self-employed individuals for funding the defined benefit

After introducing the suggested mechanism of calculating the compulsory pension insurance rate into effect, the sum of the contribution rates in respect of compulsory pension insurance and defined benefit for employees will amount to the values shown in Table 5.

Table 5. The forecast of overall insurance contributions load on compulsory pension insurance and defined benefit for the employees for the period 2017-2025 (%)

Year	$\text{Rate}_{\text{CPI}}^{\text{employees}}$	$\text{Rate}_{\text{DP}}^{\text{employees}}$	$\sum^{\text{employees}} \text{IC}$
2017	19.25	10.77	30.02
2018	19.09	10.76	29.84
2019	18.99	10.79	29.77
2020	18.20	10.74	28.94
2021	18.18	10.71	28.89
2022	18.30	10.68	28.98
2023	18.39	10.66	29.05
2024	18.51	10.64	29.15
2025	18.62	10.63	29.25

Source: Authors' calculations

At the same time, for self-employed individuals the growth of the rate will be less important and will result as follows in Equation (7):

$$\text{Rate}_{\text{CPI}}^{\text{self-employed}} = \text{Minimum wage} * 22.32\% * 12 \quad (7)$$

The defined benefit funding rate paid by the self-employed individuals as a fixed sum is given in Equation (8):

$$\text{Rate}_{\text{DB}}^{\text{self-employed}} = \text{Minimum wage} * 4\% * 12 \quad (8)$$

The new rates include administrative costs of the Pension Fund of the Russian Federation. The authors consider it necessary to establish the rule regarding the balance of the amount of administrative costs and the expense side of the Fund's budget with the purpose of improving the quality of the administrative work. The expense level itself should amount to 1.44%, which follows the example of Germany (DRV) (OECD 2015).

The authors share the position of W. Scholtz who showed the tenuity of attempts to compare the pension systems (or their elements) of different countries and to compile rankings on that basis in his study (Scholtz 2015, 23). Also it should be emphasized that the direct correlation is ascertained between the degree of the pension system's development (to what extent the pensions are diversified, the way that the personified records are kept, if the records of other revenues of the insured person or a household are kept *etc*.) and the administrative costs (Sluchynsky 2015, 40).

The authors suggest taking guidance in the matter of administrative costs at least from the example of Germany, otherwise the consistent lowering of administrative costs might lead to the deterioration of quality of duties performed by the Pension Fund of the Russian Federation (outflow of the qualified personnel, insufficient investment in infrastructure causing slow and incorrect data processing *etc*.)

On that basis, the authors consider it appropriate to use the formula provided above as a justification of insurance contribution rate for the following 3 years and to consider the matters of lowering or raising the rate and the budget estimates of the Pension Fund of the Russian Federation simultaneously. In this regard it is suggested that the distribution of the insurance contribution rate should be as follows (see Table 6):

Table 6. Compulsory pension insurance contribution rate

	Employer	Employee
Up to the limit value of the base	16.0% + i	2.0%

Note: "i" is the variable part of the rate calculated on the basis of expected costs of payment of insurance pensions in the following year (calculated as the difference between rate calculated for the compulsory pension insurance contribution and 18%)

Source: Authors' calculations

Also it seems reasonable that insurance contributions for the defined benefit should be paid only by insured persons in case there is no limit for accruing insurance contributions, as in that case the principle of solidarity will be complied with.

It is suggested that the transition to the new tariff policy should be carried out in not less than two years after its announcement. A two-year postponement is required for anticipatory social discussion of the measures and preliminary notification of both employers and employees of the upcoming changes. Hence, the transition may be carried out not earlier than starting from January the 1st, 2020.

The distribution of overall insurance contributions loading between the employees and employers in the period 2020-2025 will be as follows (see Table 7):

Table 7. Distribution of insurance contribution payments loading in respect of compulsory pension insurance and funding of the defined benefit between employees and employers in 2020-2025

	Employee	Employer	Total
Compulsory pension insurance contributions	2.0	16.18 – 16.62	18.18 – 18.62
Insurance contributions for funding the defined benefit	10.63 – 10.79	0,0	10.63 – 10.79
TOTAL	12.63 – 12.79	16.18 – 16.62	28.89 – 29.25

Note: The value in the cell TOTAL – TOTAL corresponds to the calculated values shown in Table 2

Source: Authors' calculations

The expected proceeds from insurance contribution payments are shown in Table 8.

Table 8. Calculation of rate for compulsory pension insurance contributions paid in respect of employees for 2017-2025

Year	PB, RUB billion	$Rate_{CPICR}$,%	$\sum IC_{self-employed}$ RUB billion	C_{burial} RUB billion	R_{income} %	$R_{highly\ paid}$ %	$\sum IC_{employees}$ RUB billion
2020	24,048.33	17.77	148.13	9.30	98.70	93.30	4,792.25
2021	25,407.48	17.72	153.83	9.66	98.70	93.90	5,040.87
2022	26,763.96	17.82	159.52	10.02	98.70	93.90	5,293.88
2023	28,144.20	17.91	171.56	10.38	98.70	93.90	5,556.34
2024	29,553.64	18.03	177.40	10.74	98.70	93.90	5,826.96
2025	31,010.73	18.14	183.16	11.10	98.70	93.90	6,104.34

Source: forecast of Russia's social and economic development for the year 2017 and for the planning period of 2018 and 2019 (including the data calculated for the period until 2025) made by the Russian Ministry of Economic Development, authors' calculations.

As a result of application of the suggested rates the volume of revenues received by the Pension Fund of the Russian Federation with due account for the inter-budget transfers from the federal budget will be comparable to the volume of funding of the insurance pensions.

Conclusion

The transition to the new tariff policy starting from 2020 will secure the long-term financial sustainability of the pension system, decrease its dependence on the federal budget, increase the transparency of the formation of the budget and its expenditure items and it will also allow providing clear long-term conditions for creating pension rights of the insured parties and running a business activity.

Reconsideration of the tariff policy will not influence the future pension rights of the insured persons directly. This is due to the points system of compulsory pension insurance that is in effect in Russia where only wages and pension insurance record have impact.

It is necessary to stop considering the pension system as an institute of fiscal load on the budget system and employers and to transform all decisions regarding its modernization from the perspective of encouraging investment in human capital, alleviation of poverty of the future pensioners and increasing their purchasing power. Due consideration for these criteria in the pension plan will employ its resources for stimulating the economic growth in Russia.

In this regard the authors point out the possibility of saving the compulsory funded pension even if with the minimum 1-2% rate of contributions from the payroll budget. In the future in case the real earnings of population recover up to the level of 2013 the introduction of the voluntary pension saving system is possible both in the framework of corporate pension plans and personal decisions made by individuals. This measure will allow attracting additional resources to the financial market in order to fund the long-term investments which under conditions of relative stabilization of the ruble exchange rate will secure a higher level of their profitability and higher returns on investment of pension capital as a result. According to the evaluation of the National rating agency, as a result of extension of the moratorium on pensions in 2017 the Russian financial market loses capital in the amount of 700-800 billion with capital multiplier effect taken into account.[12] Considering the average rate of gross capital accumulation in Russia being 21.3% the fixed capital formation losses only for 2017 will amount to RUB 150-160 billion. Due to that the use of pension savings in the federal budget for further funding of the transfers to the Pension Fund of the Russian Federation without restructuring the pension system encourages consuming the future potential of human capital and is therefore unacceptable.

Along with that the OECD points out that the low interest rates decrease the capacity of pension funds and life insurance companies to deliver on their promises regarding the pensioners and pension savers in the defined benefit pension plans[13].

Taking into account the social focus of the pension savings as well as a rather limited range of income sources of the senior citizens and on the basis of a modest list of facilities for investment of the pension savings and significant limitations in respect of building of investment portfolios, the authors believe that the matter of including or excluding the compulsory funded element from the pension system should be considered only in the framework of a certain country, as the generalized international recommendations are unproductive in this case. In addition, if a decision is taken in favor of the compulsory funded level, it will be more advisable to develop it alongside the distributive level, not instead of it.

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Impact of Selected Factors on the Formation of Regional Disparities in Slovakia

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Abstract:

The purpose of this study is to perform the evaluation and quantification of the impact of factors contributing to the formation of regional disparities in Slovakia. The article discusses the impact of factors such as nominal wages, unemployment rate, variability of job vacancies, labour productivity, or foreign direct investment on the amount of household disposable income and generated savings within the period of eleven years, as well as the impact of these factors on the wealth distribution among the households which was identified while applying the Gini coefficient for each region. With regard to the data structure, the panel data regression was applied in the paper (a pooled regression model, a random effects model, and a fixed effect model). Analysis results confirmed significance of five hypotheses, i.e. a decrease in unemployment rates in regions with higher wages will result in lower increase in wages than in the remaining region groups; in regions with lower unemployment rates, an increase in job vacancies is associated with a higher increase in offered wages and an increase in the labour productivity in regions with lower incomes causes more uneven income distribution, whereas in the case of foreign direct investment, the effect is opposite.

Keywords: regional disparities; panel data regression; Gini coefficient; nominal wages; labour productivity; unemployment; income, foreign direct investment

JEL Classification: E24; R11; C33; J30

Introduction

The period of growing globalisation and mutual interconnection of economies of individual countries generate a growing pressure aimed at using accessible resources in a more efficient manner. Efficient and competitive economy contributes to achieving a higher quality of regional development which is related to various aspects, such as the infrastructure in a region and provided services, potential innovations and development, and, above all, the human capital. Therefore, not only companies but also individuals more and more often, and with less and less problems, tend to gather at places offering them certain benefits. Nevertheless, it is not merely a question of the amount of disposable income but also the structure of available jobs, infrastructure in a region, *etc*. Such uneven

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distribution of available resources in the country often results in regional disparities that may lead to even bigger problems between individual regions.

The present paper is therefore primarily focused on the identification of the relationship between selected economic indicators with the assumed impact on the formation of regional disparities between the counties in Slovakia. The objective of the present paper is to verify eight significant hypotheses focused on the identification of the impact of selected economic factors (unemployment rate, variability of job vacancies, foreign direct investment, labour productivity, inescapable expenditures) on the amount and distribution of income and savings and thus their impact on the formation of disparities in Slovakia.

1. Literature review

1.1. Basic theoretical premises regarding regional disparities

Unequal distribution of available resources in the country often results in regional disparities that may lead to various problems between individual regions. The differences exist in many areas, whether designated as differences between the regions, or differences in the levels of advancement of individual countries, differences in their economy levels, differences in the amounts of generated GDP, differences in unemployment rates, and in many other spheres.

Regional disparities are a serious social problem (Gajdoš 2008). According to Cuaresma, Doppelhofer, Feldkircher (2012) the key factors of regional disparities are differences in human capital between the regions which contribute to higher growth rates in the major cities. Authors as Matlovič and Matlovičová (2011), dealing with regional disparities in Slovakia, understand the notion of regional disparities as certain differences in the levels of social and economic development of individual regions, *i.e*. counties regarded as administrative units of the SR. They claim that regional disparities in Slovakia are determined by regional consequences of the post-communist economic transformation after 1989. This economic transformation increased the dynamics of regional development, accompanied with the beginnings of differentiation tendencies as a result of competitive mechanisms.

Výrostová (2010) claims that regional disparities may be caused by several factors of economic as well as non-economic nature. The reasons thereof may include, for example, differences in the presence of production facilities, lack thereof, or irrational use of production facilities, differences in the economic structure of individual regions, in the social capital, in low workforce and capital mobility, the differences may also exist in the demand for regional products, in customers' habits, or in different ability to bring innovations. Natural, geographic, or historical conditions in a particular region, differences in culture, traditions, demographic characteristics, or the levels of education among the inhabitants also represent the reasons that cause disparities between the regions.

The causes of regional differences are always varied; however, it is important to assist with gradual elimination thereof. Each country has its own regional policy comprising individual tools aimed at mitigation, elimination, or complete removal of individual disparities and declining the existing divergences. Assistance with the removal or elimination of regional disparities is carried out while applying various methods, using various tools, state support, projects focused on regional development, *etc*. Gajdoš (2008) claims that the removal of regional differences represents a long-term and complex process that requires the application of appropriate strategies and an optimal combination of exogenous and endogenous approaches aimed at elimination of such disparities.

1.2. Results of previous research focused on regional disparities

The issues related to regional disparities represent a very extensive and frequently discussed topic. In Slovakia, there are evident and marked differences between individual regions; therefore, this topic is dealt with by many authors who analyse and examine it from various perspectives. The following section contains the review of such studies.

Habanik, Hostak, Kutik (2013) discuss the disparities in Slovakia in the article titled "Economic and Social Disparity Development within Regional Development of the Slovak Republic". The purpose of the study was to employ different measures of regional disparity in order to empirically analyse the set of chosen socio-economic indicators that provide insights about the current situation in individual Slovak regions. The study confirms the negative trends in terms of growing regional development disparities across Slovakia and discusses the

determinants of regional disparities in the Slovak Republic, most notably the foreign direct investment inflow, demographics and the flow of funds into research and development activities.

The development of regional disparities in Slovakia was studied in years 2001 – 2013 by Havierniková, Jansky (2014) who strived to evaluate the development of regional disparities between the Slovak regions in the context of selected social and economic indicators: unemployment rate, regional GDP, average nominal monthly wages, number of business partnerships per 1,000 economically active inhabitants, density of highways, and costs of research and development.

In their article titled "Analysis of Income Polarisation in Slovak Regions", Pauhofová, Stehlíková, Martinák, Páleník (2016) discuss the identification of the development in the field of wage distribution and disparities at regional and industry levels. They observed the highest percentage of the total disparities in gross wages during the examined period in Bratislava, the capital of Slovakia, where the average wages were much higher than in the remaining regions of the SR. They also observed that in the examined period of years 2010 – 2014, the average wages in Bratislava were 55% higher than the average wages in the SR, whereas in the capital city alone there was the highest income inequality from among the remaining regions of the SR. The article was also dealing with the minimum wages and the problem of low wages. The regions with a long-term persisting high percentage of employees with low wages include the regions of Prešov and Nitra. The worst results, in terms of low wages, were observed in the segment of services. Issues regarding the minimum wages, having a provable effect on the amounts of wages paid to employees with low qualification (increases the wage inequality) were also discussed by Nedomlelová, Staňková and Vavrek (2017). They studied how the minimum wage amount affects selected indicators, such as employment and GDP.

Foreign direct investment (FDI) is studied by various authors who strive to identify their positive impact on the elimination of regional disparities. Ivanová (2013) was dealing with the analysis of the impact of foreign direct investment on the economic growth in Slovak regions. Her article proved that FDI affects economic growth in these regions and their key benefit is the fact that they affect the employment rate in regions; this fact is synergically reflected in the income of inhabitants and the growth of regional demand. The author claims that the inflows of foreign direct investment is an important indicator of the innovation ability (or a prerequisite for a technological transfer), especially in newly developing economies. FDI inflow may be regarded as an important factor of economy growth and production rate in a region due to increasing export rate, a positive effect on the employment rate, or also increasing its technological level. Moreover, FDI inflow indicates the rate of incorporation of a particular economy in the international labour distribution and its attractiveness for the international capital.

The studies listed above were dealing with disparities in Slovakia; however, the topic of regional disparities as such is studied by many other authors, such as Okabe and Kam (2017), Obradovic, Lojanica and Jankovic (2016), Fendel (2016). Authors Dusek, Lukács and Rácz (2014) study regional disparities as well; they analyse and quantify regional disparities in seven regions of Hungary. Indicators frequently discussed within the study of disparities include also GDP per capita (*e.g.*, in the article of Fan, Kanbur and Zhang 2011) or FDI (Nistor 2012).

Disparities in the EU are frequently subject to various studies. Authors Borsi and Metiu (2015) dealt with the development of economic convergence in the European Union. This contribution investigated per capita real income convergence in the European Union (EU) within a non-linear latent factor framework. Their findings suggest no overall income convergence in the EU.

The same problem was dealt with by Blížkovský (2012) in his article titled "Regional Disparities and Convergences in the European Union". This contribution analysed the disparities and convergences between 97 regions of the European Union in the period from 2000 to 2008. The study tests the hypothesis that the EU regions are converging economically. The study concludes that the level of disparities among the EU regions is relatively low.

2. Methodology

2.1. Main objective

The main purpose of this paper is to evaluate and, above all, quantify the factors directly affecting regional disparities. In our opinion, the key factors include income (in this case the average household disposable income)

and savings (representing the difference between the income and the expenditures) of households. This is a primary reason for the evaluation of created sets of indicators within the effort to identify the relationships between the income and the savings.

2.2. Hypotheses

We assume that in regions with low unemployment rate and high income the number of job vacancies has a significantly lower impact than the number of unemployed persons; in such regions it is associated with a relatively high saturation of the labour market and with the labour force fluctuation. Also, we regard the foreign direct investment as one of the carriers of nominal wage growth in regions, which relates to increasing the production capacities, *i.e*. also higher labour market saturation. We also assume that with a growing average disposable wages, the income distribution inequality will increase as well.

The aforesaid indicates that the growth of income distribution inequality is also affected by the growth of labour productivity and the registered unemployment rate, or by a decreased inflow of foreign direct investment in the region and a decreased number of job vacancies on a regional labour market. When analysing the disparities between the regions, we carried out, in addition to examination of the impact of selected components on the income amount and distribution, also the evaluation of the impact of so-called inescapable expenditures (costs of meals, accommodation, transport, and clothes) within the creation of savings in households. In the long run they create investments, *i.e*. yet another factor inducing the growth of economic performance in regions, and for households they also represent a sort of collateral for hard times to come.

Working hypotheses are then as follows:

H1: In regions with lower household income the unemployment rate fluctuations have a stronger impact on the nominal wages amount than in regions with higher income.

H2: In regions with higher income of households, variability of job vacancies has a stronger impact on the nominal wages amount than in regions with lower income.

H3: Foreign direct investment affects the growth of nominal wages.

H4: Increase in the labour productivity affects regional disparities in form of more marked income distribution inequality, whereas such effect is stronger in regions with lower income.

H5: Increase in the official unemployment rate is contributed to by unequal disposable income distribution to a greater extent in regions with higher income.

H6: Increase in the inflow of foreign direct investment reduces regional disparities, understood within the meaning of income distribution among the population in the region, to a greater extent in regions with lower income.

H7: Increase in number of job vacancies stimulates the equal income distribution within the population to a greater extent in low-income regions.

H8: In poorer regions, inescapable expenses have a stronger effect on the amount of generated household savings.

2.3. The research methods and data

On the basis of the above listed assumptions, we evaluated the impact of productivity, situation on the labour market on the demand and supply sides, and the inflowing foreign direct investment on the amount of the disposable nominal income, or the impact of the expenditure structure on the amount of generated savings. The relevant functions are thus follows:

$$GINI = f(AV, LMS, FDI) \quad (1)$$

$$INC = f(AV, LMS, FDI) \quad (2)$$

SAV = f (IE), (3)

where: *GINI* represents the value of the Gini coefficient of income distribution, *INC* represents the income, *AV* means the added value understood as productivity, *LMS* is a variable representing the changes on the labour market, as assessed in terms of two primary aspects, the supply and the demand, *FDI* expresses the inflow of foreign direct investment into the region, *SAV* expresses the household ability to generate savings, and *IE* is understood as inescapable expenditures in households, including the costs of food, accommodation, clothes, and transport. The list of variables is summarised in Table 1.

Table 1 List of variables used in regression models

Variable	Description	Source	Use
INC	Income of households (in EUR). This variable is expressed by a natural logarithm of average disposable household income, as the impact of the growth is stronger with lower wages and decreases with growing wages. (*dependent variable)*	Statistical Office of the Slovak Republic	Panel A Panel B
GINI	Gini coefficient (dimensionless parameter). This variable consists of the Gini coefficient value that corresponds to the diversity or to unequal income distribution in a region. (*dependent variable)*	Statistical Office of the Slovak Republic	Panel C Panel D
SAV	Savings of households (in EUR). This variable is expressed by a natural logarithm of the difference between the household income and the expenditures. The logarithm was applied for reasons similar to those in the case of the income. (*dependent variable)*	Statistical Office of the Slovak Republic	Panel E
AV	Added value per household (in EUR per household). It is expressed by the ratio of added value in a region to the number of households in that region. (*independent variable)*	Statistical Office of the Slovak Republic	Panel A Panel B Panel C Panel D
UNE	Official unemployment rate (as percentage). It is expressed by the ratio of disposable job applicants to the economically active population. (*independent variable)*	Ministry of Labour, Social Affairs and Family of the Slovak Republic	Panel A Panel C
NVJ	Number of job vacancies per applicant (as percentage). It is expressed by the ratio of number of job vacancies to disposable job applicants. (*independent variable)*	Ministry of Labour, Social Affairs and Family of the Slovak Republic	Panel B Panel D
FDI	Foreign direct investment per household (in EUR per household). It is expressed by the ratio of all foreign investment in a region to the number of households. (*independent variable)*	National Bank of Slovakia	Panel A Panel B Panel C Panel D
FOD	Costs of food (as percentage). It is expressed by the ratio of costs of food to total costs in households. (*independent variable)*	Statistical Office of the Slovak Republic	Panel E
ACC	Costs of accommodation (as percentage). It is expressed by the ratio of costs of accommodation, water, electricity, gas, and other fuels to the total costs in households. (*independent variable)*	Statistical Office of the Slovak Republic	Panel E
CLO	Costs of clothes (as percentage). It is expressed by the ratio of costs of clothes and shoes to the total costs in households. *(independent variable)*	Statistical Office of the Slovak Republic	Panel E
TRA	Costs of transport (as percentage). It is expressed by the ratio of costs of transport to the total costs in households. *(independent variable)*	Statistical Office of the Slovak Republic	Panel E

As mentioned above, the situation on the labour market is studied from two points of view; a separate analysis was carried out for each one of them. In the first case, *i.e.* in the analysis of the supply side of the labour market, we used the unemployment rate indicator, whereas on the demand side we analysed the number of job vacancies. The indicator of added value per household in the region represents the labour productivity, the impact of which on the wage amount has already been proved, for example in the study by authors Sharpe, Arsenault,

Harrison (2008), or in the article by Vašaničová (2016). A double effect of the investment on the wage amount relates to the investment characteristics. Whereas the investment in production extension usually does not affect the wage amount directly but only through changes in the balance on the labour market, investment in new technologies not only increases the labour productivity but also increases the requirements with regard to new or existing labour force, and increasing requirements are associated with higher remuneration rates.

The analysis is focused on 8 regions, as classified in the NUTS 3, whereas the examined development covers 11 periods. The panel data were used, while applying regression models primarily intended for the analysis of such structured data, i.e. the pooled regression model (PRM), the random effects model (*REM*), and the fixed effects model (*FEM*). These methods are constructed as follows:

PRM: $GINI_{tc} = \alpha + \beta_1 * AV_{tci} + \beta_2 * LMS_{tci} + \beta_3 * FDI_{ci} + \varepsilon_{tc}$ (4)

REM: $GINI_{tc} = \beta_1 * AV_{ci} + \beta_2 * LMS_{tci} + \beta_3 * FDI_{tci} + (\alpha + u_c) + \varepsilon_{tc}$ (5)

FEM: $GINI_{tc} = \alpha_t + \beta_1 * AV_{tci} + \beta_2 * LMS_{tci} + \beta_3 * FDI_{tci} + \varepsilon_{tc};\ \alpha_t = \alpha_{t1} + \alpha_{t2} + ... + \alpha_{te}$ (6)

PRM: $INC_{tc} = \alpha + \beta_1 * AV_{tci} + \beta_2 * LMS_{tci} + \beta_3 * FDI_{tci} + \varepsilon_{tc}$ (7)

REM: $INC_{tc} = \beta_1 * AV_{tci} + \beta_2 * LMS_{tci} + \beta_3 * FDI_{tci} + (\alpha + u_c) + \varepsilon_{tc}$ (8)

FEM: $INC_{tc} = \alpha_t + \beta_1 * AV_{tci} + \beta_2 * LMS_{tci} + \beta_3 * FDI_{tci} + \varepsilon_{tc};\ \alpha_t = \alpha_{t1} + \alpha_{t2} + ... + \alpha_{te}$ (9)

PRM: $SAV_{tc} = \alpha + \beta_1 * FOD_{tci} + \beta_2 * ACC_{tci} + \beta_3 * CLO_{tci} + \beta_4 * TRA_{tci} + \varepsilon_{tc}$ (10)

REM: $SAV_{tc} = \beta_1 * FOD_{tci} + \beta_2 * ACC_{tci} + \beta_3 * CLO_{tci} + \beta_4 * TRA_{tci} + (\alpha + u_c) + \varepsilon_{tc}$ (11)

FEM: $SAV_{tc} = \alpha_t + \beta_1 * FOD_{tci} + \beta_2 * ACC_{tci} + \beta_3 * CLOA_{tci} + \beta_4 * TRA_{tci} + \varepsilon_{tc};\ \alpha_t = \alpha_{t1} + \alpha_{t2} + ... + \alpha_{te}$ (12)

The dataset was divided into five panel groups. Panel A evaluates the impact of a combination of indicators, while considering the demand side of the labour market, on the amount of disposable household income. Panel B evaluates a similar relationship, while considering the supply side of the labour market. Panel C is allied to Panel A because they cover the same combination of indicators, whereas in one case the evaluation is focused on the impact on the amount of the average disposable income and in the second case its distribution among the population. The same relationship exists also between the Panel B and Panel D. Panel E evaluates the relationship between the expenditure structure and the amount of generated savings. Moreover, each data panel is subjected to a partial analysis of region groups, whereas the combinations thereof depend on a region's economic performance. The first group comprises the regions with higher disposable income, *i.e.* BA, TT, and TN regions. The second group comprises the regions with lower disposable income, *i.e.* BB, PO, and KE regions. Remaining regions (ZA and NR) form the third group. Prior to each separate regression analysis, we assessed the stationarity of dependent and independent variables by verifying the presence of unit roots by the ADF test. Prior to the formation of regression models, we carried out the correlation analysis. We identified the appropriateness of one of the three above mentioned regression models while applying the Breusch-Pagan test statistics or the Hausman test statistics. All three methods were only used for the analysis of the complete dataset for the purpose of visualisation and comparison.

3. Results

On the basis of examination of existence of individual unit roots by the ADF test, we can confirm stationarity for all the used indicators; it means that no correction (difference) of indicators was required. Subsequently, we carried out the correlation analysis; results thereof are summarised in Table 2.

Table 2. Correlation analysis

	GINI	INC	SAV	AV	UNE	NVJ	FDI	FOD	ACC	CLO	TRA
GINI	1	0.7213 (0.520274) [3.7e-17] ***	0.7297 (0.532462) [1.1e-17] ***	0.7297 (0.532462) [1.1e-17] ***	0.1303 (0.016978) [0.1988]	-0.1219 (0.01486) [0.2293]	0.1841 (0.033893) [0.0681] *	-0.6940 (0.481636) [0.0070] ***	-0.3322 (0.110357) [0.0008] ***	-0.3770 (0.142129) [0.0001] ***	0.1958 (0.038338) [0.0521] *
INC		1	0.9522 (0.906647) [9.5e-52] ***	0.7146 (0.510602) [9.9e-17] ***	-0.0936 (0.008759) [0.356837]	0.0091 (0.000083) [0.928630]	0.4761 (0.218721) [6.32e-07] ***	-0.4705 (0.221335) [8.9e-07] ***	-0.3689 (0.136112) [0.000171] ***	-0.2897 (0.083954) [0.003626] **	0.1055 (0.011132) [0.298628]
SAV			1	0.5424 (0.294153) [6.7e-09] ***	0.113 (0.012776) [0.265301]	-0.1633 (0.026656) [0.106376]	0.3022 (0.091354) [0.002361] ***	-0.2807 (0.078816) [0.00488] ***	-0.2853 (0.081422) [0.004198] ***	-0.304 (0.092399) [0.002222] ***	0.0274 (0.000752) [0.787590]
AV				1	-0.5185 (0.268835) [3.86e-08] ***	0.3853 (0.148488) [0.000082] ***	0.9251 (0.855897) [1.4e-042] ***	-0.5893 (0.347245) [1.4e-10] ***	-0.3319 (0.110175) [0.0008] ***	-0.1588 (0.025208) [0.116498]	0.1066 (0.011368) [0.293532]
UNE					1	-0.6645 (0.441526) [6.44e-14]	-0.5324 (0.283491) [1.41e-08] ***	0.2045 (0.041837) [0.0423] **	0.3308 (0.109421) [0.0008] ***	-0.3215 (0.103372) [0.001174] ***	-0.1162 (0.013502) [0.252061]
NVJ						1	0.4761 (0.226662) [6.34e-07] ***	-0.327 (0.106908) [0.00096] ***	-0.2002 (0.040085) [0.0469] **	0.258 (0.066585) [0.0099] ***	0.0791 (0.006256) [0.436435]
FDI							1	-0.5001 (0.250061) [1.4e-07] ***	-0.1717 (0.029466) [0.0893] *	-0.1003 (0.010067) [0.323084]	-0.0042 (0.000017) [0.967242]
FOD								1	0.3358 (0.112771) [0.000679] ***	0.2015 (0.040621) [0.0454] **	-0.4144 (0.171704) [2.0e-05] ***
ACC									1	-0.2337 (0.054615) [0.019908] **	-0.491 (0.241071) [2.47e-07] ***
CLO										1	-0.1404 (0.019713) [0.165703]
TRA											1

Note: the first value represents the Pearson correlation coefficient, the value in round brackets is the coefficient of determination, and the square brackets contain the p-value of the t-test or the F-test; *, **, *** represent the statistical importance of 1%, 5%, or 10%

Source: Own processing

A directly proportional relationship between the amount of average household income and the Gini coefficient value means that within the monitored period the wage increase was associated with the growth of inequality of the distribution thereof, *i.e.* the growth of low wages was significantly lower than the growth of higher and average wages. Wages of low-income workers, amounting to approximately the minimum wage, as observed in the monitored period, showed a relatively slow increase (compared to the economy growth), whereas the wages of high-income workers depended on the economy development. Within the results of the correlation matrix, assumptions regarding a positive correlation between the disposable income and the combination of indicators, consisting of the added value (productivity), foreign direct investment, and job vacancies, were confirmed. An inversely proportional relationship was observed for the unemployment rate and the household income. However,

it is necessary to point out that none of the two labour market indicators is statistically important. Therefore, we incline to the opinion that the most important factors affecting the amount of disposable income is the added value generated in a particular region or the inflow of investments which are directly associated with the added value growth. The analysis of the impact of household expenditure items brought a surprising conclusion assuming a directly proportional relationship between the costs of transport and the amount of generated savings. We assume that it relates to the fact that the costs of transport are usually associated with travelling for jobs with higher wages (than those earned near one's place of residence), which increases the income. However, as they represent the expenditures, the evident negative impact on savings contributed to the fact that this relationship is statistically insignificant. With regard to the fact that the growth of wages in Slovak regions within the monitored period caused the increase in the income distribution variability, then the remaining indicators, such as added value and foreign direct investment, affected the growth as well. Again, labour market factors were statistically insignificant in this case as well.

Table 3 Test statistics of panels

	Panel A		Panel B		Panel C		Panel D		Panel E	
	F / LM / H	P-value	F / LM / H	P-value	F / LM / H	P-value	F / LM / H	P-value	F / LM / H	P-value
Test of joint significance of means	5.14018	7.88E-05	3.51870	0.0024984	1.57601	0.14370	3.01021	4.97E-03	0.80254	0.58770
Breuch-Pagan test statistics	5.76759	0.01632	4.29383	0.0382509	0.01318	0.90859	4.98342	0.02559	0.33788	0.56105
Hausman test statistics	24.78360	1.71E-05	16.6746	0.0008244	3.61087	0.30666	12.0076	7.36E-03	0.53557	0.96995

Source: Own processing

On the basis of the test of joint significance of the means of different groups and of the Breuch-Pagan test statistics, applied within the analysis of the impact of labour productivity and the inflow of foreign direct investment, while considering the supply or the demand sides of the labour market, on the amount of the average disposable income (Panels A and B), and within the analysis of the impact of labour productivity and the inflow of foreign direct investment, while considering the demand side of the labour market, (Panel D), we prefer the model of fixed effects. The panel diagnostics indicates the appropriateness of the use of the pooled regression model for Panel C and Panel E.

Table 4 Regression models for Panel A

Comparison of regression models for panel data				Comparison of various datasets			
	PRM ●	REM ●	FEM Δ		Regions with higher income	Regions near the average	Regions with lower income
constant	5.60612 [4.93e-093] ***	5.55499 [0.0000] ***	5.58862 [8.66e-080] ***	*constant*	5.83324 [5.07e-027] ***	5.49322 [8.80e-023] ***	5.31939 [4.38e-032] ***
AV	26.214 [4.77e-021] ***	29.7153 [1.96e-046] ***	30.1371 [5.97e-023] ***	*AV*	21.4935 [7.83e-07] ***	19.1824 [0.0117] **	39.8482 [2.86e-014] ***
UNE	−0.330534 [0.0209] **	−0.334770 [0.0231] **	−0.446119 [0.0110] **	*UNE*	−0.438202 [0.0416] **	−1.55466 [0.0008] ***	−2.14316 [0.0012] ***
FDI	−0.00809735 [3.99e-011] ***	−0.0111247 [4.02e-013] ***	−0.0131517 [1.24e-08] ***	*FDI*	−0.00868027 [0.0020] ***	0.0369602 [0.0928] *	−0.00164386 [0.9231]
Adjusted R^2 / corr $(y,\hat{y})^2$	0.747521	0.703811	0.763612	*Adjusted R^2*	0.717420	0.917202	0.919352

Note: ● only the indicative value (for the purpose of comparison); Δ constants of individual regions are listed in Table 9 in annexes

Source: Own processing

The question of foreign direct investment is described in more details after the analysis of Panel B, as in both cases the correlations were identical. The question of the relationship between the added value and the unemployment rate on one side and the growth of household income on the other side confirms that regions with

higher wages are closer to the full employment it means that any additional reduction of unemployment rate will result in higher wages than in other region groups; a quantitative expressions of the comparison of the above listed regions and the lower-income regions represents only a 11.7% increase. On the basis of the aforesaid, we can confirm the *H1* hypothesis. The same situation is in terms of the added value, as the only variable production factor in the short run (labour) is exhausted to a greater extent in regions with higher income than in the remaining regions. In particular, when comparing regions with income other than the average (higher and lower), it is only a 45.8% increase in regions with higher income.

Table 5 Regression models for Panel B

Comparison of regression models for panel data				Comparison of various datasets			
	PRM ●	REM ●	FEM Δ		Regions with higher income	Regions near the average	Regions with lower income
constant	5.3853 [2.24e-086] ***	5.29066 [0.0000] ***	5.28044 [6.24e-081] ***	*constant*	5.55685 [1.96e-032] ***	5.23524 [1.25e-020] ***	4.92101 [3.91e-030] ***
AV	28.0476 [1.92e-025] ***	27.6095 [6.07e-050] ***	27.5629 [1.27e-023] ***	*AV*	18.2484 [5.41e-07] ***	22.4036 [0.0114] **	37.0590 [1.69e-015] ***
NVJ	1.28368 [3.06e-06] ***	2.50144 [5.44e-09] ***	2.809 [5.25e-08] ***	*NVJ*	4.51506 [5.23e-05] ***	2.14449 [0.0169] **	2.24107 [3.22e-06] ***
FDI	−0.00833478 [4.16e-014] ***	−0.00984933 [1.95e-011] ***	−0.0110403 [3.92e-09] ***	*FDI*	−0.00715385 [0.0010] ***	0.0215890 [0.3840]	0.00697201 [0.6137]
Adjusted R^2 / corr $(y,\hat{y})^2$	0.799786	0.633639	0.825356	*Adjusted R^2*	0.821643	0.884319	0.947225

Note: ● only the indicative value (for the purpose of comparison); Δ constants of individual regions are listed in Table 9 in annexes

Source: Own processing

In the synergy of several effects, the foreign direct investment indicator appears to be inversely proportional, as compared to a positive correlation in the case of special evaluation in both examined panels, A and B. This may relate to the above mentioned double effect of the investments. Moreover, a connection between the investment and the added value growth, or with changes on the labour market, could have been manifested. This fact has also contributed to the disproval of the *H3* hypothesis. The job vacancies factor is the strongest in regions with the highest income; *H2* hypothesis is thus confirmed. In regions where the labour market is with almost full employment, any increase in offered jobs is associated with a higher increase in the offered wage (than in other regions) because employers strive to compete. During the monitored period, this effect caused that an increase in a single additional job vacancy will have approximately 1.5 - fold higher effect in regions with higher income than in regions with lower income, or a 1.7 - fold higher effect than in regions with more-less average income. This evident disproportion is caused by the effect associated with foreign direct investment that is directly proportional to the household income only in NR and ZA regions. The effect of added value is opposite in this case, as the labour market is now studied from the "opposite" side, *i.e.* from the supply side.

Table 6 Regression models for Panel C

Comparison of regression models for panel data				Comparison of different datasets			
	PRM	REM ●	FEM Δ●		Regions with higher income	Regions near the average	Regions with lower income
constant	0.17112 [5.29e-023] ***	0.17313 [1.15e-029] ***	0.17226 [4.71e-020] ***	*constant*	0.19805 [1.19e-08] ***	0.16218 [2.31e-012] ***	0.12746 [5.86e-08] ***
AV	4.12208 [2.64e-016] ***	4.13438 [5.08e-021] ***	4.16585 [1.79e-013] ***	*AV*	2.77248 [0.0036] ***	3.80283 [4.05e-07] ***	5.93387 [2.72e-012] ***
UNE	0.26309 [8.72e-06] ***	0.27384 [0.0033] ***	0.33025 [0.0049] ***	*UNE*	0.35481 [0.1988]	0.14703 [0.0927] *	0.26723 [0.0091] ***

Comparison of regression models for panel data				Comparison of different datasets			
FDI	−0.00146 [1.12e-010] ***	−0.00165 [5.97e-08] ***	−0.00198 [5.75e-06] ***	*FDI*	-0.00087 [0.0476] **	0.00244 [0.0215] **	−0.00108 [0.1645]
Adjusted R^2 / corr $(y,\hat{y})^2$	0.595289	0.56224	0.60823	*Adjusted R^2*	0.40806	0.94022	0.86552

Note: ● only the indicative value (for the purpose of comparison); Δ constants of individual regions are listed in Table 9 in annexes

Source: Own processing

Increase in the value added factor, perceived as productivity in a region, increases the income distribution inequality. This finding is related to the fact that the productivity growth is usually associated with the use of more advanced approaches, methods, materials, or processes, whereas the application thereof is often subject to increasing requirements with regard to employees who apply them. As the requirements increase, the compensation for employees (understood as the sum of employee's income and employer's contributions to the social and healthcare funds) increases as well. A growth of certain, a relatively small group of employees in a region increases the Gini coefficient value. Unemployment has shown the same impact on the income distribution as the added value; it relates to the supply on the labour market being higher than the demand, leading to the pressure on the available job applicants to accept a lower compensation and also creating the preconditions for reducing wages paid to currently employed people, *i.e.* to reducing the average wage. The impact of unemployment in regions with higher income did not reach the statistical significance; we therefore cannot prove its impact on the change in the Gini coefficient, whereas in the case of KE, PO, and BB regions such impact was confirmed and a positive relationship was observed. Therefore, we cannot confirm the *H5* hypothesis. Foreign direct investment was inversely proportionate to the Gini coefficient value, except for the average-income regions. This situation relates to the nature of investment flowing into regions during the monitored period, as described above.

Table 7 Regression models for Panel D

Comparison of regression models for panel data				Comparison of various datasets			
	PRM ●	REM ●	FEM Δ		Regions with higher income	Regions near the average	Regions with lower income
constant	0.21470 [3.96e-033] ***	0.20173 [7.32e-054] ***	0.20400 [2.29e-024] ***	*constant*	0.23530 [7.87e-07] ***	0.17731 [1.03e-013] ***	0.21300 [2.61e-015] ***
AV	3.78950 [1.06e-012] ***	4.37093 [6.19e-022] ***	4.50761 [1.21e-014] ***	*AV*	3.05829 [0.0038] ***	5.30103 [2.25e-06] ***	7.10295 [1.90e-014] ***
NVJ	−0.04983 [0.1062]	−0.02132 [0.4855]	−0.03065 [0.4202]	*NVJ*	−0.03896 [0.5129]	−0.07237 [0.1091]	−0.27272 [0.0143] **
FDI	−0.00146 [1.32e-08] ***	−0.00184 [1.18e-010] ***	−0.00214 [1.12e-05] ***	*FDI*	−0.00139 [0.0674] *	−0.00227 [0.3412]	−0.01359 [9.02e-05] ***
Adjusted R^2 / corr $(y,\hat{y})^2$	0.50295	0.49091	0.56926	*Adjusted R^2*	0.33567	0.94572	0.89905

Source: Own processing

A surprising finding is the absence of significance of the demand side of the labour market in all the cases. It means that the number of job vacancies in a region had no effect on the variability of the income of its inhabitants. Employers were not offering a significantly higher compensation (in aggregate) at more intensive pressure on their ability to ensure the labour factor, whereas in the opposite case such situation did not occur. The facts mentioned above do not allow us to confirm the *H7* hypothesis. A directly proportionate relationship between the labour productivity and the income distribution inequality in both panels (C and D) was observed to be more intensive in regions with a lower average wage. This indicates the assumption of insufficiently used capacities of production factors related to the transformation of inputs into outputs. The productivity factor, however, is more significantly affected by the extent of modern technologies used by local companies, which is also related to lower productivity. Therefore, the *H4* hypothesis related to the relationship between the productivity and the income distribution in different regions can be confirmed. The relationship between the productivity and foreign direct investment was

observed in this case as well. If an increase in productivity results in a more significant reduction of disparities in low-income regions and if the investment inflow increases the productivity, then an increase in the inflow of investment into regions with lower income affects more markedly the income distribution irregularities, which confirms the *H6* hypothesis.

Table 8. Regression models for Panel E

Comparison of regression models for panel data				Comparison of various datasets		
	PRM	REM ●	FEM Δ●		Regions with higher income	Regions with lower income
constant	11.4815 [1.19e-016] ***	11.4859 [1.58e-023] ***	11.5008 [9.62e-014] ***	*constant*	9.81425 [5.19e-06] ***	12.5926 [1.85e-09] ***
FOD	−4.23273 [0.1120]	−4.42754 [0.1347]	−5.09659 [0.1759]	*FOD*	−2.30834 [0.5795]	−5.60906 [0.1821]
ACC	−14.3835 [6.63e-05] ***	−13.9481 [5.44e-09] ***	−12.7899 [0.0052] ***	*ACC*	−11.3196 [0.0899] *	−16.1239 [0.0003] ***
CLO	−30.0448 [0.0001] ***	−30.8398 [4.60e-05] ***	−32.2739 [0.0002] ***	*CLO*	−27.6085 [0.0253] **	−35.3677 [0.0012] ***
TRA	−9.03797 [0.0045] ***	−9.12408 [0.0040] ***	−9.42252 [0.0088] ***	*TRA*	−2.37956 [0.7064]	−11.5031 [0.0027] ***
Adjusted R^2 / corr $(y,\hat{y})^2$	0.293333	0.292871	0.279217	*Adjusted R^2*	0.248103	0.376646

Note: ● only the indicative value (for the purpose of comparison); Δ constants of individual regions are listed in Table 9 in annexes

Source: Own processing

The most surprising finding of the regression analysis of the effects of the structure of inescapable expenditures on the generated savings is the non-existence of statistical significance of the costs of food and non-alcoholic drinks, despite the fact that the correlation indicates that such situation should be expected for the costs of transport. It means that the synergic effect transferred statistical significance from the costs of food to the costs of transport which show a relatively strong relationship (compared to other studied costs). The comparison of datasets for regions with higher and lower amounts of savings results in the confirmation of *H8* hypothesis for the costs of accommodation and transport; in the case of costs of accommodation the effect is 1.27 - fold higher, and for the costs of transport it is 16.69 - fold higher. While the costs of clothes have a stronger effect on the amount of savings generated in households in regions with lower income (1.5 - fold higher), the costs of food are not considered due to absence of significance thereof.

Conclusion

Regional disparities in economic growth of various degrees can be observed in many countries. The present paper is focused on the examination of determinants which directly affect the formation of disparities. The objective of this study was to quantify the impact of selected economic factors, including the unemployment rate, number of job vacancies, inflow of foreign investment, and labour productivity, on the amounts of income and savings and their impact on the distribution of wealth among the households, leading to the formation of regional disparities. For the purpose of confirmation or refutation of the defined eight hypotheses, the panel data regression was applied. As expected, a relationship between the income and the unemployment rate or job vacancies was confirmed; it was observed that a decrease in the unemployment rate in regions with higher wages will result in lower increase in wages than in other groups of regions and an increase in job vacancies in regions with lower unemployment rate is associated with a higher increase in the offered wages. However, it must be pointed out that our study does not consider voluntary unemployment; this provides a potential for further research in this area.

The impact of selected factors on the wealth distribution among the households was evaluated while applying the Gini coefficient in individual regions. In all three cases, directly proportional relationships were observed between the amount of disposable income and the value of this coefficient. Also, the analysis of the Gini coefficient confirmed the impact of the labour productivity and the foreign direct investment in regions with lower

income on the formation of regional disparities. As for the productivity, there is a directly proportional relationship (increased productivity increases the disparities), whereas the FDI has the opposite (inversely proportional) effect.

Even though it was not statistically confirmed (due to the double effect) that the foreign direct investment affects the increase in wages, the study did not consider addition of domestic investments which might contribute to different findings. Also, in our study we were not able to verify the impact of an increase in job vacancies or unemployment rate on the formation or the elimination of disparities in low-income regions.

A partial objective of the study was also to outline the problem of disparities as such and potential reasons thereof. In the theoretical introductory section hereof we presented a relatively high interest in this topic and in finding a solution for regional disparities in the expert literature, not only in Slovakia but also in other countries. This interest is expected to persist, as despite the quantification of various factors affecting the formation of differences within the country and its countries, none of the analysed parties has managed to eliminate this problem. Another reason is also outlining potential directions for future research in this area, as mentioned in the present paper.

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Annexes

Table 9 Constants of models of fixed effects for all panels

	Panel A				Panel B			
	Whole dataset	Higher income	Average income	Lower income	Whole dataset	Higher income	Average income	Lower income
Bratislava Region	5.90157	6.02786			5.64119	5.80218		
Trnava Region	5.44595	5.6823			5.26834	5.41269		
Trenčín Region	5.59173	5.78957			5.37319	5.45568		
Nitra Region	5.51532		5.55992		5.24601		5.2664	
Žilina Region	5.56529		5.42652		5.32135		5.20408	
Banská-Bystrica Region	5.60752			5.39601	5.15631			4.99258
Prešov Region	5.52249			5.34422	5.09484			4.95546
Košice Region	5.55912			5.21795	5.1423			4.815

	Panel C	Panel D				Panel E
	Whole dataset	Whole dataset	Higher income	Average income	Lower income	Whole dataset
Bratislava Region	0.21998	0.23368	0.25638			7.71831
Trnava Region	0.17045	0.18707	0.22736			7.63282
Trenčín Region	0.16633	0.18814	0.22215			7.60129
Nitra Region	0.15642	0.18566		0.16789		7.58825
Žilina Region	0.18000	0.20558		0.18674		7.61222
Banská-Bystrica Region	0.15667	0.20814			0.19608	7.55587
Prešov Region	0.15455	0.20322			0.17615	7.43357
Košice Region	0.17370	0.22053			0.26677	7.55722

Source: Own processing

The Impact of Financial Development, Oil Price on Economic Growth in African OPEC Members

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Abstract:

This study ascertains impacts of financial development, oil price on economic growth in African OPEC members. Many studies have been done on financial development and economic growth, without considering the nature of the economic dependency. This study considered the African OPEC members has oil-dependent economies. The study used dynamic panel method in the estimation of the results. The four sample countries are Algeria, Angola, Libya, and Nigeria the study excluding Gabon has suspended it OPEC membership within the study period. The panel cointegration estimated results using Pedroni cointegration procedure indicate that there is a long-run relationship in models. The long-run coefficient using modified OLS (FMOLS) estimator provide substantial evidence that financial development, oil price are positively encouraged economic growth. From the results, we observed that the economy is highly benefiting from oil price models without investment, but when investment included in the model, the impact of oil price become less. The policy implications of these results are that even though the economy is benefiting oil price but because of the uncertainty in the oil market the policy makers should encourage the financial sector credit to productive investment industries that can support economic growth to reduce the oil dependency to diversify the economic activities.

Keywords: financial development; oil price; economic growth; African; OPEC members

JEL Classification: G; F43; O16; O40; Q43

Introduction

Financial development is among the prerequisites sector that is needed in an economic setup for boosting sustainable economic growth and development (Demetriades and Hussein 1996, Ibrahim and Bala 2015). Financial development is an intermediary's regulatory policy and bodies that lead to the effective and efficient financial services and allocations. An effective financial service provides a low-risk environment and proper distribution of

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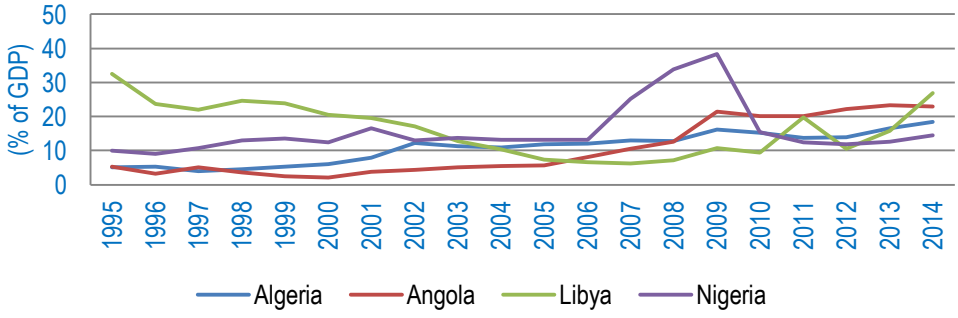
the fund. The advanced financial development leads to the advancement in the mobilization of savings and investments. There are many factors that financial development can measure such as the reliability, depth, access, performance, activities, size, banks, bond markets and financial institutions (Adnan 2009). It is necessary that every country through the monetary authority manage and regulate certain financial policies. The financial development initiatives involve the planning and implementation of several strategies, appropriate products innovation and create a conducive environment for financial institutions to provide effective and efficient function. The required numbers of financial sector services are also determined in other to perform the intermediary function between the central authority and the general public. The stronger the financial development, the more is transmitted to the various economic sectors and finally boosts the economic growth in a smooth way. Including, accelerate development and the welfare in a rapid manner. Among the earlier researchers that recognize the positive impact of financial development on economic growth Schumpeter (1911), Robinson (1952), McKinnon (1973), Levine (1997). Moreover, in recent studies still, there is evidence of a definite link between financial development and economic growth Boularedj and Faouzi (2015), Kenza and Mohamed (2015), Badeeb *et al.* (2016). But in African OPEC member countries, the financial development is not well developed to enhance economic growth, even though there a lot of inflow of oil revenue to the economy.

The misappropriation of that revenue will lead to weak the economy and create the potentials of malfunctioning financial systems will be directly and indirectly misappropriating use of resources, encourage speculation, discourage saving, causing poor investment and a misallocation of scarce resources. Some studies considered the relationship between financial development and economic growth in oil exporting countries Auty and Warhurst (1993), Bernanke *et al*. (1997), Agbaeze *et al.* (2015), Badeeb *et al.* (2016), Elhannani *et al.* (2016), Iheanacho (2016).

In developing countries, the process and manner of financial services are inefficient and has a lot of setbacks that fails to perform effectively. They are facing the challenges of how to mobilize financial services in a smooth way (Boularedj and Faouzi, 2015). In Algeria, the central government adopted to transition its economy and started the privatization the in 1990, along with the financial services reform (Elhannani *et al*. 2016). The financial services in Angola were relatively weak as domestic investors were relying on self-finance or pursue funds from foreign banks for investment when the foreign investors were unable to access financial credit (Aguemon *et al*. 2011). The level of financial services in Libya was relatively weak; majority depended on banks and insurance company (Husien and Havard 2000). In 1986 the Nigerian government adopted the program called Structural Adjustment Program (SAP) and the financial services were reformed. Figure 1 shows the domestic credit to the private sector by banks of four African OPEC members. In 1995 Libya had the highest domestic credit to the private sector by banks, followed by Nigeria, Algeria, and Angola. Along the trend, Libya's credit by banks started reducing from 1999 to 2010 and had the lowest credit. Nigeria had improved the credit service from 2006 to 2009, afterwards, the credit had dropped due to the reduction in oil price from 100.6 to 63 per barrel. In 2014 Libya had the highest provider of financial credit by banks, followed by Angola, Algeria, and Nigeria.

Figure 1. Domestic credit to private sector by banks (% of GDP)



Source: World Bank Online Database

This study attempts to investigate the relationship of oil price, financial development, and economic growth, particularly in African OPEC member countries. Figure 2 and 3 portrays the disaggregation of the African OPEC members from the oil exporting countries to plot the relationship between the financial development and the economic growth. Figure 2 show that the relationship between oil price and economic growth for Non-African oil producing countries. The link indicates that the line is steeper than for African OPEC members. Figure 3 indicate that the relationship of African OPEC members is flatter than for the other oil exporting countries illustrates the relationship between oil price and economic growth is positive in both cases but is less in African OPEC Non-African countries compare with the other oil producing countries.

Figure 2. Oil price and GDP in non-african oil exporters

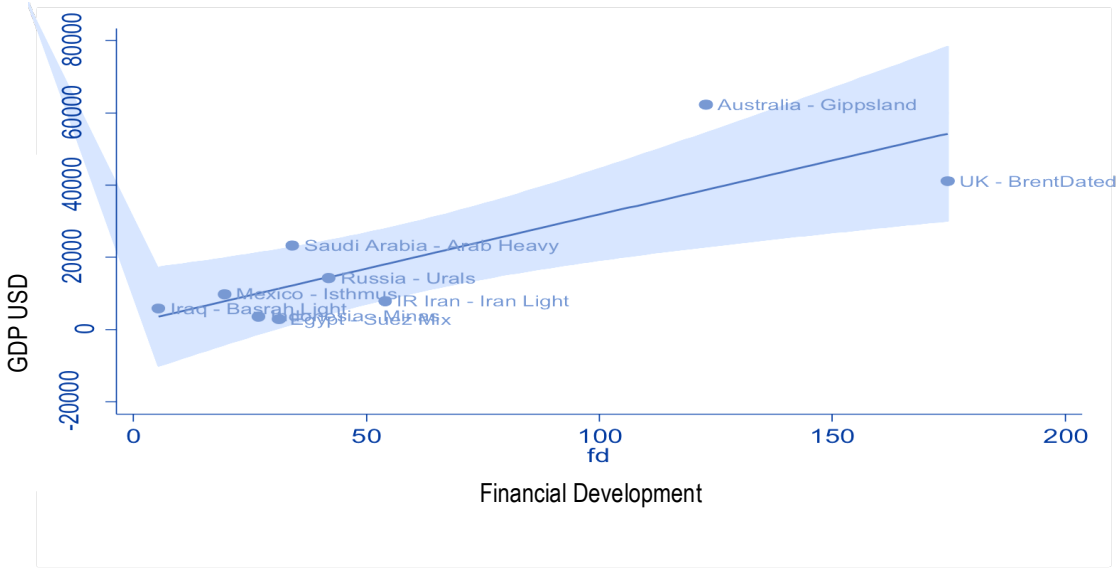
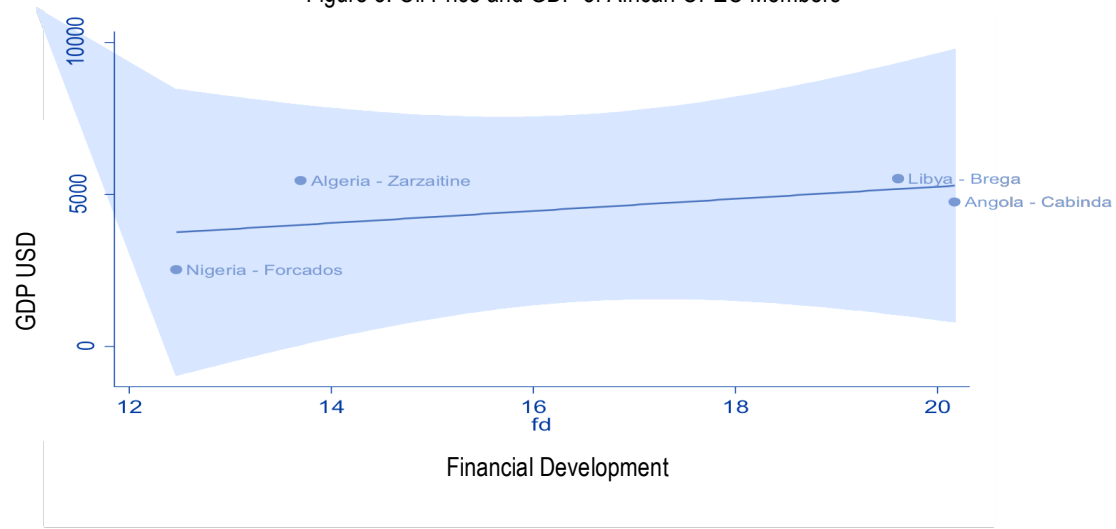


Figure 3. Oil Price and GDP of African OPEC Members



Furthermore, from the previous scatter plot shows that the relationship between financial development and economic growth of African OPEC member countries has low contribution to economic growth. Then the study strained to plot another relationship with oil price has those countries are heavily dependent on crude oil. The study categorizes the relationship of oil price and economic growth into two part the countries that provide high financial development and the countries that provide little financial development). The study argued that the strong financial development is a major factor that contributes to boosting economic growth. Figure 4 the scatter plots of countries

that provided better financial development demonstrated a positive relationship. Figure 5 shows the scatter plot of countries with low financial development that showed positivity but lesser than countries that have high financial development. From the two scatter plot it is cleared defined that a country with better financial development has a potential chance for better economic growth.

Figure 4. Oil price and GDP for high financial development countries

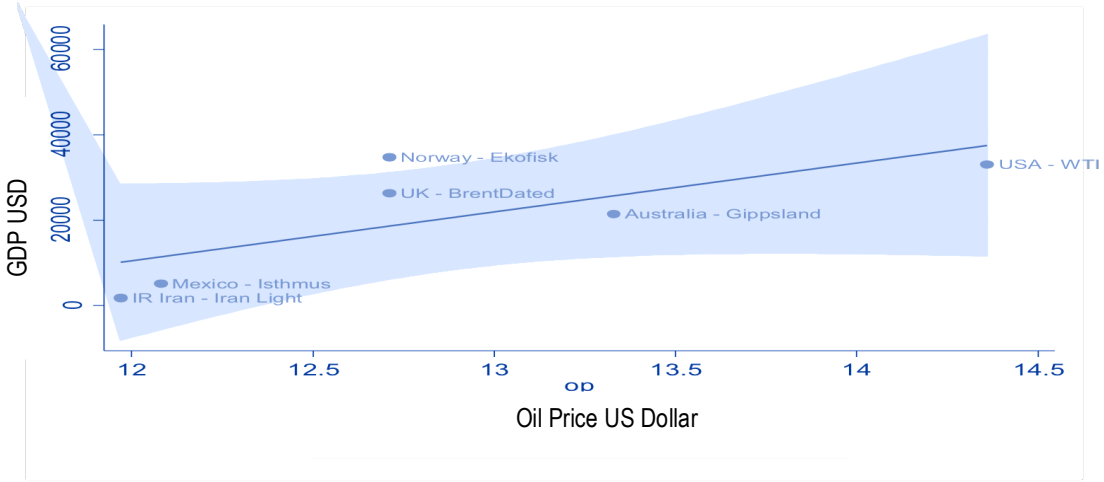
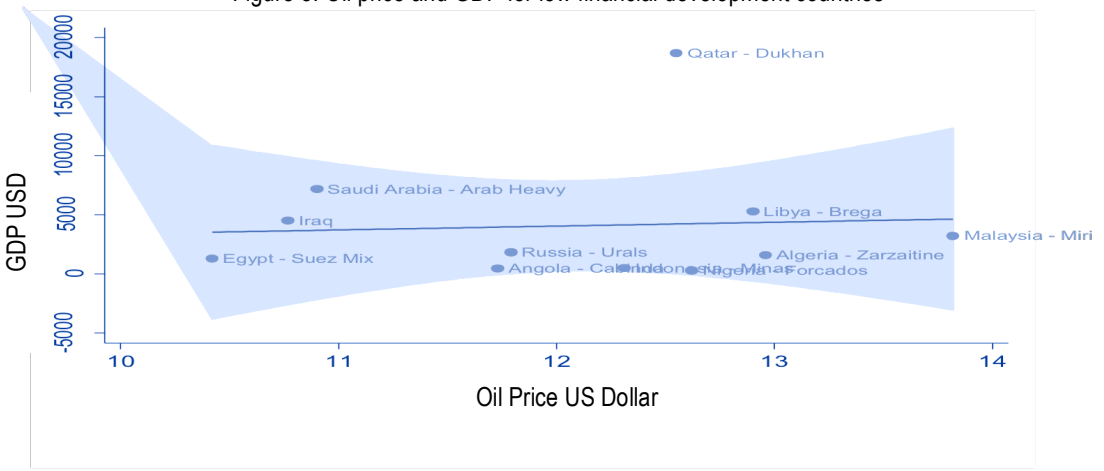


Figure 5. Oil price and GDP for low financial development countries



The results of this study are expected to make a significant understanding how importance is strong financial development in oil exporting countries. Furthermore, the need of oil depending countries to diversify their economy is also investigated. Therefore, the policy makers can reduce the high dependency on crude through investment.

The arrangement of the remaining sections of this study as follows. Literature review section, data, model and methodology section, results and discussion section, conclusion and policy Implication section.

1. Literature review

The theoretical framework of financial development and economic growth were well established by Schumpeter (1911), Goldsmith (1969), Habibullah and Eng (2006). They claimed that economic growth in less developed countries (LDCs) is associated with the low-level financial services. Empirical evidence recommended that financial development has supported sustainable economic growth and helped to reduce its instability. The positive interest rate supports financial development by encouraging people to save and generate investment (Law and Habibullah 2009). The appropriate allocation of financial resources and supports of other economic policies improve economic growth and stabilize the economy.

Barsky and Kilian (2004) highlighted that in the developing countries that are weak in financial development are most likely to suffer when oil price changes. Levine (1997) provided the explanation of the possible passage that oil dependency and financial development influence economic growth. The financial development can affect economic growth through two channels, the quantitative channel and the qualitative channel. Among the previous literature that is related to this research are studies of the impact of natural resources on the financial sector development.

This literature includes a large number of studies on the effect of oil prices on the financial development Bernanke *et al.* (1997), Agbaeze *et al*. (2015). Financial development and oil curse Badeeb *et al*. (2016), Elhannani *et al.* (2016). Some studies focus on a natural resource on economic growth Sachs and Warner (1995), Stijns (2005), Brunnschweiler and Bulte (2008), Brunnschweiler (2008). Cashin *et al.* (2014) were able to identify that oil-importing countries have an adverse effect of oil demand shock which will normally have a long-term failure in economic activities in reaction to the supply driven. On the other side of oil exporting countries has a positive effect. There is a lot of empirical studies suggested that the oil exporting countries have to diversify the economic activities. Since they rely heavily depend on oil revenue Husien and Havard (2000), Mehrara (2008), Ezike and Ogege (2012), Hamdi and Sbia (2013), Agbaeze *et al.* (2015), Babatunde (2015), African Economic Outlook (2015), IMF (2016). Other studies focus on financial reform on economic development Laurenceson and Chai (2003), Ifeoma (2011), Hamdi (2015), Sanogo and Moussa (2017).

Kenza and Mohamed (2015) study the transmission channels that financial system influences the economic growth in Algeria within the period 1970 -2012. Toda and Yamamoto's causality was used to determine the direction of causality relationship. The study found that there is no causality link between financial developments in poor financial development settings like Algeria.

Ibrahim and Bala (2015) study the causal relationship applied trivariate VAR model between financial development and economic growth in Nigeria. Found that there is indirect causality through the trade openness. The studies that link oil price with economic growth are Huang *et al.* (2005) found that oil price contributes partial shock if the movement is lower the threshold point. If the movement is higher than the threshold point, it shows that oil price has better to explain the macroeconomic variables than the volatility of oil prices. Rafiq *et al*. (2009) attempted to study the impact of a crude oil shock on economic activities the findings reveals that oil price shocks significantly affected macroeconomic indicators. Ali and Wadud (2011) investigate the role of oil price shocks on macroeconomic activities applying SVAR approach to Malaysian economy and monetary policy. Their results indicate that an oil price shock has a substantial asymmetric effect on the conditional oil price volatility. Archanskaïa *et al.* (2012) found a supply driven; the oil price shock has a negative impact on the macroeconomic activities of countries that are a net consumer of oil, there is no adverse effect on demand is driven oil price shocks. Antonakakis (2014) examines the dynamic relationship between oil price changes and economic policy uncertainty employed monthly data for the period January 1997 to June 2013. Found that economic policy uncertainty negatively response to oil price shock. Yinka (2014) discovered that oil price shock is significant regarding economic growth, although the oil price significantly increases economic growth. Whichever oil price rising is favorable to exporting countries and vice versa. Shock creates uncertainty and challenge applicable to fiscal policy.

In the previous studies such as Beck *et al.* (2006) have shown that a proficient and efficient development of financial sector has a positive impact on the economic growth. Although, there is a lot of studies on the relationship between financial development and economic growth in Africa. But the studies has not been comprehensively explored in African OPEC members. Most of the studies are mostly focus on developed countries and developing countries like Latin America and Asian countries. In the literature, the common proxy for financial development is a domestic credit to the private sector by banks. This study used two proxy of financial development to validate the proxy that is more relevant to African OPEC members' development. Many studies have been done on financial development and economic growth without considering the nature of the economic dependency

2. Data, model, and methodology

The research uses annual data ranging from 1995 to 2014 for 4 African OPEC member countries in 2014 Algeria, Angola, Libya and Nigeria. The research focus on the countries member those are active within the period of study.

The study used Real GDP, two indicators of financial development used are domestic credit to private sector percentage of GDP (PSC) and domestic credit to private sector by banks percentage of GDP (PSCB). Specific countries oil price (OPC) are spot market prices are measured in US dollars. Consumer price index (CPI). Investment (INV) and interest rate (R). The specific countries oil price is extracted from OPEC Statistical Bulletin. The required series on GDP constant 2000 US dollars, financial development is a percentage of GDP, the CPI is used to measure each country's inflation rate, the gross fixed capital formation was a proxy for investment, and the interest rate is obtained from the World Bank's World Development Indicators (WDI) website. The variables are expressed in natural log.

2.1. Econometrics model

From the theoretical framework of oil price transmitted channel to economic growth is extracted and shows that economic growth in a small open economy was affected by oil price, CPI, investment, and interest rate. This implies:

$$Y = f\ (OP, CPI, INV, R) \tag{1}$$

From the theoretical and empirical literature on financial development and economic growth has been recognized their strong relationship. Barsky and Kilian (2004) argue that the countries that have insufficient financial stability are weak to control external shock. So this study includes the financial development indicators in the growth model.

$$lY_{it} = \alpha_0 + \beta_1 lFD_{it} + \beta_2 lOP_{it} + \beta_3 lCPI_{it} + \beta_4 lINV_{it} + \beta_5 lR_{it} + \mu_{it} \tag{2}$$

where: lY_{it} is the log of GDP; lFD_{it} is the log of financial development indicators; lOP_{it} is the log of oil price; lR_{it} is a log of interest rate as monetary policy instruments; μ_t is the stochastic disturbance term. $\alpha = (\alpha_0, \beta_{1,}, \beta_2, \beta_3, \beta_4, \beta_5)$ is a vector of long-run parameters to be estimated. It is expected that $\beta_{1,}\beta_2, \beta_{3,}, \beta_4$ to be positive and β_5 to be negative.

2.2. Methodology

Considering the properties of the data are first order integrated, as well as the small sample size, this paper also used the Pedroni (2000) and the fully modified ordinary least squares (FMOLS) estimator. The method addresses the bias caused by the endogeneity of the regressors by incorporating the Phillips and Hansen (1990) semi-parametric correction into the OLS estimator. Considering the following cointegration system for panel data:

$$y_{it} = \beta_0 + x_{it}\beta_1 + \vartheta_{it} \tag{3}$$

$$x_{it} = x_{it-1} + \varepsilon_{it} \tag{4}$$

where: the vector error process $\xi_{it} = (\vartheta_{it}, \varepsilon'_{it})$ is stationary with a covariance matrix represented by Ω_i.

Following Pedroni (2000), the between-dimension, group mean panel FMOLS estimator can be written as follows:

$$\hat{\beta}_{GFM} = N^{-1} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2 \right)^{-1} \left(\sum_{t=1}^{T} (x_{it} - \bar{x}_{it}) z^*_{it} - T\tau_i \right) \tag{5}$$

where: $z^*_{it} = (z_{it} - \bar{z}_{it}) - \left(\frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}}\right) \Delta x_{it}$ and $\tau_i \equiv \hat{\Gamma}_{21i} + \hat{\Omega}^0_{21i} - \left(\frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}}\right) (\hat{\Gamma}_{22i} + \hat{\Omega}^0_{22i})$

$$\hat{t}_{\hat{\beta}^*_{GFM}} = N^{-\frac{1}{2}} \sum_{t=1}^{T} \left(\hat{\beta}^*_{FM,i} - \beta \right) \left(\hat{L}^{-1}_{11i} \sum_{t=1}^{T} (x_{it} - \bar{x}_{it})^2 \right)^{\frac{1}{2}} \tag{6}$$

where: the traditional FMOLS estimator applied to each panel member is $\hat{\beta}^*_{FM,i}$. The properties of the associated t-statistics are standard and normally distributed as $T \to \infty$ and $N \to \infty$.

3. Findings and discussion

In the panel, data estimation has discussed in the previous section some preliminary tests have to be done before concluding to final estimation. The panel descriptive statistics, correlation matrix, panel unit root test, panel cointegration test and finally long-run relationship have to be tested. Table 1 presents the descriptive statistics has defined the nature of the variables mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera, probability, sum, sum square. Deviation, and the number of observations. The mean of variables is GDP 95851.00, PSC 13.35250, PSCB 13.30107, OPC 54.83649, CPI 74.98379, INV 22399.96, R 24.80663. The standard deviation of the variables GDP 110624.0, PSC 7.536117, PSCB 7.519657, OPC 35.69469, CPI 38.07184, INV 21429.25, R 37.90680. Table 2 present the correlation matrix shows that the two proxies of financial development PSC and PSCB are highly corrected while other variables can be seen has moderate.

Table 1. Descriptive statistics

	GDP	PSC	PSCB	OPC	CPI	INV	R
Mean	95851.00	13.35250	13.30107	54.83649	74.98379	22399.96	24.80663
Median	54884.25	12.63831	12.60897	44.83800	80.25557	13289.02	15.69500
Maximum	561600.4	38.38656	38.34855	114.1500	146.0394	85736.70	217.8800
Minimum	4670.000	2.013644	1.966540	12.28000	0.000700	1429.481	6.000000
Std. Dev.	110624.0	7.536117	7.519657	35.69469	38.07184	21429.25	37.90680
Skewness	2.490556	0.910430	0.907540	0.426253	-0.384888	1.275946	3.506191
Kurtosis	9.384915	3.840513	3.853783	1.638818	2.437739	3.624266	16.25332
Jarque-Bera	218.5954	13.40664	13.41154	8.598602	3.028970	23.00620	749.4135
Probability	0.000000	0.001227	0.001224	0.013578	0.219921	0.000010	0.000000
Sum	7668080.	1068.200	1064.086	4386.919	5998.703	1791997.	1984.530
Sum Sq. Dev.	9.67E+11	4486.652	4467.074	100654.8	114507.7	3.63E+10	113517.1
Observations	80	80	80	80	80	80	80

Table 2. Correlation matrix

Variables	GDP	PSC	PSCB	OPC	CPI	INV	R
GDP	1						
PSC	0.2157	1					
PSCB	0.2164	0.9999	1				
OPC	0.6451	0.3245	0.3246	1			
CPI	0.5615	0.5505	0.5522	0.7396	1		
INV	0.8819	0.2694	0.2705	0.7518	0.6353	1	
R	-0.2369	-0.4076	-0.4093	-0.2997	-0.6059	-0.2947	1

Note: GDP = GDP constant, PSC = domestic credit to private sector, PSCB = domestic credit to private sector by banks, OPC= specific oil price for the countries, CPI = consumer price index, INV= investment, R=interest rate, n=4, T=20 and N=80

Table 3 present the panel unit-root test results, to detect the integrating order of the variables, the study used five different methods of unit-root test. In other to acquire robust results of each variable the procedure specifically includes Levin *et al*. (2002), Im *et al*. (2003), Breitung (1999) and Fisher-ADF and Fisher PP.

The results indicate that the null hypothesis of the panel unit-root tests cannot be rejected in the level form in all the variable except for oil price and interest rate when LLC, IPS, Breitung and Fisher PP. Moreover, when the variables are converted to first differences, the hypothesis is rejected. These results strongly indicate that the variables GDP, PSC, PSCB, OPC, CPI, INV, and R are non-stationary in the level form and first differences become stationary.

Table 3. Panel Unit Root Results

	GDP		PSC		PSCB		OPC		CPI		R		IV	
	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend
LEVELS														
LLC	3.02 (0.99)	-1.41 (0.07)	0.92 (0.82)	-0.42 (0.33)	0.89 (0.81)	-0.44 (0.32)	-0.86 (0.19)	-4.00*** (0.00)	7.11 (1.00)	-0.29 (0.38)	2.27 (0.98)	-19.18*** (0.00)	3.01 (0.99)	-1.54 (0.06)
IPS	3.89 (1.00)	0.51 (0.69)	1.33 (0.90)	1.03 (0.84)	1.34 (0.91)	0.33 (0.62)	1.73 (0.95)	-1.66** (0.04)	7.17 (1.00)	1.84 (0.96)	-6.47*** (0.00)	-12.38*** (0.00)	2.51 (0.99)	0.51 (0.69)
Breitung		1.15 (0.87)		0.34 (0.63)		1.03 (0.84)		-1.92** (0.02)		0.84 (0.96)		-0.88 (0.18)		2.43 (0.99)
Fisher ADF	3.48 (0.90)	5.78 (0.67)	3.80 (0.87)	6.62 (0.57)	3.82 (0.87)	6.73 (0.56)	1.58 (0.99)	13.58 (0.09)	0.50 (0.99)	4.99 (0.75)	45.72*** (0.00)	48.05*** (0.00)	3.56 (0.89)	4.35 (0.82)
Fisher PP	3.33 (0.91)	5.93 (0.65)	5.62 (0.68)	5.22 (0.73)	5.63 (0.68)	5.24 (0.73)	1.08 (0.99)	11.53 (0.17)	0.16 (1.00)	3.17 (0.92)	37.40*** (0.00)	8.81 (0.35)	2.94 (0.93)	3.29 (0.91)
FIRST DIFFERENCE														
LLC	-7.48*** (0.00)	-7.51*** (0.00)	-4.88*** (0.00)	-43.89*** (0.00)	-4.99*** (0.00)	-3.86*** (0.00)	-5.48*** (0.00)	-4.04*** (0.00)	-2.41*** (0.00)	-2.03** (0.02)	-2.60*** (0.00)	3.56 (0.99)	-2.48*** (0.00)	-4.89*** (0.00)
IPS	-6.59*** (0.00)	-5.59*** (0.00)	-3.59*** (0.00)	-3.79*** (0.00)	-3.61*** (0.00)	-3.14*** (0.00)	-5.28*** (0.00)	-3.79*** (0.00)	-1.82** (0.03)	-1.87** (0.03)	-4.46*** (0.00)	-3.16*** (0.00)	-2.43*** (0.00)	-5.40*** (0.00)
Breitung		-6.60*** (0.00)		-3.10*** (0.00)		-3.81*** (0.00)		-2.34*** (0.00)		-1.37 (0.08)		-2.13** (0.01)		-4.82*** (0.00)
Fisher ADF	49.10*** (0.00)	45.73*** (0.00)	29.56*** (0.00)	23.10*** (0.00)	29.76*** (0.00)	23.42*** (0.00)	40.41*** (0.00)	27.91*** (0.00)	16.70** (0.03)	15.74** (0.04)	34.06*** (0.00)	24.33*** (0.00)	22.34*** (0.00)	38.15*** (0.00)
Fisher PP	49.80*** (0.00)	63.41*** (0.00)	42.35*** (0.00)	33.99*** (0.00)	42.52*** (0.00)	34.26*** (0.00)	73.05*** (0.00)	70.78*** (0.00)	14.61* (0.06)	32.48*** (0.00)	37.68*** (0.00)	45.64*** (0.00)	43.49*** (0.00)	45.61*** (0.00)

Notes: Figures in parentheses are probability values. *, ** and *** denote rejection of the null of non-stationary at the 10, 5 and 1 percent levels of significance. The maximum numbers of lags length are selected based on Akaike information criterion (AIC). (#) Null hypothesis: the series is stationary

After succeeding the detection of the order of integration of the variables, the study used panel cointegration developed by Pedroni has suited procedure of the estimation. The estimation is used to verify whether there is a long-run relationship between the variables in the model. If the long-run equilibrium relationship exists among variables, then the dynamic model (FMOLS) estimator can be performed estimate to validate that the variables in the model have a long-run impact on economic growth. Table 4 present the Pedroni panel cointegration results indicate that the null hypothesis cannot be rejected in all the models in panel v-statistics, panel rho-statistics and group rho-statistics results. The null hypothesis is rejected in the models in panel PP-statistics, panel ADP-statistics, group PP-statistics and group ADF-statistics. The study found there are three to four significant equations in a model. The cointegration equations are detected from the most compelling statistic has indicated that some estimators are superior to others (Pedroni 1999).

Table 4. Panel cointegration results

	GDP = f (PSC, OPC, CPI, INV, R)		GDP = f (PSCB, OPC, CPI, INV, R)	
	w/o trend	with trend	w/o trend	with trend
Panel v-statistic	0.0975 (0.46)	-0.0519 (0.52)	0.0915 (0.46)	-0.0596 (0.52)
Panel rho-statistic	0.7069 (0.76)	1.1281 (0.87)	0.7280 (0.76)	1.1523 (0.87)
Panel PP-statistic	-3.2519*** (0.00)	-3.3093*** (0.00)	-3.1968*** (0.00)	-3.2394*** (0.00)
Panel ADF-statistic	-2.1233** (0.01)	-3.4513*** (0.00)	-2.0821** (0.01)	-3.3771*** (0.00)
Group rho-statistic	1.2696 (0.89)	1.9167 (0.97)	1.2920 (0.90)	1.9342 (0.97)
Group PP-statistic	-2.8512*** (0.00)	-2.3776*** (0.00)	-2.7867*** (0.00)	-2.3211 (0.01)
Group ADF-statistic	-0.9966 (0.15)	-2.3998*** (0.00)	-0.9590 (0.16)	-2.3436*** (0.00)

Notes: Values in parentheses are the probability values. ***, ** are significant at 1 and 5% level respectively.

Table 5 presents the FMOLS long-run estimated results with the two indicators of financial developments domestic credit to private sector (PSC) and domestic credit to the private sector by banks (PSCB). The study has four models with the two financial development indicators the first estimated model with domestic credit to private sector and then with domestic credit to the private sector by banks. The results from model 1 indicate that domestic credit to private sector, domestic credit to the private sector by banks, and oil price are a positive and significant impact on economic growth. In another word, 1% increases in domestic credit to private sector and domestic credit to the private sector by banks lead to 29.25% and 25.24% increases in economic growth. While 1% increases of oil price lead to 96.86% increases of economic growth with domestic credit to private sector while 96.81 percent with domestic credit to the private sector by banks. From the model 1 results, the study detected that the coefficient of financial developments domestic credit to the private sector is slightly higher than the domestic credit to the private sector by while the coefficient of oil price is opposite. The results of financial development indicators and oil price are consistent in the model 2 while when the inflation indicator was included in the model shows a positive and significant impact on economic growth. In model 3 when the interest rate is included in the model, the previous results remain the same sign while the interest rate indicates a negative and significant sign. The results from the two equations with domestic credit to private sector and domestic credit to the private sector by banks indicate that 1% increases in interest rate lead to 27.78 and 27.32% reduction in economic growth. The results are consistent with the findings of Roubini and Sala-i-martin (1992), Demetriades and Hussein (1996), Beck *et al.* (2014) whose found the evidence of a positive relationship between financial development and economic growth. Lastly in model 4 when investment indicator included in the model, the previous variables maintain the same sign while the investment indicator is shown a positive and significant impact on economic growth. The main finding from the model 4 is that the investment indicator is an alternative indicator for a country to diversify the economy and reduce

the high dependency on crude oil. Has we can detect that when the investment indicator is included in model 4 the coefficient of oil price has drastically reduced compared with the previous models.

Table 5. FMOLS Long-run Results with PSC and PSCB

	Model 1		Model 2		Model 3		Model 4	
LPSC	0.2925*** (4.02)	-	0.2680*** (2.82)	-	0.2584*** (3.35)	-	0.2335*** (2.87)	-
LPSCB	-	0.2924*** (4.03)	-	0.2100*** (2.87)	-	0.2605*** (3.40)	-	0.2333*** (2.87)
LOPC	0.9686*** (20.99)	0.9681*** (20.96)	0.7682*** (12.23)	0.7667*** (12.17)	0.7294*** (11.45)	0.7291*** (11.42)	0.2599*** (3.87)	0.2588*** (3.86)
LCPI	-	-	0.1487*** (6.37)	0.1489*** (6.36)	0.1547*** (6.53)	0.1553*** (6.54)	0.2512*** (4.37)	0.2528*** (4.38)
LR	-	-	-	-	-0.2778*** (-8.48)	-0.2732*** (-8.44)	-0.1146*** (-3.87)	-0.1123*** (-3.80)
LIV	-	-	-	-	-	-	0.3185*** (4.09)	0.3170*** (4.08)

Notes: Values in parentheses are *t*-statistics. ***, ** are significant at 1% and 5% level respectively.

Conclusion and implications

The study ascertains impacts of financial development, oil price on economic growth in African OPEC members. The study used dynamic panel method in the estimation of the results. The four sample countries are Algeria, Angola, Libya, and Nigeria the study excluding Congo has suspended within the study period. The panel cointegration estimated results using Pedroni cointegration techniques indicate that there is a long-run relationship in models. The long-run coefficient using fully modified OLS estimator provide substantial evidence that financial development. The study concludes that oil price and financial development have positive impacts to enhance economic growth. The two financial development indicators domestic credit to private sector and domestic credit to the private sector by banks have shown similar results both the four models. In model 3 and 4 when the interest rate was included, the impact of interest rate on economic growth is negative, which means increases in interest rate lead to reduce the economic growth has revealed in theory. Moreover, in the last model 4 when the investment variable was included have an indicator of alternative economic activity to reduce the dependency on oil. The results reveal that the economy is highly benefited from crude oil in model 1, 2 and 3 without the investment variable but when investment variable included in the model the impact of oil price become less.

The policy implications of these results are straightforward, even though the economy is highly benefited from crude oil price. However, because of the uncertainty, volatile in the oil market and distortion in the extracting of crude oil in the African OPEC members countries, the policy makers should provide financial sector credit into productive investment industry that can support economic growth to reduce the oil dependency and encourage diversification in the economic activities. Is shows that there is a potential opportunity in oil exporting countries to diversify their economic activities. Possibly a country with strong financial development will channel to investment opportunities. Consequently, the African OPEC member countries have seriously in a policy challenge on how to reduce the dependency on oil and gas. With alternative sector that will provide a long-term sustainable economic growth as discussed by Callen *et al.* (2014) the diversification has a significant impact on job creation in the investment sector compare with the oil industry offered limited employment opportunities.

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A Co-Integration Analysis of Interest Rate Spread and Corporate Bond Market Development in Selected African Economies

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Abstract:

This paper examines the relationship between interest rate spread and corporate bond market development in thirteen African economies comprising of Botswana, Egypt Mauritius Nigeria, Tunisia, Cameroon, Kenya, Morocco, South Africa, Cote d'Ivorie, Ghana Namibia, Tanzania from 2004 and 2014 using fully modified ordinary least square (FMOLS) in an autoregressive distributive lag (ARDL) framework. Subsisting literature suggests that in bank-based economies, interest rate spread could adversely affect the potency of corporate bond market development; and thus limits the financial market competitiveness. The result provides evidence that corporate bond issue, as a proxy for financial development is negatively influenced by interest rate gap in the short and long term. The result affirms the 'group interest' theorem in these African economies leading to a deterrent in competitive financial development. The ECM coefficient satisfies a priori expectation, affirms the short run dynamic relationship, which implies long run equilibrium from the annual speed of adjustment, which is about 100 percent. The paper suggests policy recommendations for the reduction in interest rate, and thus the spread to encourage the growth of corporate bond issues for a market-led financial development.

Keywords: co-integration; corporate bond market; interest rate spread; market development; group interest

JEL Classification: C23; G10; E43

Introduction

The corporate bond market is very important for capital-scarce developing economies as a mechanism for long-term capital accumulation and allocation, but little of this potential advantage has been explored. The bond market was explored by: doctoral students from Department of Banking and Finance Covenant University Nigeria or Faculty, Department of Banking and Finance, also professors of Finance University of Lagos, Nigeria with the scope of increasing the potentials of these economies to exploit their numerous natural resources, in order to improve the people's well-being, particularly by financing sectors with a high multiplier like agriculture and industrial sectors. These sectors have positive and strategic links to poverty reduction, as they enhance inclusiveness and achieve other sustainable human development goals in several ways (UNIDO 2015). The diverse development goals may be elusive if the financial capital required to achieve the ambitions are not harnessed, possibly by exploiting the machinery of a private capital market mechanism.

In any modern economy, interest rate provides sensitive price signals to borrowers, lenders, savers, and investors; and could serve as an economic policy instrument to moderate their behaviour. Ackley (1978) opines that the mechanics of interest rate term structure is of major implications for the performance of the macroeconomy.

The behaviour of interest rate influences industrial outlook and service variables, such as what the US Fed rate does in the global financial market. In the domestic economy, high real interest rate makes debt servicing more expensive. The high-interest rate differentials in many African economies causes a deterrent to financial development, as it makes the financial system uncompetitive, unsupportive to market-based arm's length financial development. Ranjan and Zingale (2003) state that it is uneasy for the financial system to provide level ground for the average entrepreneur (in a non-connected relationship) and raise the desired capital for projects at arm-length or via a non-relationship bank-based finance. In such financial system, the investor's ease to dispose financial assets at fair returns also becomes an issue as a result of illiquidity. Going by this standard, the current bank-based financial system practice is far from promoting financial development, or near any level of perfection.

Recently, thoughts on the increasing interest rate spread, high average lending against low deposit rate in emerging and frontier markets have occupied researchers' attention. On the 'determinants of interest rate spread Tennant and Folawewo (2009) studied 33 developing economies while Akinlo and Owoyemi (2012) examined the case of Nigeria only. An issue in the analyses is if financial development promotes the economic growth of nations. Rajan and Zingale (2003) argue the 'group interest' theory as part of the structural impediment of the growth of the market-based finance system. The 'group interest' of the bank finance model is seen as limiting the competitiveness of these financial markets, hence the underdevelopment of financial system in many developing economies. In other words, a country's financial structure matters for the wide interest margin and underdevelopment of the financial market. This had led to the crowding out of bond (debt) finance.

Adelegan and Razewicz (2008) found that the sub-Sahara Africa domestic debt market is weak relative to the bank finance while attributing the lack of financial deepening to savings constraint. The average real interest rate is low and sometimes negative in the region, while with low saving interest rate the willingness and propensity to save declines. Asogwa (2005) however appraises both bank and market-based financing in Nigeria and concludes that for long-term industrial financing, the bank model template seems unsuitable, claiming that if adequate strategies are in place among the borrowers and investors, the advantages of market-based finance and growth could be enormous even in information-poor countries. Bank based finance has chiefly advanced the 'availability' doctrine, irrespective of cost, increase default risk levels exacerbates financial instability. The World Bank (2001) argues that if finance is fragile in developing countries the banking sector will be the most hit.

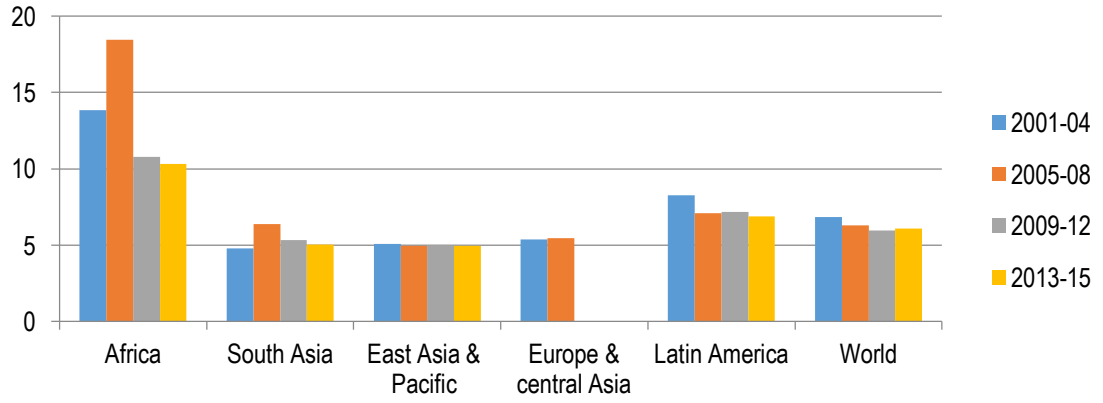
Figure1 below presents the picture of the interest rate spread in Africa relative to other regional peers. The histogram reveals that African economies record interest rate highest margin all through, while the 2005-2008 has average spread picked at 18.46%. Next to Africa is Latin America region as second highest bank margin above the global average through the period 2001-2015.

Figure 2 below shows the trend in bond issues in Africa and the Middle East economies from 2001 to 2015 with the banking institutions as the highest issue. The non-consistent growth pattern is seen from non-finance corporations, other finance corporations, and government issuers after the global financial crises in 2011.

This study conjectures that to a large extent, African countries' economic policies and initiatives have over-promoted the bank-based financing option for long-term industrial finance needs which however seems inappropriate and inadequate. WEF (2015) is uncomfortable with the relatively slow growth of corporate bond market dependence emerging and frontier economies, citing that the post-2011 credit crunch environment. This calls for acceleration of the corporate bond financing as it produces significant greater long-term benefits than bank financing. Several industrial financing in Nigeria through the bank base model have been unsuccessful (Asuquo 2005).

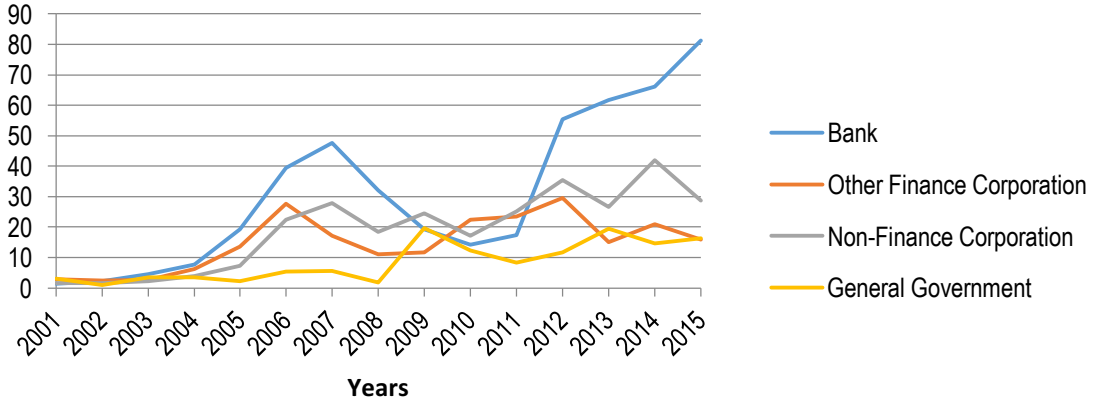
The hypothesis that increasing bank interest rate gap may constitute a long-term deterrent to primary corporate bond market development is worth examining. This is an idea is yet to receive much research attention, particularly in regions experiencing low bond market growth. This study, therefore, hypothesises that there is no significant long-run relationship between the interest rate structure and primary corporate bond market development. The remaining sections of the paper are structured as follows: next are the literature review, the data and methodology. These are then followed by results, discussion, recommendations and conclusion.

Figure 1. Average Interest rate spread of African Economies relative to regional peers 2001–2015



Source: Authors computation based on World Bank Financial Sector Development Indicator's database (UNTAD, 2014)

Figure 2. Bond Issue in Africa & Middle East in $ Billions, 2001-2015



Source: Authors computation based on Bank for International Settlement (BIS) database

1. Literature review

The theory underlying the relationship between interest rate spread and corporate bond development interconnects with theories of financial liberalization, the 'group interest' theory and financial structure. Mckinnon (1973) and Shaw (1973) made a case against financial repression successfully, which might have inspired the World Bank's pressure for liberalization of financial markets in developing economies, and the spur to achieve growth convergence. The intervention, however, may have resulted in high-interest rate gap regime in most developing economies (Ngugi 2001).

The financial system development debate as necessary catalyst for economic development had however been laid in arguments elicited in Schumpeter (1912), Gurley and Shaw (1955), Goldsmith (1970), Levine (2004), and many more. Each of those papers applied different methods, measurement variables, and techniques but generally concluded that finance spurs growth. On the financial structure, the arguments rest on the structure most desirable: whether bank-based or market-based or a neutral system, were proffered for developing economies. The ensuing reforms may have assisted many emerging economies on the part of relative finance–growth nexus stability. Many African economies currently operate financial structures that are largely bank-based; which is strengthened or weakened by the extent of the quality of legal and governance institutions. In the meanwhile, emerging Europe already has at least two complementary bond markets (Osipov *et al*. 2017).

The contentious debate of the market-based versus bank-based economies took a new turn recently at the instance of want of solution for financial instability following the 2008 global stock market crash and subsequent widespread economic recession. However, despite the enormous impact of the crises in the United States (US), the persistent pre-eminence of the market-based system suggests that the US has "a strong bias that markets work", while to the rest of the world, this position may be a narrow view. The neutral base system otherwise called the "financial functions view" regards financial structure classifications as secondary, as it is more interested in the economy operating an efficient financial system (Merton and Bodie 2004, Levine 2004).

Studies have also argued that in many developing economies, the 'group interest' of financial institutions play a greater role in the implementation of financial policies which must have paved the way for greater dominance of the bank-based system. The 'group interest' theory contends the banks often attempt to dominate the bond issue market by maintaining their dominance in the financial intermediation. The indirect intermediation structure has higher interest rate consequence and higher interest rate spread (see Figure 1) and thus slow industrial development (Olokoyo, Adetiloye and Ikpefan 2016). Bhattacharyay (2011) tests the major determinants of factors that influence the bond market across major Asia economies and finds that bank interest rate spread negatively impacts the market growth in both the government and corporate bond categories.

Certainly, the high rate of financial system's inefficiency contributes to high nominal interest rate, such that the attendant high cost of funds consequently reflects on high price level for goods and services. If, as it has been suggested, that the high cost of loanable funds rate structure which results in the high-interest spread in African economies in the past decade merely reflect their true scarcity, why, however, does the cost of savings not reflecting their true real cost? For instance, in the Nigerian case, Soyibo and Olayiwola (2000) cited in Ojo (2010) it is reflected that aggregate savings propensity merely correlate the real deposit rate, such that both the savings rate and real demand for money do not significantly influence deposit rate. The liquidity of the market is also of serious concern where it has existed much unlike emerging Russia where the financial market liquidity has gone beyond bonds to establish a market in the currency, the rouble (Teplova and Sokolova 2015).

The disadvantage to potential savers has not increased the quantity and quality of investment in Africa, with an attendant dampening effect on output growth (Ojo 2010). It is observed that even at the low saving-investment gap, the economies often witness excess bank liquidity, while high lending gap prevails, which some literature attributes to the prevalence of a mismanaged fiscal system. An equilibrium savings rate is required to prompt scarce capital formation for real investment growth and help to stabilize the financial system. Thus, savings culture needs to be promoted because in situations where savings cannot be effectively mobilised idle funds cannot assume 'life' for productivity (Adegbite 2015). Savings seem to be a key issue in development financing as found out by Babajide, Taiwo and Isibor (2015) where the savings rate is reported to have increased significantly as a result of innovation in products.

2. Theoretical framework

One of the mechanisms that best links the workings of the interest rate to corporate bond issues is the well-known bond price mechanism. In a simple form the mechanism establishes the bond's risk and return (benefits) framework to determine its price, as stated below:

$$\text{Price} = \sum_{t=1}^{n} \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n} \quad (1)$$

where: n = number of years; C = annual coupon payments; r = periodic required rate of return; M = maturity value; t = time period when payment is received.

The fundamental issue is that the price of a bond fluctuates with changes in market interest rate, such that as market interest rate (or market required yield) increases, the present value of its cash flows (the price) declines. This is commonly referred to as interest rate risk or price risk. The risk is inherent irrespective of the initial price that the investor pays for the bond. The bond interest rate risk or price sensitivity also depends on various features of the issue such as the maturity, coupon rate, and embedded options (Fabozzi 2007). However, by convention the

market interest rate and the macroeconomy is asynchronous, hence investing in corporate bonds entails managing the volatility of the market interest rate. In an increasingly globalised world, the behaviour of market interest rate becomes a product of the economy's macro-structure, as it correlates with major domestic and international economic and financial activities.

3. Data and methodology

Data was sourced from the Bank of International Settlement, the World Bank's World Development Indicators (WDI), Worldwide Governance Indicators (WGI), and the Annual Reports of respective African Stock Market Exchanges obtained from the website of African Securities Exchange Association (ASEA) as in 2014. There are fifty-four (54) countries in Africa, but not all the economies have corporate bond market. This study's population comprises the twenty-five (25) countries who are registered members of African Securities Exchange Association (ASEA) as in 2016 (ASEA 2016). Following the dearth of corporate bond market and the omission of observations the study sample is limited to thirteen economies that have corporate bond issues and being traded on their Exchanges as in 2014 (ASEA 2014). The aggregate size of the selected African capital markets is approximately 97.6% of African Stock Market Capitalization as in 2014 (ASEA 2014). The countries are Botswana, Cameroon, Cote d'Ivorie, Egypt, Kenya, Ghana, Mauritius, Morocco, Nigeria, and South Africa and were all obtained from 2005-2014.

The non-bank corporate bond issue is relatively new in African development paradigm (effectively from the current millennium) with South Africa obviously having the most advanced corporate and government debt markets in Africa that have been built in many decades (Mu *et al.* 2013). Being an emerging market, South Africa has a history of the yield curve for more than thirty (30) years (Osase 2007). The market is however dominated by the sovereign issues. The detail of the type and sources of the data adopted are presented in Table 1.

Table 1. Description of Variables, Data Sources with Justification and *a priori* expectation

Variable description	Type/Source	Literature justification	a-proiri
Irs = Interest rate spread	Secondary/ World Bank	Tendulker (2015), Adelegan and Radzewicz-Bak (2009), Bosworth (2014)	<0
Cbi = Corporate bond issued	Secondary/ BIS*/BM**	Tendulker (2015)	>0
Rpi = Real Gdp per capita	Secondary/ World Bank	Akinlo and Owoyemi (2012)	>0
Pdr = Public debt/Gdp ratio	Secondary/World Bank	Bosworth (2014), Akinlo and Owoyemi (2012)	<0
Iqx = Institutions' quality: Regulatory quality, rule of law, governance effectiveness	Secondary/ computed from Worldwide Governance Indicators, 2015 www.govindicators	Ayala *et al.* (2015), Djankor *et al.* (2007)	>0
Svr = Saving rate	Secondary/World Bank	Adelegan and Radzewicz-Bak (2009)	>0
Sbi = Sovereign bond issue	Secondary/ BIS*/BM**	Tendulkar (2015)	>0

Source: Compiled by authors: * BIS: Bank for International Settlement; **BM: Bond Markets from Annual Reports of sampled countries who are members of African Securities and Exchange Association

The empirical method of study is the fully modified ordinary least square (FMOLS) of Pedroni (2000) in autoregressive distributive lag (ARDL) framework. The study obtained the short run residual of the series and incorporated into the ARDL framework, to produce an augmented error correction linked ARDL. The ARDL specification with defined lag polynomial is within the VAR model family. The ARDL was developed by Henry, Pagan and Sargan (1984), and further popularized by Pesaran and Shin (1999) and Pesaran *et al.* (2001). Stated below is a modified Maddala and Kim (1998) generalized version of panel ARDL with *p* regressors *m* lags in *y*, and *n* lags in each *p* regressors denoted as ADL (*m, n; p*):

$$y_{it} = \phi_0 + \sum_{k=1}^{m} \alpha_k y_{it-k} + \sum_{j=1}^{p} \sum_{k=0}^{n} \beta_{jk} x_{jit-k} + \varepsilon_{it} \quad (2)$$

It is assumed that ε_{it} iid $(0, \sigma^2)$, a white noise process, and that the impact multiplier decreases in successive periods if $|\alpha_i| < 1$, and additionally by including sufficient lags of the dependent and explanatory variables, the serial correlation in the error term can be eliminated (Hill, Griffiths, and Lim 2011). Moreover, there is a theoretical connection between the ARDL and ECM. We modify in simplified panel form Verbeek (2004) as follows:

$$Y_{it} = \delta + \phi Y_{it-1} + \gamma_0 X_{it} + \gamma_1 X_{it-1} + \varepsilon_{it} \quad (3)$$

From 3, the long-run equilibrium relationship between *Y* and *X* can result by subtracting Y_{t-1} from both side and following transformation process, an ECM representation model could be formed as follows:

$$\Delta Y_{it} = \delta - (1-\phi) Y_{it-1} + \gamma_0 \Delta X_{it} + (\gamma_0 + \gamma_1) X_{it-1} + \varepsilon_{it}$$

or

$$\Delta Y_{it} = \phi_0 \Delta X_{it} - (1-\phi)[Y_{it-1} - \alpha - \beta X_{it-1}] + \varepsilon_{it} \quad (4)$$

where: α and β are the long run equilibrium multipliers of a unit change in *Xt*.

It connotes that the change in *Yt* responds to a current change in *Xt* plus an error correction term, and *(1-ϕ)* is the parameter that determines the speed of adjustment, the current error in achieving long run equilibrium. In this study, the ECM is extracted from the fully modified ordinary least square (FMOLS), in an autoregressive distributive lag model (ARDL) or Bound testing framework. Thus, the superiority of the ECM over the VAR is that apart from the long run equilibrium relationship, as part of explanatory variables, the past disequilibrium is introduced in a dynamic along with other current variables (Granger and Weiss 1983, Maddala and Kim 1998)

3.1. Model specification

In implicit form, the corporate bond issue (*Cbi*) is expected to be influenced by interest rate spread (*Irs*), sovereign bond issue (Sbi), gross saving rate (*Svr*), public debt stock (*Pdr*), institutional governance (*Iqx*), and real per capita income (*Rpi*), as follows:

CBI=f(Irs, Sbi, Svr, Pdr, Iqx, Rpi) (5)

The specification is presented explicitly below:

$$\Delta Cbi_{it} = \alpha_0 + \beta_1 \Delta Irs_{it} + \beta_2 \Delta Sbi_{it} + \beta_3 \Delta Svr_{it} + \beta_4 \Delta Pdr_{it} + \beta_5 \Delta Iqx_{it} + \beta_6 \Delta Rpi_{it} + \varepsilon_{it} \quad (6)$$

more formally, including the ECM term:

$$\Delta Cbi_{it} = \beta_0 + \sum_{j=1}^{P} \theta_{ij} \Delta Cbi_{it-j} + \sum_{j=1}^{P} \delta_{ij} \Delta Irs_{1t-j} + \sum_{j=1}^{P} \varphi_{ij} \Delta Sbi_{2t-j} + \ldots + \xi z_{t-1} + \varepsilon_{it} \quad (7)$$

It is assumed that ε_{it} iid $(0, \sigma^2)$, is the white noise process, while z_{t-1} is the ECM term.

3.2. Summary statistics

Presented in Table 3 below is the summary statistics. Corporate bond issue (*Cbi*) has the highest issue of $4.5173bn in Botswana in 2008, while the lowest issue of $0.2623bn was made in South Africa and Tunisia between 2004 and 2012 respectively. Interest rate spread (*Irs*) has the highest value recorded in Mauritius in 2005 with 13.8 percent, while the lowest spread also occurred in Mauritius with 0.5% in 2010. The highest institutional regulatory quality index (*Iqx*) value of 0.96 was achieved in Mauritius in 2012, while Nigeria achieved the lowest value of -1.63

in 2004. The real per capita income (*Rpi*) has the highest value of $7,328.5 in Morocco in 2012, while the lowest value of $11.5 was achieved by Ghana in 2006. Furthermore, Public debt ratio to GDP (*Pdr)* has its highest at 89 percent in Egypt in 2013 while Nigeria recorded the least value of 7.45% in 2008, and savings ratio to GDP has the highest value of 48% in Botswana in 2007, while the lowest is 9% in Ghana in 2008.

Table 2. Summary statistics table

	CBI	IRS	PDR	IQX	RPI	SBI	SVR
Mean	-0.1125	0.0457	0.3844	-0.2013	994.67	0.3034	0.2008
Maximum	8.3000	0.1380	0.8903	0.9600	7328.5	5.8795	0.4800
Minimum	0.1000	0.0500	0.0745	-1.6300	11.500	-2.3025	0.0900
Jarque-Bera	10.092	4.1003	2.0565	4.9791	456.03	630.29	24.430
Probability	0.0064	0.1287	0.3576	0.0829	0.0000	0.0000	0.0000
Observation	94	94	94	94	94	94	94

Sources: Computed by authors using E-view 9

3.3. Correlation analysis

Correlation study establishes the preliminary course of associations among variables. Table 3 suggests that corporate bond issue (*Cbi)* is positively associated with interest rate spread (*Irs*), sovereign bond issue *(Sbi*), savings rate (*Svr*) and Institutional quality index (Iqx), but negatively related to public debt ratio (Pdr) and real per capital income (*Rpi*). Interestingly, the sovereign bond issue (*Sbi)* is positively associated with interest rate spread *(Irs*) but at a less value unlike the *Cb*i. Thus, while the association between the *Cbi* and *Irs* is 17%, that of *Sbi* and *Irs* is 15% among the economies of study.

Public debt ratio *(Pdr*) has 31% negative link with the *Cbi*, which suggests that increases in bond debt could be increasingly detrimental to corporate bond development in the African economies. The *Pdr* is also negatively linked with a sovereign bond issue (*Sbi*) with 25%, which could also suggest that increase in public debts ratio does not encourage *Sbi*. However, the negative 16% link between *Pdr* and interest rate spread (*Irs*) counters the public finance and monetary theory thoughts that increase in public debt is a potential source of high-interest rate in many developing economies.

Largely, the high valued 41% and 42% positive association between sovereign bond issue (Sbi) and Saving rate (*Svr*) to corporate bond issue (*Cbi*) respectively generally underscore the corporate bond development theory. Institutional quality (Iqx) is about 27% and 39% positively linked with *Cbi* and *Rpi* respectively. This result indicates the quality institution required in the development of corporate bond and improvement of living standards among African economies.

Table 3. Correlation analysis

	CBI	IRS	SBI	SVR	PDR	IQX	RPI
CBI	1.000000						
IRS	0.173081	1.000000					
SBI	0.412965	0.152935	1.000000				
SVR	0.427636	0.146055	0.420679	1.000000			
PDR	-0.312445	-0.165108	-0.25532	-0.206816	1.000000		
IQX	0.268929	0.067609	0.125014	0.200858	0.075965	1.000000	
RPI	-0.06638	-0.344915	0.049711	0.094585	0.189833	0.390583	1.000000

Source: As Computed by authors

3.4. The short and long run dynamic effects

The regression result presented in Table 8 below provides for the hypothesis's parametric short and long run regressions. The regression is addressed with the use of an augmented autoregressive distributed lag (ARDL) (that is, of order *p+m*) estimation technique, where *p* is optimal lag length and *m* is the highest integration order. The result is presented in Table 6 below. The short run dynamics interaction is rightly signed by the negative error correction mechanism (ECM), and it is significant at 1%. This result reveals that the explanatory variables jointly

influence the dependent variable, and the annual speed of adjustment to long-run equilibrium is about 100%. The ECM result of 101% suggests two outcomes. First, it affirms the underlying economic theory of the explanatory variables included in the model and secondly, it affirms the long-run equilibrium relationship among the variables (Kennedy 2008). The long run results are addressed through individual explanatory variables. The long run development of the corporate bond market is significantly determined by the immediate part history of the corporate bond market by 93%, while the lag 2-period result is negative with 7%, however insignificantly.

Additionally, interest rate spread (*Irs*) in line with *a priori* negatively influences corporate bond issues in the region, which implies that a one percent increase in interest rate spread would reduce corporate bond issue by about 168% and 50% for lags 1 and 2 respectively. This result allies with the findings of Tendulkar (2015). Tendulkar (2015) adopts correlation analysis and panel fixed regression technique to study interest rate spread (Irs) and corporate bond market in 62 developed and emerging economies between 2004-2013, with an outcome that interest rate spread negatively affects the bond market development. However, perhaps due to data limitation the outcomes are insignificant. Other complementary outcomes from the relationship meet *apriori* requirements, such that a one period lag saving rate (*Svr*) and institutional quality (*Iqx*) positively affect immediate corporate bond issue (*Cbi*) in the region by 273% and 77% respectively.

The outcome of the diagnostic results by the significance of the *F*-statistics and Chi-square statistics at 1 percent reasonably suggest that the explanatory variables determine the dependent variable. The R^2 is 58%, which suggests that the model is fitted. The overall Wald test for the multivariate variables by the *F*-statistics and Chi-square statistics produce significant outcomes at 1%. The outcome of the diagnostic tests results-serial correlation, model stability, cross-section serial correlation, and residual normality tests are presented below.

Table 4. FMOLS RESIDUAL BASED ECM-ARDL: Short & Long-run results

Dependent Variable CBI				
Explanatory Variables	Coefficient	Std. error	t stat.	p value
ECM(-1)	-1.0094	0.3286	-3.0717	0.0036*
IRS(-1)	-1.6718	7.6005	-0.2199	0.8269
CBI(-1)	0.9366	0.2982	3.1409	0.0029*
SVR(-1)	2.7318	3.8138	0.7162	0.4774
PDR(-1)	9.5678	3.6822	2.5983	0.0125*
IQX(-1)	0.7732	1.2758	0.606	0.5414
RPI(-1)	-0.0003	0.0002	-2.0543	0.0457**
IRS(-2)	-0.5	7.5451	-0.0662	0.9474
CBI(-2)	-0.0775	0.1544	-0.502	0.618
SVR(-2)	-1.6071	3.0209	-0.5319	0.5973
PVR(-2)	-9.2058	3.5764	-2.574	0.0133*
IQX(-2)	-0.8328	1.2785	-0.6514	0.518
RPI(-2)	0.0002	0.0002	0.9411	0.3516
F. Stat.	4.52078		0.0011*	
X Stat	17.12468		0.0001*	
Diagnostics				
R^2	0.5846			

Source: Computed by authors. * &** denote significance at 1% and 5% respectively

3.5. Diagnostics tests

3.5.1. Serial Correlation LM test

The Serial correlation LM test presented below in Table 7 suggests that the study fails to reject the hypothesis that there is no serial correlation among the series, given 49 degrees of freedom, thus concluding that there is no serial correlation among the residuals.

Table 5. Serial Correlation Test

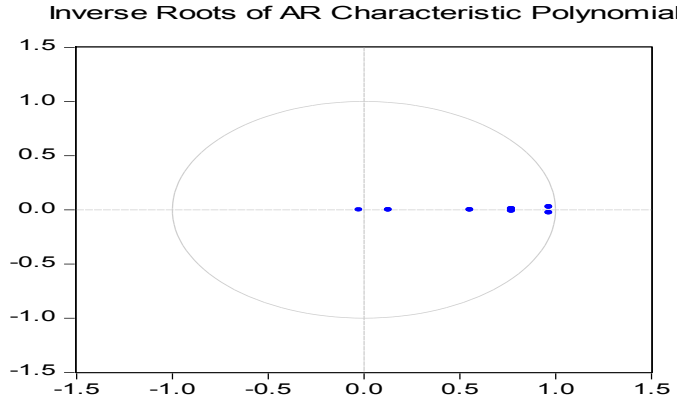
Lag	*LM-Stat.*	χ^2 D.F	*Probability*
1	58.31717	49	0.1701

Source: Computed by authors using E-view 9

3.5.2 Model stability test

This test examines whether the model is stable. In Figure 3 below evidence of the locations of the unit root within the unit root circle indicates that the study fails to reject the hypothesis that the model is stable overtime.

Figure 3. Inverse Roots of AR Characteristic Polynomial



Source: Extract from E-view 9

3.5.3. Residual test for cross section serial correlation

The four residual cross-section dependency (correlation) tests whose results are presented in Table 11 below suggests the absence of a serial correlation across the cross sectional unit, as the probability value is above 5%. Since the null hypothesis test shows 'no cross-sectional dependency (correlation)', the study then fails to reject the null hypothesis that the cross sections are independent.

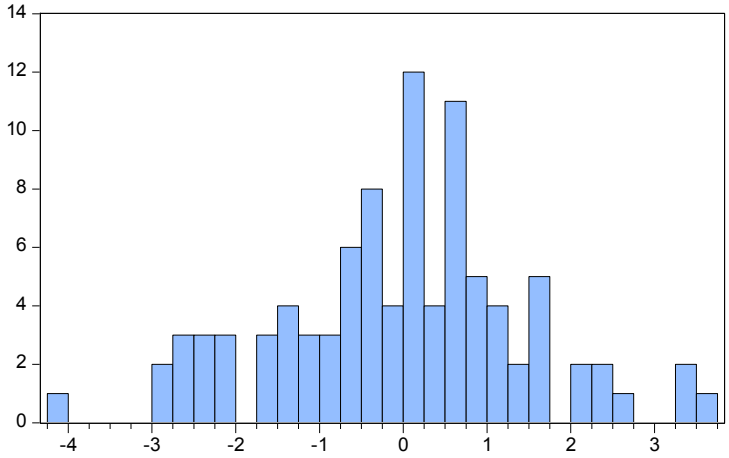
Table 6. Cross-section serial correlation

Test	statistics	*d.f.*	*p*.value
Breusch-Pagan LM	43.15326	36	0.1921
Pesaran scaled LM	-0.217641		0.8277
Bias-corrected scaled LM	-0.780141		0.4353
Pesaran CD	0.226660		0.8207

Source. Computed by authors using E-view 9

3.5.4. Test for Normality of Residual

Figure 4. Normality test result



4. Discussion

The hypothesis's result suggests a 167% negative influence of interest rate spread on a corporate bond issue. This analysis requires examination of potential developments that may arise from rising nominal interest rate. Given relative high inflation rate, often in two digits in the African region, rising nominal interest benefits the bank, as it increases the lending-deposit rate spread (profit), and infers an increase on issuing cost of bonds. When the margin is low however, banks would not have an appetite to produce loans for non-finance corporations (NFC), thereby improving patronage of the corporate debt issue market.

High-interest rate spread in bank based economies may not be unconnected with the inherent challenge of access to corporate information. It suffices that in developed economies, the capital market treat matters of corporate information as a public good. There is need to improve on the level of information and its quality on market participants. A general characteristic of developing market economies credit markets is that, investors and other market participants' merely free-rides on matters of corporate information (Stiglitz 1988). In line with the growth of efficient market economies are the instantaneous response needed from participants.

A high interest spread regime promotes the oligopoly market structure of the banks and frustrates the competitiveness of the financial institutions. A low nominal lending rate would stimulate the investors' appetite in the bond market where general price of issues is strictly under control, as it is market determined; that is, a-once–and-for-all issue price. This study finds support from Bosworth (2014) that there exists a weak relationship between interest rate and economic growth in G7 and 19 OECD countries from 1970-2012. In fact, despite the growth in support of finance led growth debate, several studies on African economies conclude that the financial system is maladapted and cannot promoted real growth (Ojo 2010).

The bond market can, therefore, malfunction in an atmosphere of increasing inflation, which exacerbates interest rate spread (Tendulkar 2015, Rose and Spiegel 2015). The result from this study is consistent with Tendulkar (2015) and Bhattacharyay (2011). Tendulkar (2015) finds that interest rate spread has negative impact on international bond market development under the markets size, depth and activity categories but positive to market activity in the domestic market category. It remains that for inflation-target regimes, the bond market could be an appropriate strategy to control increases in inflation and moderate high-interest rate spread in the money market.

Additionally, that there is a positive impact of savings rate on corporate bond issue market in these markets is supported by the work of Adelegan and Radzewick-Bak (2009). In the supply leading hypothesis, saving-investment-output nexus is positively linked. Savings rate need to be attractive to improve savings behaviour of the people and institutions and need to attract scarce capital towards the primary bond market growth.

The regression result also finds that regulatory institutional quality positively influences corporate bond issue. Financial regulation should generally govern commercial behaviour in the financial system. As social rules are needed to reconcile the conflicting interests of members of the social system, also commercial rules are to reconcile the conflicting interests of participants in the commercial system (Carmichael and Pomerleano 2002).

Recommendations and conclusions

The foregoing results suggest the need to recommend the following for African economies against interest rate spread and lagging corporate bond market development. First, the bank lending dominance in the credit market needs to be managed downwards. Interest rate spread would be reduced by policies that would help to provide competitiveness in the financial market and secure the potential creditors. Government Treasury bill rates need to be reduced to bring the bank lending rate downward with concurrent impact on spread. Additionally, since information asymmetry is a major constraint for growing market-based economies, regulations that would make corporate information a public good and reforms that would promote access to a credit bureau and credit registrar should be pursued. Secondly, the banking industry in African economies operates in oligopolistic market structure, which would have contributed to high lending rate and interest margins, due to low competitiveness. African governments should improve the level of competitiveness by granting more banking licenses. A model of banking behaviour indicates that in oligopolistic bank market structures a rise in the bill rate raises the loan rate (Matthews and Thompson 2014). Thirdly, there is need to provide a fiscal incentive to non-finance corporations (NFC) to accommodate bond funding in their corporate finance restructuring decisions.

Fourthly, the savings rate, habit, and behaviour can be improved upon by government's tax concessions. Many factors influence savings, however, the desire to save in order to improve investment in the corporate bond can be better addressed through higher income for the personal and corporate individuals and managed inflation rate policies. A two digits' inflation rate common with African economies discourages savings habit and behaviour, as savings has complimentary relations witc consumption. Moreover, since many households only engage in 'precautionary savings', a government needs to improve the level of economic certainty in the region. Government fiscal and monetary policies should be holistic to improve disposable income and provide cheap living conditions.

Fifthly, the importance of institutional regulatory quality index is stressed in the regression result for a corporate bond market. Economic theory suggests that financial systems adopt rules and regulations meant to promote economic efficiency; safeguard the system against systemic risk; protect consumers against opportunistic behaviour by suppliers of financial services; and achieve a range of social objectives (Herring and Santomero 1999). The nature of the risks and the special role the financial institutions play in the financial system makes them to be singled out for special regulatory attention. The "specialness" of their role in the economy is attested to in the nature of financial services. To improve the competitiveness, innovation and efficiency in the corporate bond market, the apex and self-regulatory institutions must ensure that rules are strictly applied and be dynamic. The quality regulatory regime is anecdotal to investors' confidence.

The institutional regulatory outcome ties with the fifth recommendation since the auto- regression's outcome reveal corporate bond issue market positively correlating with past performance. For the market to improve upon its past, associated institutions need to improve on their qualities. Capital market institutions develop on the strength of effective rule of law, effective governance and regulations.

This paper has examined the co-integrating relationship between interest rate spread and corporate bond market, while also testing the 'group interest' theory of financial intermediation. A common characteristic of many African bank-based economies is the prevalence of high-interest rate spread, which this study argues as correlating with a low development of corporate bond issues. The banking institutions dominate the corporate bond issue market in the region and hence produce loans at high rates to long-term fund seekers, who hitherto, would have approached the long term market. The financial mismatch syndrome has consequences in financial instability. The study, in a context of thirteen African economies, used fully modified ordinary least square (FMOLS) in an autoregressive distributive lag (ARDL) framework. Our result provides evidence that corporate bond issue, as a proxy for financial development is negatively influenced by interest rate margin in the short and long terms. The result supports the postulation of the 'group interest' theory, that a bank-based financial system may be

uncompetitive, hence a deterrent to financial development in the respective economies. The ECM coefficient significantly satisfies the *apriori* expectation which implies long run equilibrium from the annual speed of adjustment.

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Managing Fiscal Risk in High Public Debt: Evidence from Indonesia

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Abstract:

This paper analyzes the fiscal risk and its determinants in Indonesia. It estimates a Value-at-Risk (VaR) based on the debt ratio using Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model for the data 1991-2016. This research also evaluates the response of the fiscal policies to the debt ratio volatility. We apply fiscal reaction function to capture the relationship between that variable and other variables namely primary balance, output gap, and seignorage. The research finds a risky situation in 1999 following the 1998 Asian crises and another risky in 2008 following the crash in the US capital market. It also reveals slow response of fiscal adjustment to the debt risk in the country. The primary balance model indicates that fiscal policies do not adjust effectively to the short run fiscal imbalance. This paper concludes that fiscal capacity improvement and debt risk reduction are main challenges to achieve better fiscal sustainability. The government needs to improve the quality of its budget governance both in primary deficit and debt management.

Keywords: fiscal; risk; primary balance; public debt; seignorage

JEL Classification: C22; C53; E62; E63

Introduction

In the past few decades, various Indonesian economic indicators have been improving, except those during the economic crisis in Asia started in 1997 and the crises started in the USA in 2008. However, since the 1990s, Indonesia has been trapped by the burden of foreign debt, high inflation and huge unemployment rate. As a result, Indonesia experienced a serious fiscal risk since this period (Marks 2004, Kawai and Morgan 2013). In the same period Indonesia has been experiencing increasing fiscal risks caused by economic shocks both from outside and inside the country. This condition can threaten the fiscal sustainability and probably lead in creating to fiscal cliff (Kiran 2011, Gnip 2013).

Since Indonesia is one of Asian countries which suffered deeply from financial crisis of 1997–98, it was suspected that increasing in debt ratio contributed to its fiscal imbalances. Not only there was an increase in the budget deficit, but public debt also rose sharply to meet the government budget. Unfortunately, economic growth declined significantly that aggravated the fiscal balance several years' aftermath the crisis. The trend of debt ratio and fiscal balances in recent years describes the fiscal weaknesses of the country (Sriyana 2016). Just before the crisis hit the economy, debt ratio seemed flat, indicating a fiscal stability. In contrast, as financial crisis occurred, debt ratio increased sharply as a consequent of currency changes. In respond to this situation, the government was

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attempting to invite funds from international market. However, fiscal deficit also rose during the crisis period, reflecting a combination of higher interest rates, cyclically weak domestic demand that depressed tax revenues, and banking sector recapitalization in the aftermath of banking sector crises (Kawai and Morgan 2013). In addition, fiscal balances were recovered slowly via several economic policies.

To achieve fiscal stability and growth, the Indonesian authorities formulated an economic reform program in 2000 which was supported by International Monetary Fund (IMF). The program was designed to restore the economic growth, to control inflation rate, and to achieve fiscal sustainability in the next few years. Under this program, the government targeted public debt would be less than 65% of GDP by 2004 (Brondolo *et al.* 2008). The authorities designed a fiscal adjustment program to achieve a balance between supporting economic recovery and fiscal sustainability. For this purpose, the government considered to maintain fiscal stimulus as well as fiscal consolidation in achieving optimum economic growth and reasonable inflation rate. Furthermore, the government applied a fiscal adjustment framework through gradual reduction in public debt and the budget deficit. As a result of the program, inflation declined as well as GDP grew in 1999 which lead to the national economy recovery. Since 2000, Indonesia's fiscal reforms have been successfully reduced public debt and improved the fiscal capacity. The program also had strong and positive impacts on the government revenue which was strongly supported by tax revenue. Furthermore, debt ratio in this year had decreased significantly which was followed by more stable primary balance.

The increases of debt ratio in few years after the crisis were almost 100% of GDP. In fact, based on the International Monetary Fund (IMF)'s guideline for debt sustainability, debt ratio should remain below 60% of GDP (Brondolo *et al.* 2008). Even though debt ratio has been trending downward since 2002, because of political issues that made slow economic recovery, it grew in 2010s as an impact of global financial crisis in 2008. During this period, Indonesia implemented substantial fiscal easing policies to offset a sharp drop in its import demand from other countries. Moreover, prudent fiscal management after the global financial crisis provided plenty of fiscal space to support several stimulus programs. Thereafter, primary balance was in a stable level, with a relatively low growth of government debt. As primary balance relatively constant, the debt ratio has risen up to 90% of GDP. In this period, the central bank of Indonesia has applied financial repression, marked by the increase in interest rate. This situation might contribute significantly to the rapid improvement in public debt which strengthens the fiscal sustainability. It is theoretically known that the main factor of fiscal sustainability is the difference between the economic growth and the real interest rate. If the interest rate is higher than economic growth, the debt ratio will tend to rise. On the other hand, if the interest rate is less than economic growth, the debt ratio will tend to decline. In the situation of increases debt ratio, fiscal sustainability might be worsened.

1. Literature review

As a developing country, Indonesia has applied expansionary fiscal policies using deficit budget instruments for more than two decades. The public financing needs as consequence of budget deficit raised in that period. Moreover, deficit financing using public debt in some developing countries tends to rise as the result of the global economic turbulence (Kawai and Morgan 2013). Regarding fiscal management issue, minimizing fiscal constraints and fiscal risk in order to achieve safe fiscal zone were important challenges for Indonesia (Sriyana 2016). Therefore, it is important to explore the source of such turbulences and their impacts on Indonesian fiscal sustainability. We need some measurements to assess fiscal risk in the growing public debt in such country. The question is how the government finances the budget deficit. Theoretically, there are two options available for deficit financing, by taking debt and printing money. For more two decades Indonesia has been employing both options. Some examples are selling government bonds both inside and outside the country, and privatizing some government enterprises. One important thing to note is that increasing the public debt caused lower economic growth and fiscal sustainability (Fan and Lv 2012).

A proper fiscal management is important in boosting a country's economy. Fiscal conditions are reflected in the government budget whether it is strong and sustainable supporting the performance of the national economy (Barnhill and Kopits 2003). As consequence of low tax revenue and government spending increase the government applied deficit fiscal policy (Fan and Lv 2012). This policy also aims to maintain economic stability as well as stable

economic growth. In addition, it has an impact on macroeconomic variables, which could potentially bring to economic inefficiency, including the inefficiency of state financial management (Kawai and Morgan 2013). If this condition persists in the long term, it will endanger a country's fiscal sustainability.

To evaluate whether fiscal risk is in danger, various papers have discussed this issue (Barnhill and Kopits 2003, Adrogue 2005, Kiran 2011). Barnhill and Kopits (2003) used Value-at-Risk (VaR) which was widely used in macro finance research to measure fiscal risk for some countries. Moreover, Adrogue (2005) used Value-at-Risk approach to evaluate fiscal risk using the debt to GDP ratio. This paper recognizes that VaR approach based on balance sheet conditions will be better in modelling fiscal risks, but not all countries have sufficient data to calculate the VaR (Porter 2007). As the consequence, if we wish to make comparisons across countries fiscal risks, particularly developing countries, the VaR approach using debt ratio is a better choice.

This paper attempts to analyze fiscal risk in Indonesia using debt ratio, primary balance and other key fiscal variables. To make it simple, we will consider debt ratio and debt to GDP ratio as similar terms. A model on the ratio is built based on the relationship between debt and the primary balance. To evaluate whether the ratio is in unsustainable level, this paper builds a Value-at-Risk (VaR) on debt ratio. This paper develops the approach used by Adrogue (2005) and Barnhill and Kopits (2003), namely calculating conditional VaR. Unlike the aforementioned papers, this paper calculates the variance used to calculate the VaR using conditional family of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model adopted from Engle, (2001). Furthermore, the study also analyzes the response of fiscal policy to the debt management. For this purpose, we modify a fiscal reaction function developed by Celasun *et al.* (2006). In addition, to present more sophisticated results, this research further analyzes the fiscal policy response using Vector Error Correction Model (VECM). This model considers evaluating the short and long run relationship between debt, primary balance and other fiscal variables. (Kiran 2011) points out that VECM is a more robust method for estimating the long-run relationship in small samples. The novelty of this paper lies on the use of conditional volatility to calculate the VaR and the dynamic analysis of fiscal reaction to capture the response of fiscal policies.

2. Research method

2.1. Data description

This paper provides empirical analysis of fiscal risk and fiscal reaction functions. The analysis of fiscal risk will be conducted based on the GARCH model which involves data of debt ratio, primary balance, and output gap. Meanwhile, the model of fiscal reaction function will be estimated using multiple regression and VECM. These models employ a data set of debt, primary balance, output gap, tax, budget deficit, and seignorage. This research uses the annual data from 1991 to 2016, which are collected from Indonesia's Annual Budget Reports (http://www.fiskal.kemenkeu.go.id/) and Annual Reports of Bank Indonesia (http://www.bi.go.id/). The data of output gap are calculated based on the difference between trend and actual GDP. Data of seignorage are calculated using narrow money (M1) and inflation.

2.2. Fiscal risk model

This paper measures fiscal risk using debt ratio. The ratio pictures the ability of a country in paying its debt. The lower the ratio, the more sustain the fiscal of the country is. Assuming that GDP is constant, an increase in the government debt leads to an increase in the ratio. However, an increase in the ratio might also be caused by some external factors such as increases in exchange rates, interest rates, inflation, tax rate, or government spending.

To evaluate whether the ratio is lower than the threshold of a particular critical level, the Value at Risk or VaR will be constructed. VaR is widely used to measure the risk in finance. The novelty of this paper is that the VaR is calculated using the conditional standard deviation, well known as the conditional volatility. To model such conditional volatility, this paper uses a GARCH model.

Burger, Stuart, Jooste, and Cuevas, (2011) stated that establishing how government reacts to its debt burden can be done through the estimation of a fiscal reaction function. Fiscal reaction functions usually specify, for annual data, the reaction of the primary balance to GDP ratio to changes in the one-period lagged debt ratio, controlling for other influences. According to Bohn, (2007), if the debt ratio increases, government should respond

by improving the primary balance, to arrest and even reverse the rise in the debt ratio. The rationale behind this is rooted in the government budget constraint (Galí and Perotti 2003, De Mello 2005). In its simplified terms, this constraint may be written as follows:

$$D_t = D_{t-1} + iD_{t-1} - B_t \quad (1)$$

where: D_t is public debt at period *t*; *i* is nominal interest rate on government bonds; B_t is primary balance period *t*.

To get the sense of relativity of the variables included in the model to GDP, Burger *et al.*, (2011) re-parameterized equation (1) into equation (2) as follows.

$$\Delta(D/Y)_t = \frac{r-g}{1+g}(D/Y)_{t-1} - (B/Y)_t \quad (2)$$

$$\Delta d_t = \left[\frac{r-g}{1+g}\right] d_{t-1} - p_t \quad (3)$$

where: Y is nominal GDP at period *t*; d_t is the debt ratio at the period *t*; *r* is real interest rate; *g* is real economic growth rate; p_t is the ratio of the primary balance to GDP at period *t*.

Considering the nature of the data stationary and the impact of output gap, Burger *et al*. (2011) further re-parameterized the model and end up with a VECM, with Δd_t and Δp_t as the dependent variables. Furthermore, this research also provides an empirical of the relationship between these two variables using VECM. Regarding to the issue of fiscal risk analysis, this paper is a simpler attempt to model the debt ratio based on the conditional volatility model. In order to capture the volatility in the debt ratio, this paper considers model the second moment, or the conditional variance, of such variable. Considering this second moment model, the estimated model becomes:

$$d_t = \beta_0 + \beta_1 d_{t-1} + \beta_2 p_{t-1} + \beta_3 ygap_{t-1} + \varepsilon_t \quad (4)$$

$$\varepsilon_t = \eta_t \sqrt{h_t} \quad (5)$$

$$h_t = \alpha + \beta \varepsilon^2_{t-1} + \xi_t \quad (6)$$

where: $ygap_t$ is the output gap at period *t*; ε_t is error term in equation (4); η_t is standardized residual; h_t is conditional variance in equation (6).

The VaR_t threshold for d_t can be calculated as:

$$VaR_t = E(y_t | F_{t-1}) + z\sqrt{h_t} \quad (7)$$

F_t represents all information available at time *t*. Recall the VaR value in finance, for example the forecast of VaR based on return on stocks, where the VaR value is on the far left tail. The VaR in this paper is, different from the aforementioned VaR, on the far right tail of the distribution, because the risky debt ratio is the high one. The final step of the analysis is to compare the estimated VaR on the debt to GDP ratio with its actual value of debt ratio. If the actual debt ratio is bigger than estimated VaR, a violation occurs. This violation indicates that the fiscal position is in a risky level.

2.3. Fiscal reaction function

It is important to trace the causes of debt risk using comprehensive analysis such as the fiscal reaction model. A number of studies have recently estimated fiscal reaction functions (Celasun, Debrun and Ostry 2006, Burger *et al.* 2011). The aims of these literatures are commonly to identify a stable relationship between fiscal policy which is

measured by the primary balance and various potential determinants. This paper attempts to establish empirical evidence on such issue which involves key variables and economic policies. Debt sustainability is expected to be one of those considerations, along with cyclical developments, and institutions affecting a government's incentives. According to (Celasun, Debrun, and Ostry 2006), fiscal reaction function is considered as a description of average fiscal policy patterns. In this research, the modified fiscal reaction function will be estimated using annual data. In line with the mentioned literatures, the general specification is given by:

$$p_t = \delta_0 + \delta_1 d_{t-1} + \delta_2\, ygap_t + \delta_3\, Tax_t + \delta_4\, Def_t + \delta_5\, Seig_t + e_t \quad (8)$$

where: p_t is the ratio of the primary balance to GDP at period t; d_t is the debt ratio at the period $t-1$; $ygap_t$ is the output gap at period t; Tax_t is tax revenue; Def_t is budget deficit; *Seig* is seignorage; e_t is an unobserved residual variable.

In line with the literature, the reaction function we estimate, given in equation (8), relates the annual primary fiscal balance to the outstanding level of public debt, the gap between actual and trend output, and a number of potentially important drivers of the primary balance such as tax revenue, budget deficit, and seignorage. Moreover, we also consider analyzing the effect of output fluctuations to the primary balance as formulated in equation (9). This model presents estimates of the fiscal reaction function which allows for a response to debt at 50% of GDP, and a different response to the output gap depending on the output gap's sign. The specification of the estimable function is as follows:

$$p_t = \beta_0 + \beta_1 d_{t-1} + \beta_2\, ygap_t + \beta_3\, Tax_t + \beta_4\, Def + \beta_5\, Seig_t + \beta_6\, D1 + \beta_7\, D2 + e_t \quad (9)$$

where: D1 is a dummy variable that equals one if debt ratio in period (*t-1*) exceeds 50% of GDP; *D2* is a dummy variable that equals one if the output gap is positive (a boom); equals zero if the output gap is negative (a downturn).

This paper further analyzes fiscal solvency which concerns with the raise of primary balance in response to an increase in public debt. If all other determinants of fiscal policy are stationary, the positive correlation between debt and the primary surplus is sufficient to guarantee that the debt ratio will revert to some finite steady-state value (Celasun, Debrun, and Ostry 2006, Burger *et al.* 2011). Furthermore, this section describes the VECM estimation of fiscal reaction functions for a group of fiscal variables such as debt, primary balance, output gap, and seignorage. The analysis emphasizes on the two models of debt and primary balance. The models take in the simple form as follows:

$$p_t = f\,(d_t, ygap_t, Seig_t) \quad (10)$$

$$d_t = f\,(p_t,\ ygap_t, Seig_t) \quad (11)$$

The long run model is estimated using VECM which captures short run disequilibrium among variables in the model. To provide an estimable technique to test the existing of long run dynamic equilibrium between debt and primary balance, this equation could be written as follows:

$$\Delta p_t = \rho + \sum_{i=1}^{m} p_i\, \Delta d_{t-i} + \sum_{i=1}^{n} q_i\, \Delta p_{t-i} + \sum_{i=1}^{p} r_i\, \Delta ygap_{t-l} + \sum_{i=1}^{q} s_i\, \Delta Seig_{t-i} + \gamma\, ECT1_{t-1} + w_t \quad (12)$$

$$\Delta d_t = \delta + \sum_{i=1}^{m} b_i\, \Delta d_{t-i} + \sum_{i=1}^{n} c_i\, \Delta p_{t-i} + \sum_{i=1}^{p} d_i\, \Delta ygap_{t-i} + \sum_{i=1}^{q} e_i\, \Delta Seig_{t-i} + \lambda\, ECT2_{t-1} + v_t \quad (13)$$

A negative and significant error correction term λ in equation (12) and γ in equation (13) would indicate the existing of cointegration relationship among underlying variables in the equation. In this case, a long run equilibrium in the budget constraint equation is hold (Ghartey 2010). The optimum lags length of the ADL equations is chosen by using information criteria such as Akaike Information Criterion (AIC). The error correction term also measures the speed of adjustment from short run deviations to a long-run equilibrium. If it is statistically significant and has a negative sign, it means that the set of variables are co-integrated (Johansen 1991).

3. Results and discussion

Indonesia has experienced several phases of its fiscal policies since 1990's. For more than two decades the country met several financial crises which threat its fiscal capacity. When the Asian financial crisis attacked in 1997, Indonesia suffered more serious than other Asian countries did. This condition required a reform in Indonesia's fiscal management. To respond to such phenomena, the government imposed fiscal adjustment policy and tax administration reform in the early 2000's against the negative impact of the Asian financial crisis. As an impact of the crisis, real GDP contracted in 1998 and it needed six years to recover. On the other hand, inflation increased sharply which achieved 75% in 1998. The situation deteriorated further the fiscal capacity as indicated by fast growing of debt ratio for more than one decade. For more detail it can be observed on the behaviour of several monetary and fiscal variables which their descriptive statistic table is also presented in Table 1.

Table 1. Descriptive Statistic of Data 1991-2016

Statistic Indicators	Output Gap (% of GDP)	Debt Ratio (%)	Primary Balance (% of GDP)	Budget Deficit (% of GDP)	Tax Ratio (%)	Seignorage (%)
Mean	-0.19	39.32	0.74	1.92	7.48	2.41
Median	-0.01	34.79	0.33	1.80	9.79	1.15
Maximum	0.76	85.43	4.07	4.45	13.83	8.74
Minimum	-3.60	23.00	-1.23	0.20	0.79	0.23
Std. Dev.	0.84	16.39	1.29	0.89	4.65	2.69

The first step of fiscal risk analysis is to estimate the model of debt ratio. As mentioned, this paper applies the GARCH model which involves both the first and second moments. The empirical result of second moment in this case is presented in Table 2. From the estimation result of conditional mean equation, it can be concluded that all variables statistically influence d_t at 5% significance level. From the estimation result of conditional variance equation, the residual term does not significantly influence the conditional variance at 5% significance level, suggesting that debt to GDP ratio is volatile which might be the result of various volatile variables such as exchange rates and interest rate.

Table 2. GARCH Estimates of Debt Ratio

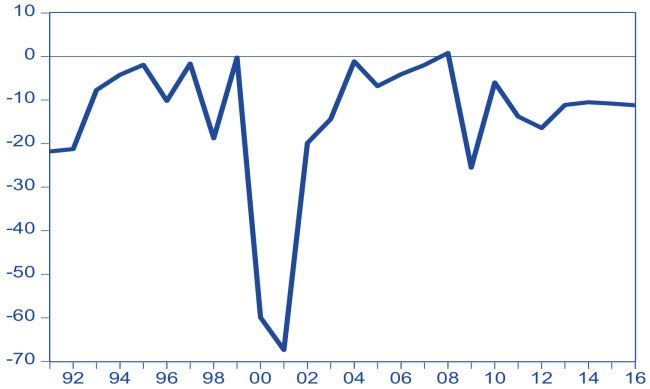
Conditional Mean		
Variables	Coefficients	Z-statistic
C	14.01	[2.64]***
Debt ratio(-1)	0.82	[11.93]***
Primary balance(-1)	-3.03	[-4.46]***
Output gap(-1)	-11.17	[-2.14]**
Conditional variance		
C	0.015	[0.001]
$RESID^2(-1)$	-0.281	[-0.99]
GARCH(-1)	1.263	[4.15]***
Adjusted R^2	0.85	
F-statistic	22.70***	

Note: ***, ** indicate statistically significant at 1% and 5% respectively.

Furthermore, the estimation result provides conditional standard deviation which is then used for calculating the violation of debt ratio. The result using normal distribution with the confidence level of 95% suggests that there is one violation in 2008. The estimation result using *t* distribution with the confidence level of 95% suggests that there are two violations, both in 1999 and in 2008 (Figure 1). The violation in 1999 might be caused by the economic crises started in 1997 in Asia, while the violation in 2008 might be related to the financial crises stems from the capital market in the USA. It can be concluded that both models, especially the one with *t* distribution can capture the risky situation of debt ratio, which are mostly caused by severe situations in the global economy. The VaR using *z* distribution provides good result in the sense that it provides violations for the two unfavourable crises. The

advantage of *z* distribution might come from the fact that the observations used to estimate the model with limited sample. It perhaps also indicates that the distribution of such debt ratio is of fait tail distribution. Since the actual debt ratio is bigger than estimated VaR for two years, we conclude that a violations occur which indicates that the fiscal position is in a risky level.

Figure 1. Violation of debt ratio



Further important analysis is to trace the factors may cause the fiscal risk situation. For this purpose, the estimation result of fiscal reaction function which is modified from Celasun *et al.* (2006) is presented in Table 3. In line with the literature, the modified reaction function given in equation (8) relates the annual primary fiscal balance to the public debt ratio, output gap, tax ratio, deficit, and seignorage. Meanwhile, equation (9) has two additional dummy variables that potentially drive the primary balance volatility. Both empirical models show strong relationships between primary balances and their independent variables. In the first equation, all variables, except budget deficit, significantly influence primary balance at least at 1 percent of significance level. Based on the second equation, the dummy variable (D1) confirms the hypothesis that the fiscal response to debt is stronger when debt is above 50% of GDP. This result is in line with such issue in emerging market economies as pointed out by Celasun *et al.* (2006).

The dummy variable D2 which reflects the response of economic fluctuations to primary balance is also significant even at 10% level of significance but it indicates negative response. This finding does not support the hypothesis that primary balances automatically decrease (increase) as a share of GDP decreases (increases) as noted by Celasun *et al*. (2006). Since our interest is in investigating fiscal policy response, this result confirms that the responses to booms and recessions are asymmetric. Broadly, regarding the fiscal response to output, this study is not part of view of Auerbach and Gorodnichenko (2012). This finding indicates that the primary balance adapt to the economy in a-non cyclical pattern. Moreover, this finding suggests that primary balances during economic contractions do not exceed the improvements attained during economic booms. In short, this research does not assert the strong relationship between output and primary balance as pointed out by Bal (2014). In other word, this result is not in line with Keynesian views.

Table 3. Estimate results of fiscal reaction function

Independent Variables	Dependent Variable: Primary Balance (p_t)			
	Equation (8)		Equation (9)	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	1.67	[1.62]	-0.76	[-0.70]
Debt ratio(-1)	0.01	[1.83]*	0.03	[2.65] **
Ouput gap	1.01	[2.54]**	1.18	[4.14]***
Tax revenue	-0.19	[-2.63]**	-0.25	[-2.64]**
Budget deficit	-0.62	[-1.47]	0.14	[0.62]
Seignorage	0.49	[4.16]***	0.44	[5.75]***
D1	-	-	2.55	[3.48]***

Independent Variables	Dependent Variable: Primary Balance (p_t)			
	Equation (8)		Equation (9)	
	Coefficient	t-statistic	Coefficient	t-statistic
D2	-	-	-1.16	[-2.73]***
Adjusted R^2	0.50		0.78	
F statistic	3.86		7.80	
Durbin-Watson	1.62		1.76	

Notes: ***, **,*: statistically significant at 1%, 5% and 10% respectively.

The next analysis in this research is estimating by the dynamic regression. As mentioned, this paper utilizes VECM to capture the dynamic response among fiscal variables. VECM requires a unit root test to test for the stationary data series before conducting the estimation. Table 4 presents the result of individual unit root tests on the data series with intercept and time trend component. The result shows that the null hypothesis of unit root in-level should not be rejected for all data series at 1 percent level of significance except for seignorage (Table 4). In contrast, the null hypothesis of unit root on the first difference could be rejected for all data series even though at 1% level of significance. These indicate that these series are all stationary in first difference. Due to the Engle and Granger (1987), cointegration test will be valid if a set of data series are stationary and they have the same degree of integration. This research used Johansen procedure to evaluate such long run equilibrium relationship (Johansen 1991). Thus, cointegration test could be applied to estimate the long run relationship between those variables.

Table 4. Unit Root Test based on Aughmented Dicky-Fuller (lags=2 with intercept and trend)

Variables	Level		First Difference	
	t-Statistic	Probability	t-Statistic	Probability*
Primary balance	2.53	0.12	7.63	0.00
Debt ratio	2.55	0.11	5.54	0.00
Output gap	3.61	0.04	6.33	0.00
Seignorage	4.30	0.01	7.21	0.00

Notes: *MacKinnon (1996) one-sided p-values. All variables are statistically significant at 1% in first difference

The result of cointegration test is summarized in Table 5. The trace statistics value rejects the null hypotheses of no co-integrating relationship at 5 percent level. The result implies that they are co-integrated at the same degree of stationary. In other words, the series have a long-run relationship. With intercept in the equation, a co-integrating vector is found in the estimation. This result shows that a long run relationship exists in a set of variables consisting primary balance, debt, output gap, and seignorage. The presence of the cointegration indicates a corresponding error correction representation which implies that the changes in independent variables are a function of the level of disequilibria in the long run relationship. According to Engle and Granger (1987), this mechanism is captured by error correction term, as well as changes in explanatory variables. In the same way, we will estimate VECM which has some explanatory variables and error correction term obtained from the cointegration equation. This model may be applied to explain the short run effect of explanatory variables to primary balance and debt ratio.

Table 5. Result of Cointegration Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.85	78.79	60.06	0.00
At most 1	0.60	32.36	40.17	0.24
At most 2	0.20	10.36	24.27	0.82
At most 3	0.15	4.71	12.32	0.60

Notes: Trace test indicates 1 co-integrating equation(s) at the 0.05 level of significance. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.

The short run behaviour of primary balance and debt ratio could be explained based on two empirical models in equation (12) and (13) presented in Table 6. According to minimum value of AIC we find the best VECM estimation is based on 2 lags. Specifically, error correction term (ECT) which indicates the validity of VECM is significant only in primary balance equation. The error-correction term in the primary balance equation is 0.17, indicates a low response to the deviations from its long-run equilibrium. Thus, about 17% of the deviation is corrected in the first period after the deviation occurs. The previous primary balance and seignorage do not significantly affect the primary balance growth. This result is similar with the previous research which indicate the existing of fiscal disequilibrium (Sriyana 2015). Generally, the model of primary balance explains that fiscal policies have not effectively adjusted to the short run change of fiscal imbalance. Following Burger *et al.* (2011), due to the fiscal sustainability, this result might be a warn to the government to review the quality of budget governance, both for primary deficit and debt management (Mokoginta and Stephanie 2015). As pointed out by Kawai and Morgan, (2013), these findings recommend the government to strengthen the fiscal balance and reduce debt risk in order to improve fiscal sustainability.

The empirical debt equation represent that the variable of error correction term is not significant, indicating the absence of long run equilibrium in the debt management. Consequently, it indicates low adjustment process to response the debt risk. Another paper also found such phenomenon (Asiama, Akosah, and Owusu-Afriyie 2014). The insignificant of debt ratio equation indicates that government did not use the opportunity of the primary surplus to maintain debt risk. These results imply that the government needs to strengthen the revenue sources as well as pointed out by Porter (2007). This finding is in line with Brondolo, Bosch, Le Borgne, and Silvani (2008) who recommended the Indonesian government to reforms tax administration within the context of a fiscal adjustment.

Table 6. Estimate Results of VECM

Independent Variables	Equation (12)		Equation (13)	
	Dependent Variable: Primary Balance (p_t)		Dependent Variable: Debt Ratio (d_t)	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	-0.21	[-0.99]	-2.16	[-0.85]
Δ Primary balance(-1)	0.11	[0.52]	-2.13	[-0.80]
Δ Primary balance (-2)	0.03	[0.15]	0.73	[0.29]
Δ Debt ratio(-1)	-0.05	[-2.16]**	-0.33	[-1.13]
Δ Debt ratio(-2)	0.003	[0.20]	-0.55	[-2.55]**
Δ Output gap(-1)	0.39	. [2.61]**	2.75	[1.52]
Δ Output gap(-2)	0.34	[2.33]**	-0.54	[-0.30]
Δ Seignorage(-1)	-0.02	[-0.20]	1.88	[1.57]
Δ Seignorage(-2)	-0.03	[-0.36]	0.82	[0.79]
ECT(-1)	-0.17	[-2.26]**	1.43	[1.52]
Adjusted R^2	0.49		0.67	
F-statistic	1.43		3.20	
Akaike Information Criterion (AIC)	3.08		8.50	

Note: ***, **,* indicate statistically significant at 1%, 5% and 10% respectively.

To present the response of public debt and primary balance to other variables shocks, this paper provides an impulse response based on the vector error correction estimation. Figure 2 presents the effect of the shock of output gap, primary balance, and seignorage on public debt. In this case, shock of primary balance has negative impact on public debt meanwhile output gap and seignorage have positive effects on public debt. Similarly, Figure 3 describes the reaction of primary balance to a shock in output gap, public debt, and seignorage. The shock of output gap has positive effect to primary balance. Otherwise, public debt and seignorage have negative impact to primary balance. In short, it can be concluded that public debt and primary balance affect negatively to each other. In addition, monetary sector which is reflected by seignorage has positive effect to public debt, but it has negative response to primary balance.

Figure 2. Response of Primary Balance to Shock in other Variables

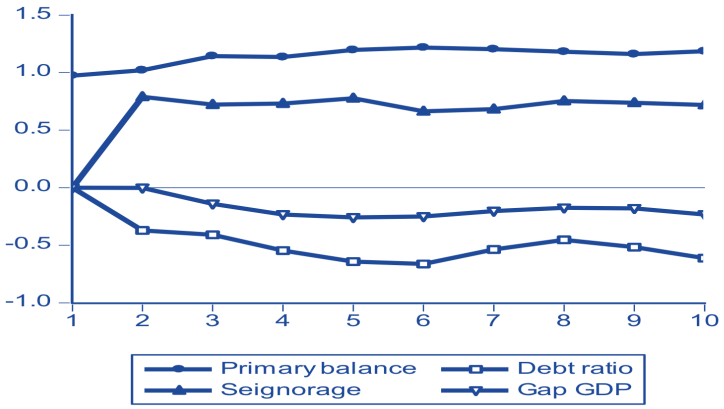
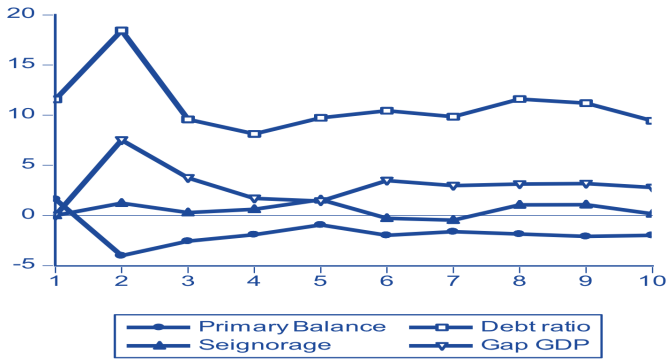


Figure 3. Response of Debt Ratio to Shock in other Variables



Conclusion

This research provides an empirical analysis of the fiscal risk and its determinants in Indonesia. To measure the fiscal risk, this paper calculated a Value-at-Risk (VaR) based on the debt-to-GDP ratio which was estimated using a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. Furthermore, a fiscal reaction function was used to capture the determinants of fiscal balances. We apply this model to elaborate the relationship between that variable and primary balance, output gap, and seignorage. This research also evaluates the response of the fiscal policies to the debt ratio volatility. We conclude that the empirical model built in this research, especially the one with *z* distribution, can capture the risky situation of debt ratio which was mostly caused by severe situations in the global economy. The VaR using *z* distribution provided better result in the sense that it provided violations for the two unfavourable crises. This model captured the risky situation in 1999 following the 1998 Asian crises, and in 2008 following the crash in the US capital market.

The estimation of fiscal reaction function presents strong relationships between primary balances and their independent variables. Several key fiscal variables, except budget deficit, significantly influenced primary balance. Moreover, the dummy variable of debt cyclicality did not confirm the hypothesis that the fiscal response to debt was stronger when debt was above 50% of GDP. The other dummy variable which reflected the response of economic fluctuations to primary balance was not significant which showed the tendency for primary balances to automatically decline during cyclical downturns, and vice versa. Due to the fiscal policy response, this result concluded that the response to booms and recessions was asymmetric. It indicates that the primary balance reacted to the economy in a non cyclical pattern. Moreover, this finding suggests the government to manage primary balances during economic contractions does not exceed the improvements attained during economic booms.

Furthermore, this research finds the adjustment process to response the debt risk was very low in the country. The empirical model of primary balance explains that fiscal policies have not effectively adjusted to the short run change in fiscal imbalance. Due to the fiscal sustainability, this result warns the government to review the quality of budget governance both for primary deficit and debt management. This paper recommends the government to strengthen the fiscal capacity and reduce debt risk in order to improve fiscal sustainability.

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Examining the Nigerian Stock Market Efficiency: Empirical Evidence from Wavelet Unit Root Test Approach

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Abstract:

This study examines the Efficient Market Hypothesis (EMH) using data sourced on monthly bases on the Nigerian Stock Market. We employed recently developed frequency domain wavelet-based unit root test as well as two-time domain unit root tests that accommodates structural breaks. The results show that when frequency domain was factored into stock market efficiency framework for the Nigerian stock market, evidence abound to reject the null hypothesis, whereas no evidence not to do so with conventional time domain estimation techniques. The study recommends that investors should take advantage of the arbitrage opportunity that exist in the market; and that policy makers should see the stock market as a good platform that can aid economic growth as its vibrant arbitrage activities can attracts substantial fund for economic growth.

Keywords: efficient market hypothesis; wavelet unit root test; random walk; mean reversion; Nigeria.

JEL Classification: G10; G11; G14; C22; C32

Introduction

Economics and finance researchers have in the recent put considerable efforts to better understanding of emerging economics stock markets with special focus on markets efficiency. This is premised on the fact that inefficient stock market is very crucial to the promotion of higher economic growth (Tiwari and Kyophilavong 2014). At best, the results on market efficiency, can be described as mixed, for instance, Kavussanos and Dockery 1996, Lo and Mackinlay 1988, Al-Loughani and Chappell 1997, Poterba and Summers 1998, Grieb and Reyes 1999, Chaudhuri and Wu 2003, Narayan 2006, 2008, Hasanov 2009, Lawal *et al.* 2013, Gozbasi *et al*. 2014 all show that no evidence exist to support the existence of Efficient Market Hypothesis (EMH) for a number of economies they studied, others like Cheung and Coutts 2001, Buguk and Brorsen 2003, Narayan 2005, Qian *et al.* 2008, Munir and Mansur 2009, Alexeev andTapon 2011, are of the view that stock markets behave in a way that is consistent with the EMH.

The pioneer work on market efficiency can be traced to Fama (1970) Efficient Market Hypothesis where stock market efficiency was classified into three (3) categories – Weak, Semi-strong, and Strong market efficiencies.

Gozbasi *et al*. (2014) argued that at best emerging economies stock markets can be described to have weak form efficiency.

Though, a number of empirical studies have been conducted to examine the behavior of stock market as it relates to market efficiency in emerging economy with mixed results, little empirical analysis had been conducted on Nigeria.

Nigeria is the largest economy in Africa and one of the fastest growing economies in the world (WDI 2014). The nation has a vibrant stock market with a market capitalization of about eleven trillion naira. As at June, 2016, it has about one hundred and eighty (180) listed companies on the floor of the exchange. In term of market capitalization, the Nigeria Stock Exchange is the third largest exchange in Africa.

The essence of this paper is to examine the EMH for the Nigerian stock market using Wavelet unit root test approach. Wavelets are considered more powerful estimation techniques for signalling processing which offers more insight to the stock market efficiency framework by decomposing time series into time scale component. It allows analyzing stock market behaviour (which is time series in nature) within the context of frequency domain without losing the time information.

The paper also intends to know whether or not the Nigerian stock market is characterized with random walk or with mean reversion. Evidence of Random walk hypothesis, means reversion among other things is the basic condition used in empirical literature to determine market efficiency. Examining the efficiency level of the stock market has some important implication for virtually all the economic agents especially the policy makers and investors. When the behavior of financial series - stock market index included – cannot be predicted because they can change without limit in the long run, then it can be described as following a random walk, hence, any shocks to stock prices are permanent. The implication is that the long run volatility in stock prices will increase over time. On the other hand, mean reversion condition exists when stock prices follow a stationary trend, thus future returns can be forecasted by using historical prices (Tiwari and Kypohilavong 2014).

Briefly foreshadowing our main findings, it was observed that when frequency- domain was factored into the Nigeria stock market efficiency framework, evidence abound to reject the null hypothesis whereas, no evidence exist not to do so with conventional time-domain estimation technique. The rest of the paper is structured as follows: Section two presents the literature review, section three deals with data and methodology, section four presents the results while section five concludes the study.

1. Research background

The theoretical note that described the behavior of stock prices to follow a random walk mirroring efficiency could be traced to the works of Samuelson (1965), Fama (1965) and Mandelbrot (1966). Ever since, a number of studies have attempted to examine stock market efficiency using various techniques.

The random walk hypothesis explains that fluctuations in stock markets can change without limit in the long run, thus, making its prediction very impossible. The theory explains that, if stock market prices are characterized by random walk process, then innovation to the prices will be permanent, thereby making market prediction based on historical prices difficult, with attending potential for increase in long run volatility over time. However, if the stock prices are mean reverting such that is follows a stationary trend, prediction of future return based on historical data/prices is possible. Building on this framework, Fama (1970) observed that the link between information content and price prediction is necessary to determining whether or not stock market is efficient. The author further classified stock market efficiency tests into three viz: Weak form test, Semi strong efficiency test, and Strong efficiency test. In its Weak form, a market is efficient if all the publicly available information about the economy is incorporated into the stock prices, and prices response to arrival of new information effectively. As noted by Tiwari and Kyophilavong (2014), over the years' evidence of the existence of random walk hypothesis has been considered to be a sufficient condition for market efficiency.

Every sincere the work of Fama (1970), a number of studies has been carried out to examine efficiency of markets around the world with mixed results. For example, Tiwari and Kyophilavong (2014) examined the validity of random walk hypothesis on the BRICS stock indices using wavelet based unit root test proposed by Fan and Gencay (2010), the authors observed that evidence abound to reject the null of unit root for all the BRICS countries

except for the Russian Federation. This implies that stock markets in BRICS except for the Russian Federation are inefficient and are predictable. A major flaw of Tiwain and Kyophilavong's contribution lies in the coverage as the number of years covered are relatively small for accurate result.

In a related development, Narayan and Smyth (2006) observed that results from the empirical investigation of fifteen (15) European stock market supports existence of random walk hypothesis for the European economies examined. Similar results can also be found in Ozdemir 2008, Marashdeh and Shrestha 2008, Munir and Mansur 2009, Oskooe *et al.* 2010, for Turkey, UAE, Palestine and Iran stock market respectively.

In another development, some authors have documented that no evidence abound from empirical analysis to support the random walk hypothesis. Some of these scholars include Lima and Tabak (2004), Tabak (2003) and Soon *et al.* (2014) for stock markets of China, Singapore and Malaysia respectively.

Opponents of the random walk hypothesis relies majorly on Mean reversion framework which draws its strengths from stock market Overreaction hypothesis which stresses that investors' reaction in term of being pessimistic or optimistic often swings away stock prices from their basic value at least in the interim. They also identified irrational behavior of noise traders, stock market size and associated risk factors, price related microstructure –induced biases effect among others as the key factors that debunk the random walk hypothesis (see De Bondt and Thaler (1985), Shefrin and Statman (1985), Poterba and Summes (1988), Zarowim (1990), Richard (1997), Summers (1986), Conrad and Kaul (1993), Chan (1988), Ball and Kothari (1989)).

Early studies from Africa reveal that most African stock markets are inefficient. For instance, Dickson and Muragu (1994) documented that Nairobi Stock Market is inefficient, similar results were reported for Ghana and Namibia by Osei (1998) and Matome (1998) respectively. For some selected African economies, Gyamfi *et al.* (2016) noted that no evidence exists to support the EMH. The authors' submission was in line with the findings of Magusson and Wydick (2002) who used partial autocorrelation test to analysis the efficiency nature of a number of African stock markets – Nigeria inclusive- and observed that stock markets in Nigeria, Ghana and Zimbabwe did not in any way support the EMH (see also Smith 2008). Sunde and Zivanomoyo (2008), Uddin and Khoda (2009) are of the view that no evidence supports the random walk hypothesis for the stock market of Zimbabwe and Senegal respectively.

Empirical evidences on stock market efficiency from Nigeria like other emerging economies are at best mixed. For instance, while Samuel and Yacout (1981), Ayadi (1983) (1984), Omole (1997), Olowe (1999), Lawal *et al*. (2015) were of the view that evidence abound to support that EMH holds for the Nigerian Stock Market, others like Ekechi (1989), Oludoyi (1999), Adelegan (2001), Nwosa and Oseni (2011), Afego (2012), Babajide *et al*. (2015), (2016) are of the view that the Nigerian stock market is inefficient both at weak and semi-strong efficiency. Up till date, no empirical evidence has examined stock market behavior within the context of strong form efficiency in Nigeria.

A critical review of the Nigerian literature shows that existing literature were conducted within time-domain framework with no attempt to calibrate frequency domain. For instance, Ayadi (1983) employed Wald-Wolfwitz test and runs test to examine random walk property of the Nigerian Stock Market. As later noted by Inanga and Asekome (1992), Ayadi's submission is biased because he excluded zero runs in his tests. Samuel and Yacout (1981), Inanga and Asekome (1992), Omole (1997) and Adelekan (2004) all used serial correlation analysis to examined stock market efficiency in Nigeria at various time period.

The preference of frequency-domain over time-domain estimation techniques as recently emphasis in academic circle is what motivates the current study to examine stock market efficiency using data from the Nigerian economy.

2. Data and methodology

2.1. Data

In this study, we used the All Share Index (ASI) weekly data sourced from the Central Bank of Nigeria Statistical Bulletin (various issues). Our data spanned from 1985-2016. The choice of the scope of the data was induced by

the availability of data. Though the Nigeria Stock Exchange began operation in 1960, Stock market data become publicly available in 1985 and 2016 is the most current year.

2.2. Methodology

Different methods have been employed in empirical literature to examine market efficiencies especially in emerging economics. This study differs from previous work by using wavelet analysis to analysis weekly data sourced on the Nigerian economy for the period 1985 to 2016. Wavelet analysis outperforms earlier techniques like serial correlation, run test, Generalized Autoregressive Conditional heteroskedasicity, Q-test etc., because it has the ability to decompose data into several time scales and possess the ability to handle non-stationary data and localization in time. It also establishes both the long run and the short run relationship through the use of wavelet time scales, thereby providing an wholistic view on the entire relationship (Durai and Bhaduri 2009, Aloui and Hikiri 2014, Tiwari *et al.* 2016, Moya-Martínez 2015, Madaleno and Pinho 2015, Boubaker and Sghaier 2015, Hathroub and Aloui 2016, Li *et al*. 2014, Nury *et al* 2015, Xue *et al*. 2014, Yang *et al*. 2016).

The preference of wavelet analysis over other estimation techniques could also be justified from its ability to calibrate frequency domain into empirical analysis. Most of the existing estimation techniques are based on the time-domain framework with no attention paid to frequency domain. However, evidence abound that some appealing relationship among macroeconomic variables exist at different frequencies that time domain framework will not be able to capture (Andries *et al.* 2014, Bai *et al.* 2016, Jammazi, and Reboredo 2016, Bahmani-Oskooee *et al.* 2016). In addition, stochastic process can be decomposed into wavelet components with specific frequency band.

Another significant power of wavelet lies in its ability through the wavelet power spectrum to measure the contributions of the variance at a particular frequency band in comparison to the overall variance of the process (Boubaker and Sghaier 2015, Hathroubi and Aloui 2016, Li *et al.* 2014, Nury *et al.* 2015, Bai *et al.* 2016, Jammazi and Reboredo 2016, Bahmani-Oskooee et al. 2016, Xue *et al*. 2014, Yang *et al.* 2016).

Fan and Gencay (2010) describes the wavelet-based unit root tests as follow.

$$y_t = py_{t-1} + u_t \tag{1}$$

where: u_t is a weakly stationary zero mean error with a strictly positive long-run variance defined by $w^2 \equiv y_0 + 2\sum_{j=1}^{\infty} y_j$ given that y_j = E ($\mu t\, \mu t - j$) expressed as:

$$y_t = \mu + a_t + y_t^S \tag{2}$$

If H0: p = 1, then y_t^S is a unit root process, but if H0 :(p) < 1, then y_t^S is a zero mean stationary process, if α = 0. If H_0: ρ=1, y_t^S is a unit root process. If H0: ρ=1 <1 y_t^S is a zero mean static any process, α = 0 $\{y_t - \bar{y}\}$ *where* $\bar{y} = T^{-1}\sum_{t=1}^{T} y_t$ is the sample mean of $\{y_t\}$. If $\alpha \neq 0$, then we use the detrended series $\{\tilde{y}_t - \bar{\tilde{y}}\}$ where $\tilde{y} = \tilde{y}_t = \sum_{j=1}^{t}(\Delta y_j - \Delta\bar{y})$, $\bar{\tilde{y}}$.

Fan and Gencay (2010) further developed two test statistics for the demeaned and detrended series as follows $\hat{S}_{T,1}^{LM}$ and $\hat{S}_{T,1}^{Ld}$ using DWT wavelet. The two tests are defined as follows:

$$\hat{S}_{T,1}^{LM} = \frac{\sum_{t=1}^{T/2}\left(V_{t.1}^{M}\right)^2}{\sum_{t=1}^{T}\left(y_t - \bar{y}\right)^2} \tag{3}$$

$$\hat{S}_{T,1}^{Ld} = -\frac{\sum_{t=1}^{T/2}\left(V_{t.1}^{d}\right)^2}{\sum_{t=1}^{T}\left(\widetilde{y_t} - \bar{\tilde{y}}\right)^2} \qquad \text{.....(4)}$$

To fitting into our specification, we employed Morlet's wavelet and expand equation (4) such that

$$\square^{M}(t) = \frac{1}{\pi^{1/4}} e^{i\omega_0 t} e^{-t^2/2} \tag{5}$$

where: $\omega_0$represent the central frequency of the wavelet, following Aloui and Hkiri (2014), the study used $\omega_0 = 6$, this is premised on the fact that evidence abound that setting ω_0 to 6 will enhance a good balancing between time and frequency localization (see also Rua and Nunes 2009, Vacha and Barunik 2012).

3. Presentation of results

Table 1 below presents the descriptive statistics of the All Share Index in Nigeria for the period studied. From the result, it can be deduced that the Kurtosis statistic is greater than 3; this implies that the distribution is peaked (Leptokurtic) relative to normal. The excess kurtosis strongly supports the evidence of non-normality as indicated by the Jargue-Bera test. The Skewness, which is a measure of asymmetry of distribution around its mean, is negative as reported in the Table 1.

Table 1. Descriptive Statistics of the ASI

Mean	0.5052
S.D	3.784
Skewness	-0.5051
Kurtosis	4.7250
J.B (Prob)	101.482 (0.000)
AR (1)	0.1179 (0.0065)
LB_Q-Stat.	5329 (0.0000)
AC(12)	0.812
ARCH LM(12)	3.2408 (0.0002)
ADF Test	- 0.6128(0) 0.9775

Source: Authors' computation (2016)

The results of the test statistics of for Equations 3, 4 and 5 of the wavelet-based unit root tests are presented in Table 2.

Tables 2. Wavelet-Based unit root tests

	Lag = 10	Lag = 20	Lag = 30
$\hat{S}_{T,1}^{LM}$	-47. 14758*	-42.87703*	-39.45521*
$\hat{S}_{T,1}^{Ld}$	-172.23335*	-157.1544*	-145.6549*
$\square^{M}(t)$	-206.2653**	-158.12254**	-145.6885**

Note: *; ** and *** denotes 1%; 5% and 10% significance respectfully.
Source: Authors' computation (2016)

In order to test the robustness of our results, the study followed Tiwani and Kyophilavong (2014) by using three different lags: 10, 20 and 30 from the results, It can be deduced that evidence abounds to reject the null hypothesis of existence of random walk in the All Share Index for the Nigerian economy. The result from Morlet's wavelet also provides sufficient evidence to reject the null hypothesis of random walk for the All Share Index.

To test the supremacy of the wavelet-based estimation techniques over the conventional time-domain estimation techniques, we used a set of unit root tests that considered structural breaks in our models. Specifically, we used the Narayan and Popp (2010) and GARCH-based unit root test proposed by Liu and Narayan (2011). Both tests incorporate at least two structural breaks in the data series.

The result of the time domain estimation techniques are presented in Tables 3 and 4. From the results, it can be deduced that both the test statistics do not provide any evidence to reject the null hypothesis – *i.e* they accept the null hypothesis type.

Table 3. Narayan and Popp (2010) unit root test with break test

	Model 1				Model 2			
	TB1	TB2	$\hat{p}[t_p]$	K	TB1	TB2	$\hat{p}[t_p]$	K
ASI	93:9	2003:10	-0.0808 [-4.790]	7	2003:10	2004:08	-0.0782 [-4.898]	1

Source: Authors' computation (2016)

Table 4. Liu and Narayan (2011) GARCH (1,1) unit root test with break test

	Periods	TB1	TB2	$[t_p]$
ASI	1985:1 – 2015:12	87:06	2003:08	-7.039

Source: Authors' computation (2016)

Conclusion

This paper examined the validity of the random walk hypothesis for the Nigerian stock market using a newly developed econophysics wavelet analysis. We employed a 3 lag lengthens so as to test the sensitivity of the results. Our results clearly reject the null hypothesis of random walk hypothesis for the Nigerian stock market. This implies that the Nigeria capital market is inefficient. The result further implies that the stock market can serve as a platform to advance economic growth in Nigeria as it provides opportunities for arbitrage activities thereby attracting funds both domestic and external, needed for economic growth.

The study further apply two time domain unit root test that considers structural breaks, the results from the time domain estimation techniques shows that evidence abound to accept the null hypothesis.

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Boosting Innovative Activity in Companies: Problems and Potential

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Abstract:

This paper represents a factor analysis of innovative activity in the Russian Federation and overseas. The authors examine some of the policy foundations of the innovation-driven development of certain types of economic activity. Economic modernization is viewed here as a key area for boosting innovative activity in companies. The authors highlight the need to enhance the quality of career guidance and vocational training provision to turn out a highly-skilled workforce. A priority area for galvanizing human capital is a mobilization-motivation approach to managing personnel at a company. The authors propose a set of possible ways to galvanize creativity and cultivate on this basis an innovation-driven economy. The authors' analysis substantiates the advisability of and need for studying best practices from other developed nations, putting to use the existing achievements of national science, and implementing top solutions and achievements in the activity of Russian companies. The use of the outcomes of intellectual labor in high-tech production and production of competitive products will help avoid the possibility of bankruptcy for companies and ensure their long-term operation and efficiency.

Keywords: innovative activity; economic modernization; personnel management; vocational training; galvanizing technical creativity; advanced development zones; entrepreneurial climate

JEL Classification: M13; O31; O10

Introduction

Amid the global economic crisis, Russia has been faced with a whole array of issues governed by both internal and external factors. These include the nation's ongoing reforms (political, administrative, social, military, legal, *etc.*),

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difficulties in embarking on the path of innovation-driven economic development, unstable prices in the global market for hydrocarbons, as well as a set of large-scale anti-Russian economic sanctions imposed by the US and EU.

The purpose of this paper is to analyze a set of factors for external and internal impact on the efficiency of economic transformations, as well as to identify the nation's current problems in and potential for boosting innovative activity in its business.

The study owes its relevance to Russia's choice to embark on the path of innovation-driven development based on modernizing its economy, machinery, and technology. Boosting innovative activity is certain to require coordinating and integrating the efforts of all branches of the government at every level and galvanizing the nation's civil society institutions.

As is evidenced by numerous analytical materials, the nation has amassed a multitude of issues impeding the effective rebuilding of the economy. These include the nation's lack of an efficient system for distributing state support and enforcing statutory guarantees; poor investment levels; lack of new machinery and technology; businesses' poor innovation potential; insufficient demand for innovations in production due to senior management lacking confidence in the advisability of implementing them; lack of the necessary conditions for implementing the outcomes of research, which, in turn, is due to the lack of skilled personnel, the lack of a well-developed innovation infrastructure, high loan costs, and declines in the population's paying capacity.

Despite the existing situation, the nation has continued to implement its program for economic modernization and expand its partnership with the EAEU (Eurasian Economic Union), BRICS (Brazil, Russia, India, China, and South Africa), APEC (Asia-Pacific Economic Cooperation), CIS (Commonwealth of Independent States), etc., member states.

There is a set of relevant policy documents (The 2013–2020 Development of Education State Program of the Russian Federation, The Concept on the Long-Term Development of the Russian Federation Through to 2020, The 2016–2025 Federal Space Program of Russia, The Long-Term Program for the Development of Russia's Coal Industry Through to 2030, The Forecast for the Long-Term Social-Economic Development of the Russian Federation Through to 2030, *etc*.) charting a specific course for development, both across the types of economic activity and across the nation's regions.

In addition to the above conditions, it is worth focusing on a set of environmental issues associated with global climate change, as well as the development of relevant policy documents promoting the sustainable development of the global community, a process which Russia is now a keen part of. In April 2016, the Paris Agreement, an agreement within the United Nations Framework Convention on Climate Change, was opened for signature, and a little earlier, in January of the same year, the Russian president had signed a decree designating 2017 as the Year of Ecology.

An important consideration to keep in mind is the state's guarantees of sovereignty and security for the nation amid growing concerns about global extremism, terrorism, and drug trafficking, as well as escalating technogenic threats.

It goes without saying that all of the above conditions and factors ought to be taken into account when developing strategy and tactics for the process of cultivating an innovation-driven economy in Russia. The following areas may act as a potential for boosts in innovative activity in companies:

- boosting the innovation attractiveness of the Russian economy;
- improving the entrepreneurial climate;
- mobilizing and motivating the nation's economically active population to assume a proactive and creative attitude toward economic modernization.

Conducting proper analysis of the nation's economic sectors, as well as identifying specific issues in and searching for proper ways of developing an innovation-driven economy, requires galvanizing fundamental and applied science and actively engaging the nation's pool of engineers and specialists in intellectual labor (technical creativity).

1. Methodology

The information basis for the authors' investigation into current issues in the innovation-driven development of Russian enterprises and identification of the potential for galvanizing it are publications by scholars and practicians, government statistics data, information from international sources, as well as legislative and other regulatory enactments.

This study utilizes a systemic approach, methods of comparison, analogy, analysis, synthesis, and others. Despite an extensive scientific and practical focus on issues related to Russia's innovation-driven development, so far little attention has been devoted to labor education, career guidance, and occupational training, which should be oriented toward the competitive environment of the nation's nascent market economy. For this reason, in this paper the authors attempt to summarize best international practices and examine specific ways to implement these practices in Russian reality.

In a fragmentary manner, the paper draws upon public platforms that are used periodically to examine, monitor, and discuss the state of development of Russia's innovation-driven economy and search for ways to enhance it going forward.

2. Results

2.1. State of and issues in the development and use of human capital

The lack of skilled manpower is regarded by the government as one of the primary factors today impeding boosts in the innovative potential of Russian companies and posing a major threat to economic stability in the nation.

The government, represented by the Ministry of Education and Science, Ministry of Labor and Social Protection, Ministry of Defense, Ministry of Economic Development, Ministry of Industry and Trade, as well as the nation's professional communities and associations of employers, may need to consider altering the moral and ethical foundations of labor education in the family and career guidance for children and teenagers in preschool institutions and schools and, what is most important, enhancing the quality of occupational training and cultivating a respectful attitude toward workers in any occupation in the form of decent working conditions, quality of working life, and pay. Without these foundations, no measures will help resolve the nation's existing issues in occupational training for its workforce.

What is more, employers ought to work closely with institutions of tertiary learning. They ought to be encouraged to engage in putting together relevant educational programs, as is suggested by Federal Law No. 307-FZ 'On Amendments to Certain Legislative Acts of the Russian Federation for the Purposes of Empowering Associations of Employers to Take Part in Implementing State Policy in the Area of Vocational Education' of December 1, 2007. Employers should be expected to focus on the provision of quality occupational training with a view to preparing highly-skilled production workers, engineers, and managers. Furthermore, professional standards and vocational training programs ought to be synchronized with the needs of employers (Kiselev, Chechina and Zbyshko 2012). It would help to introduce financial literacy classes in schools and special courses on the basics of entrepreneurship in institutions of tertiary learning.

Russia has the necessary potential and a decent scientific school to conduct quality fundamental and applied research. It will be worth using best practices and technology from foreign nations, as well as the achievements of domestic scientists and inventors working in advanced sectors like space exploration, aviation, the nuclear power generation industry, and the defense-industrial complex. Unfortunately, many scientists are leaving Russia due to lack of decent conditions for engaging in quality intellectual work and implementing solutions of one's own design. There is a need to invest in education (starting in preschool), organize research platforms and labs, and raise student allowances and teacher salaries. There is all the more reason for this as many innovative solutions from overseas have a direct relation to Russia – not necessarily in a legal sense, but definitely do factually. According to the UN, over the last couple of decades as many as 15,000 inventors have left Russia for various reasons. By various estimates, inventions by these individuals have generated $3–4 billion worth of patent proceeds in foreign jurisdictions (Gryzlov 2009). Accordingly, there is a need to create the right conditions for people to start believing

in their significance, seeing prospects for development, and seeing an opportunity to engage in serious intellectual and creative work – right in Russia, their homeland.

Another factor affecting innovative activity in companies is their low innovation potential (Veselovsky, Gnezdova, Romanova, Kirova and Idilov 2015).

The innovation potential of industrial enterprises incorporates:

- workforce potential (the composition and structure of the workforce, movement of staff over a certain period of time, labor productivity, changes in output per worker, *etc.*);
- financial potential (earnings, profitability, liquidity, financial stability, *etc.*);
- production potential (technology, equipment, and methods used in the management and operation of the company);
- information potential (professional and business information the company possesses, information technology it uses, and the level of information protection achieved by it);
- intellectual potential (staff's qualification characteristics, length of service and experience, potential, learning ability, *etc.*).

There is a need to continually streamline personnel management and enhance its development and learning in order to enable timely reacting to changes in external factors, capable of influencing the company's activity as a whole. Greater significance is being attached to executives in the system of management, for the outcomes and efficiency of the operation of the company's management system are, in large part, determined by one's experience, capacities, skills, and abilities needed to organize and knit the team together, encourage it to engage in active and fruitful work, and forge a team spirit. According to the Soviet researcher N.A. Vitke, "Any team's behavior is grounded in certain laws of a social-psychological nature. Having established and mastered these laws, you can construct the team in such a way as to have it operate with maximum relevance, as a genuine social apparatus" (Bezdenezhnykh 2014).

The reform of the education system is not over yet – what is more, it is actually in its active stage at the moment. Amid intensifying competition in the labor market, graduates from institutions of learning – future qualified and highly-qualified specialists – ought to not just acquire, during the course of study, the knowledge, abilities, and skills needed in a climate of implementation of innovative technology but also be able to form, nurture, and awaken in themselves the aspiration to continually perfect themselves and learn new things. They ought to gain an awareness of the need for and advisability of continual self-development and learning. This requires taking a new motivation-based approach, both in the system of vocational training and in the workplace, to help galvanize large-scale creative technical work. There were 4 Russian colleges listed in the 2015 US News and World Report world subject rankings of Physics: M.V. Lomonosov Moscow State University (ranked 23rd), National Research Nuclear University MEPhI (Moscow Engineering Physics Institute) (127th), Novosibirsk State University (170th), and Saint Petersburg State University (241st).

It is no secret that the level of staff qualification is what the efficiency of the entire organization depends on. This can be felt especially hard in a climate of economic instability. It is when staff members are motivated, when there is a powerful team spirit maintained in the workplace, when there is every opportunity to develop and learn, and when they are fully aware of their significance that the organization will be able to operate successfully even under conditions of a crisis (Altindağ and Kösedağı 2015).

Today, to stabilize the situation, many companies resort to cutting staff numbers, which is not always justified. Based on data from the Rabota.ru service, in 2015 the number of unemployed residents increased in 81 out of 85 regions examined in the study. The rising unemployment rate is causing increased competition for jobs, which is quite logical and natural. There are 2 possible ways to resolve this issue. First, senior management may need to start acting proactively by focusing more on using methods of analysis and monitoring. In particular, it helps to carry out regular staff audits.

Here are just some of the benefits of carrying out staff audits:

- integrating all members of the management team into the system of HR management;

- classifying expenditure on staff not as the company's costs but as investment that ensures continual professional employee growth and, as a consequence, sustainable profit generation going forward;
- employing the highest qualified staff for the company;
- focusing in the HR management system on key staff members, who have what it takes to really help ensure the company's competitiveness, by giving them priority over rank and file employees;
- cultivating a robust, adaptive culture oriented toward displaying initiative and striving to achieve the company's strategic objectives;
- creating the right conditions for staff to build a successful career and actualize their creative potential.

Another method for galvanizing staff is the use of the Pareto Principle (also known as the 80/20 Rule), whereby 20% of our effort produces 80% of the results, while 80% of our effort produces only 20% of our results.

Without question, everyone's success depends on their mindsets and aspirations. The awareness of the complicated situation in the labor market and growing unemployment should inspire you for self-development and the improvement of your professional level, which should ensure you competitiveness and demand in the labor market going forward. What can help in this regard is the efficient planning of your working day (the use of the Eisenhower Matrix, priority planning, the Schwab method, the ALPS method, etc.), as well as spending your off-work time with the benefit for yourself and your family.

Furthermore, greater significance is being attached to assessing staff performance, as it helps appraise job applicants during the probationary period, during their engagement in work activity, and based on the outcomes of their work. Here, it is worth noting the significance of the staff composition of one of the company's major departments – its HR department. For it is the professionalism of staff at this department that the correctness of planning, shortlisting, selecting, positioning, and adapting personnel, motivating and stimulating them, and training and developing them often depends on. Conducting relevant and timely activities and their qualitative assessment, just like assessing staff performance, helps work out and implement at the right time the very mechanism for influencing personnel that will have a due effect on the efficiency of their work and actualization of their potential.

As was mentioned earlier, the company's success and its innovative activity depend on the qualification level of its staff. It is worth calling to mind the School-To-Work program, whose efficiency has been substantiated by research conducted by the National Employer Leadership Council (NELC).

Implementing this program, and adapting it if necessary, will help not just enhance the quality of national education but also motivate young people (high-school and college students) to engage in effective learning, strive to acquire as much knowledge as possible, and prepare themselves to pursue a career in a promising company.

The company's well-developed potential (production, intellectual, information, etc.) plays a significant role in boosting its competitiveness. That being said, it is impossible to achieve a positive effect from the use of the company's resources without conducting objective assessment of its performance and using the findings to manage its production process more efficiently. Today, it is important for companies' senior management to realize that, under conditions of the crisis, galvanizing innovative activity may constitute an inevitable condition for not just being competitive but being able to, at least, survive in the market (Figure 1).

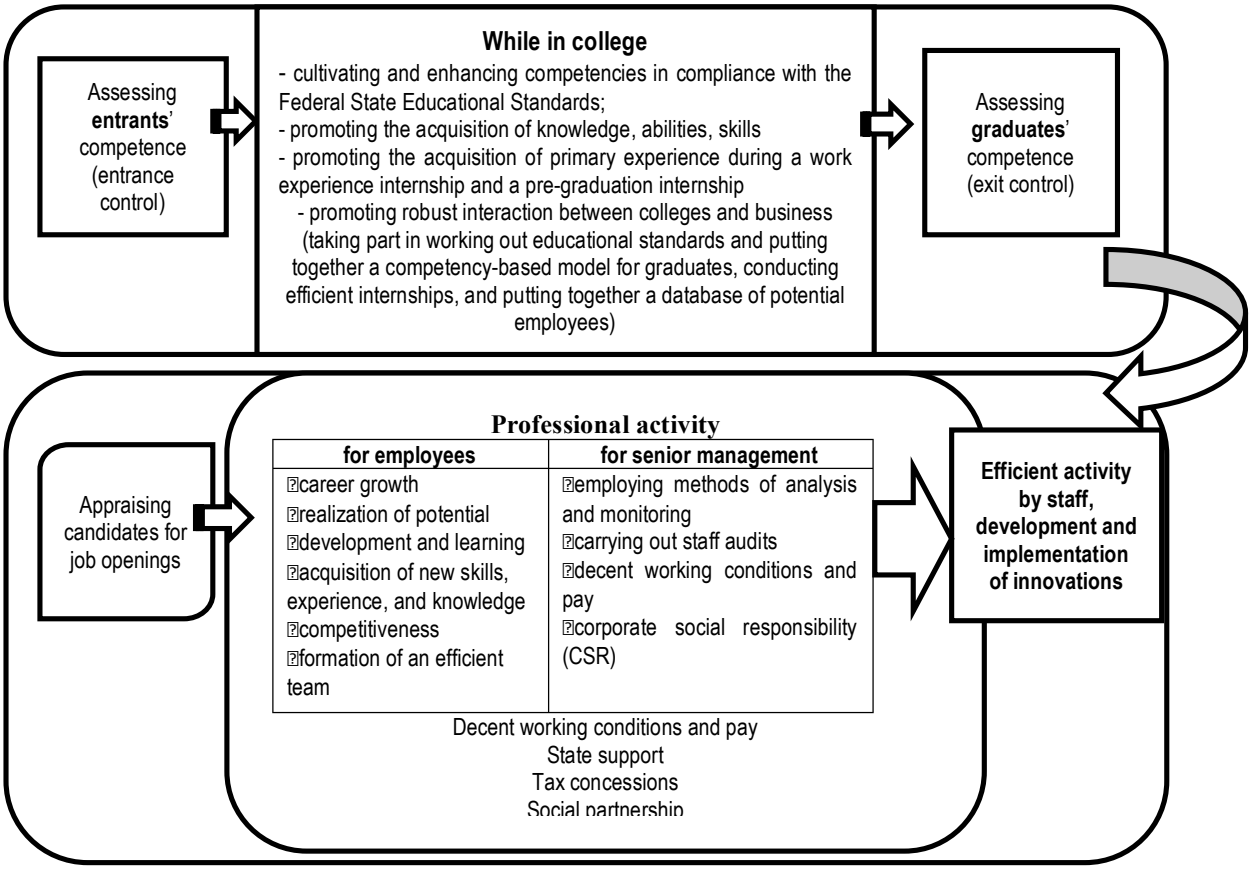
However, Russian companies appear to be taking their time with implementing any kind of innovation. This may also be due to lack of confidence in the possibility of deriving economic gains from this type of investment on the part of the team of specialists capable of developing them and/or implementing them in practice, which currently is testimony to the nation's imperfect system of motivating one to engage in creative work and innovate (Podgornaya, Grudina, and Avdonina 2015).

Back in the previous century, foreign scholars brought forward 2 hypotheses providing a rationale for the generation of innovations – the so-called "technological push" and "market pull" models. Based on the "technological push" hypothesis, innovations emerge as a result of internal research and development activities (Mensch 1975), while the "market pull" model implies a demand from consumers for new or improved products (Freeman and Soete 1999). It has been proven that the need for economic modernization and boosts in companies' innovative activity is caused by factors that, indeed, deal either with internal laws governing production (the

changing needs of the production process) or with changes in demand in the market for goods and services (demographic changes and people's changing moral and value mindsets).

The last few years have seen a galvanization of efforts to expand the sphere of tourism and leisure for Russians and foreigners. There is a special program in place that is currently being implemented by the Russian government called 'Development of Internal and Incoming Tourism in the Russian Federation (2011–2018)'. The nation also continues to develop cross-border trade and economic ties between its regions and the states it neighbors (China, Kazakhstan, Turkmenistan, Mongolia, etc.).

Figure 1. Components of innovative activity in companies.



It has been a common practice around the world to conduct assessments of nations' achievements and development using a variety of criteria. Below are some of the findings of this kind of research. A total of 9 criteria were used in the study below to evaluate a nation's performance, including assessment of its levels of power and influence on global politics.

Based on the 2016 world rankings released by US News & World Report, Russia placed 24th among the world's best 60 countries that year (Table 1). The above source has also mentioned Russia as the world's second largest exporter of military weapons, after the United States. In economic growth, Russia ranked 10th, ahead of Vietnam (11th), South Korea (13th), and Israel (14th). The top three spots in this metric were occupied by India, Singapore, and China (Filatov 2016).

Table 1. Russia's 2016 international rankings across a set of US News & World Report metrics

Criterion	Russia's global ranking
1. Movers (as an up-and-coming economy)	10
2. Open for business (as a business-friendly nation)	60
3. Power (as a nation that projects its influence on the world stage)	2
4. Quality of life (as a nation that ensures broad access to food and housing, quality education and health care, employment, *etc.*)	42
5. Cultural influence (as a center of art, entertainment, and fashion)	25
6. Entrepreneurship (as a nation that successfully supports its entrepreneurs)	20
7. Citizenship (as a nation that cares about human rights, gender equality, and religious freedom)	33
8. Heritage (as a nation with distinctive ways of life that values the past)	19
9. Adventure (as a travel destination)	47

Russia ranked 12th in the 2016 Bloomberg Innovation Index of the world's most innovative economies. The system ranked South Korea 1st, the Top 5 including also Germany, Sweden, Japan, and Switzerland.

2.2. Ways to shift from outmoded and underproductive machinery and technology to innovation and mass technical creative work

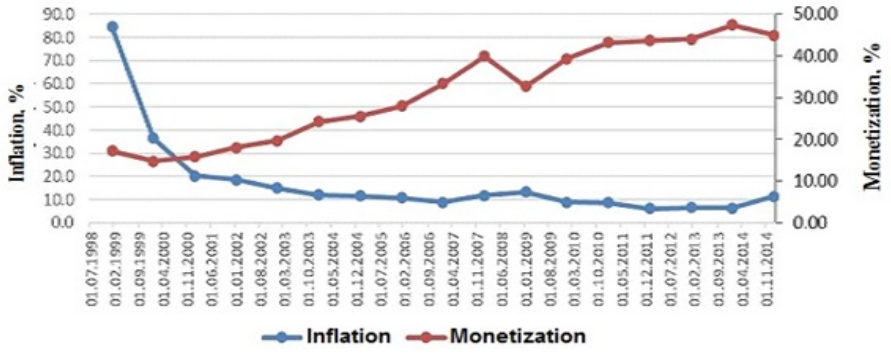
The use of outmoded, worn-out equipment and outdated technology results in declines in the company's productivity and the quality of its product, which may then lead to declines in demand for its product and affect its competitiveness in the market for goods and services (Ercis and Unalan 2015).

Upgrading the company's technological fleet and equipment and training and retraining its personnel will help it not just boost its competitiveness and conquer new positions in the market for goods but will also help motivate its personnel to display initiative, be creative, and innovate (Faskhutdinov 2015).

A major element in, above all, the development of industry and production of both producer and consumer goods is the further development of technoparks. Currently, there are 300 of them in Russia and there are plans to create new ones, which may significantly help revive the economy's production sector.

An important consideration, when it comes to the state's investment policy, is the fact that Russia has been subjected of late to enormous political, economic, and information pressure on the part of Europe and the US. It may help to shift to import substitution and develop a new monetary policy (Figure 2). Russia does fit into the trend, similar to other countries.

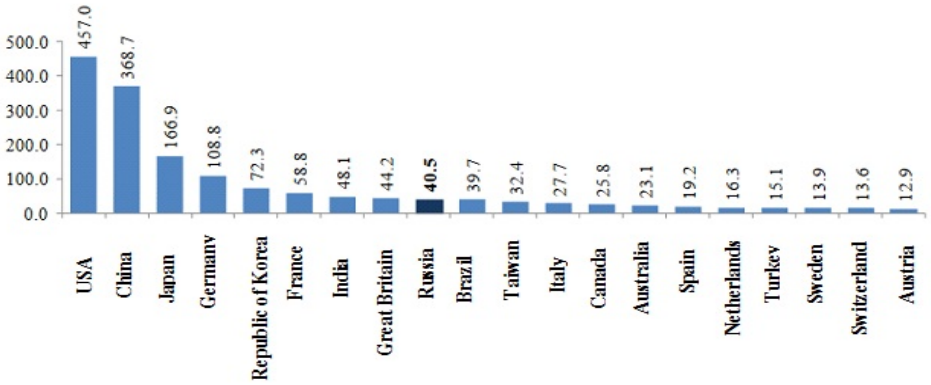
Figure 2. Dependence of inflation on monetization levels 1998–2014 (Odintsov 2015).



As was mentioned earlier, compared with Russia, developed countries spend heavily on research and development. To be specific, Russia's 2015 volume of domestic expenditure on R&D was 914.7 billion rubles, which is $40.5 billion (calculated based on purchasing power parity). This placed Russia 9th in the world, behind the US, China, Japan, Germany, the Republic of Korea, France, India, and Great Britain (Figure 3) (Ratai 2016).

Among the areas for boosting innovative activity in companies – and, especially, galvanizing business and expanding the sphere of entrepreneurship, engaging creative youth in production, and providing a wide spectrum of services to the population – is enhancing the nation's entrepreneurial climate (Izmailova, Burak, Rozhdestvenskaya, Rostanets and Zvorykina 2016). In this indicator, in recent years Russia has advanced into 51st place from 54th, which, however is clearly not enough to ensure the efficient development of the nation's entrepreneurship.

Figure 3. Top 20 nations in expenditure on research and development 2015 (billion dollars; based on a national currency's purchasing power parity).



The important issue that persists is getting funding for innovative projects, with the lack of investment felt especially hard when it comes to funding research and activity related to the implementation of resulting solutions. There is a need for considerable investment, and such investment is needed long-term. There are several sources of funding for innovative activity that are known today: venture capital funds, private investors (business angels), grants, and state support for startups (Veselovsky, Suglobov, Khoroshavina, Abrashkin and Stepanov (2015). Business angel investing may help ease part of the process of getting funding for innovative projects, while, aside from financial assistance, business angels can also provide non-financial assistance (business plan development, marketing research, project management, *etc.*) (de Moraes, Lobosco and Lima 2013).

However, the above institutions still need to be developed more in-depth in Russia and are currently unable to satisfy most financial needs. In this case, it may be hoped that changes in restriction policy will help reduce loan rates and increase money supply, which in the end will have a positive effect in terms of funding innovative projects.

One of the possible sources of investment resources is people's savings. Yet, evidence from practice indicates that Russians have yet to improve their financial literacy levels and ability to manage their personal investments.

A significant area to tap into in building an innovation-driven economy in Russia is its economic forums (Petersburg, Krasnoyarsk, Far-East, Sochi, *etc.*), which are held on a consistent basis and provide ample opportunity to learn about the latest strategic proposals by the nation's constituent regions, as well as help expand the horizons of international cooperation aimed at exploring and developing the nation's vast natural resources and further developing the nation's production sector, transport corridors, occupational training system, *etc.*

Among the top-priority mechanisms for development worthy of note under current conditions are public-private partnerships (PPP), internationally significant projects on the creation of transcontinental transport corridors for the southern neighbors of Russia and Europe, as well as the 'New Silk Road' project, which aims to link Asia with Europe and the Middle East.

Today, special attention is being devoted to regions with excess supply of manpower. Worthy of note is the state's development of industrial-purpose facilities and cultivation of the service sector in Chechnya, Dagestan, Karachay-Cherkessia, Adygea, Kalmykia, and other regions.

The nation has great expectations of the development of so-called advanced development zones (ADZ), some of which are already in operation (Nadezhdinskaya, Khabarovsk, Komsomolsk, Belogorsk, Priamurskaya,

Kangalassy, Mikhailovskaya, Kamchatka, and Beringovsky) (Table 2), with more expected to be launched in the coming years in Russia's Far East region.

It is worth noting that weak ties between business, universities, and science, as well as the lack of highly-skilled manpower and the existence of administrative barriers, are among the major factors impeding the development of innovative activity in Russian companies today.

Table 2. Information on certain advanced development zones (ADZ)

ADZ, name and location	Specialization	Investment, billion rubles		Number of jobs created
		Private	Budgetary	
'Predmostovaya', Blagoveshchensky District (Amur Oblast)	Industrial-logistics	128.90	0.00	1,530
'Kamchatka', Petropavlovsk-Kamchatsky (Kamchatka Krai)	Industrial-logistics; tourism	28.10	8.30	2,918
'Mikhailovskaya', Primorsky Krai	Agriculture	39.03	4.40	2,401

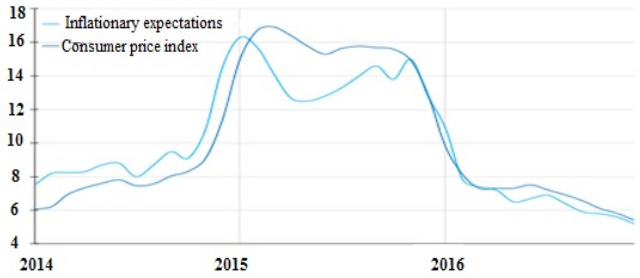
In putting together an innovation-driven economy in Russia and charting a course for its dynamic development going forward, it may also help for the government to consider creating a powerful vocational-education framework for training skilled and highly-skilled specialists, who will have the creative ability to help continue the nation's economic development across all life-sustaining areas.

There is an opportunity to tap new horizons based on the further development of scientific-technical and production clusters, similar to those created and being created in the Kaluga, Tula, Rostov, Lipetsk, Omsk, Kemerovo, Penza, and Moscow oblasts.

In a climate of sanctions and counter-sanctions, the mechanisms for galvanizing innovative activity in industrial enterprises can be set in motion only at the state level. Government support for small business is not just about allocating funds toward certain objectives but should also include all types of concomitant assistance, which is no less sought-after than financial resources. For entrepreneurs are simply unable to alter the economy's orientation on their own (based on expert estimates, the share of Russian small and medium-sized innovative businesses in the total turnover of all organizations is just a little over 20%, while large business is mainly represented by mineral resource companies) (Lavrent'ev 2009).

In a climate of economic instability, creating the right conditions for the development of entrepreneurial activity through the tax regulation area is a crucial aspect of efficient state policy. Here, of major significance is economic stimulation in the form of tax concessions for business, especially companies involved in the development and implementation of innovations. An example of this kind of support is providing a business with a 3–5-year-long tax holiday (depending on the degree to which the product is significant and sought-after). It is worth noting that today the government already has in place a number of laws aimed at easing some of the tax load and administrative pressure on small and medium-sized business. In particular, the special depreciation allowance has been increased from 10 to 30%, while the government has also ordered and reduced checks by supervisory agencies, as well as made significant cuts in the powers of the police (Gryzlov 2009). Russia's annual inflation rate dropped more than double in 2016, hitting a historic low of 5.4% (Figure 4).

Figure 4. Population's inflationary expectations for the year 2017



Source: Ministry of Economic Development of the Russian Federation 2017

However, in a climate of the current economic crisis this is still not enough, and there is a need for government assistance with creating a positive image for entrepreneurial activity and reducing the cost of utilities (expenses associated with the use of natural gas, electricity, and communal infrastructure).

Among the possible means of creating a positive image are mass media and the Internet. More specifically, the way the entrepreneur will look in the eyes of the audience depends directly on journalists, as it is them who gather and process information for articles, describe one's appearance, project one's social and psychological image, as well as one's level of erudition and professionalism – it is this information that will be perceived by the audience. It is worth taking account of the fact that the entrepreneur's image develops not just during the process of professional activity but also based on their daily behavior and life (their interaction with their family and clients).

3. Discussion

In today's world, as has been pointed out more than once, the key resource is man – it is people's well-being, confidence in tomorrow, and being goal-oriented that the outcomes of their life's activity depend on. In 2016, the government of the United Arab Emirates put in place the nation's Ministry of Happiness and Ministry of Tolerance. This can be interpreted variously, but it is hard to ignore the fact that happy people always work more productively and are more benevolent and more tolerant to all sorts of aggravators. According to Federation Council Speaker V. Matvienko, the nation ought to make every person happy, build happy schools, and provide people with such level of service that would leave them happy. And that is so true!

A while ago the UN released its 2016 World Happiness Report. It uses the following parameters to compare the levels of happiness with life across the world: the nation's real GDP per capita or Human Development Index (HDI) ranking; healthy life expectancy; freedom to make life choices; a sense of security and confidence in tomorrow; family stability; guarantees of employment; levels of corruption, as well as such categories as levels of trust within society, magnanimity, and generosity (Table 3).

Russia placed 56th with a score of 5.856, while no top economic powerhouse made it into the top 10 countries, the US ranking 13th, Germany 16th, the UK 23rd, and France 32nd.

Table 3. 2016 World Happiness Report rankings (Ukraine Ranks 123rd 2016)

#	Country	Happiness score	#	Country	Happiness score
1	Denmark	7.526	11	Israel	7.267
2	Switzerland	7.509	12	Austria	7.119
3	Iceland	7.501	13	the USA	7.104
4	Norway	7.498	14	Costa Rica	7.087
5	Finland	7.413	15	Puerto Rico	7.039
6	Canada	7.404	16	Germany	6.994
7	the Netherlands	7.339	17	Brazil	6.952
8	New Zealand	7.334	18	Belgium	6.929
9	Australia	7.313	19	Ireland	6.907
10	Sweden	7.291	20	Luxembourg	6.871
Happiness levels in other countries based on UN data					
56	Russia	5.856	118	India	
			157	Burundi	2.905

According to Jeffrey Sachs, head of the Colombia University Earth Institute, "measuring self-reported happiness and achieving well-being should be on every nation's agenda as they begin to pursue the Sustainable Development Goals" (Ukraine Ranks 123rd 2016). This statement can hardly be further from the truth. Suffice it to recall Aristotle's definition whereby the state is a living creature that develops striving for the moral perfection and happiness of private individuals.

In 2015, in his presidential message to the Federal Assembly, President Vladimir Putin gave an assessment of the economic situation in the nation and brought forward 5 key areas for the nation's future development, which are as follows:

- diversifying the economy and launching competitive production operations within such sectors as agriculture and small and medium-sized business;
- providing state support for at-risk sectors of the economy (construction, automotive industry, light industry, railroad rolling stock manufacturing);
- providing social support for citizens by reference to the individual needs of various categories of people;
- pursuing a sound budgetary policy, maintaining budgetary discipline, and boosting control over the movement of state funds;
- boosting trust between business and the government.

The Russian government has put together and been implementing a number of federal targeted programs focused on the key sectors of the national economy. The consistent execution – and, if need be, adjustment – of these programs will help the nation thrive in the global arena. Russia, according to President V.V. Putin, being a strong state, will definitely succeed!

Conclusion

Addressing and discussing the improvement of the current situation is something that can and should be done, but today's realities are such that the population's paying capacity has declined amid the economic crisis and sanctions. What is this testimony to and fraught with? We all know that dissatisfaction may lead to lack of confidence, social-psychological instability, and professional burnout. What sort of innovative activity are we talking about when someone does not have enough to pay for what is most essential? Under conditions of this kind, of special significance are the professionalism and acumen of companies' management team.

Members of the management team are expected to act in proactive mode and try to prevent any negative influence from without. Working out a strategy for the company's development, intellectualizing human capital, and reducing the shortage of decent work are the key aspects of effective corporate social responsibility (CSR), cultivating and implementing which on a large scale in the life of Russians is another mechanism for combating corruption and, consequently, boosting the efficiency of the nation's economy, which is being modernized.

Currently, the world's more developed countries account for no less than 90% of all innovative solutions produced globally, with each nation using its own mechanisms for boosting innovative activity in companies. It will help to study best practices from these nations, utilize the existing achievements of national science, and implement all top solutions in the activity of Russian companies. The use of the outcomes of intellectual labor in high-tech production and production of competitive products will help avoid the possibility of bankruptcy for companies and ensure their long-term operation and efficiency. Russians are a creative nation, but there are still some real issues with the way innovation is approached in Russia.

The set of measures developed by the authors to help boost innovative activity in Russian industrial enterprises do not cover the entire diversity of existing approaches and methods, but implementing them may help achieve some pretty solid results.

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Identification of Small and Medium-sized Enterprises Development in Slovakia

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Abstract:

SMEs play an important role in every developed economy, so research conducted in this field is still a relevant issue. All of these enterprises contribute directly to the development of various economic sectors and the business environment. The main objective of primary research was to prove a significant relation between the level of development of various sectors and the development potential of the analysed self-governing region. Standard method of questionnaire survey, including structured questions was used to collect primary data. The questionnaire survey to verify the research question was conducted on a sample of 496 small and medium-sized enterprises. Basic and specific methods of research as Chi-Square Test of Independence, Goodman and Kruskal Lambda were used for data processing. On the basis of analysed data of primary research and the Pearson's Chi-square test we can conclude, that any differences between the businesses of individual economic sectors regarding the development potential of the county can only be random. According to categorization of the businesses into different economic sectors we cannot anticipate and estimate the level of development, even if representatives of the industry have expressed their concern, that they can see potential in the studied self-governing region.

Keywords: small and medium-sized enterprises; development; business environment; regional economy; Slovakia

JEL Classification: L26; M21; O18

Introduction

Economic development of the country can be examined from different perspectives. The scientific literature provides various studies dealing with different factors related to economic growth of the country. The best known factors are: education (Barro 1991), effectively built financial structure (Levine *et al.* 2000) free international trade (Sachs and Warner 1997, Wisniewska 2014). Further studies deal with the impact of company size on the macroeconomic development of the country (Grančay *et al.* 2015, Nedu Osakwe *et al.* 2016). The research results can prove that jobs created by smaller businesses have shorter time of existence than workplaces created by larger enterprises (Davis *et al.* 1996, Adamišin and Kotulič 2013), which conceals the fact that smaller companies have a higher potential to meet customer demand, as well as realize large corporate changes. Based on the study of Schumpeter, Klette and Moen (2012) emphasize the importance of the business environment. It is important to consider the impact of businesses on the economic growth of the county resp. its individual self-governing regions.

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1. Literature review

Self-governing regions of Slovakia show many differences. These differences are caused by several factors, *e.g.* geographical location, distance from the capital, infrastructure, proximity to the state border, and others. One of the priority tasks of the government is to minimize the differences of the business environment in different self-governing regions of Slovakia. The research of different economic sectors in Slovakia is conducted on a sample of small and medium-sized enterprises (SMEs) of the chosen county. Important indicators in choice of the county were the appropriate macroeconomic indicators *i.e.* unemployment rate, GDP per capita, as well as added value per capita. It was also important that the chosen county is within a reasonable distance from the biggest cities in Slovakia (Bratislava, Košice). Based on these pre-defined criteria we chose self-governing region Nitra. Following the analysis of theoretical background of the research where we reflect current theoretical issues regarding the importance of SMEs, results of the research conducted in Nitra region will be discussed. Theoretical definition of the research will be first addressed to the importance of SMEs and their role in the economic development from perspectives of benefits, resp. barriers to their existence. This will be followed by the basic economic characteristic of Nitra region

SMEs are the backbone of each developed economy. Levit and Renelt in the summary of their scientific research pointed out a strong, positive relation between the size of SMEs and the economic growth of developed economies (Levin and Renelt 1992, Drobniak 2015). Among the benefits these enterprises represent is usually ranked their ability to adapt quickly to changing market conditions, which can be implemented due to simple organizational structure and personal relationship with employees and customers. Among the socio-economic benefits of SMEs is classified their ability to generate workplaces. Concerning the creation of workplaces by SMEs is important to highlight the findings of Hill and Stuart. Their research results point out, that vacant workplaces offered by SMEs are rather informal, unplanned and short term oriented on employee training (Hill and Stewart 2000). Based on the findings of research team led by Curran, informal trainings of employees in SMEs are less expensive and can be easily integrated into operational activities of the organization in accordance with the needs of employees. (Curran and Blackburn and Kitching and North 1997). It is generally known that the benefits of SMEs are reflected in the region, as entrepreneurs invest their own capital and earn profit, largely contributing to the recovery of the region, as well as shaping the business environment. However, the performance of businesses is affected by various social and economic factors. Based on the regional aspects of business environment it can be stated, that the development of the self-governing region depends on the characteristics of the business environment with an emphasis on improvement of it. A well-developed business environment is essential for development of Slovakia and its regions, as well as it contributes to the growth of the market economy. Considering the facts mentioned above, the state has an important role to support and create conditions for business activities (Adamowicz and Machla 2016).

SMEs are affected by market fluctuations. Their response to changes must be made more flexible, which is often regarded as a competitive advantage of SMEs. The flexibility of SMEs can help to meet the need of the most demanding customers. Further benefit is the potential of their employees, as they have more universal skills than employees of bigger companies. Enterprises involved in our research are the source of new technologies and innovations. Innovation is connected to independent innovators and small businesses (Strážovská 2014, Koráb and Koudelková 2016).

The benefits of SMEs can be listed as the following (Srpová and Řehoř 2010):

- flexibility – the ability to adapt quickly to changing market conditions;
- simple organizational structure and personal relationship with employees;
- the ability to generate employment opportunities with low capital costs;
- close relationship with customers;
- less extensive administration (outsourced activity);
- operating activities less dependent on energy and raw materials.

The advantage of SMEs is reflected in the region, as entrepreneurs invest their own capital and earn profit, as well as contribute to recovery of the region in large extent.

Barriers to business development of SMEs can be distinguished from different perspectives. In terms of time we can distinguish long-and short term barriers to business development. Long-term barriers are the following: improper fund contributions, lack of infrastructure and others. A typical short-term barrier example is the conversion of euro into other currencies. In terms of origin we can distinguish objective (*e.g.* financial crisis) and subjective (poor sales strategy) barriers to business development (Šúbertová 2015, Grigore and Drăgan 2015).

Barriers to development of SMEs in terms of their impact on the business can be divided into external and internal factors. External factors act as barriers from outside the company, *e.g*. legislation. Internal factors are based on the nature of the business and form the internal environment of the company. The most common internal barrier is the relationship between the owner and the company management (Šúbertová 2012, Majdúchová 2003).

Despite the considerable economic benefit of SMEs, we can also recognize some restrictions that apply to them. The barriers of SMEs could be summarized as the following (Majtán *et al.* 2009):

- negative social perception of the entrepreneur;
- less access to capital;
- entrepreneurship training;
- limited innovative capacities and low spending on research and development;
- administrative burden.

Barriers to development of SMEs Sobeková-Majková (2011) divided into two groups, whether the disadvantages are resulting from the nature of the business or specific business conditions in Slovakia. A substantial part of disadvantages arising from the nature of businesses form a limited access to finance resp. credit sources, which is caused by high-risk nature of SMEs and the limited ability of liability. Among problems arising from specific conditions of entrepreneurship in Slovakia, the authors (Ubrežiová *et al*. 2008) rank high contribution burden of SMEs, the often changing and non-transparent legislation and non-functioning capital market.

Barriers may affect businesses to expand and may cause the disappearance of enterprise. Failure of the business can also be caused by insufficient analysis of the market, poor quality products, inefficient handling of funds, underestimating competition and lack of managerial skills (Králl 2012, Armeanu and Instudor and Lache 2015).

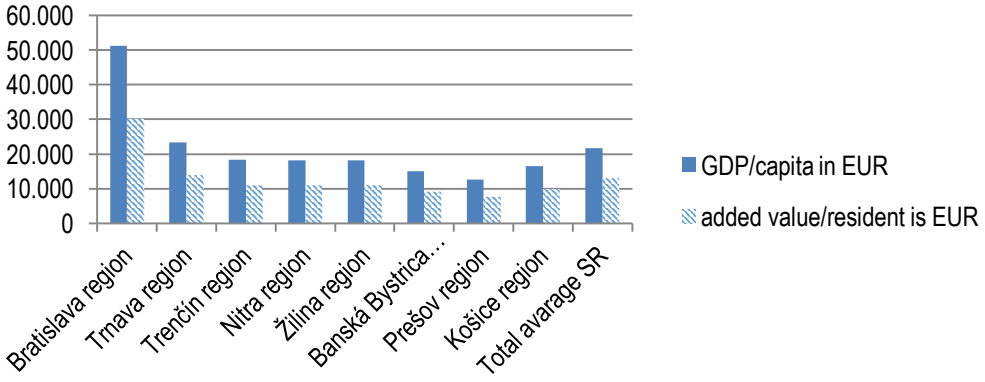
Slovakia has been one of the fastest growing economies in the EU in the past few years. There are discrepancies in the improvement of living standard in different self-governing regions of Slovakia and the regional disparities have deepened as it is concluded in the UniCredit Bank survey, which specializes in SMEs and in study of Lazíková *et a*l. (2017) as well. The fastest economic growth was recognized in Bratislava region, where GDP per capita of purchasing power has increased in average of 7,7% annually over the period of 2000-2011 (average growth in Slovakia was 6,4% per annum). Above-average growth was recorded in Trnava (7,0% per annum) and in Žilina region (6,9%), Nitra region is characterized by growth of 6,4% of GDP per capita in purchasing power parity, which corresponds to the Slovak average. Nitra region has largely contributed to the economic development of Slovakia, which is proved by high GDP ratio of the region. According to Statistical Office data, the region's share on GDP recorded at current price in EUR around 11% (Doležal 2014).

Based on characteristics of Nitra region and its position in the national economy we will devote to selected macroeconomic indicators of the region, introduce the structure of economic sectors, the most significant foreign investments and briefly describe the role of educational institutions in the region.

There is constant effort made by the government to reduce the deepening disparities between the regions. Despite various EU steps and government measures, the differences in the quality of the business environment are increasing, which is reflected by the main macroeconomic indicators of individual regions.

The GDP indicator for individual regions per capita is shown in Figure 1. The GDP per capita in Nitra self-government region is below the average. More than four-fold differences can be seen between individual regions of Slovakia (Bratislava and Prešov region).

Figure 1. Selected macroeconomic indicators in regions of Slovakia in 2013 resident is EUR



Source: Data processed by Statistical Office of the Slovak Republic, 2016, Bratislava.

29,11% added value was created in Bratislava region. Nitra self-governing region has reached 10,57% of the total value added, which is lower than the national average. (12.968 mil. EUR). Business development in the regions of Slovakia is very imbalanced, which is reflected in the main macroeconomic indicators of regions (Table 1). Collected data shows that unemployment rate in Nitra region (7,93%) is below the Slovak average (9,18%), which is considered to be a positive indicator and points to certain hidden opportunities of the region. The basic macroeconomic indicators in Nitra self-governing region are close to the Slovak average.

Table 1. Basic macroeconomic indicators in self-government regions of Slovakia (2014)

Self-governing region	GDP/capita EUR	Added value/capita EUR	Employment rate% (*)
Bratislava	51 235	30 202	5,03
Trnava	23 394	14 007	5,23
Trenčín	18 335	11 043	6,56
Nitra	18 178	10 966	7,93
Žilina	18 259	10 962	7,38
Banská Bystrica	15 059	9 083	13,47
Prešov	12 642	7 578	14,58
Košice	16 521	9 901	13,25
SR total-average	21 703	12 968	9,18

Note: unemployment rate in different regions until 30.09.2016
Source: Data processed by Statistical Office of Slovak Republic, Bratislava

Nitra self-governing region in terms of national economy can be characterized based on the structure of economic sectors. Due to different statutory criteria for the establishment of various types of enterprises and their characteristic features defined by the Commercial Code and the Small Business Act in Slovakia we decided to introduce the structure of individual economic sectors in Nitra region for legal entities and natural persons. Data was obtained from the regional database of Statistical Office.

Based on the data of Statistical Office in Slovakia, 30,60% of legal entities operating businesses in Nitra self-governing region in 2014 belonged to wholesale or retail sector, repair of motor vehicles and motorcycles.[6]

[6] Statistical Classification of Economic Activities, Rev. 2 is issued by Decree of the Statistical Office of Slovakia from 18 June 2007 No. 306/2007 Coll. This national statistical classification is drawn up on the basis of the common statistical classification of economic activities in the European Community NACE Revision 2, set for the countries of the European Community by Regulation of European Parliament and Council Regulation No. 1893/2006 of 20 Dec 2006 and has been applied in entire content in all the member states since 1 Jan 2008. Based on the classification NACE Rev 2 into the section of wholesale and retail trade; repair of motor vehicles and motorcycles is ranked wholesale, retail trade and repair of motor vehicles and

Relatively high proportion is represented by retailers with different types of business. In case of individual districts of Nitra self-governing region, this sector is over-represented in Komárno district (34,78%) and district of Nové Zámky (32,13%). The above-average representation can be explained by the geographical location of these districts. The second characteristic economic sector in the region is the sector of professional, scientific and technological activities (13,20%), which is over-represented in districts of Nitra (15,35%) and Komárno (14,44%). Universities with different study programmes in Nitra self-governing region contribute to professional, scientific and technological development of the district resp. the self-governing region. The development of self-governing region is also ensured by different chambers, associations of legal entities and the Agroinštitút Nitra, an educational institution of the Ministry of Agriculture and Rural Development, providing broad portfolio of services mainly in the field of lifelong learning and professional training. Industry is the third most represented sector in the self-governing region (10,40%). Above-average representation of legal entities in industry sector can be recognized in districts of Zlaté Moravce (14,75%), Levice (12,97%) and Topoľčany (12,75%).

Natural persons in Nitra self-governing region are mainly represented in the sectors of wholesale and retail trade, repair of motor vehicles and motorcycles (30,59%). Similarly, to legal entities, the business activities of natural persons are the same, repair of motor vehicles and motorcycles and retail activities of different kind. The research made in different districts of Nitra self-governing region can prove, that the mentioned sector is represented above-average in the districts of Nové Zámky (33,93%), Komárno (33,24%) and Šaľa (31,87%). The self-governing region is represented by high number of natural persons in construction sector (20,84%). However, this activity is not among the three most typical with legal entities, it is characteristic for natural persons. Similar results can be identified in districts of Zlaté Moravce (26,36%), Šaľa (23,76%), Topoľčany (22,80%) and Nitra (21,90%). Various activities carried out by natural persons in construction sector can be listed here, including design and implementation of construction work.

Similarly, to legal entities, natural persons have relatively high presence in industry sector as well (especially manufacturing). The ratio of registered natural persons in industry sector was 19,20% in 2014. This economic sector is over-represented in districts of Levice (30,38%), Zlaté Moravce (21,92), Komárno (20,77%) and Topoľčany (19,45%).

Based on available data of National Bank of Slovakia Nitra region attracted 4% of FDI (Table 2).

Table 2. FDI in Nitra self-government region, Slovakia (in thousands EUR)

	2009	2010	2011	2012	2013	2014
Slovakia	36 469 023	37 665 095	40 173 448	41 779 811	42 071 875	40 969 240
Nitra region (%)	4,02	4,12	4,05	4,13	3,79	4,01
Nitra region	1 467 286	1 552 909	1 627 601	1 724 309	1 595 784	1 641 344
Komárno	193 439	177 061	188 756	202 357	202 742	216 677
Levice	167 204	187 060	157 697	167 107	158 864	109 132
Nitra	334 759	448 272	482 840	519 560	573 438	625 326
Nové Zámky	189 811	155 747	142 850	196 288	175 317	170 768
Šaľa	391 153	402 401	442 465	277 791	297 848	312 189
Topoľčany	76 307	92 061	79 999	72 926	98 872	118 480
Zlaté Moravce	114 613	90 307	132 994	288 280	88 873	88 772

Note: Detailed information about FDI in 2015 for individual districts of Nitra self-governing has not been available yet.
Source: Data based on the indicators of NBS, Bratislava [online]

Thanks to foreign direct investment industry parks were built resp. expanded in the region. According to data of Slovak Agency for Investment and Trade, 6 industry parks are registered in Nitra region. In the second half of 2015 the Slovak Government announced a new investment made by a car company. The UK car manufacturer, Jaguar Land Rover is going to build a new plant in Nitra. It is expected to roll out the first car in 2018. The new investment, worth more than 1,3 billion EUR will create about 6000 workplaces.

motorcycles; wholesale trade except of motor vehicles and motorcycles; retail trade, except of motor vehicles and motorcycles.

2. Methodology

Research was conducted on a sample of SMEs in a chosen county of Slovakia. Appropriate macroeconomic indicators without any extreme values i.e. level of unemployment, GDP per capita, added value per capita were important indicators to consider. Further important factor was the reasonable distance of the county from the largest cities (Bratislava, Košice). We did not want the distance to big cities to excessively influence the development of macroeconomic indicators of the county. Based on these pre-defined criteria we chose Nitra self-governing region.

The main objective of primary research is to verify the research question *i.e.* Is there a significant correlation between the levels of development of individual economic sectors and the development potential of Nitra self-governing region?

Nitra Region with its favourable geographical position and its distance from the capital provide opportunities to develop the business environment of the region. It is also confirmed by the study „Strategies for rural development in Nitra Region". The main objective of the questionnaire survey is to show the development potential of the business environment in individual sectors of Nitra self-governing region.

The questionnaire survey to verify the research question was conducted on a sample of 496 SMEs in Nitra region. Basic and specific research methods were used to process our research data.

To verify the research question, the following statistical methods were used:

- *Pearson's Chi-Square Test of Independence*– based on pivot tables and as an extension of Chi-Square Test Goodness –of- Fit, it tests the null hypothesis, which expresses the independence of variables *i.e*. knowing the value of one variable does nothing to predict the value of another variable. If the level of significance (P-value) is higher than the set level of significance (α), the null hypothesis is confirmed against the corresponding alternative hypothesis, *i.e*. there is no correlation between the variables. If the level of significance (P-value) is lower than the set level of significance (α), the null hypothesis is rejected against the corresponding alternative hypothesis, *i.e*. difference measured is too large to be merely accidental, so there is relation between variables. After recognizing the correlation between two variables, the strength of association is still questionable. To determine the strength of association is necessary to establish contingency coefficient. Cramer's contingency coefficient V is considered to be the most appropriate measure of association between two nominal variables. It takes values between 0 (no correlation) and 1 (perfect correlation). For more detailed characterization of contingent index, we apply a scale introduced by Cohen. Based on Cohen's categorization, if correlation is less than 0,1 is trivial, 0,1–0,3 small, 0,3–0,5 moderate and over 0,5 there is high degree of correlation between variables (Cohen 1988).
- *Goodman and Kruskal's lambda* expresses association between column and line variable which measures the usefulness of line (or column) variable when predicting the value of the second variable. To express likelihood, the value of lambda ranges from 0 to 1, where 0 = knowing the value of one variable does not indicate the value of the second variable. Value 1 = knowing the value of one variable allows to predict correctly the value of second variable. Without knowing the value of the independent variable (in this case ranking SMEs into various economic sectors) the value of dependent variable (*i.e*. opinion of entrepreneurs regarding the development potential of the region) each observation can be estimated as the most numerous value. The frequency of the most numerous category of dependent variable will represent the number of correct estimates.

3. Results and discussion

Focusing on research question we will examine the relationship between the opinion of entrepreneurs and ranking businesses into different economic sectors, where the opinion of entrepreneurs regarding the development potential on Likert scale will be the dependent variable and ranking of businesses into various economic sectors will be the independent variable.

While examining the opinion entrepreneurs had about the business environment in Nitra region H_0 and H_1 hypotheses were formulated, where H_1 is the opposite to H_0.

H_0: There is no significant correlation between the development level of economic sectors and the development potential of Nitra self-governing region.

H_1: There is significant correlation between the development level of economic sectors and the development potential of Nitra self-governing region.

Considering the character of variables, contingency table will be applied for analysis. Correlation between variables is analysed with the help of Chi-Square Test (Table 3).

Table 3. The results of Chi-Square Test

Indicator	Value	Degree of independence	Sig. (duplex) – (p-value)
Pearson's Chi-Square	49,135[a]	35	0,057
Ratio of probability	54,247	35	0,020
Correlation between linear variables	0,869	1	0,351

Note: a) at 35,4% the value is lower than 5.
Source: Primary research, SPSS software used for calculation.

The value of Pearson's Chi Square is 49,135, which is characterized by a measure of significance sig=0,057, it is higher value than the pre-set level of significance *e.g.* sig. > 0,05 and it means, that H_0 hypothesis is confirmed by the Pearson's Chi-Square, so any differences between the businesses of individual economic sectors regarding the development potential of Nitra region might be random. According to level of probability (Likelihood Ratio) the level of significance is lower than 0,05. Indicator expressing linear value between the variables (Linear-by-Linear Association) cannot be applied as it expresses correlation between the interval and ratio scale, however we are examining the correlation between nominal and ordinal scale. The analysis of relevant data shows that pivot table is not a reliable source to verify the hypothesis, since one of the conditions has been compromised, applying Pearson's Chi-Square is not appropriate. Based on these facts, we cannot make a clear contribution to research question.

If dependent variable stands for the perception of entrepreneurs on Likert scale about the development potential of the district reaches the value of 0,088, *i.e*. knowledge of the perception of development potential of the district means 8,8% reduction in errors in economic sectors where the economic unit is ranked. Table 4 shows significant correlation between the variables (approx. Sig value is lower than 0,05), but this correlation is extremely weak.

Table 4. Test results using indicators Lambda, Goodman and Kruskal Tau, risk factor

Indicator			Value	Asymp. Std. error[a]	Estimated value T[b]	Estimated value Sig.
Nominal based on nominal	Lambda	Symmetric	0,051	0,022	2,242	0,025
		Perception of development potential of district Dependent	0,088	0,038	2,217	0,027
	Goodman and Kruskal Tau	Perception of development potential of district Dependent	0,025	0,008		0,012[c]
	Risk factor	Symmetric	0,034	0,008	4,318	0,020[d]
		Perception of development potential of district Dependent	0,038	0,009	4,318	0,020[d]
a. H_0 hypothesis is rejected.						
b. Using asymptotic standard error of assuming H_0 hypothesis.						
c. Based on the approximation of Chi-Square						
d. Likelihood ratio of Chi-Square						

Source: Primary research, SPSS software used for calculation.

The value of Cramer V stands at 0,148, which is not enough for significant correlation between the variables (Table 5). The value of contingent index is 0,313*, i.e.* correlation between the variables is small, considering the

level of significance it is impossible to show a significant correlation between the enterprises ranked into different economic sectors and the opinion of entrepreneurs regarding the perception of development potential of the district.

Table 5. Test results using indicator Phi, Cramer V and contingency coefficient

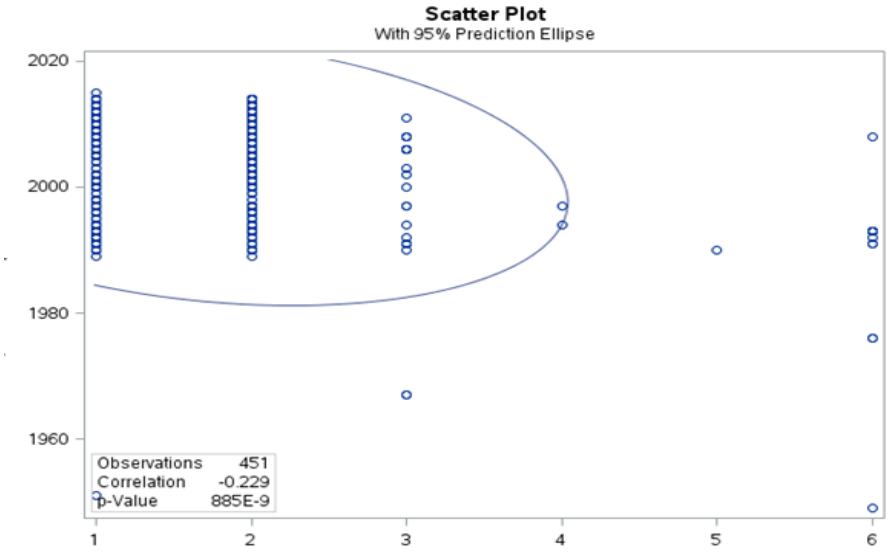
Indicator		Value	Estimated value Sig.
Nominal based on nominal	Phi	0,330	0,057
	Cramer V	0,148	0,057
	Contingency coefficient	0,313	0,057

Source: Primary research, SPSS software used for calculation.

Hypothesis H_0 is confirmed, *i.e.* there is no significant correlation between the level of development of individual economic sectors and development potential of Nitra region. When evaluating the development potential of districts, respondents had rather sceptical opinion. Only businesses in agricultural and construction sector expressed optimism and admitted that the industry will develop rather quickly.

We also had interest about the fact, whether correlation between the year of establishing the business unit and its organizational-legal form exists. After deducting inaccessible data, the statistical data set consisted of 451 observed statistical units (enterprises). Results are shown in Figure 2.

Figure 2. Testing the correlation between the year of establishing business unit and its organizational-legal form

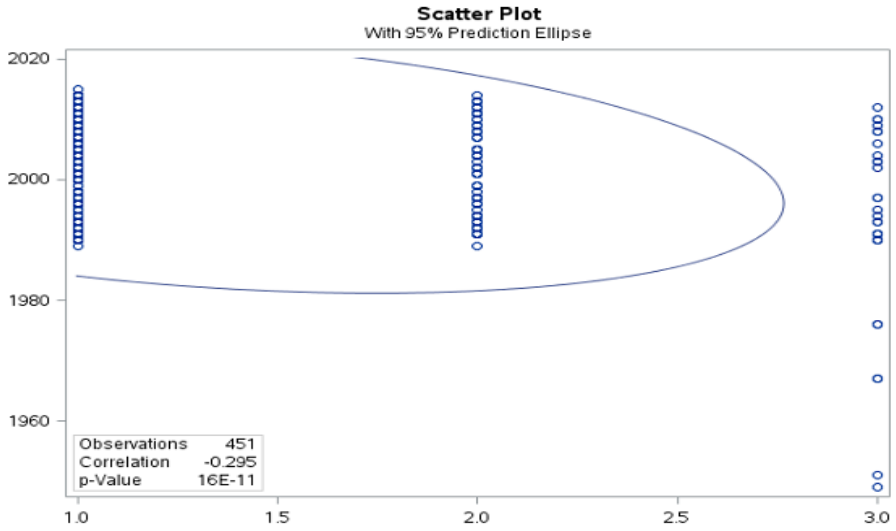


Source: Primary research, SAS is applied for statistical analysis.

Figure 2 is presenting the result of statistical analysis in form of scatter plot at the chosen level of significance α=0.05. This is the prediction ellipse. Possible legal forms of business units are shown on the X-axis and the year of establishing the business unit is demonstrated on Y-axis. Graph 1 clearly demonstrates that most of the businesses were established in the first few years of the 21st century and the highest concentration is achieved by businesses representing the following organizational-legal forms: limited liability company and natural person. Far less dependence can be observed in case of other organizational-legal forms of businesses and the year of their establishment.

It is characteristic that small and medium- sized enterprises employ fewer employees and the largest group of these types of businesses is formed by micro-enterprises. We also verified this fact in the chosen statistical set. Figure 3 illustrates statistical analysis again. The scatter plot clearly shows a correlation between the year the enterprise was established and the number of employees. The prediction ellipse indicates the direction of the trend of this indicator.

Figure 3. Testing the dependence between the year of establishing business unit and the number of employees



Source: Primary research, SAS is applied for statistical analysis

Figure 3 is presenting the results of scatter plot analysis at the chosen level of significance α =0.05. The number of employees is shown on X-axis and Y-axis stands for indicating the year of establishing business units. Graph 2 clearly shows that most of the business units were established at the turn of the millennium, preserving the trend of growth in the new millennium. These enterprises fall into the category of single member limited liability companies. The second largest group is formed by businesses with two employees, established before 2000, followed by a short break and increasing the trend again in 2010. Far less is the number of businesses with three or more employees, where we can identify several clusters. The smallest cluster could be recognized in the 80s of the 20th century, represented by one entity and two entities in the 60s of the 20th century. Larger clusters could be identified in the second half of the 90s of the 20th century and then after the millennium.

Conclusion

Based on theoretical scientific work of foreign and domestic authors we have formulated our research question and defined hypotheses.

In accordance with the research question we examined the correlation between the development levels of economic sectors and development potential of Nitra self-governing region. Based on Pearson's Chi-Square we concluded that any differences between the enterprises of different economic sectors regarding the development potential of Nitra self-governing region can be random (sig=0,057, represents a higher value than the pre-set level of significance, *i.e.* sig. > 0,05, but the difference is minimal). Considering this fact, we cannot clearly comment the research question. As another indicator we chose Cramer V. The reached value of 0,148 is not enough to show significant correlation between the variables. This means, that categorization of enterprises into different economic sectors does not predict or estimate the level of development even if representatives of the sector can see potential in Nitra self-governing region. Based on the analysis of data collected we came to conclusion, that further detailed research and deeper analysis of data is vital to understand the development of economic sectors in Slovakia.

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Strengthening Competitiveness of Small and Medium Enterprises in Municipalities

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Abstract:

In the article the importance of strengthening competitiveness of small and medium enterprises for municipalities to support economic development is considered. The major problems of small and medium enterprises development in Ukraine were identified. The actual problems of small and medium enterprises competitiveness improvement in single municipality were defined. Methodological approach to conduct the research on strengthening competitiveness of small and medium enterprises for individual municipalities was developed. The model of formation the program of strengthening the competitiveness of small and medium enterprises is offered for a particular industry in a particular city. This model was implemented on the example of two industries in Vinnytsia that confirms the effectiveness and validity of the developed model. The competitive advantages of small and medium enterprises of the tourism and clothing industry in Vinnytsia were identified which enabled to develop the programs for strengthening the competitiveness of small and medium enterprises in these industries.

Keywords: competitiveness; small and medium enterprises; competitive advantages; industry; benchmarking; municipality

JEL Classification: F10; L67; L83; M21

Introduction

Small and medium enterprises (SMEs) is a driving force for the development of the country as a whole, the key to the welfare of citizens and the creation of perspectives of development in each particular community. Small and medium business plays a significant role in the Ukrainian economy, being a flexible and efficient mechanism to create new jobs and an important factor in the formation of the middle class. The success of the middle class is one of the factors to ensure the stability of the national economy, which ultimately determines the stability of the country, providing the solvency of the internal market, the ability to protect democratic values. Nowadays, small and medium business in Ukraine gives only 12-15% of GDP, whereas in Poland – up to 40%, France, Japan – more than 70% (International Trade Centre 2016, Czerniak and Stefański 2015, Shimizu 2013).

The majority of SMEs of cities in Ukraine have a low level of economic potential and competitiveness. Such trend causes a significant problem for the economic development of individual cities in particular and the country as a whole. The solution of the problem requires a coordinated interaction between SMEs and public authorities. So, on the one hand, it is needed to make efforts to enhance the competitiveness of SMEs themselves, and on the another hand – considerable support from the public authorities is required.

In terms of the mentioned above, the aim of this study is to develop methodological and practical recommendations to strengthen the competitiveness of SMEs of a single city. To achieve such goal, the model of formation the program of strengthening the competitiveness of SMEs for a single city is proposed. The approbation of this model was conducted on the example of the priority industries of the region. The research was carried out on the basis of data collection, analysis and processing of primary and secondary information.

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The results of current study maybe applied by the local authorities of a particular city to implement changes in local regulations and practices and to enhance interaction between business and government to improve the business climate in general and SMEs in particular.

The research can also be useful for representatives of the business community and public sector of the city who would like to monitor the actions of local authorities to improve conditions of doing business in the city.

1. Literature review

The issues of competitiveness are covered by a wide range of both Ukrainian and foreign publications in the economic literature. Recently, an increasing number of scientists research the issues of assessment the level of competitiveness of enterprises and provide recommendations for improving it in them researches.

The problems of increasing the competitiveness of enterprises are conserved in researches of the following authors: L. Guerrieri, G. Hooley, M. Porter, D. Ricardo, A. Smith, A. Starostina, A. Fatkhudinov and others. In their paper the essence of competition, competitiveness, competitive strategies and competitive advantages are reflected. Issues of SMEs development were research by such scientists as A. Cherniak, E. Gogu, S. Lachiewicz, M. Mrva, M. Muresan, H. Rocha, K. Shimizu, P. Stachová, M. Stefański, G. Tkachuk *etc*. Their works are devoted to the problems of creation the favorable climate for SME development, competitiveness of SMEs, the main directions of state support for SMEs in the European Union, strategy of development the small and medium business in Ukraine etc.

Critical analysis of domestic and foreign scientific literature gives an opportunity to conclude that despite the existence of significant number of scientific works today there is no single theoretical approach to definition the economic essence of the concept of competitiveness of the enterprise, as well as precise algorithm of enhancing the competitiveness and application of the algorithm to Ukrainian SMEs. All stated above causes the high relevance of this problem for modern economic science.

2. Methodology

A research of the level of development of any country demonstrates that an important factor in solving its internal problems is the development of business activities and especially small and medium-sized businesses (Muresan and Gogu 2012, Mrva and Stachová 2014). The development of SMEs is one of the most important factors in the creation of additional working places and consequently the reduction of unemployment, development of competition, the revival of innovation processes and more fully satisfy market of goods and services. Analyzing the experience of leading countries of the world, it can be argued that SMEs helps the state to solve social and economic problems.

The aim of this research is to develop recommendations for the development of SMEs of a particular industry on the basis of determination the level of competitiveness of the SMEs of a single city.

To achieve this goal there have been developed the following exploratory questions:

- the major tendencies of the industry development. Such question enables to stipule the features of the development of the SMEs in a particular city. It is clear that some trends in particular sectors of the economy are common to the country, but there are those that are specific to the SMEs of a single city;
- the competitive advantages, *i.e.,* strengths that distinguish each industry (direction) of SMEs of a single city compared to other cities;
- the specific features of interaction with key stakeholders of enterprises;
- the positioning of the industry;
- the strategic objectives, directions of the industry development. In the framework of the conducted focus groups with SME representatives of particular industries the strategic aims, directions of development the industry were developed.

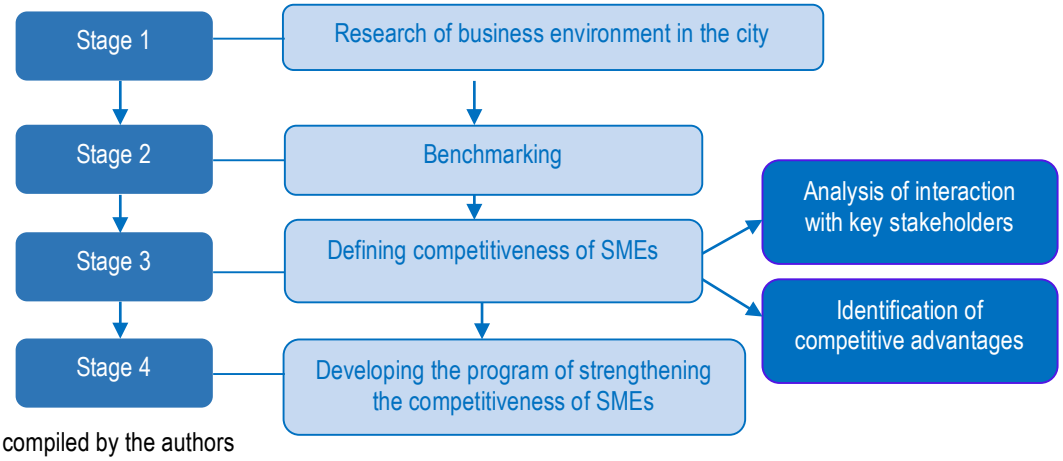
The object of research is the activity of SMEs in a particular city. Subject of research are theoretical foundations and methodological approaches for strengthening the competitiveness of SMEs of a single city.

During the research, the sources of both primary and secondary information may be used:

- desk research, which involves the collection, analysis and processing of statistical information, analytical reports, articles, publications, published reports of the central government, city council, enterprises, universities etc. In addition, requests can be sent to the relevant authorities of a single city, to prepare brief information on the main features of the industry;
- primary data collection involves conducting focus groups with representatives of various SME industries of a single city. Focus groups provide an opportunity to receive feedback from entrepreneurs, their vision and understanding of the realities and prospects of SMEs in a particular city. Data received during the focus groups needs to be processed and, if necessary, checked in the sources of secondary information.

After processing of the responses received, recommendations concerning strengthening the competitiveness of SMEs of a single city are provided. On the basis of previous studies, based on international leading practices the model of formation the program of strengthening the competitiveness of SMEs in a particular city was proposed. (Figure 1).

Figure 1. The model of the formation the program of strengthening the competitiveness of SMEs in a particular city.



Source: compiled by the authors

This model of the formation the program of strengthening the competitiveness of small and medium enterprises in a particular city consists of four major stages. Below each stage is described more precisely.

The first stage stipulates study of the business environment in the city which enables to get characteristics of SMEs, leading industries, to analyze and identify the main tendencies of SME development in the city. This stage is very important since it support the process of identification of the most important SME industries within city as well as to compare a current situation in the city with a general situation in the country.

The second stage "benchmarking" is aimed to conduct a comparative analysis of SMEs of a particular city with SMEs in other cities-analogues, where enterprises are working in similar business conditions. Such analogue cities maybe located both inside and outside the country. In general, benchmarking is the process of comparing company's activity with the best companies on the market and in the industry with the subsequent implementation of changes to achieve and maintain competitiveness in the long term (Bendell *et al*. 1998, Camp 2007).

The third stage is focused on determining the competitiveness of the SMEs of a single city. Current stage includes two sub-steps: firstly, analysis of interaction with key stakeholders, and secondly, identification of competitive advantages, as follows:

1. Stakeholders (involved parties) – the groups of influence within the industry and beyond. Their interests can often contradict each other. Usually, the enterprise interacts with stakeholders, and effective communication and cooperation with them can be a source of overcoming of difficulties of direction or industry. Stakeholders include: authorities, suppliers, consumers, competitors, and the business-associations. It is important to determinate both positive and negative features of cooperation. For different industries, the key stakeholders may differ, but authorities will always be the main.

2. Identifying the strengths of SMEs which can be converted into competitive advantages. Competitive advantage of the SME is acquired core competence by enterprise, which in the specific business environment gives the opportunity to provide the most complete satisfaction of consumer needs and implementation of their own economic interests (Starostina *et al*. 2012). The competitive advantages are essential for the competitiveness of SMEs.

The fourth stage is focused on development of the program of strengthening the competitiveness of SMEs in the city. After identifying the competitive advantages of SMEs, it is recommended to develop a program of strengthening competitiveness, as competitiveness is achieved through the existing sustainable competitive advantages. Competitiveness of SMEs is the ability to achieve a competitive advantage over other SMEs in terms of competition for the best conditions of production and realization of goods to meet the needs of consumers in the market (Tkachuk 2010). A prerequisite for the competitiveness of SMEs is the production and realization of competitive goods. At this stage the program of strengthening the competitiveness of SMEs of a single city, based on the definition of the main directions of development, is formed. Also at this stage the recommendations about strengthening the competitiveness of SMEs in a particular city are given. Here it is determined the positioning of the industry that involves the formation of a desired image or perception of the industry/direction in the minds of consumers.

3. Case studies

To confirm the possibility of practical application of the program for strengthening the competitiveness of SMEs proposed model in a particular city, it is advisable to implement it at the SMEs in the city of Vinnytsia (Ukraine).

The city of Vinnytsia was chosen since it is one of the largest cities in Central Ukraine and an administrative and territorial center Vinnytsia Oblast. The city has favorable environmental conditions, powerful resource base, staff capacity and developed infrastructure, which are important components of favorable business climate formation and increasing of city competitiveness in the European scale. Also the city of Vinnytsia is one of the most comfortable places to stay in Ukraine by results of the Focus magazine rating (Babenko and Gordeychik 2016). It is a powerful industrial, medical and tourist center of Ukraine with a large quantity of small and medium-sized enterprises. SMEs competitiveness determines the overall city development.

During the research 7 priority industries of SMEs were identified, which includes the following sectors: information technologies, medicine, tourism, social entrepreneurship, service sector and food and clothing industries (Project PROMIS 2017). It is proposed to carry out the approbation of the proposed methodology on the example of two priority sectors, namely, tourism and clothing industry.

Nowadays SMEs of the researched industries in Vinnytsia compete with industry peers within the local market, sustaining the pressure of large business and state and municipal institutions. However, with development of business and expansion outside the city/region, competition acquires a national and international scale. Under such circumstances, it is important to identify the main factors of strengthening the competitiveness of local SMEs and to propose mechanisms for their support in face of growing competition and industry reforms.

The research was prepared based on the analysis of secondary (official statistics, project reports) and primary (focus groups with industry representatives) information.

The model of the formation the program of strengthening the competitiveness of small and medium enterprises of tourism industry in Vinnytsia city.

Stage 1. Research of the tourist industry business environment in Vinnytsia city.

One of the priorities for the development of Ukraine until 2020 is tourism sector development. In particular, Vinnytsia Oblast and its center, the Vinnytsia city, should become a leading tourist center of Podillia region (Conception of Development 2020).

Industry characteristics. Tourist industry in Vinnytsia is developing dynamically. According to the Statistics Department in Vinnytsia Oblast, in 2015 revenue from travel services reached 18 874 million UAH (Analytics and statistics 2017). Today Vinnytsia demonstrates successful work of travel agencies involved in outbound tourism, which provides travel services of departure from the city. As of March 2017, 188 subjects of entrepreneurial activity

(individuals and legal entities) were registered, where 1,410 people are employed. A positive impact on industry development was caused by the opening of the Vinnytsia airport for charter flights. In 2016, appeared the reasons to inform on the growth of tourism revenues to the budget of Vinnytsia city. In particular, for 8 months in 2016, the city budget received 138.801 thousand UAH from tourist fees. At the same time, in 2014 and 2015, revenues from this collection amounted to 74,223 thousand and 94,907 thousand accordingly (Analytics and statistics 2017).

Among the educational institutions that train specialists in this sphere is the Vinnytsia Institute of Trade and Economics and the Donetsk National University relocated to Vinnytsya due to the current situation in the Eastern Ukraine.

Tourism is one of the priority directions of Vinnytsia development, and its growth is able to stimulate the development of other related industries of the city, and above all, SMEs in the sphere of services, trade, social entrepreneurship etc. In October 2015, the City Council approved the "Tourism Development Program in Vinnytsia for 2016-2020" (Conception of Development 2020), which defines a set of measures aimed at provision a systematic approach to the tourism development, enhancing the tourist attraction, development of the city's tourism infrastructure and creation of a quality service network, both for entertainment and business tourism. On the official site of the City Council in the section "Branches of the city" there is a separate page "Tourism", which provides structured information about the city main cultural attractions, events and tourist infrastructure.

Tourist services provided in the city include visits to museums, historical and national monuments, holding of festivals, local and public catering and accommodation services in hotels, hostels and dormitories.

The industry is characterized by a high development level of a travel agencies network engaged in the sales of tourist packages for vacation abroad, as well as in organizing trips through the territory of Ukraine. Tourist services in Vinnytsia Oblast in 2014 were provided by 11 licensed enterprises (tour operators) and about 58 travel agents, the number of which is growing consistently every year (Strategy of sustainable 2020). A promising and perspective direction is traveling through Podillia region. In fact, commercial organizations in Vinnytsia are not engaged in local tourism.

There is a clearly expressed seasonality of tourist visits in the city. In high season (a period from April to October) the number of tourists is significantly higher due to fountains work. Musical fountain is one of the major touristic locations in the city. Also a positive effect on the dynamics of city visiting is given by growing popularity of locations around the city, in particular it comes to Podillia in general and Liadovo and Brayilovo. According to industry representatives, the city has few attractions that are worth to be recommended to tourists. In general, in 2015, 22748 tourists were officially registered in the region, including 42 foreign tourists, 13580 Ukrainian tourists who traveled abroad, 9126 domestic tourists and 4580 excursionists (Statistics of Tourist flows 2016).

Concerning the organization of excursions and tourist support it is worth noting that there are individual guides in the city, however, there are no databases and systems of cooperation with them for SMEs in the city. According to industry representatives, it makes no sense to cooperate with other agencies in organization of travels throughout Ukraine, because finding a hotel and a guide and making the rest of reservations can be done by agencies from the city of departure.

Stage 2. Benchmarking

A specific feature of the tourism industry in the city of Vinnitsa is the orientation towards foreign markets, while the development of domestic tourism remains at very low level. The ratio of local users of tourist services to visitors from other cities/countries is 9:1.

The competitiveness of the tourism industry directly depends on the development of the city's infrastructure (hotel and restaurant business, transport infrastructure) and the revival of local culture and values, which is partly under the responsibility of local authorities.

In order to conduct benchmarking of the tourist industry in Vinnitsa, the Romanian city of Cluj-Napoca was chosen as the basis for comparison, which pretends to be the cultural capital of Europe in the strategic plans of 2021 (Table 1).

Table 1. Comparative assessment of the competitiveness of SMEs of tourism industry in Vinnitsa.

Comparison indicators	Vinnytsia	Cluj-Napoca
Tourism development strategy (its priority in the overall city development strategy)	▪ The program of tourism development in the city of Vinnytsia for 2016-2020.	▪ The Cluj-Napoca 2021 European Capital of Culture program (Cluj-Napoka 2021).
Number of centralized public events held during the year including non-governmental institutions and private individuals with the support of local authorities	▪ Musical, literary, art, film festivals; ▪ Day of the city; ▪ Europe Day.	▪ Musical, literature, art, film festivals; ▪ Academic tourism (conferences, workshops).
Availability of an educational institution for training specialists for the industry	▪ Vinnytsia College of Trade and Economics (Preparation of junior specialists in the tourism industry); ▪ Donetsk National University.	▪ Gheorghe Dima Music Academy; ▪ Art and Design University of Cluj-Napoca.

Source: developed by the authors

In order to increase the competitiveness of the Cluj-Napoca companies in the framework of the tourism development strategy, segmentation of tourist destinations was carried out and support programs were developed for the most promising companies in terms of competitive potential. So, given the high concentration of young specialists in the field of culture and art, the concentration of artistic and cultural monuments of Romania in the city, it was decided to position Cluj-Napoca as the cultural capital of Europe. The main conception of the program: "The East of West". Since Cluj-Napoca is an important scientific and educational center of Romania, academic tourism was singled out in a separate direction, the development of which became one of the priorities of the Cluj-Napoca 2021 Program.

So, the key factors in strengthening the competitiveness of the SMEs sector in Vinnytsia are the active position of the city authorities in the development of domestic tourism, a favorable natural environment that makes the development of "green tourism" possible, the concentration of national architectural monuments and modern leisure facilities, the relatively developed tourism infrastructure, the possibility of attracting qualified personnel from local educational institutions, *etc*.

An important measure to enhance competitiveness of the SMEs tourism sector in Vinnytsia is the promotion and implementation of educational programs aimed at the development of domestic tourism.

Stage 3. Defining competitiveness of SMEs of tourism industry in Vinnytsia.

Interaction with key stakeholders

Authorities. City authorities regularly organize and hold fairs, festivals, Days of the City, Days of Europe. These events attract tourists to the city. For the rest, the attitude of SMEs to the government is reflected in the reluctance to contact, as entrepreneurs afraid of control. The authorities do not promote the possibility of departure from Vinnytsia airport. The request for promotion often sounds from the officials, but there are no special conditions and programs for promotion on local communication channels.

Serious difficulties are created by the fact that the cost of a license to provide services (catering, tourism) does not depend on the size of the business. The municipal enterprise "Podolsky tourist information center" works in the city. The business community of the city initiated the deprivation of its license, because the company was engaged in the sale of beverages and food products in its information centers. Moreover, it was impossible to obtain quality tourist information or a map and there were no cash registers. In addition, Podolsky tourist information center did not work on weekends (Saturday and Sunday).

Competition. There is a sufficiently high level of competition in the industry, agreements between market players in the city do not work. There is a big threat from illegal sellers of tourist services. "The young generation"

of travel agencies and restaurant business are ready to share their knowledge for the development of the industry, while the "older" generation is wary of competition, having a "closed" business.
In the opinion of entrepreneurs, the establishment of cash registers at all enterprises can make the game rules more clear and transparent.

Business associations. Some representatives of the industry cooperate on legal issues with the union of entrepreneurs "Stina". Also, the Association of Travel Companies of Vinnytsia has been established in the city and has 15 members, but in fact it does not work.

Suppliers. There is a shortage of qualified personnel in the region, despite the fact that Vinnytsia Trade and Economic Institute annually graduates 139 persons. Entrepreneurs say that the level of preparation of graduates is extremely low, the complete absence of a qualitative practical component in the training of specialists. The "Bednyazhka" Tourist Club started the School of Tourism Service Providers. 78 resumes were submitted to the school, 25 of which were chosen for training. This School is an opportunity to replenish its own staff, as well as the development of the market itself.

Consumers. According to representatives of the industry, consumers of services of travel agencies are mainly residents of Vinnytsia and the region (90%) and other regions (10%). The number of tourists among visitors to restaurants depends on the location of the institution. The main communication channels for the promotion of services to tourists in the city are social networks (Facebook), Foursquare, Booking.com, TripAdvisor.

Financial institutions. Fundraising is virtually unavailable. Opportunity of receiving preferential return financing for the purchase of cash registers for all players in the industry is the positive moment.

The competitive advantages of the Vinnytsia tourism industry

Considering the above, the competitive advantages of the Vinnytsia tourism industry are:

- the availability of a popular and visited musical fountain and the museum «Pirogovo» in the city;
- direct high-speed train communication with the largest cities of Ukraine on Intercity. Express trains such as InterCity allows to save time when traveling between large cities of Ukraine. Every day from 3 to 6 trains of this type run through Vinnytsya railway station;
- the availability of sanatoriums and health facilities around the city allows organizing "health tourism", among which are: sanatorium "Avangard", Vinnytsia children's sanatorium, sanatorium "Zheleznodorozhnikov", boarding treatment house of Kotsyubinsky, boarding houses "Lastochka" and "Podillya", tourist complex "Podillya", sanatorium "Radon", military sanatorium "Khmilnyk", sanatorium "Khmilnyk", sanatorium "Pivdennyy Bug" (Petruk *et al.* 2016);
- Vinnytsia is an ancient city with a history and has many historical monuments and memorial places. Interesting materials on the history of the city and Podillia are collected in the local history museum;
- equidistance from the millionaire cities, proximity to Kiev;
- the presence of an international airport. The airfield of Vinnytsia is located 1 km southwest of the Havryshivka village. It is located in the center of Ukraine, and has a convenient traffic junction (road and rail) for the transportation of passengers and goods both in Ukraine and abroad, as well as the capacity of 400 people per hour. It has been working in the transport system of Ukraine for more than half a century. The aerodrome received the status of "International" and was included in the English-language edition of "AIP of Ukraine".

The weak side is the lack of a culture of service, food establishments and places that worth visiting.

Stage 4. Development of a program to strengthen the competitiveness of SMEs in tourism industry of Vinnytsia

Program to strengthen competitiveness in the areas of development. According to the results of the focus group, it was determined that the enterprises see the strategic goals of the industry development in: - the development of Vinnytsia as a tourist city; - the development of restaurant business for the locals and tourists; - the development of "green tourism" in Vinnytsia; - Vinnytsia is a city of festivals, "Festival Island" (construction of an amphitheater in the city); -travelling - relaxing on the Southern Bug (dirigible, river ship).

The tasks for the enterprises of the industry in order to achieve this goal are:

- enterprises should be open for communication and cooperation;
- they need to be ready to learn how to organize tourist events and share experiences;
- to have the principle "start with yourself," that is, conscientiously pay taxes, be ready to install cash registers, *etc*.

Recommendations for the authorities:

- to promote communication in the industry;
- to contribute to the formation of industry standards, to the official operation of the whole industry;
- to create or promote the creation of a centralized database of guides, a "guide" for Vinnytsia for tourists;
- formation of a quality and real tourist infrastructure of the city;
- to create and improve the activities of business associations;
- to form a program of educating the consumer to purchase services of those companies that conduct business honestly, pay taxes, officially hire staff and so on;
- to make a list of "white" travel agencies and industry players and post it on the city website;
- transparently conduct their activities, communicate with entrepreneurs, *etc*.

Positioning of the tourism industry. Vinnytsia is the heart of Ukraine, a "smiling" city located in the center of the country is worth visiting at least for a weekend. The model of forming the program for strengthening the competitiveness of small and medium enterprises in clothing industry in Vinnytsia city.

Stage 1. Research of the clothing industry business environment in Vinnytsia city

Industry characteristics. Clothing industry is one of the leading industries in the region. It is a branch that has sufficiently large production capacity and development perspectives. The enterprises of the industry produce clothes, leather and leather goods and overalls both for intraregional consumption and consumption in markets outside the region. The clothing industry oh Vinnytsia has sufficiently large production capacity and considerable development perspectives.

In total, 234 enterprises of clothing industry operate in the city, thereof near 10% are SMEs. Textile production, production of clothing, leather, leather goods and other materials, manufactured by the enterprises of the industry, enabled to sell products and to provide services for a total of 26.8 million UAH in 2016, which 180% exceeds the results of an appropriate period of 2014. Today there are 90% of profitable enterprises in the industry (Statistic of Vinnytsya region 2017).

Products of the clothing industry are presented at quarterly exhibition events, organized by Vinnytsia Chamber of Commerce and Industry. Designer clothes are presented annually at the Vinnytsia fashion days. Vinnytsya Institute of Clothing Design and Entrepreneurship and Kalynivsky Technological College are preparing specialist of the industry.

The clothing industry was significantly affected by the loss of the market of Russian Federation, Donetsk and Lugansk regions and the Autonomic Republic of Crimea. Enterprises face with significant difficulties while entering the new markets. However, even with adverse conditions, the industry has managed to keep the output at sufficiently high level and export its production. Due to this, highly qualified staff was retained and the industry had the opportunity to upgrade its equipment, which is now actively used for the production and export of products in dozens of countries around the world.

Low cost of labor and relatively high quality of products causes a possibility of conducting activity of a significant number of enterprises on the terms of processing of give-and-take raw materials (such approach is typical for companies with long-term activity in the clothing sector). Such approach is not able to provide an adequate level of profitability of the clothing industry in Vinnytsia, sufficient to renewal of basic means of production and expanding production volume. In conditions of a high degree of physical and moral deterioration of equipment, the city's products will gradually lose their competitiveness and will lead to the curtailment of production activities.

According to the results of the focus groups, at present the key problems for the clothing industry players in Vinnytsia are: the growth of the cost of finished goods due to the use of imported raw materials, the lack of working

personnel, the seasonality of production, the loss of the Russian sales market, limited access to external sources of financing, etc.

More flexible to the conditions of the market environment are SME companies, the number of which is constantly growing. One of the most progressive enterprises of the clothing industry in the city of Vinnytsa is the factory "Volodarka", which priority direction of development is promotion of collections in the Ukrainian market under its own trademarks. Recently, the company signed a partnership agreement with one of the largest European men's clothing manufacturers - TM "HUGO BOSS".

The industry is characterized by seasonality, which is reflected in the manufacturing of different types of products depending on the season. In Vinnytsia region there are huge energy costs. This leads to increasing production costs.

Stage 2. Benchmarking

For the conduction of benchmarking, the state and key trends of development of the Khmelnytskyi clothing industry were studied, SMEs of which occupy quite stable positions in the Ukrainian market and gradually expand the geography of exports.

The key difference between the clothing industry in Vinnitsa and Khmelnytskyi is an excellent specialization (Table 2). So, the city of Vinnytsia mainly specializes in tailoring of outerwear and leather products, while SMEs in Khmelnitsky have concentrated on the production of women's and children's clothes. Nowadays, due to the gained experience, understanding the trends of the market environment, staffing, *etc.*, the majority of companies in Khmelnytskyi city manufacture products with higher added value under their own brand, which in the future will ensure the recognition of the city as a quality clothing manufacturer.

Table 2. Benchmarking of the competitiveness of clothing industry in Vinnytsia and Khmelnytskyi

Comparison indicators	Vinnytsia	Khmelnytskyi
Production under own brand	▪ Preferred production from raw materials without developing the own brand ▪ The company "Volodarka" is the leader in promotion of men's products with its own brand	▪ TM "Bambi" (production of children's underwear and clothing); ▪ TM «A JOUR» (children's clothing) «Helen-A»; ▪ TM ViAnna (Women's clothes); ▪ TM Valery Style (children's and women's clothing); ▪ TM "Luytyk", *etc.*
The presence of special support programmes for clothing industry	▪ None	▪ Support program for SMEs of the region (clothing industry is determined as a priority one)
Specialization	▪ Production of outerwear, leather products, leather - haberdashery products, underwear	▪ Production of children's wear, woman's wear
Geography of exports	▪ Germany, France, Russia	▪ Germany, Russia, France

Source: compiled by the authors

Results of the conducted benchmarking. The clothing industry in Vinnytsia is an important sector for the development of SMEs, being a significant employer in the city.

The experience of sewing skills, the reputation of a quality manufacturer, the available resource base (cheap and skilled labor, equipment) and the possibility of implementing a full production cycle creates significant competitive advantages for the city's enterprises both on the national and international markets.

Considering the prospects for the development of the industry from the point of view of import substitution (caused by devaluation of the hryvnia and reduction of the population's solvency), it is advisable to promote the development of the clothing industry as a strategically important sector for the SMEs in Vinnytsia.

To maintain the competitiveness of the city's clothing manufacturers, it is proposed to conduct incentive activities for business training of enterprise managers, to promote the application of information technologies in

production and promotion of products (most companies of the industry do not have their own websites). It is recommended to initiate the creation of business associations of SMEs sector to ensure effective networking within the industry as well as with neighboring areas. It makes sense to create clothing cluster involving suppliers and designers that would optimize the production process and cost structure, put in place to develop their own models and promote the national market products with greater added value under its own brand.

Stage 3. Defining competitiveness of SMEs of clothing industry in Vinnytsya

Interaction with key stakeholders

Authorities. The position of the industry is that authorities should not, but they are willing to communicate. The representatives of the industry are sure that they are ignored by the authorities and entrepreneurs are convinced that representatives of the government and local authorities are not open for communication with them. Today the government does not support the communication with enterprises. With great indignation industry representatives point out that public order, including the plating army, the government gives foreign companies

Consumers. Ukrainian consumer is impoverished, so moving to a cheaper product - second-hand. Corporate customers (wholesale purchases for commercial organizations) in the Ukrainian market stopped ordering because of budgets reduction. Operations at the foreign markets significantly decreased dues to ban of Ukrainian products at the Russian market.

Competition. Competition in the field is present, but Ukrainian products quality is pretty much higher than Turkish and Chinese counterparts, especially leather. There is no competition from the side of Ukrainian producers from other regions.

Financial institutions. Enterprises avoid getting credit, trying to work on the principles of financial sustainability.

In view of the above-indicated, the competitive advantages of the industry are:

- the city has established a complete production cycle - from production to finished product fabrics, sewing leather products;
- many years of experience with both Ukrainian and foreign consumers. For example, JSC "Volodarka" is the an official partner of the renowned European manufacturer of menswear - TM "HUGO BOSS";
- high-quality products;
- the growing popularity of designer products and fashion in the city. Vinnitsya fashion day is the biggest project the city.

Among the weaknesses in the industry should be divided the following:

- lack of sufficient domestic production Ukrainian tissue leads to the need to import;
- the problem of sales, in particular the lack of facilities for wholesale sales, foreign companies and more;
- out-of-date equipment in the majority of manufacturers.

Stage 4. Development of a program to strengthen the competitiveness of SMEs in clothing industry of Vinnytsia

The results of the focus groups enabled to determine that a strategic goal for the industry is development of export. In order to achieve such goal SMEs are ready to unite for joint sales activities; to seek markets abroad; to create and promote their own Ukrainian overseas brands; to work together to create rules of industry. Recommendations for the authorities are as follows:

- to establish a tender board with representatives of the industry for sales on the domestic market;
- to appoint a specific purpose, modern person who has knowledge of business and industry responsible for collaboration with industry;
- to promote the products for export;
- to develop a structure that supports the promotion of Ukrainian brands for export;
- to support and develop the resource base;

- to promote training, promotion of trades sector in particular it can be program development and maintenance staff; - support for domestic producers;
- to support the full cycle of production;
- to maintain a constructive dialogue with entrepreneurs, understanding in government offices, to encourage businesses to develop cooperation and industry development programs;
- to promote the exchange of experiences, organizing study tours, providing opportunities for business education.

Positioning. SME in clothing industry in Vinnytsia may be positioned as companies that produces high-quality fashion products: textiles, clothing, leather, leather products.

Conclusion

The competitiveness of SMEs is primarily explained by the potential which is incorporated in SMEs and predetermined by quality characteristics such as flexibility, mobility, efficiency in making management solutions, high speed current assets and others.

The proposed model of formation program of strengthening of SME competitiveness in a particular city, consists of 4 stages, allows to analyze business environment of SMEs, to carry out benchmarking, to determine the competitiveness of SMEs through establishing cooperation with key stakeholders and identify competitive advantages and prepare a program for enhancing the competitiveness of SMEs.

Implementation of the model SME in tourism and clothing industries of Vinnitsa allowed to form a program of strengthening the competitiveness of SMEs in these industries. The data needed to develop this program was obtained through primary research, including focus groups, participation in which were enlisted SMEs tourism and clothing industry, which helped to identify the key competitive advantage and to formulate proposals for strengthening the competitiveness and positioning of SME tourism industry and clothing industry of Vinnitsa. The data collected during the focus groups was treated and tested in the secondary sources of information.

As a result of the competitiveness research of SMEs of the tourism and clothing industry of Vinnitsa problems and needs were detected, including:

- the lack of a proper dialogue of industry representatives and local authorities, but SMEs are willing to communicate;
- the need to protect "fair" market players from illegal producers of goods and services;
- consumers' education;
- fund raising;
- acquisition of knowledge for business development;
- promotion of certain professions for the tourism and clothing industry;
- assistance in marketing activities, finding markets for both local and international levels.

Developed programs enhancing SME competitiveness in the tourism and clothing industry of Vinnitsa can be used by the business community and local authorities of Vinnitsa for implementing change and to deepen cooperation between business and government to improve the business climate and cooperation with SMEs.

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Cultural Ethics and Consequences in Whistle-Blowing Among Professional Accountants: An Empirical Analysis

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Abstract:

The main aim of this article is to examine the impact of cultural ethics in whistle-blowing. More precisely it examines the consequences among professional accountants coming from the Javanese culture (people leaving in Java Indonesia) known as "Tepo Selipo" and how these attributes determine some specific characteristics in their professional practice. The research is based on a survey among Javanese accountants in a way to investigate their interest to become whistle-blowers in the Indonesian society. Taking into consideration the differences in Islamic and conventional accounting and finance, which have been approved in other studies, the present research claims that general auditing practices cannot be applied easily in Islamic auditing without some adjustments regarding issues of ethics, governance, responsibility and respect. The findings of the empirical analysis based on a market research with questionnaires show that the majority of Javanese respondents are not interested in being whistle-blowers concluding that auditors, accountants, and policy makers have to design policies that encourage whistle-blowing in order to improve auditing procedures. Finally, the findings will enable policy makers and professional accountants to anticipate and predict whistle-blowing.

Keywords: cultural ethics; islamic finance and auditing; whistle-blower

JEL Classification: M41; M41; M48

Introduction

Whistle-blowing is an effective way in preventing and reducing fraud and irregularities (Suryanto 2016). In 2002 Time Magazine gave awards to three whistle-blowers women. They are called "Persons of the Year" recognized as "people who do the right thing by only doing the right thing". They are also rewarded for their bravery in doing whistle-blowing (Lacayo and Ripley 2003).

Whistle-blowing is defined as disclosure by the members of an organization (former or present) on the illegal, immoral, or illegitimate practice controlled by superiors to the person or organization that can take the follow-up as stated in the works by Near and Miceli (2016). A whistle-blowing decision is always full of ethical, cultural, personal, and professional considerations (Patel and Millanta 2011).

Whistle-blowing is influenced by the cultural context because the right or wrong perception, justice, morality and loyalty can be totally different in description and practice depending on the country and the school of thought the person is coming from. Pioneers of cross-cultural research found that culture can affect the whistle-blowing to a great extend (Patel and Millanta 2011).

Culture is a reflection of the attitude of a group of people or of a society. In Indonesia, it consists of various ethnic groups that have a diverse culture reflecting regional characteristics for each one of them in accordance with their respective areas. One of the tribes in Indonesia with high population is the Javanese. The majority of Javanese tribe is in Java, but as time progresses the Javanese people have moved to various areas in Indonesia.

Javanese tribe is famous because of its culture with several behavioral characteristics among them the so called "Tepo Seliro". It connotes tolerance which means tolerating and appreciating others. “Tepo Seliro” or upholding a sense of tolerance is not only important in realizing the harmony of lives but it also makes people achieve good dignity in the local society. The person with high “Tepo Seliro” tends to result in high tolerance to others not only a person having tolerance of a thing. Related to whistle-blowing, potential whistle-blowers can feel that whistle-blowing will only undermine the trust to the organization (Dandekar 1991). Therefore, the whistle-blowing could affect the beliefs, perceptions and feelings of the co-workers. It also affects the relationship among employees, cooperatives and partners in the workplace.

The present study identifies a number of cultural factors that affect the desire to improve the conditions of whistle-blowing in Java Island, Indonesia. The results can be used in similar circumstances taking into consideration the cultural differences in countries or/and regions using Islamic accounting and finance.

1. Theoretical reviews and hypothesis testing

1.1. Theory of reasoned action

Ajzen and Fishbein (1980) stated that the desire is a good predictor of actual behavior. Individual and context issues have been accepted by a number of researchers as the main factors affecting individuals’ decision to do whistle-blowing especially by perceiving their unethical act (Greenberger *et al.* 1987, Miceli and Near 1992). Some of the individual issues stated in the works above have been considered as moral standard (Miceli *et al.* 1991) and others as religious values (Miceli and Near 1992). In another context the most important factors influencing the decision of whistle-blowing is the norm group (Greenberger *et al.* 1987), the seriousness of errors (Miceli and Near 1992) and the responsiveness perception of complaints’ receiver (Keenan and McLain 1992, Ivanova and Bikeeva 2016, Thalassinos and Liapis 2014).

1.2. Whistle-blowing

In early 2000s was the period with a lot of financially fraud committed by high-profile corporation including big companies such as Enron, WorldCom, Lucent, Tyco, Global Crossing and others (Hwang and Baker 2003, Hwang and Staley 2005, Baker *et al.* 2006). As stated previously, Time Magazine named Sherron Watkins, Cynthia Cooper, and Colleen Rolwey as “Persons of the Year” in 2002 for their contribution to uncover the illegal, immoral, or illegitimate practices controlled by their superiors to the person or organization that is able to follow it up. The term "whistle-blower" and "whistle-blowing" became popular because many people and organizations praise the three women as a "hero" or their exemplary. From another prospective being an exemplary and a whistle-blower has a bad effect.

According to Maroun and Solomon (2014) and Near and Miceli (2016) whistle-blowing is reporting by party members dealing with the deviation actions that are not in accordance with the rules in their organizations.

Actually, whistle-blowing action has impacts and risks. Near and Miceli (2016) have revealed that there is a fear to discover whistle-blowing because the thought of retaliation in the form of insulation and other threats. Watkins, one of the three whistle-blowers in Tomossy *et al.* (2017) stated that the whistle-blowers feel and have diverse consequences; it can be positive and negative on their action. However, the predominant reaction is a negative reaction from colleagues.

1.3. Javanese culture

Culture is the result of human evaluation process. It cannot be separated from the individual learning process in the long term. It is a combination of current culture with the previous culture. One of the Indonesian cultures is Javanese culture. The cultures that develop in Java community are coming from Hinduism, Buddhism and Islam (Anggraini 2012, Tugiman 1999). Javanese culture was born not free of thoughts, ideas and concepts within the individual. Through the years it has been arranged, controlled and strengthened. One of the very famous Javanese cultures is "Tepo Seliro". In human behavior is interpreted as tolerance. It is a behavior that can understand the others’ feelings and has high empathy toward others. It also means not hurry to take a decision and to blame others (Herliana 2015, Tugiman 1999).

1.4. Research hypothesis

A research conducted by Anggraini (2012) found that cultures can influence business ethics. Weltzien Hoivik (2007) argued that western management systems are not running well in Chinese cultural environment, and suggested doing reassessment and improvement of tools to suit the Chinese cultural environment. In addition, Zhang and Zhang (2006) provide a framework to understand why whistle-blowing tends to be different in Chinese cultural environment. Cherry (2006) found that business men in Taiwan and in the United States have a different attitude towards bribes; the respondents from Taiwan have a larger external locus of control.

The research suggests that culture is a factor shaping whistle-blowing action. Specifically examines "Tepo Seliro" culture with an attitude of strong tolerance toward others that lives within the individual and tends to make a person cautious to do something. In this case, someone tends to see the other side (the family, the tolerance, the empathy towards other people) before taking decisions (Tugiman 1999). This attitude negatively impacts a person's desire to express something that is considered wrong because of various considerations perceived by the individual if he/she reveals the error among his/her colleagues. Based on the studies discussed previously, the researchers formulate the following research hypothesis:

H0: "When a person has a high sense of "Tepo Seliro", it will reduce the desire to investigate whistle-blowing"

Figure 1. Theoretical framework

Source: Authors's

1.5. Data and Sample

The research sample is consisting of 35 Javanese accountants who have working experience over 3 years. Using a questionnaire, specially designed to test the impact of Javanese culture towards the intention of whistle-blowing at Public Accounting Offices in Java, a modified method that has been used in the research by Hwang *et al.* (2008) and Patel and Millanta (2011) by applying cultural development of Javanese culture through Tugiman's thought (1999). The questionnaire consists of fifteen questions and it is in accordance with a work conducted by Novita and Laksito (2014) and Maroun and Solomon (2014). It is designed and completed by using the "Tepo Seliro" approach covering issues such as the sense of confidence, morality, norms, personal relationships, treasonous, justice, tolerance, fairness, reward, empathy, confidence, and religion.

1.6. Data quality test

According to Hair *et al*. (1995) data quality generated from a research can be evaluated through reliability and validity test. These two tests have been used in the present study to determine the consistency and the accuracy of data used. There are two procedures to measure the reliability and the validity of the dataset:

- the internal consistency test toward the respondents' answer on research instruments;
- the validity test by correlating the scores of each item with the total score.

The internal consistency test or reliability test is determined by Cronbach' Alpha coefficient. A construct or an instrument is determined as reliable if it gives Cronbach' Alpha values above the value of 0.60 (Hair *et al.* 1995). The data homogeneity test or the validity test is determined through Pearson's correlation test. If the result is significant then the dataset is classified as valid.

2. Empirical evidence

The data collection of this study using the questionnaire as described above had a response rate of 61.4% (35 out of 57). The respondents' characteristics are based on data derived from the questionnaires as can be seen in Table 1.

Table 1. Respondents characteristics

No	Descriptions	Total	Percentage (%)
1.	Sex		
	Male	22	63
	Female	13	37
	The number of questionnaires that can be processed	35	100
2.	Age		
	≤ 40 year old	21	60
	> 40 year old	14	40
	The number of questionnaires that can be processed	35	100
3.	Education		
	Bachelor	9	25
	Master	24	69
	Diploma 3	2	6
	The number of questionnaires that can be processed	35	100

From Table 1 above it can be seen that all the respondents fill out the gender profile item. Then, it is found that 63% of the respondents are males. Based on their age, it is found that there are 21 respondents (60%) aged ≤ 40 years and there are 14 respondents (40%) aged > 40 years.

Table 2 shows the findings regarding validity and reliability of data. It can be concluded that the questions incorporated in Javanese culture variable are valid and reliable to be used as a research instrument.

Table 2. Validity and reliability test in Javanese culture variable

Question	Pearson correlation value	r table	Description
1	0.737	0.274	Valid
2	0.747	0.274	Valid
3	0.714	0.274	Valid
4	0.727	0.274	Valid
5	0.663	0.274	Valid
6	0.650	0.274	Valid
7	0.770	0.274	Valid
8	0.678	0.274	Valid
9	0.732	0.274	Valid
10	0.436	0.274	Valid
11	0.418	0.274	Valid
12	0.541	0.274	Valid
13	0.630	0.274	Valid
14	0.352	0.274	Valid
15	0.678	0.274	Valid
Reliability = 0.896			Reliable

The findings of validity and reliability test on whistle-blowing variable can be seen in Table 3.

Table 3. Validity and reliability tests on whistle-blowing on variable

Question	Pearson correlation values	r table	Description
1	0.836	0.274	Valid
2	0.872	0.274	Valid
3	0.811	0.274	Valid
4	0.739	0.274	Valid
5	0.721	0.274	Valid
6	0.784	0.274	Valid
7	0.801	0.274	Valid
8	0.776	0.274	Valid
9	0.722	0.274	Valid
10	0.335	0.274	Valid
Reliability = 0.875			Reliable

The researchers have applied a single regression model to determine the effect of "Tepo Seliro" of Javanese culture towards whistle-blowing. Table 4 presents the coefficients of the regression. It can be concluded that Javanese culture variable partially affects significantly the desire to investigate whistle-blowing. Therefore, the research hypothesis stating that "when a person has a high sense of "Tepo Seliro" his desire to do whistle-blowing is reduced" has been accepted.

Table 4. The findings of hypothesis testing

COEFFICIENTS[A]							
Model	Unstandardized		Standardized	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-4.727	2.686		-1.760	.088		
total_bdy	.753	.046	.943	16.303	.000	1.000	1.000
a. Dependent Variable: total_whst							

3. Discussion

By accepting the research hypothesis, it means that the Javanese culture including "Tepo Seliro" attitudes such as the sense of confidence, morality, norms, personal relationships, treasonous, justice, tolerance, fairness, reward, empathy, confidence and religion can reduce the accountant's desire to investigate whistle-blowing. These findings are consistent with Ponemon's (1994) views. He suggested that the existence of culture ethics in employee' environment implicates the importance to ensure that there is a strong communication link among whistle-blowers to report the error.

However, this research does not support a research conducted by Patel and Millanta (2011) who examined the Guanxi culture in China against the desire to do whistle-blowing. According to Patel and Millanta (2011) potential whistle-blowers are more often whistle-blowing and rarely influenced by Guanxi culture.

The "Tepo Seliro" culture is the dominant culture with flexible and open-minded attitude on tolerance. "Tepo Seliro" including a sense of confidence, morality, norms, personal relationships, treasonous, justice, tolerance, fairness, reward, empathy, and religion, would restrict someone to do something that is considered "unsecured" for himself. The sense of norms, personal relationships, tolerance and empathy will make a person being lenient and full tolerant to someone he knows, even if the person had made a mistake. Prevention, fraud elimination and abuse are highly dependent on the action or the desire to investigate whistle-blowing. This is because the culture that they have professed has mingled with perspectives on their lives. The sense of fairness makes people tend to be afraid to reveal the truth. Someone who has fairness can be labeled as traitor to the organization because it has exposed the truth that disturbing the security for the organization.

Instead, the incentive to increase the willingness of whistle-blowing, such as increasing the monetary reward for those who expose illegal, immoral or illegitimate practices by controlled superiors, to the person or organization that can carry out follow-up, is less important for the improvement of the whistle-blowing (Ponemon 1994).

Conclusion

The study has proved that "Tepo Seliro' Javanese culture can inhibit the desire to investigate whistle-blowing in the society because it has been mixed with the worldview regarding whistle-blowing.

Future research needs to compare the findings of Javanese culture responses with respondents from other cultures. It is also required to investigate specific cases of whistle-blowing in Javanese culture, or the specific cases of internal control failure in Javanese culture to ascertain whether the whistle-blowing can prevent such failures. Also, future research could examine the factors that inhibit the whistle-blowing, the factors that encourage whistle-blowing and the desire to do whistle-blowing.

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A Survey of Innovation Performance Models and Metrics

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Abstract:

Innovation is seen as a key element of an organization's competitiveness. Along with the current imperative for innovation comes the need to adequately measure it. The purpose of this paper is to perform a literature review in the field of innovation performance models and metrics. The performed work aims to make an important contribution by facilitating the identification and categorization of innovation performance models and metrics formulated until the present time. A survey methodology was adopted to identify the most predominant contributions in the field. For that, the top three most popular bibliometric indexes (Web of Science, Scopus, and Google Scholar) were used. Then, the top ten most relevant studies on innovation performance models and metrics were compared to determine similarities and differences between each generation of models and metrics. Finally, the main innovation performance models and metrics were identified, classified and compared.

Keywords innovation; models; metrics; measurement; performance

JEL Classification: O31

Introduction

Innovation is a fundamental tool to face very competitive markets and satisfy very demand costumers. Innovation is not only about developing or launching new products, but it also helps to promote new business models, provide new services and improves processes to make life easier for people. Therefore, it is unthinkable to start a business without considering innovation. Nevertheless, there is no consensus on the best approach, neither guarantees of success.

However, it is known that there are many firms that close their businesses in the first three years of activity. On the other hand, there are many firms who fail the launch of new products or services, sometimes, with dramatic consequences for the business. These unsuccessful cases should contribute to learning about what went wrong in the process and help to avoid the perpetration of the same mistakes. However, that's not what happens. The probable main cause is the absence of metrics and knowledge about what and how to measure.

The ability to innovate is one of the main challenges faced by managers and the impossibility of doing it has great repercussions for companies. Although innovation is an uncertain activity, it is important to acquire a vision by mapping innovation policies and practices to foster innovative business performance.

The performed work allows us to identify and characterize the main generations of innovation performance models and metrics. The paper is organized as follows: we initially perform a literature review in the field by conceptualizing the most relevant aspects related to innovation, and by identifying and describing the most predominant innovation performance models and metrics. After that initial phase, we present the adopted methodology that allowed us to identify the main relevant studies in the field and the generation of each innovation

performance model and metric. Then, we discuss the differences and similarities between each generation of models and metrics. Finally, the conclusions of this work are drawn.

1. Literature review

1.1 Innovation aspects

Invention is the conception of the idea, where innovation is the subsequent translation of the invention into the economy and is concerned with the commercial and practical application of ideas or inventions (Tüker 2012). Thus, it is suggested an equation to show the relationship between the two terms, where "Innovation = theoretical conception + technical invention + commercial exploitation". Neely and Hii (1998) consider three dimensions of innovation: (i) product, (ii) process; (iii) organization. According to Burnett (2011) "innovation is the process of turning ideas into value". Malinoski and Perry (2011) define innovation as the "process of ideation, evaluation, selection, development, and implementation of new or improved products, services, or programs" (p. 1). Anthony and Bunker (2007) present a definition of innovation in a global context: innovation is a process through which the nation creates and transforms new knowledge and technologies into useful products, services and processes for national and global markets – leading to the creation of value for stakeholders and higher standards of living. The same authors identified four areas in the context of evolution of innovation metrics. The first (1950s-60s) was focused on input indicators; the second (1970s-80s) focused on output indicators; the third (1990s), focused on innovation indicators; and the fourth (2000 + emerging focus), focused on process indicators.

The McKinsey (2008) presents a report where it identifies how innovation is perceived by organizations. The approach covers the following subjects: (i) what gets measured and why; (ii) how metrics are used; (iii) how the money is spent in the innovation process; (iv) and how innovation and metrics, are related to growth. On the other hand, there is also no consensus on the classification of the type of innovation. However, the most relevant in innovation potential are: business model, organization, cooperation and networks, market, product, service, process, relationships, marketing, sales, delivery, brand and customer experience (Andersson *et al.* 2011; Sabadka 2012). On the other hand, Tüker (2012) advocates the existence of two components of innovation: innovation management (creativity, invention, innovation) and technology management (innovation, diffusion).

Gamal (2011) identifies eight attributes of innovation: (i) the existence of inputs and outputs; (ii) the tangibility and intangibility of innovation inputs; (iii) knowledge is a fundamental key input and output; (iv) inputs seen as assets; (v) intends to create and increase economic value; (vi) the high complexity of the process; (vii) the unpredictability of the outputs; and (viii) the drive for innovation is determined by the rate of investment, diffusion and acceptance of new products and services in the market. The same author also identified three categories of factors that involve adversities to innovation: (i) knowledge factors; (ii) institutional factors; (iii) cost factors; (iv) market factors.

According the OECD (2005) innovation implies the implementation of products or production and delivery processes with new or significantly improved characteristics. However, the Advisory Committee on Measuring Innovation (2008) has a more comprehensive vision of innovation and defines it as design, development, and implementation of new or altered products, services, processes, organizational structures, and business models to create value for the customer and financial returns for the firm practicing innovation.

Manzini (2015) suggests four types of innovation: technological, managerial, soft (takes place across all sectors of the economy) and social. On the other hand, Rose *et al.* (2009) propose ten innovation attributes, being a significant part of them identical to those identified by Gamal (2011). Only two attributes are new, respectively: (i) the existence of risk in the innovation process; and (ii) the importance of the research, development and commercialization cycle.

Schroeder (2013) presents the key factors in the "art and science of transformation" approach to innovation. These key factors are divided in Art (organization culture, collaboration) and in Science (strategy, systems). A set of recommendations relating to transformation for improved innovation performance are proposed: (i) to develop a formal innovation strategy that identifies priority areas; (ii) allocate dedicated resources and formal responsibilities for each stage of the innovation process; (iii) conduct a review of organizational culture, structure, and systems,

using an approach based on art and science; (iv) implement a cultural transformation strategy that is targeted at both individual employees and organizational systems; (v) establish systems and tools for the purpose of measure and monitoring innovation performance against the strategy, including detailed plans, performance metrics, and reporting methods such as balanced scorecards.

1.2 Models

One of the oldest models of innovation was introduced in the decade of 1980, and it is popularly known as the linear model of innovation. The model was revised by Godin (2006) in the historical construction of an analytical framework and is basically defined as an innovation process that starts with basic research, then adds applied research and development, ending with the production and diffusion. A slightly different approach was proposed by Boehm (2000) and it is known as the spiral innovation model. The model considers that the innovation is a continuous cycle with ups and downs, inputs from different places, repetitions, failures, and many steps back and forth. The spiral innovation model designs the product development process as a spiral representation, where each loop is a phase of the process. Therefore, the model consists of three parts: (i) classifying project, according to the degree of uncertainty; (ii) adopting a controlled iterative process of discovery; (iii) using the right analysis tools that correspond to the level of uncertainty at each iteration. This model has been particularly popular in the software engineering industry.

Abouzeedan (2011) criticizes the current performance models and also, addresses three major questions about innovation performance models: (1) What are the advantages and disadvantages of the existing models used in evaluating SME performance? (2) What characterizes a comprehensive model for measuring SME performance with acknowledgement of the firm's innovation activities? (3) How can a firm's innovation activity be enhanced in relation to the firm's external environment? Additionally, Abouzeedan (2011) proposes the establishment of the Survival Index Value (SIV) model as a new model of SME performance evaluation, the ASPEM (Arena of SMEs Performance Models) as a new tool for strategic utilization of SME performance models, and a new approach to account for innovation in relation to the external environment of the firm using the IBAM (Innovation Balance Matrix) tool.

Du Preez and Louw (2008) identify six generations of innovation models: technology push (simple linear sequential process, emphasis on R&D - Research and Development - and science); market pull (simple linear sequential process, emphasis on marketing, the market is the source of new ideas for R&D); coupling model (recognizing that there is a high interaction between the various elements, particularly between the R&D policy and marketing strategy); interactive model (combinations of push and pull models, integration within firm, emphasis on external linkages); network model (emphasis on knowledge accumulation and external linkages, systems integration and extensive networking); open innovation (internal and external ideas as well as internal and external paths to market that can be combined to advance the development of new technologies).

Du Preez and Louw (2008) also present the Fugle innovation process which is constituted by two phases: (i) identifying opportunities and creating a prospect portfolio; (ii) commercialize by developing, deploying and exploiting. Both phases are influenced by the internal environment composed by strategy, people and culture, information & knowledge, organization structure & processes. The external environment also influences the two phases. The first phase works like a funnel with distinguishable stages with filters: idea generation/identification stage (collect, categorize and present information; generate and gather ideas; capture ideas); concept definition stage (develop the concept; incubate and refine concepts); concept feasibility and refinement stage (determine feasibility; develop models and prototypes; refine concepts). It is possible to generate an iterative loop with the third and the second stage. This phase is linked with a funding gate to the portfolio stage composed by development of portfolio, management of the portfolio and preparation of the project launch. The second phase is connected to the portfolio stage with a launch gate, works like a bugle, and is composed of three stages: deployment stage (plan project; detail design and test; implementation), refinement and formalization stage (operate; refine; formalize), exploitation stage (exploit business model). The activity of refinement, from the second stage, can generate an iterative loop with the implementation step present in the first stage of this phase.

Neely *et al.* (2000) propose a process for the design of performance measurement systems based in twelve phases:

- *Phase 1:* It begins by identifying the needs of the business and its managers. The result of this initial process is the provision of a list with possible areas for performance measurement;
- *Phase 2:* This phase is a cost-benefit analysis; the output is a prioritized list of high payoff areas of performance measurement;
- *Phase 3:* Ensure the relevance of each measure. In this sense, the output list should identify the core areas of performance measurement;
- *Phase 4:* Guarantee that all fundamental measurement areas have been covered. If not, provide a list of additional areas for performance evaluation;
- *Phase 5:* Define the structure for each performance measurement. The output is a detailed list of performance metrics highlighting potential key issues;
- *Phase 6:* Establish an integration model for each performance measurement identified in previous phase;
- *Phase 7:* Check if all key performance measures are appropriate for the function's current environment;
- *Phase 8:* Define an integration model for performance measures identified by different managers;
- *Phase 9:* Verify is all the measures are suitable for the organization's current environment;
- *Phase 10:* Provide and enhanced integrated set of performance measures to maximize apparent performance;
- *Phase 11:* Institutionalize the performance measurement system;
- *Phase 12:* Delete redundant measures and replace them by new ones. The output is a systematic process that guarantees that the performance measures are regularly updated by the entire management group.

Begeer and Banerjee (2002) propose a basic model to measure competence management based on a three level tier: (i) measurement activities performed at individual and project level help in deriving competences at Product Development Centre (PDC) level; (ii) measurement activities at the different PDC level again add up to deriving competences at the Business Group (BG) level; (iii) measurement activities with different BG levels add up to an efficient organization capable of evaluating and managing competences. This model is supported by a set of diagrams. It seems rather complex and it is not helpful in the understanding of the model. This approach is very centered on technology organizations.

A study developed by Calantone *et al.* (2002) point to the learning orientation of the organization as influences the firm performance and competitive advantage. The authors advocate that learning orientation is critical for the existence of innovation and that innovation itself is a broad process of learning. The presence of learning orientation in the organization is manifested in the commitment to learning, shared vision, open-mindedness and intra organizational knowledge sharing.

Wunker and Pohle (2007), concerned with intangibility, developed two frameworks for measuring innovation. One of the frameworks measures innovation activity by computing the intangible assets that are created by and fed back into the innovation process at the firm or organizational level, which can then be scaled to the national level. This framework focuses on measuring intangible capital, which is categorized into three types; human capital, intellectual property, and organizational capital. The second framework measures innovation investments, especially the broader investments that set the stage for innovation. It focuses on measuring the intangible capital generated by specific innovation activities. There are three fundamental investments, necessary for innovation to take place: human capital in the form of skilled, educated employees; technical knowledge, including information and facts employees can apply; ICT (Information Communication Technology) infrastructure, which is the way employees organize and communicate information and facts.

Dickel and Moura (2016) also look to the importance of the intangibility. They developed a model to measure organization performance looking to the innovation management and knowledgment practices. The hierarchical structure of the model is composed by seven dimensions (*e.g.,* people, structure, processes, organizational alignment, support and organizational resources, innovation process, and behavior and organizational model) and a total of 17 KPIs associated to each dimension.

Wolk *et al.* (2009) worked on a model based on the following elements: mission and vision of success; activities and operations; measure; report; learn; improve. A five-step process is recommended to build a performance measurement system: (i) planning to measure; (ii) choosing what to measure; (iii) determining how to measure; (iv) preparing to use the data; (v) putting the system in action.

The model conceptualized by Hollanders and Van Cruysen (2009) is based on three stages which have a set of dimensions: (i) creative climate (*e.g.,* creative education, self expression), (ii) creativity and design (e.g., creative sector, R&D activity), and (iii) innovation (*e.g*., human resources, finance and support). The results of the study supported for this model reveal: (i) creativity and design are important features of a well-developed knowledge economy, both having a positive impact on countries' innovation performance; (ii) there are strong relations between creativity, design and innovation; (iii) countries with a good creative climate tend to have higher levels of R&D and design activities and also strong overall innovation performance; (iv) the scoreboard approach used in this report lacks adequate indicators.

Gupta (2009) differentiates between the methods of analyzing the innovation of nations or firms. In the business field, he proposes five models: (i) cash curve; (ii) balanced score cards; (iii) computing aggregating innovative indexes; (iv) monetizing innovation (the residual method); (v) accounting methods for measuring intangibles.

The method developed by Malinoski and Perry (2011) consider the measurement of innovation as a strategic objective and consists of the following steps: (i) define objectives; (ii) identify potential measures; (iii) define targets and thresholds for a measure; (iv) measure service/product innovation; (v) use the formula of the Return on Product Development Expense (RoPDE). The same authors propose a framework to follow the evolution of a process-based approach to performance measurement system design. The methodology used to mature and improve the process was based on action research. The developed model seeks to address four questions: how to design measurement systems; how to implement measurement systems; how to use measurement systems; how to maintain measurement systems. This applies to a cultural context that involves people, processes and infrastructures.

Perception of Innovation in Company's model (PIC) was developed by Andersson *et al.* (2011) to measure the homogeneity between tangible and intangible innovation. The model captures the respondent's perception (employees) of how important innovation is for the company´s overall success, at the same time, as it captures how well the company is performing within different types of innovation. It's composed by five main measurement charts based on the definition of tangible and intangible innovation and the questionnaire: (i) employee perception of different types of innovation; (ii) perception of innovation in relations of measured levels of innovation; (iii) perception of innovativeness importance; (iv) perceived innovativeness performance; (v) a ratio between innovativeness perceived performance in relation to perceptual importance.

Furthermore, Sabadka (2012) refers the balanced scorecard as a model to evaluate innovation and adds methodology for processing innovation characteristics by the OECD (Organization for Economic Cooperation and Development) and modeling of innovation potential. The innovation potential model is oriented to be used in more or less complex management systems in the innovation process, to evaluate and manage expectations, generated by metrics and indicators. Thus, the author proposed business innovation potential based on pre-selected criteria and indicators compiled in these areas: research and development; competitive intelligence; new products; organization, human resources; financing innovation; information technologies; transfer of innovations; technological flexibility, high-tech; partnership and cooperation; innovation techniques.

The model defended by Kim (2014) is a framework based on an extensive version of Analytic Hierarchy Process (AHP) and is supported by a mathematical tool based on linear algebra. The method is based on the principle that innovation performance measurement factors can be prioritized and a descending-order rank list of the performance factors can be prepared in order to choose the best strategies to improve the innovativeness of companies. The process of this model consists in four main steps: (i) survey based data gathering; (ii) build up of the matrices; (iii) calculation of the matrices by using a spreadsheet; (iv) generation of the evaluation list.

Dewangan and Godse (2014) advanced with the indicative innovation performance measurement scheme, which divided the innovation life cycle in two stages: invention (generation and selection of ideas; incubation of

ideas) and exploitation (commercialization of ideas; realization of innovation). There are two KPIs (Key Performance Indicators) dimensions: non-financial and financial. The KPIs in the first dimension are not fixed because, in the model, the KPIs address customer, internal processes, innovation & learning, and in the case study, the KPIs include innovator participation, internal processes, innovation area (consumer experience). On the other hand, the metrics used in the different KPIs are in accordance with the innovation life cycle.

The model of Herrera (2016) incorporates five organizational factors leading to successful innovation: (i) strategic alignment (business landscape and strategy); (ii) responsible purpose (clearly defined impact areas); (iii) institutional drivers (leadership, strategy, values, policies, culture, structure); (iv) stakeholder engagement (active engagement along the value chain across all stages of innovation: assessment, design or ideation, development, systematizing, and institutionalization); and (v) business model management.

1.3 Metrics

The use of metrics is important in order to evaluate the success. Therefore, the accomplishments of innovation must also be measured (Gupta 2009). The innovation metrics have evolved over time and, according to Milbergs and Vonortas (2004), it is possible to find four metrics generations. The first generation metrics reflect a linear conception of innovation focusing on inputs such as R&D investment. The second complements input indicators by accounting for the intermediate outputs of science and technology activities. The third generation metrics focus on a richer set of innovation indicators and indexes, based on surveys and integration of publicly available data. At last, the fourth generation metrics, grounded in a knowledge-based networked economy, remain ad hoc and are subject of evaluation.

Neely and Hii (1998) consider innovation hard to measure, due its multi-dimensional characteristics and identifies the following as the most commonly used measures of innovative activities: (i) R&D expenditures; (ii) patent counts; (iii) and innovation counts. In this context, the most frequently employed methods of collecting information about innovative activities are the patent analysis and innovation survey.

Burnett (2011) argues that there are key aspects to determine what is the most suitable measure, and proposes some questions: (i) what outcome do we want, e.g. what does innovation mean to our customers? (ii) where must we change our innovation process to achieve this sought-for innovation? (iii) how to measure value creation from Innovation? (iv) what is the state of maturity of our innovation management system and how can we improve it?

Innovation can be measured using the classic scheme, which encompasses the inputs, processes and outputs (Anthony and Wunker 2007, Dervitsiotis 2010, Gupta 2009, Kim 2014, Tüker 2012). Anthony and Wunker (2007) suggest fifteen metrics, distributed equally in three categories covered by the classic system, as depicted in Table 1.

Table 1. Innovation metrics in the classic scheme (Anthony and Wunker 2007)

Category	Metrics
Input-related	Financial resources dedicated to innovation; Human resources focused on innovation; Ring-fenced resources for non-core innovations; Senior management time invested in new growth innovation; The number of patents filed.
Process and oversight	Process speed; Breadth of idea-generation process; Innovation portfolio balance; current growth gap; Distinct processes and tools for different types of opportunities.
Output-related	Number of new products or services launched; Percentage of revenues in core categories of new products; Percentage of profits from new customers (or occasions); Percentage of profits from new categories; Return on innovation investment.

Kim (2014) also uses the metrics above mentioned with some adaptations. In the input-related measures he includes non-core innovations and IP (intellectual property and patents). In the process-related measures he introduces the gap between actions and plans instead of current growth gap.

In turn, Tüker (2012) is more thorough in each of the three groups, considering the existence of major factors, each composed of sub-factors. In the inputs group the author considers human resource factors (with ten sub-factors), knowledge creation (four sub-factors), vision and strategy (with eight sub-factors), entrepreneurship (with

nine sub-factors). In the group of process factors, innovative organization culture factors (with six sub-factors), control factors (with 14 sub-factors) and other process factors with three sub-factors are taken into consideration. The last group consists of tangible returns factors (with six sub-factors) and intellectual capital (with eight sub-factors). This model presents the workflow of technological innovation capability measurement and defends the utilization of surveys submitted to HR (Human Resource) departments, R&D departments and AF (Administration and Finance) departments of organizations.

Dervitsiotis (2010) outlooks differed. His main considerations regard the input constituted by enablers of the innovation process, including: organizational culture, leadership (vision, shared values, incentives alignment), employee participation process, innovation strategy, innovation resources (investments, partnerships), customer feedback process, supplier participation process. The outputs he reckons as key benefits of the innovation process comprise: customer impacts (satisfaction, loyalty), employee impacts (satisfaction, loyalty, cooperation, new ideas), organization impacts (level of trust, risk attitude, degree of cooperation, network density). Therefore, it is expected as an overall performance: competitiveness (quality, productivity, response time), economic (revenue of new products, ROI (Return On Investment) on innovation, investment, revenue captured to revenue generated, time to break even), market (% change of market share, time to market), environment footprint (alteration in pollution levels, adjustment in energy requirements).

Kemp *et al.* (2003) conducted a study to test the relationship between innovation and firm performance. The instruments of measure are divided into innovation indicators and performance indicators. Innovation indicators are split into three categories: inputs (three variables), processes (fourteen variables) and outputs (one variable). Thus, they use the classic system, with some variable differences, and add the performance indicators (total number of employees; turnover and its development; export share in total turnover; net profits/losses in a period).

The link between innovation and the business performance is also studies by other authors, considering different samples sizes and sectors of activity. Hatzikian (2015) used data from 372 companies collected along two years to demonstrate this relationship. Karabulut (2015) explored this relationship considering a panel of 197 manufacturing firms in Turkey. Tuan *et al.* (2016) considered a sample of 118 supporting industries in Vietnam to demonstrate positive effects of process, marketing, and organizational innovations on firm performance. Finally, Valdez-Juárez *et al.* (2016) explored the connection between management of knowledge, innovation and performance in SMEs. They adopted a large data sample of 903 SMEs in Spain to demonstrate that knowledge management has a significant influence on innovation but not on the performance of those companies.

On the other hand, Burnett (2011) proposed some KPIs grouped in five categories:

- Conversion ratios for each step in the innovation process / value stream: (a) ideas: ideation campaigns; (b) ideas that reach concept design; (c) implemented designs: concept designs; (d) ideas that sell: implemented ideas; (e) ideas that make a profit: ideas that sell; (f) sales lead: target customer base; (g) sales: sales lead;
- Financial and market measures; (a) revenue from new products or services; (b) profit from new products or services; (c) new customers of new products or services; (d) new segments and sector entry of new products and services;
- Holistic ratios for the rate of renewal of the organization: (a) profit from new products and services: profit from existing products and services; (b) customers on the new products: customers on the old products; (c) rate of transfer of capital investment to new capabilities; (d) sales from new products and services: sales from existing products & services;
- Balancing the desire to innovate with risk management; (a) verified knowledge: unverified assumptions; (b) effort spent on implementations: effort spent on concept development; (iv) innovation competency/ effectiveness / discipline / repeatability: (a) use of formal creativity tools & techniques; (b) use of formal idea management tools and techniques; (c) use of formal problem solving tools and techniques;
- Growth and sustainability measures: (a) revenue from new products and services; profit from new products and services; (b) quantification of customers increased success (quality/sales/revenue/...) or reduced cost due to use of our products and services; (c) rate of return on innovation investment (how sustainable is the innovation); (d) market share growth from new products and services; (e) brand

awareness and stickiness (those who stay on new product: those who leave); (f) patents created per year; market share protected by patents; (g) revenue protected by patents; revenue generated from licensing patents.

Manzini (2015) suggests the adoption of new innovation indicators based on input and output focus organized into five themes that are at the center of innovation activity: knowledge demand indicators; knowledge mobilization indicators; knowledge application indicators; knowledge flow indicators; social impact indicators. He considers the need to use the number of indicators to the minimum and classify them as primary and secondary. So, he offered as primary indicators: knowledge and technology intensity of manufactured goods; contribution to the manufacturing trade balance; participation in lifelong learning; licensing of patents; entrepreneurship; innovation networks; social cohesion; social impact of innovation.

Edison *et al.* (2013) argue that innovation should be measured on two levels: top and lower level. In the first level three key factors are considered: (i) capability (measurement of innovation inputs, determinants and process); (ii) output (measurement of innovation output); (iii) performance (measurement of innovation impact). At lower levels, aligned with mentioned key factors, we have: inputs (organizational resources, research and development, knowledge, technology transfer), activities (research, development, commercialization), output (products, processes, market, organization) and performance (direct economic benefits, indirect benefits, technological benefits). Inputs and activities are influenced by determinants, which consists in internal and external factors. This proposal to evaluate the innovation presents a conceptual and an operational component, as well as a categorization of metrics.

Wolk *et al.* (2009) suggest three types of categories of indicators and they evaluate: organizational health (financial sustainability, team capacity, implementation effectiveness), program performance (activities, outputs, quality, program costs), social and economic impact (outcomes, outcomes costs, systemic impact generated).

Adams *et al.* (2006) propose seven category areas to measure: inputs (people, physical and financial resources, tools); knowledge management (idea generation, knowledge repository, information flows); innovation strategy (strategic orientation, strategic leadership); organization and culture (culture, structure); portfolio management (risk/return balance, optimization tool use); project management (project efficiency, tools, communications, collaboration); commercialization (market research, market testing, marketing and sales).

Saunila and Ukko (2012) argue that the innovation performance and the business performance must be measured. For innovation performance, they suggest the innovation capability potential (factors that affect the present state of innovation capability), the innovation capability process (systems and activities that assist organizations to utilize their innovative potential and therefore enable innovations) and the innovation capability results (product/service and process innovations.) In business performance the authors propose a measurement in the personnel level (employee satisfaction, employee retention and employee skills), internal processes (quality of products and services, flexibility of decision-making, the reliability of deliveries and effectiveness of problem-solving), customer (customer profitability, customer retention, customer satisfaction and market share) and financial aspects (added value, profitability and growth).

Almquist *et al.* (2013) present a workflow to determine innovation performance, which involve twelve key success factors distributed by five stages:

- *Strategy*: set compelling, credible objectives and investment priorities. Two key success factors: innovation goals and strategies; strategic alignment;
- *Organization*: build an innovative organization and collaborative culture. Three key success factors: both brain talents (partnerships and management); structure, roles and decision making; culture;
- *Idea generation and development*: create profitable new approaches that meet customer needs better than the competitors can. Three key success factors: idea generation and development; idea screening and development; idea screening;
- *Portfolio management*: improve the size, shape and speed of the innovation portfolio. Two key success factors: portfolio management; project management;

- *Scaling*: strengthen testing, learning and scaling skills. Two key success factors: scaling and launch strategy; feedback loops and adaptation.

The evaluation, based on these key factors, results on one of three levels: low performer, average performer or high performer.

Galvez *et al.* (2013) advocate the utilization of metrics based in six main innovation practices, designed as creativity and concept generation (include three sub-practices), new product development (with three sub-factors), human resources management (two sub-factors), technological strategy (four sub-factors), project management (three sub-factors), data and knowledge management (three sub-factors). In fact, there are eighteen sub-factors, and the authors refers that list can be updated as new innovation management practices emerge.

Gupta (2009) ponders both a study developed by the Boston Consulting Group as well as a study developed by McKinsey, considering that the most important metrics are: (i) revenues realized from offerings launched in the last three years; (ii) projected versus present performance; (iii) total funds invested in growth projects; (iv) allocation of investments across projects.

Rylková and Chobotová (2014) defined five indicators, which comprise one or more metrics: (i) realized innovation (*i.e.,* number of implemented innovation during a period); (ii) success of innovation (*i.e*. number of successful projects to the total number of initiated innovative projects); (iii) time of innovation (*i.e.* average time implementation of innovative projects); (iv) acquired patents (*i.e*., number of patents for a certain period; (v) economic indicators: return on innovation (*i.e*. total expenditure on innovation as a % of sales; real contribution of the project to the overall cost of the project).

Malinoski and Perry (2011) propose a simple formula, designed as Return on Product Development Expense (RoPDE) to monitor the innovation process, as follows:

$$RoPDE = \frac{(GM-PDE)}{PDE},$$

where: GM – Gross margin; PDE = Product development expense

The use of surveys and external data sources to measure and evaluate the success of innovation policies are also considered as a methodological approach to collect indicators and innovation outputs of various aspects of innovation activities performed by firms (Guellec and Muzart 2011, Vergori 2014). These indicators are typically organized in different categories, such as infrastructure, sources of information, legal protection, workforce, financial performance, social outcomes, and co-operation.

2. Methodology

This section presents the criteria used to analyze the several innovation performance methods and metrics. Setting a basis for discussion will facilitate the mapping of the surveyed methods and metrics to a common framework, how to compare each approach and detect trends, such as shared features, or the evolution of assumptions made along the way. These criteria were defined in an incremental analysis of the methods and metrics surveyed in this paper. For each method and metric we captured its main features, which were mapped onto different criteria. A mind map representation of these features for methods and metric may be found in Figure 1 and Figure 2. The mind map was adopted, because it allows having a general vision, sufficiently broad and comprehensive, that allows understanding the main concepts associated with a subject area (Davies 2011).

Figure 1. Mind map representation of innovation performance models

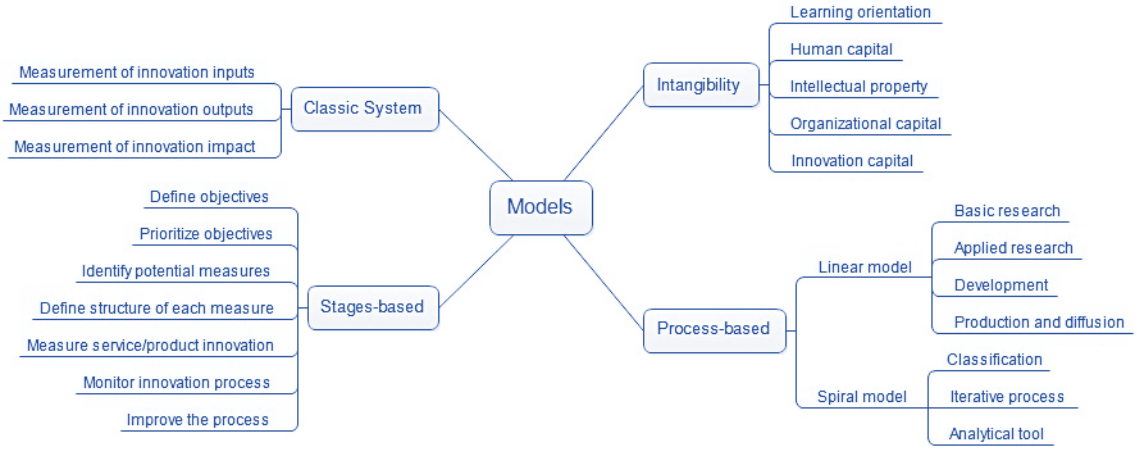
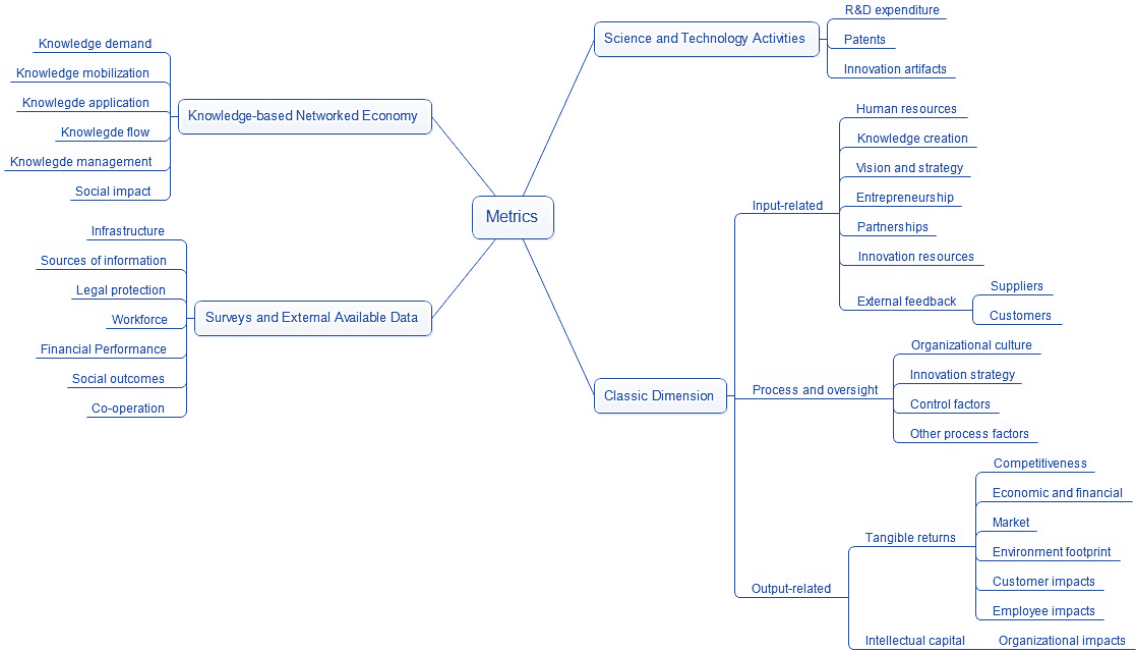


Figure 2. Mind map representation of innovation performance metrics



In order to determine the most relevant studies conducted along the last year we analyzed the impact of these publications using the Thomson ISI Web of Science and Google Scholar citations up to the end of June 2016. Web of Science was used because it is one of most popular bibliometric indexes and it provides an analysis of the journal impact factor, which a tool for evaluating the importance and influence of a specific publication (Falagas *et al.* 2008, Winter *et al.* 2014). According to Falagas *et al.* (2008), the impact factor has been highly criticized but remains the most widely employed for the indexes available. Additionally, Web of Science only includes citations to journal articles published in ISI listed journals, and hence does not include books, book chapters, conference papers, and journal articles published in non-ISI journals. Therefore, and in order to complement our source of information, we also incorporate Google Scholar, which can occasionally provide a more nuanced view of the importance of scholarly articles in the social sciences (Levine-Clark and Gil 2009). The simultaneous use of these two indexes allows us to provide a more comprehensive depiction of the extent of international and interdisciplinary nature of our research topic.

Table 2 and Table 3 show the total number of citations distributed by each bibliometric index for each study presented in the state of the art section.

Table 2. Number of citations for innovation performance models

Reference	Web of Science	Scopus	Google Scholar	TOTAL
Calantone *et al.* (2002)	482	619	1719	2820
Godin (2006)	151	204	678	1033
Neely *et al.* (2000)	0	0	196	196
Boehm (2000)	0	0	183	183
Du Preez and Louw (2008)	3	9	71	83
Hollanders & Van Cruysen (2009)	0	0	65	65
Dewangan & Godse (2014)	3	2	11	16
Abouzeedan (2011)	0	0	7	7
Andersson *et al.* (2011)	0	0	4	4
Herrera (2016)	0	0	3	3
Sabadka (2012)	0	0	3	3
Malinoski and Perry (2011)	0	0	3	3
Gupta (2009)	0	0	3	3
Wunker and Pohle (2007)	0	0	3	3
Kim (2014)	0	0	2	2
Wolk *et al.* (2009)	0	0	2	2
Begeer and Banerjee (2002)	0	0	1	1
Dickel and Moura (2016)	0	0	1	1

Table 3. Number of citations for innovation performance metrics

Reference	Web of Science	Scopus	Google Scholar	TOTAL
Neely and Hii (1998)	0	0	196	196
Kemp *et al.* (2003)	0	0	147	147
Dervitsiotis (2010)	16	21	63	100
Milbergs and Vonortas (2004)	0	0	68	68
Edison *et al.* (2013)	4	13	40	57
Saunila and Ukko (2012)	4	5	31	40
Tüker (2012)	0	0	9	9
Galvez *et al.* (2013)	1	1	6	8
Almquist *et al.* (2013)	0	0	6	6
Vergori (2014)	1	0	5	6
Karabulut (2015)	0	0	5	5
Hatzikian (2015)	0	0	4	4
Guellec and Muzart (2008)	0	0	4	4
Gupta (2009)	0	0	3	3
Malinoski and Perry (2011)	0	0	3	3
Rylková and Chobotová (2014)	0	0	3	3
Valdez-Juárez *et al.* (2016)	0	0	2	2
Kim (2014)	0	0	2	2

Reference	Web of Science	Scopus	Google Scholar	TOTAL
Wolk *et al.* (2009)	0	0	2	2
Tuan *et al.* (2016)	0	0	1	1
Burnett (2011)	0	0	0	0
Anthony and Wunker (2007)	0	0	0	0
Manzini (2015)	0	0	0	0

In order to focus our analysis on the most predominant studies, we established a cut line of ten studies. This value allows us to consider a significant number of studies without losing the diversity in their analysis, which is fundamental in the process of performing a comparative analysis. Moreover, we only cover the most recent study conducted by each author.

3. Comparison of approaches

In this section, we present a detailed summary of the main features of each model and metric. Approaches surveyed and considered only include studies inside the cut line defined in Table 1 and Table 2, and distributed along these tables according to the number of citations. Rows correspond to criteria introduced in the mind maps showed in the methodology section and columns correspond to each approach studied. A given cell contains information for an approach for a certain criterion. Most of the criteria are evaluated as yes/no, but others have alternatives. The following acronyms were used: "-" means that this criterion does apply for that given methodology, whereas "none" means that none of the alternatives are considered. These acronyms can be found in Table 4 and Table 5.

3.1 Models

Table 4 summarizes the main characteristics of innovation performance models. The most cited studies in the literature focus on analyzing the intangible aspects of innovation, because their measurement becomes a challenge. Therefore, it isn't a surprise that the most recent studies in this field try to answer two crucial questions: (i) What are the main components of intangible innovation artefacts? (ii) How to measure the intangible aspects of innovation?

The main identified components of intangible performance innovation models are: (i) learning orientation, (ii) human capital, (iii) intellectual property, (iv) organizational capital; and (v) innovation capital. Organizational capital is transversely considered by all authors as one of the most pertinent intangible elements, followed by learning orientation, human capital and innovation capital. On the other hand, intellectual property is not recognized as relevant as other components due essentially to lack of motivation and experience from companies to handle the entire process themselves. Thus, the process of measure of intangible aspects of innovation suffers a heavy dependence on features of the characteristics of intangible innovation artefacts. However, there is, in general, four contextual steps that an organization should adopt to effectively measure the intangible assets: (i) identification of the intangible assets of the organization; (ii) link intangible assets to tangible resources; (iii) include innovation results in the budgeting process; and (iv) establish a continual cycle of "link, measure, manage, and budget".

The adoption of a classical system is an innovation performance model widely recognized in several studies. Three in ten studies adopt this model. The classic system considers that innovation can be measured by looking for its inputs, outputs and impact. However, those intangible innovation assets are typically not easy to be included on balance sheets because they are difficult to measure. At the same time, intangible assets, as mentioned above, are increasingly being recognized as critical to the innovation process.

Process-based innovation is also considered a relevant innovation performance model. The process-based model can be divided into two approaches: (i) linear model; and (ii) spiral model. The linear model is characterized by three components: (i) basic research; (ii) applied research; (iii) development; and (iv) product diffusion. This model is inspired in the categorization of research in several activities, which are interconnected and typically applied to science and engineering fields. A slight different vision emerges from a software engineering field, as

the spiral model, which is based on the iterative and the feedback nature of prototyping. The spiral model is characterized by three components: (i) classification; (ii) iterative process; and (iii) analytical tool.

Stages-based model is presented by two out of ten authors. The idea of this performance model is to divide the innovation life cycle in several stages. The identified stages are: (i) define objectives, (ii) prioritize objectives; (iii) identify potential measures; (iv) define the structure of each measure; (v) measure service/provider innovation; (vi) monitor the innovation process; (vii) improve the process.

Table 4. Classification and comparative analysis of innovation performance models

	[CLT02]	[GOD06]	[NLY00]	[BHM00]	[DPL08]	[HVC09]	[DWG14]	[ABZ11]	[ADS11]	[HRR16]
Classic System										
Measurement of innovation inputs	-	-	-	-	Yes	-	-	Yes	Yes	-
Measurement of innovation outputs	-	-	-	-	Yes	-	-	Yes	Yes	-
Measurement of innovation impact	-	-	-	-	Yes	-	-	Yes	Yes	-
Stages-based										
Define objectives	-	-	Yes	-	-	-	Yes	-	-	-
Prioritize objectives	-	-	Yes	-	-	-	Yes	-	-	-
Identify potential measures	-	-	Yes	-	-	-	Yes	-	-	-
Define structure of each measure	-	-	Yes	-	-	-	Yes	-	-	-
Measure service/product innovation	-	-	Yes	-	-	-	Yes	-	-	-
Monitor innovation process	-	-	Yes	-	-	-	Yes	-	-	-
Improve the process	-	-	Yes	-	-	-	Yes	-	-	-
Intangibility										
Learning orientation	Yes	-	-	-	Yes	Yes	Partially	-	None	Partially
Human capital	Partially	-	-	-	Yes	Yes	None	-	None	Partially
Intellectual property	None	-	-	-	Yes	Yes	None	-	None	None
Organizational capital	Partially	-	-	-	Yes	Yes	Partially	-	Partially	Yes
Innovation capital	None	-	-	-	Yes	Yes	Partially	-	None	Partially
Process-based										

	[CLT02]	[GOD06]	[NLY00]	[BHM00]	[DPL08]	[HVC09]	[DWG14]	[ABZ11]	[ADS11]	[HRR16]
Linear model										
→ Basic research	-	Yes	-	-	Yes	-	-	-	-	-
→ Applied research	-	Yes	-	-	Yes	-	-	-	-	-
→ Development	-	Yes	-	-	Yes	-	-	-	-	-
→ Product and diffusion	-	Yes	-	-	Yes	-	-	-	-	-
Spiral model										
→ Classification	-	-	-	Yes	-	-	-	-	-	-
→ Iterative process	-	-	-	Yes	-	-	-	-	-	-
→ Analytical tool	-	-	-	Yes	-	-	-	-	-	-

3.2 Metrics

Table 5 summarizes the main approaches of innovation performance metrics. The most cited studies in literature adopt a classic dimension of metrics, which is composed by three dimensions: (i) input-related; (ii) process and oversight; and (iii) output-related. In the input-related dimension we find metrics related to human resources, knowledge creation, vision and strategy, entrepreneurship, partnerships, innovation resources, and external feedback (suppliers and customers). However, entrepreneurship metrics are only referred by Tüker (2012), and partnerships metrics are only mentioned by Dervitsiotis (2010). In the process and oversight dimension we find metrics related to organizational culture, innovation strategy, control factors and other process factors, such as the level of how a company is being innovative, the presence in national or international fairs, etc. Finally, in the output-related dimension we find two kinds of metrics in terms of tangible returns and intellectual capital. The tangible returns have metrics related to competitiveness, economic and financial, market, environment footprint, customer impacts, and employee impacts. However, only Edison *et al.* (2013) refer specific metrics for environment footprint. On the other hand, the intellectual capital has specific metrics to measure organizational impacts.

Science and technology activities offer a group of metrics that intends to give a package of indicators on science, technology and innovation. These metrics are organized in the following three sub-dimensions: (i) R&D expenditure, (ii) patents, (iii) innovation artefacts. Some critics of this model have arisen considering that it focuses on measurement of the tangible assets of innovation. Therefore, a new class of innovation metrics has been emerging, with the intent to provide metrics in a knowledge-based networked economy. In this dimension, six metrics have been proposed: (i) knowledge demand, (ii) knowledge mobilization; (iii) knowledge application; (iv) knowledge flow; (v) knowledge management; and (vi) social impact.

Finally, a new generation of metrics is focused on a richer set of innovation indicators and indexes based on surveys and integration of publicly available data. In this dimension we can find metrics related to: (i) infrastructure, (ii) source of information, (iii) legal protection, (iv) workforce, (v) financial performance, (vi) social outcomes, and (vii) co-operation.

Table 5. Classification and comparative analysis of innovation performance metrics

	[NLH98]	[KMP03]	[DVT10]	MBV04]	[EDS13]	[SUK12]	[TUK12]	[GLV13]	[ALQ13]	[VGR14]
Classic Dimension										
Input-related										
→ Human resources	-	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	-
→ Knowledge creation	-	Yes	Partially	-	Yes	None	Yes	Yes	None	-
→ Vision and strategy	-	None	Yes	-	Yes	None	Yes	None	Yes	-
→ Entrepre-neurship	-	None	None	-	None	None	Yes	None	None	-
→ Partnerships	-	None	Yes	-	None	None	None	None	None	-
→ Innovation resources	-	Partially	Yes	-	Yes	Yes	None	Partially	Partially	-
→ External feedback										
→ Suppliers	-	None	Yes	-	Partially	None	None	None	Partially	-
→ Customers	-	None	Yes	-	Partially	Yes	None	None	Partially	-
Process and oversight										
→ Organiza-tional culture	-	Yes	Yes	-	Yes	None	Yes	Partially	Partially	-
→ Innovation strategy	-	Yes	Yes	-	Yes	None	Partially	Partially	Partially	-
→ Control factors	-	Yes	Yes	-	Yes	Yes	Yes	Partially	Partially	-
→ Other process factors	-	Yes	Yes	-	Yes	Yes	Yes	None	None	-
Output-related										
→ Tangible returns										
→ Competit-iveness	-	Yes	Yes	-	Yes	Yes	Yes	None	None	-
→ Economic and financial	-	Yes	Yes	-	Yes	Yes	Yes	None	None	-
→ Market	-	Yes	Yes	-	Yes	Partially	Yes	None	None	-
→ Environment footprint	-	None	Yes	-	Yes	None	Yes	None	None	-
→ Customer impacts	-	None	Yes	-	Yes	Yes	Yes	None	None	-
→ Employee impacts	-	None	Yes	-	Yes	Yes	Yes	None	None	-
→ Intellectual capital										

	[NLH98]	[KMP03]	[DVT10]	MBV04]	[EDS13]	[SUK12]	[TUK12]	[GLV13]	[ALQ13]	[VGR14]
→Organizational impacts	-	None	Yes	-	Yes	None	Yes	None	None	-
Knowledge-based Networked Economy										
Knowledge demand	-	-	-	-	-	-	-	Yes	-	-
Knowledge mobilization	-	-	-	-	-	-	-	Yes	-	-
Knowledge application	-	-	-	-	-	-	-	Yes	-	-
Knowledge flow	-	-	-	-	-	-	-	Yes	-	-
Knowledge management	-	-	-	-	-	-	-	Yes	-	-
Social impact	-	-	-	-	-	-	-	None	-	-
Surveys and External Available Data										
Infrastructure	-	-	-	Yes	-	-	-	-	-	Yes
Sources of information	-	-	-	Yes	-	-	-	-	-	Yes
Legal protection	-	-	-	Yes	-	-	-	-	-	Yes
Workforce	-	-	-	Yes	-	-	-	-	-	Yes
Financial performance	-	-	-	Yes	-	-	-	-	-	Yes
Social outcomes	-	-	-	Yes	-	-	-	-	-	Yes
Co-operation	-	-	-	Yes	-	-	-	-	-	Yes
Science and Technology Activities										
R&D expenditure	Yes	-	-	Yes	Yes	-	-	Yes	-	-
Patents	Yes	-	-	Yes	Yes	-	-	Yes	-	-
Innovation artefacts	Yes	-	-	Partially	Yes	-	-	Yes	-	-

Conclusion

Managing innovation is one of the most relevant functions that a company should accomplish in order to grow and be competitive in the global market. However, to achieve innovation effectively, it has to be measured. The process of measuring innovation is a rather challenging task due to a high number of models and metrics that can be adopted.

The present study intended to identify and describe the main innovation performance models and metrics. While aiming to identify the most predominant contributions in this field, we performed a survey using the three most popular bibliometric indexes (Web of Science, Scopus, and Google Scholar). The results allowed us to identify four generations of innovation performance models (*e.g.* classic system, stages-based, process-based, and

intangibility). Regarding the metrics, it was possible to identify also four generations of metrics (*e.g.,* classic dimension, science and technology activities, knowledge-based networked economy, and surveys and external available data).

The main limitation of this study is the absence of an empirical study to determine how the innovation performance models and metrics identified here are effectively used in reality, namely in which scenarios they become more useful, and what is the level of acceptance of these models and metrics by companies. In the future, we plan on carrying out new empirical studies in this field, by employing qualitative and quantitative methodologies, to identify, characterize and clarify these open issues.

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Gender Differences in Perception of Advertising in the Context of Expectations of Advertising

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Abstract:

Effects of advertising are conditioned by several factors. The presented report focuses on specification of the links between expectations of advertising and perception of advertising with emphasis on gender differences and age correlations. Conceptualization of the studied issue is based on the fact that, both in the context of expectations and the context of perception of advertising, every person creates their subjective cognitive image of these advertisement attributes. The report presents result of an analysis of data acquired from the sample of 206 respondents aged between 18 and 83 years, out of which 93 were men and 113 were women. Significant correlations between the selected attributes of expectations of advertising and the factors of subjective perception of advertising were specified. The research results also confirmed the significant differences in perception of advertising and expectations of advertising between men and women. Women pay more attention to the music and visuals of the advertisement and appreciate the humorous aspects in advertising. The have also greater expectations of advertising – they expect it to be memorable, informative, intelligent, genuine and visually stunning.

Keywords: advertising; perception of advertising; expectations of advertising; gender; age

JEL Classification: M37; Z13

Introduction

Gender role, gender identity and gender stereotypes create a set of illusions about how women and men in a particular culture and a social environment should behave, express themselves, what they should wear, how they should think and, therefore, what exactly they expect of advertising and how they perceive it. Links between gender and advertising may be analyzed also from the viewpoint of defining gender as a process and characteristics of an individual person (Wharton 2012). The following study aims to enrich the area of knowledge of the advertising effects management. The attention is paid to the perception of advertising and expectations of advertising with emphasis on the gender context. Interconnections between the expectations of advertising and the perception of advertising are specified in the research project, followed by characterization of the differences between men and

women in terms of assessment of expectations of advertising and advertising perception factors, and a subsequent specification of the age correlations.

1. Advertising and gender

There are a large number of definitions of advertising. The basic attributes of advertising were characterized by Stanton (1984) as a presentation which has an audio or visual form, is paid, impersonal, promoting a product, service or an idea. This presentation occurs most frequently via mass media (Bovée and Arens 1992). Advertising is defined in a similar context by Kotler and Armstrong (2004) or the American Marketing Association.

Barker (2006) argues that advertising has become an integral part of the culture and its effects are re-transmitted to shape the culture itself. It extends to all subsystems of the social and cultural space and is echoed even in those parts of the social structure which are seemingly unrelated to it. Such approach represents the concept of broader understanding of advertising with its impact on values and norms of the society.

Advertising may also be perceived as one of the most common ways of influencing by means of the semantic transposition in order to strengthen the sensory-imaginative, but also the emotional-cognitive impression (Lelková and Lorincová 2015).

In addition to the conceptualization and definition of advertising, a relatively independent area is constituted by the models of attitudes, perceptions, evaluations and expectations of advertising. Pollay and Mittal (1993) proposed a comprehensive model of attitudes toward advertising, which consists of three personality factors (information, social images and hedonism) and four socio-economic factors (economic profitability, materialism, values and falsehood).

In this sense, with an emphasis on the subjective aspect of effects of advertising, Bauer and Greyser (1968 in Andrews 1989) based on scaling of opinions and beliefs about advertising specified the economic and social dimensions which include opinions and beliefs about advertising. The economic dimension consisted of items describing advertising as necessary and helpful in living standards increase, and the result of these ads are better products to the public, as well as lower prices. The social dimension consisted of items describing advertising as a true picture of the product, insulting the intelligence of the average consumer and convincing people to buy things that they would not buy.

Subjective creation of the image of advertising relates to several areas of knowledge that are represented by constructs of cognitive schemas, irrational beliefs, contra-fact thinking, the Dunning-Kruger effect, which arises from an erroneous self-esteem and others (Beck *et al*. 2007, David, Lynn and Ellis 2010, Mandel *et al*. 2005, Istenik 2011, and others).

In connection to the subjective perception of advertising it is necessary to emphasize the role of emotions that can significantly affect individual creation of the mental advertising image. Abrams and Keren (1997) state that emotions, particularly in terms of intensity and duration, strongly influence the subjective mental image of reality.

Another important factor associated with the image of advertising can be specified in terms of expectations of advertising. According to Newell and Simon (1972), creation of this image sometimes deviates from the criteria of objective rationality, is tinged with emotion and uses various schemes.

Musical and visual processing, humor, fear, the element of surprise, erotica and others may act as peripheral ways and signs, thus affecting the buying behavior of individuals. The above-mentioned factors of perception of advertising are complemented by expectation that the ad will be engaging, truthful, funny, easy to understand, but also credible, informative and intelligent.

The gender context may be considered in various ways, also in terms of perception of the surrounding world, not excluding the advertising effects. Gender specifics in the perception of advertising are manifested in regarding the products and services as the male and the female ones (Owolabi 2005). Several studies (*e.g.* Renzetti, Curran and Maier 2012, Gail, Humez *et al*. 2003, Goffman 1979, Lindner 2004, Štefko, Fedorko and Bačík 2015) suggest that ads are often intertwined by gender stereotypes. Stereotypical roles in advertising often reinforce the gender-stereotypical attitudes of the society. McKay and Covell (1997 in Lindner 2004) through research found that gender stereotypes in advertising strengthen and reproduce the prevailing myths about gender differences.

One of the first authors to use the term „gender“ was Oakley (1972), who perceives it as a social and cultural construct as opposed to the biological term „sex“. A dominant position in the context of gender is taken by the cultural, political and social conditions of a particular society. In this sense, Connell (2002) claims that the issue of gender has a key dimension in personal life, social relations and culture but at the same time it is a topic which carries along certain prejudice, ideologies, myths and disinformation.

Eckert and McConnell-Ginet (2003) add that the questions about the issue of gender are discussed almost in every scientific discipline which deals with human behavior, cognition, society and culture. Crawford and Unger (2003) define gender in terms of three integrated levels of meaning: the social-structural level represented primarily by the social role, the interpersonal level represented mainly by the gender stereotypes, and the individual level represented by the gender identity.

Individually, people thus become gender-typical, they continually adapt certain characteristics, roles and behavior desired in women and men of a particular culture, which is manifested for example in their decision-making (Suhányi and Suhányiová 2014), as well as in relation to perception of advertising and expectations of advertising.

2. Methodology

The main objective of the research was to enrich the area of knowledge of the advertising effects management by means of observing the perception of advertising and the expectations of advertising in the context of gender and age. The research sample consisted of 206 respondents aged between 18 and 83 years (mean age: 31.22 years, standard deviation: 16.083), out of which 93 were men (45.1%) and 113 were women (54.9%).

The research was conducted by means of two original scales. The first scale (EoA), which contained 11 items (Cronbach's Alpha – 0.917) was aimed at expectations of advertising (true, funny, understandable, credible, memorable, informative, unobtrusive, intelligent, genuine, visually stunning, artistic). The second scale focused on the subjective perception of advertising (SPoA). It contained five items (Cronbach's alpha – 0.889) (a good slogan, good music, good visuals, good humor, and the element of surprise).

Respondents had a choice of answers on a 6-point scale, ranging from "definitely not" to "definitely yes". The obtained data were evaluated by means of the statistical software SPSS 20 with the use of Student's t-test and Pearson's correlation.

3. Research

The correlation between the expectations of what an advertisement must contain for its recipients to become interested and the subjective perception of advertising was tested by the Pearson's correlation analysis. The results are shown in Table 1.

The examined indicators of expectations of advertising statistically significantly correlate with perception of advertising. A high correlation coefficient (above 0.5) was recorded between expectations of strongly visual advertising and its perception of good visual and musical processing, and also humor and the element of surprise as well as between informative expectations and good music. On this basis it can be assumed that producers of ads should focus precisely on these aspects of advertising. Highly statistically significant were also expectations of funny advertisement and perception of the element of surprise, then expectations of understandable advertising and perception of a good slogan or the element of surprise, and expectations of originality and perception of good visualization, or the element of surprise. Simultaneously, such correlation was also found between expectations of credibility and good musical processing.

Table 1. Correlations between expectations and perception of advertising – recalculated values

Perception Expectations	Good slogan	Good music	Good visuals	Humor	Element of surprise
True	.340**	.400**	.214*	.079	.239*
Funny	.451**	.418**	.298**	.425**	.560**
Understandable	.530**	.464**	.436**	.370**	.525**
Credible	.375**	.505**	.381**	.262**	.344**
Memorable	.464**	.494**	.410**	.350**	.427**

Perception Expectations	Good slogan	Good music	Good visuals	Humor	Element of surprise
Informative	.457**	.585**	.514**	.272**	.315**
Unobtrusive	.378**	.303**	.389**	.323**	.420**
Intelligent	.456**	.390**	.430**	.330**	.434**
Genuine	.420**	.471**	.533**	.357**	.516**
Visually Stunning	.481**	.553**	.581**	.510**	.555**
Artistic	.368**	.390**	.405**	.303**	.272**

Note: * p < 0.05; ** p < 0.01
Source: own elaboration based on the research

According to Table 1, only in one case there was no statistically significant correlation observed, namely the expectations of truthfulness of advertising and humor (0.079). Humor and truth in the presented results are not related to each other which, of course, could be discussed further.

Examined gender differences in expectations of advertising were evaluated by means of the statistical software SPSS 20, using Student's t-test for two independent samples. The detected differences are presented in Table 2.

Table 2. Statistically significant differences in expectations of advertising in terms of gender

Expectations of advertising	Gender	Mean	Test criterion	Significance
True	Male	3.83	-.814	0.417
	Female	4.00		
Funny	Male	4.11	-1.262	0.208
	Female	4.33		
Understandable	Male	4.16	-2.257	0.025
	Female	4.58		
Credible	Male	3.89	-1.879	0.062
	Female	4.25		
Memorable	Male	3.73	-2.934	0.004
	Female	4.27		
Informative	Male	4.10	-2.555	0.011
	Female	4.52		
Unobtrusive	Male	3.90	-2.150	0.033
	Female	4.30		
Intelligent	Male	3.71	-2.574	0.011
	Female	4.19		
Genuine	Male	4.39	-3.145	0.002
	Female	4.95		
Visually stunning	Male	4.02	-3.566	0.000
	Female	4.62		
Artistic	Male	3.80	0.193	0.847
	Female	3.76		

Source: own elaboration based on the research

Table 2 shows the statistically significant differences in expectations of advertising in terms of gender. The average values of the responses of women in the examined attributes of expectations of advertising (memorable, informative, intelligent, genuine, and visually stunning) are closer to the answers “mostly yes”. These values are higher in contrast to men whose answers have lower average values and on the used response scale are between “yes” and “no”. It means that in the examined attributes, women expect more of advertising than men.

Examined gender differences in the perception of advertising were evaluated by Student's t-test for two independent samples. The detected differences are shown in Table 3.

Table 3. Statistically significant differences in perception of advertising in terms of gender

Perception of advertising	Gender	Mean	Test criterion	Significance
Good slogan	Male	4.20	-3.316	0.001
	Female	4.79		
Good music	Male	4.29	-3.769	0.000
	Female	4.88		
Good visuals	Male	4.35	-2.332	0.021
	Female	4.76		
Humor	Male	4.29	-2.582	0.011
	Female	4.79		
Element of surprise	Male	4.09	-3.991	0.000
	Female	4.81		

Source: own elaboration based on the research

Table 3 presents the statistically significant differences in the perception of advertising in terms of gender. The average values of the responses of women in the selected factors of perception of advertising (music, visuals, humor) are closer to the answers "mostly yes". Unlike men, whose average values of answers on the measurement scale used have reached the level "yes", these values are higher. Therefore, in perception of advertising, women prefer (and is more relevant to them) the musical and visual processing and humor more than men.

Characterization of the differences in assessment of expectations of advertising and the perception of advertising factors between men and women was carried out also in terms of age of the respondents. Tables 4 and 5 present the acquired results of the performed analyses.

Table 4. Correlations between expectations of advertising, perception of advertising and age of men

Perception of advertising	good slogan	good music	good visuals	humor	element of surprise
AGE	0.091	-0.039	-0.039	-0.121	-0.010

Expectations of advertising	true	funny	understandable	credible	memorable
AGE	0.172	0.059	-0.030	-0.104	-0.160

Exp. of ad. (continued)	informative	unobtrusive	Intelligent	genuine	visually stunning	artistic
AGE	-0.007	0.210*	0.029	0.013	0.056	0.048

*Source: o*wn elaboration based on the research

Table 5. Correlations between expectations of advertising, perception of advertising and age of women

Perception of advertising	good slogan	good music	good visuals	humor	element of surprise
AGE	-0.017	0.035	0.170	0.140	-0.112

Expectations of advertising	true	Funny	understandable	credible	memorable
AGE	-0.281**	-0.127	-0.291**	-0.134	-0.343**

Exp. of ad. (continued)	informative	unobtrusive	intelligent	genuine	visually stunning	artistic
AGE	-0.154	-0.222*	-0.056	-0.221*	0.128	0.157

Source: own elaboration based on the research

The results of the analyses indicate that statistically significant correlations between age and the observed expectations of advertising were shown in a greater extent among women than men. There was only one significant correlation detected among men. Older men attributed greater importance to unobtrusiveness of advertising than younger men. Interestingly, women assessed this relationship reversely. Younger women attributed greater importance to unobtrusive advertising than older women. In the group of women in terms of age, other expectations

of advertising were assessed similarly. Younger women attributed more importance to other expectations of advertising such as truthfulness, clarity, originality and memorability.

In terms of analysis of the links between age and perception of advertising there were no statistically significant correlations detected within either the group of men or women.

Conclusion

Advertising is a paid form of communication between manufacturers and customers. People encounter it daily, it affects them and whether they want it or not, advertising is in their lives. The main objective of the research was to determine whether there is a statistically significant correlation between the expectations of advertising and perception of advertising in the context of gender specifics.

Implementation of the research project enabled specification of a large number of statistically significant correlations between the expectations of advertising and the subjective perception of advertising. In the specified context, it is to be noted that no significant correlation between the expectations of the truthfulness of advertising and perception of humor in advertising was found. This finding suggests that the use of elements of humor in advertising must be careful and not be an end in itself, especially in terms of the expectations of the truthfulness of advertising.

The research results confirm the suitability of the multidimensional theoretical and methodological reflection of the issue both on the level of expectations of advertising as well as on the perception of advertising.

In terms of gender, the results confirmed the differences between men and women in expectations of advertising as well as in the perception of advertising. Women have higher expectations of advertising than men and also perceive advertising more intensely. These findings correspond with the teachings of Statt (1977), according to whom women have a more complex perception of advertising, while men interpret advertising by means of heuristic systems. The advertisement itself is experienced by women with a greater proportion of emotions than by men.

In advertising, one can often see a happy family, order, nice warm colors. This appeals to the female sensibility. It is also interesting that income does not have a primary role for women (Zeman 1994).

In the context of the links between gender and advertising it is necessary to draw attention to the age of the recipients of advertising and other complex factors related to the expectations and perception of advertising (Litavcová *et al*. 2015). In this sense Šeďová (2007) states that advertising has a more significant impact on younger individuals primarily within the attributes of cognitive and social competences (Osvaldová and Halada 2007).

The identified and specified differences between men and women in terms of expectations of advertising and perception of advertising correspond with the findings by Vysekalová and Mikeš (2010) who state that for a successful advertisement it is important to know the personality of its recipient and thus the gender specifics from the perspective of appropriate targeting of the ad at a certain group of people which it plans to reach effectively.

The acquired results related to the expectations of advertising and perception of advertising as trans-situational, dispositional traits of the ad receivers should be interpreted in the context of situational characteristics (Owolabi 2005).

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Application of Selected Quantitative Methods to Assess the Development of Personal Income Tax in the Czech Republic

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Abstract:

The article deals with the assessment of selected aspects of personal income tax in the conditions of the Czech Republic. It follows from this article that the actual amount of the tax burden is based on the wage of a taxpayer – natural person, as well as on the amount of applied deductions that reduce the tax liability. For taxpayers with above-average income, the positive fact is that the moving progressive tax rate has been abolished since 2008, positive impact for the lower-income taxpayers is the fact, that there has been the increasing in child deduction rates. Therefore, in most scenarios, the tax burden by personal income tax decreases. Descriptions, analysis, synthesis, comparisons, correlations, and multi-criterion decision methods are used in the article.

Keywords: correlation analysis; effective tax rate; multi-criteria decision making; personal income tax

JEL Classification: C02; H21; H24; J30; K34

Introduction

The objective of the article is to select a variant, using the selected multi-criterion decision method, where the taxpayer has the highest utility in relation to the taxation of his incomes through the personal income tax in the conditions of the Czech Republic. Another objective is to assess the dependence of the development of two amounts of the most frequently used deductions – for a taxpayer and for children.

Taxes are an important tool of state fiscal policy (Sen and Kaya 2013, Szarowská 2014, Karolak 2011). Czech tax system is in its main features similar to systems of most developed european countries (Suhányiová and Korečko 2014). The tax system currently consists of direct and indirect taxes. Direct taxes are assessed directly on the basis of the taxpayer´s income or assets. Indirect taxes are paid and levied in the prices of goods, services, transfers and leases, the decisive moment of taxation is usually the very act of purchase or consumption of a commodity. One of the most important direct taxes is income tax, since its total share of the collection of direct taxes is the largest (Kuznetsova, Krzikallova and Kuznetsov 2017). But the major income tax item in public budgets of Czech Republic is value added tax (Široký, Kovářová and Randová 2012).

The first part of this article deals with the general structure of the personal income tax and its selected institutes. The next section characterizes the most significant changes which occurred in the Income Tax Act during the period of its being in force. Analysis of dependence of the selected indicators and application of multi-criteria decision making methods are discussed in the last section of this article.

1. Personal income tax and research background

Vickrey (1945) and Mirrlees (1971) has studied the design of a personal income tax. Personal income tax is a direct and distortion tax. The personal income tax is one of the most common policy tools used to alleviate income inequality (Li, Ma and Xu 2015). Many countries use income taxation as one of the essential tools of income redistribution (Sabitova and Dyudina 2015). Wagstaff *et al.* (1999) find that a personal income tax policy reduces the Gini coefficients of OECD countries by an average of 3.3% points. On the other hand, corporate income tax rates ought to be lowered to increase competitiveness (Duncan and Gerrish 2013). Redistribution of personal

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income tax in times of crisis in Portugal has studied Catarino and Teixeria (2016). The analysis was carried out for the period of the years 2008-2012, when the given country was affected by the financial crisis and the law regulating the income tax was amended in this context. It was found that the effect of this amending on alleviating the inequality in the distribution of pensions was only minimal.

Reith, Westhphal and Grazia (2016) investigated the effect of personal income tax progressivity on output volatility using data from a sample of OECD countries. They found supportive evidence that higher tax progressivity leads to lower output volatility. Results of Kramer *et al*. (2016) show that the underlying distribution of income in one country has an unsustainable effect on the overall results of taxation, when the tax system of the other county is applied. This study has analysed personal income tax in states Slovenia and the Federation of Bosnia and Herzegovina. Social Security contributions has, like in the Czech Republic, a significant share of the state budget revenue.

The first income tax was introduced in England in 1799. The income tax, all over the developed world moved from the margins to the centre of the fiscal state (Aidt and Jensen 2009). In the Czech Republic, the income tax emerged in 1993. It replaced an earlier payroll tax, tax on income of the population, agricultural tax and tax on literary and artistic activity. Personal income tax is, as it was said, one of the major revenue of the state budget of the Czech Republic. The development of personal income tax in was solved in research by Čok *et al*. (2012). They found out, that personal income tax burden on-low income individuals were reduced during the financial crisis.

A calculation of the personal income tax is based on the principle that the tax base is reduced by tax credits, from such calculated tax base a tax is calculated from which the tax credit can be deducted. Personal allowances are very effective tools that allow reaching a fairer distribution of tax burdens without using complex progressive tax scales (Tanzi 2000). Personal allowances are example of the stimulus role of personal income tax (Tománek 2014). The issue of optimal taxation of personal income tax was dealt by authors as: Wilson (1992), Wildasin (1991) or Cerioni (2015).

Peter, Buttrik and Duncan (2010) analyzed comprehensively the reforms in income taxation in 1981-2005. Using complete national income tax schedules, they calculated actual average and marginal tax rates at different income levels as well as time-varying measures of structural progressivity and complexity of national tax systems. Most countries reduced the number of tax bands and tax rates, which led to a reduction of the tax burden.

A form of an income tax in Czech Republic is governed by Act no. 586/1992 Coll., on income taxes. Selected institutes of this tax undergoes the changes annually. Not only the tax rate, but also tax allowances, deductible items or tax credits are subjects of the change. In 2007 and 2008 there was a change of techniques of income tax calculation.

2. Nominal size of personal income tax

Piketty and Saez (2013), who analyzed the optimal taxation of employees, consider the existence of a progressive income tax rates to be a perfectly normal thing. Progressivity allows the government to redistribute from rich to poor (Saez 2001). Examination the impact of progressive personal income tax rates and the effectiveness of this tax as an automatic economic stabilizer was made by Krajewski and Pilat (2017). The study shows that the analysed tax acts efficiency as an automatic stabilizer.

This trend remains intact until 2007. Since 2008 the moving progressive tax rate is replaced by a linear tax rate. In 2013, a second tax rate is added – so called solidarity tax increase in amount of 7%. This rate is applied to taxpayers with above-average incomes, who next to excessing a 15% tax rate portion are excessing additional 7 % of their incomes. Ways to tax the taxpayers who have the highest incomes were dealt by Piketty, Saez and Stantcheva (2014). The issue of effective taxation of above-average incomes were dealt also by Bach, Corneo and Steiner (2013) or Lang, Nöhrbaß and Stahl (1977). They found that the effective tax rate increased with income, although the increase of the tax rate was shown to be negligible at high income levels. Other result was that the income tax significantly contributed to reduce income inequality.

The optimal tax system should be designed to minimize avoidance through tax enforcement and tax neutrality across income forms. Table 1 shows the rate of personal income tax applied in 1993.

Table 1. Progressive tax rate in accordance with Act no. 586/1992 Coll.

From the tax base		Tax	From the tax base exceeding (CZK)
From CZK	Up to CZK		
0	60 000	15 %	
60 000	120 000	9 000 CZK + 20 %	60 000
120 000	180 000	21 000 CZK + 25 %	120 000
180 000	540 000	36 000 CZK + 32 %	180 000
540 000	1 080 000	151 200 CZK + 40 %	540 000
1 080 000	and more	367 200 CZK + 47 %	1 080 000

Source: own processing according to Act. No. 586/1992 Coll.

The original margin of rates was decreasing until 2007, a range from 15% to 47% was decreased to 12% to 32% that was applied in 2006 and 2007. The number of bands from 6 to 4 also decreased. The shift in many countries has been towards a less progressive tax system, at least when all the forms of taxation are taken into account (Lehmus 2014). For details on the development of the personal income tax rates see Krajňák (2015) or Večerník (2006). It should be noted that even after the introduction of the single tax rate the income tax remained still progressive due to the existence of tax credits and tax allowances of tax bases. Benefits of existence of a progressive tax are stated by Godar, Paetz and Truger (2015) or Kakwani (1977).

3. Change of tax allowances and credits

For the entire existence of the Income Tax Act, the tax allowances changed as well, as documented in Table 2.

Table 2. The development of tax allowance in CZK

Year	1993	1994	1995	1996	1997	1998	1999-2000	2001-2003	2004	2005
Taxpayer	20 400	21 600	24 000	26 400	28 800	32 040	34 920	38 040	38 040	38 040
Child	9 000	10 800	12 000	13 200	14 400	18 000	21 600	23 520	25 560	-

Source: own processing according to Act. No. 586/1992 Coll.

The original tax allowances were the amount for taxpayer, dependent child, for the other spouse, for partial or full disability pension and a severely physically handicapped person with the need for a guide. These stated items, on the contrary, are not to be found in today´s current wording of the law, it is because that they have been replaced by tax credits since 2006. By replacing selected tax allowances with tax credits, there were gains mainly in a group of taxpayers with below-average incomes. The amount for children was replaced as it can see in Table 3 already in 2005.

Table 3. The development of tax credit in CZK

Year	2005	2006-2007	2008-2009	2010	2011	2012-2014	2015	2016	2017
Taxpayer	-	7 200	24 840	24 840	23 640	24 840	24 840	24 840	24 840
1st child	6 000	6 000	10 680	11 604	11 604	13 404	13 404	13 404	13 404
2nd child	6 000	6 000	10 680	11 604	11 604	13 404	15 804	17 004	19 404
3rd child	6 000	6 000	10 680	11 604	11 604	13 404	17 004	20 604	24 204

Source: own processing according to Act. No. 586/1992 Coll.

A change was noted also in techniques of calculation of income tax. The tax base was the gross salary decreased by health and social security contributions paid by the employee. This tax base was multiplied by a tax rate, or by tax rates. The tax rate was a moving progressive one.

Since 2008 there has been a change in calculation technique of the personal income tax for the taxation of employment. As part of the tax reform, the Czech Republic newly introduced also taxation of electricity, solid fuels and natural gas (Zimmermannová and Menšík 2013), changes occurred also in the field of property taxes, such as the tax on the acquisition of immovable property (Široký, Krajčová and Hakalová 2016).

Calculation of the advance tax on personal income from employment from 2008 is shown in Figure 1. The tax base is the super-gross wage (Bajus, Hudáková and Gál 2015), *i.e.* a gross wage plus health and social security contributions paid by employers for their employees (currently overall 34%). Very high tax rates earmarked for funding the social security and health insurance have an impact on the amount of income tax. The conclusion reached by Kopczuk (2005) is confirmed, that the change in tax rates may lead to a change of the method of determining the tax base. In comparison with other countries, this fact in the tax system is unusual (Dušek, Kalíšková and Munuch 2015). The tax base is multiplied by the tax rate of 15%. The taxpayers with a monthly income of more than 4 times of the average wage in the national economy furthermore apply a solidarity tax increase of 7% from the difference between the gross wage and maximum monthly basis of assessment of employee for social insurance. If the taxpayer signed a tax declaration, it is possible for him/her to apply for the tax credits, or tax advantages. The most commonly applied tax relief is discount for taxpayer. If the value of the tax advantage is higher than the advance tax prior to the discount, there occurs a tax bonus. Otherwise, this method leads to obtaining an advance tax after discount.

Figure 1. Diagram of the calculation of personal income (employment) from 2008

Source: own processing

4. Methodology

To achieve the objective of the paper author used standard positivist economic methodology which also included the scientific methods of description, deduction, comparison, as well as study of legal sources and finally synthesizing methods. For analysis of dependency between the examined factors, the correlation analysis was used, for choosing the best variants method of multi-criteria decision making was used.

To assess the size of the tax burden, the indicator of *ETR* determined by equation (1) is used,

$$ETR = \frac{T}{W_g}, \tag{1}$$

where: T is a tax liability and W_g is gross wage.

4.1. Weighted sum approach

The assessment of utility of the *j*-th variants is performed by using the criteria matrix. A solution is selected from the set of variants $V=\{V_1; V_2; \ldots V_n\}$, the criteria $C=\{C_1, C_2, \ldots C_m\}$ are taken into account in decision-making process. The result is establishing of a model using a criteria matrix A (2),

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

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.

The resulting utility determined by a weighted sum approach is influenced by weight criteria, for significance of these criteria is different. The weight of the criteria is set by the method of the order determined by (3):

$$v_i = \frac{p_i}{\sum_{i=1}^{k} p_i}, \tag{3}$$

where: p_i is the value assigned to the *i*-th criterion.

The resultant utility of the *j*-th variant, as stated by Fishburn and Peter (1967), is determined by the sum of values c_{ij} (4)

$$c_{ij} = b_{ij}.\ v_{i,} \tag{4}$$

where: v_i is weight of *i*-th criterion; b_{ij} is element of criterial matrix determined by the equation (5).

$$b_{ij} = \frac{a_{ij} - a_i^{min}}{a_i^{max} - a_i^{min}}, \tag{5}$$

where: a_i^{max} expresses the highest (ideal) value of the *i*-th criterion; a_i^{min} the lowest (baseline) value of the *i*-th criterion.

For minimization criterion is used equation (6),

$$b_{ij} = \frac{a_i^{max} - a_{ij}}{a_i^{max} - a_i^{min}}. \tag{6}$$

4.2. Correlation analysis

Verification of the dependence of selected values is carried out by correlation analysis. One of the most commonly used indicators is the Pearson correlation coefficient *r* (7) which reflects the linearity degree of dependence:

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}}, \tag{7}$$

where: $\tilde{x}$ and $\tilde{y}$ are sample average. For more details about Pearson correlation coefficient see Newbold, Carlson and Thorme (2013).

5. Case study

5.1. Decision analysis

The Income Tax Act has undergone many amendments during its entire duration. The taxpayer's goal is to optimise the tax liability as much as possible. Using the chosen multi-criterion decision method, one of the variants out of the set will be chosen to maximize the utility of the decision making subject – the taxpayer – *i.e*. such variant, where the tax liability is the lowest and the possibilities how to optimize the tax liability are the highest. The decision-making analysis is done for the following 5 variants:

V_1 – taxation of income of natural persons according to the conditions applicable in the year 1993;
V_2 – taxation of income of natural persons according to the conditions applicable in the year 2005;
V_3 – taxation of income of natural persons according to the conditions applicable in the year 2007;
V_4 – taxation of income of natural persons according to the conditions applicable in the year 2008;
V_5 – taxation of income of natural persons according to the conditions applicable in the year 2016.

The period of the year 1993 is chosen due to the fact that it is the first year when incomes in the Czech Republic were taxed according to Act No. 586/1992 Coll. on Income Taxes. In 2005, a tax bonus was introduced, the years 2007 and 2008 are characterized by a change in the construction of the tax base and the technique of calculation of the tax liability and the year 2016 is the last analyzed period.

While choosing the optimal option, a total of 5 criteria will be taken into account – the effective tax rate (C_1), the possibility of a tax bonus emergence (C_2), the number of non-taxable portions of the tax base or tax credits (C_3), the existence of a moving progressive tax rate (C_4) and the method of the tax base construction (C_5).

The assessment and selection of the optimal variant will be made for taxpayers who differ in the amount of income set by the multiples of the average wage of the Czech Republic for the years 1993, 2005, 2007, 2008 and 2016. The amount of annual income of the taxpayer from employment will be in the following scenarios:

A) Average wage amount and deduction for 2 children in the household;

B) A half times the average wage and deduction for 2 children in the household;

C) 1,5 times the average wage and deduction for 2 children in the household;

D) Average wage without deduction for children;

E) A half times the average wage without deduction for children;

F) 1,5 times the average wage without deduction for children;

Table 4 shows the average wages in the Czech Republic for the analyzed years.

Table 4. Average annual wage in CZK

Year	1993	2005	2007	2008	2016
Average wage	70.848	220.128	251.484	272.292	324.072

Source: own calculation according to the Czech statistical office

The decision analysis will be first carried ouf for the scenario *mentioned in point A*. The input data are shown in Table 5. Values of criterion C_1 for the *j*-th variants capture the effective tax rate calculated by the relation (1). Criterion C_2 is a verbally expressed criterion indicating whether or not it is possible under the legislation in case of the given variant to make a tax bonus. The third criterion C_3 captures the number of tax-deductible items (non-taxable portions of the tax base or tax credits). Here the growing trend of this number is confirmed. Criterion C_4 is verbally expressed and it indicates whether income is taxed by moving progressive tax rate in a given year. If the answer is NO, a linear rate is used. The last criterion C_5 is of a similar nature, the decisive factor is whether the tax base is a supergross wage. If NO is indicated, the base of the tax is the gross wage reduced by social security and health insurance contributions. The way of constructing the tax base differentiates the Czech Republic from other countries in the world since 2008, because no other country works in the legislation with the concept of supergross wage and, on the contrary, in many countries, the tax base is decreased by the compulsory contributions.

Table 5. Input data

Criterion	C_1	C_2	C_3	C_4	C_5
V_1	4,83%	No	7	Yes	No
V_2	6,11%	Yes	12	Yes	No
V_3	5,65%	Yes	13	Yes	No
V_4	3,28%	Yes	13	No	Yes
V_5	3,05%	Yes	14	No	Yes

Source: own processing according to Act. No. 586/1992 Coll.

The weight of the assessed criteria is determined by the method of the order in Table 6 using (3)

Table 6. Weight of criterion

Criterion	C_1	C_2	C_3	C_4	C_5
Number of points	5	1	3	3	3
Weight of criterion	0,333	0,067	0,2	0,2	0,2

Source: own calculation

The most important criterion is considered to be the value of the effective tax rate, since this value, unlike the nominal tax rate, reflects the actual amount of the tax burden. On the contrary, the least significant criterion for scenario A is criterion C_2 – the possibility of a tax bonus emergence. In the case of a taxpayer with an average income in relation to the amount of tax liability before the rebates, there is no presumption that the tax bonus would arise. The reason is that fact that this entire amount is only a tax credit. On the above mentioned grounds, the number of points assigned to this criterion is the lowest.

Verbally expressed criteria C_2, C_4 and C_5 are converted to numerical values in Table 7. Criteria C_1 and C_5 are criteria of minimization type, the rest are criteria of maximization type.

Table 7. Criterial matrix

Type of criteria	MIN	MAX	MAX	MAX	MIN
V_1	4,83%	0	7	0	0
V_2	6,11%	1	12	0	0
V_3	5,65%	1	13	0	0
V_4	3,28%	1	13	1	1
V_5	3,05%	1	14	1	1

Source: own calculation

Using (5) or (6), according to the criterion type, the values in the standardized criterion matrix are calculated in Table 8.

Table 8. Normalized criterial matrix

Type of criteria	C_1	C_2	C_3	C_4	C_5
V_1	0,4183	0	0	0	1
V_2	0	1	0,7143	0	1
V_3	0,1486	1	0,8571	0	1
V_4	0,9253	1	0,8571	1	0
V_5	1	1	1	1	0

Source: own calculation

Using (4), the final utility associated with the realization of the *j*-th variant is determined by weighted sum method in Table 9.

Table 9. Total utility

Variant	V_1	V_2	V_3	V_4	V_5
Utility	0,339	0,409	0,487	0,746	0,800

Source: own calculation

For a taxpayer with an average income and two children in a common household, the fifth variant, *i.e.* year 2016, is the best option when assessing all the criteria considered. Among the main reasons there are an increase of the deduction amount for dependent children and the application of only one tax rate of 15%. As the least favourable is considered the situation in year 1993, the reason for this is the existence of a moving progressive tax rate. On the contrary, more favourable at this time was a construction of a tax base where the base was created by a gross wage decreased by the compulsory contributions paid by the employee, while in 2016 the supergross wage creates the basis, which means that the real tax rate is higher than the nominal rate (without consideration of deductions). Similar assessing procedure is also used for the taxpayers mentioned in sections B) to F). Table 10 lists effective tax rates corresponding to the relevant amount of income and deductions applied. Table 11 states the weights of criteria. The remaining values of the criterion matrix of criteria C_2, C_3, C_4 and C_5 are the same as in case of a taxpayer with the average amount of income applying the deduction for 2 children in the household.

Table 10. Effective tax rate (in %)

Scenario	B	C	D	E	F
1993	0	7,50	8,89	4,57	10,73
2005	-2,97	10,39	11,58	8,01	14,12
2007	-4,77	11,05	10,5	4,81	14,32
2008	-13,68	8,94	11,09	1,99	14,16
2016	-18.77	8,73	12,43	0.00	14,98

Source: own calculation

Table 11. Weight of criterion

Scenario	B	C	D	E	F
K_1	0,267	0,267	0,334	0,334	0,267
K_2	0,267	0,267	0,000	0,000	0,000

Scenario	B	C	D	E	F
K_3	0,133	0,267	0,222	0,200	0,200
K_4	0,200	0,200	0,222	0,266	0,333
K_5	0,133	0,200	0,222	0,200	0,200

Source: own calculation

The resulting values are determined by (4). The individual elements of the criterion matrix are determined by (5) or (6) according to the criterion type. The aggregated results are shown in Table 12.

Table 12. Evaluation of variant

Scenario	B	C	D	E	F
V_1	0,334	0,467	0,713	0,609	0,507
V_2	0,737	0,507	0,492	0,609	0,254
V_3	0,782	0,495	0,594	0,771	0,384
V_4	0,575	0,654	0,570	0,421	0,556
V_5	0,667	0,707	0,222	0,534	0,504

Source: own calculation

A taxpayer who receives income in the amount of a half times the average wage and applies a tax benefit for 2 children in a common household (*scenario B*) shows the highest utility in case of V_3, *i.e.* in 2007. The reason is the existence of a tax bonus that arises for the taxpayers with under-average incomes. Also, the existence of a moving progressive tax rate causes that the lower-income taxpayers' incomes are taxed at a lower rate than those with average or above-average income. The least favourable legislation appears to be the one that is in force on 1 January 1993. Raising the value of a tax advantage is a factor that significantly affects the tax rate, but it is not the only indicator that affects the amount of income tax. The results confirm the fact that income tax reform on 1 January 2008 is favourable mainly for the average income taxpayers, since the resulting utility between V_3 and V_4 is significantly decreasing.

In the decision-making situation of a taxpayer with an income of 1,5 times the average wage in the national economy of the Czech Republic (*scenario C*), the optimal variant is V_5 – year 2016. The reason is the application of only one rate and the already mentioned increase of the amount of the deduction for children. The moving progressive tax rate causes that taxpayers with above-average incomes experience the lowest utility in years when revenues are taxed by just this type of rates (1993 to 2007).

In the case of an assessment of tax aspects for a taxpayer with an average income without applying the deduction for children in a common household (*scenario D*), the optimal year is the year 1993. On the contrary, the lowest resulting value is that of the last variant from the set, where the incomes and wages are at the level of year 2016. Considering the fact, that this taxpayer does not apply for the deduction for children, the increase in the amount of the deduction for children is not a factor that would reduce his tax liability.

When analyzing all the factors influencing the choice of the optimal variant for a taxpayer with under-average income (*scenario E*), the best situation appears to be in year 2007. Most of this taxpayer's incomes were taxed in the first band by the tax rate of 12%. On the contrary, the least optimal situation in year 2008 was for the lower-income taxpayer. For the above-average income taxpayer (*scenario F*), the optimal situation is for year 2008. The moving progressive tax rate was abolished, on the other hand, there was a change in the method of construction of the tax base causing the amount of the tax base to be higher than the gross wage. The least favourable situation was in 2005.

5.2. Correlation analysis

Data in Table 2 and Table 3 show that the amounts of deductions for taxpayers or children are the most frequently changing amounts of deductions. Using (7) the interdependence of changes of both values is analyzed. Table 13 reflects the results of the correlation analysis for the period of 1993 – 2004, table 14 for the period of 2006 – 2017. The year 2005 is excluded from the analysis, since in this year, the deduction for a taxpayer had a form of the non-taxable portion of the tax base, while the deduction for the children had a form of a tax advantage (*i.e.* tax credit, tax bonus, or a combination of both).

Table 13. Pearson correlation coefficient – deduction for taxpayer and for children

		Taxpayer	Child
Taxpayer	Pearson Correlation	1	0,989
	Sig. (2-tailed)		,000
	N	12	12
Child	Pearson Correlation	0,989	1
	Sig. (2-tailed)	0,000	
	N	12	12

Source: own calculation

The development of the non-taxable portion of the tax base for both the taxpayer and children has had the rising trend all the time, the increase in the deduction of one amount was usually accompanied by an increase in the deduction of the other one. This is also confirmed by the results of the correlation analysis, the coefficient value is 0,989 and there is a high degree of direct dependence between the two variables analyzed.

Table 14. Pearson correlation coefficient – credit for taxpayer and for children

		Taxpayer	First Child	Second Child	Third Child
Taxpayer	Pearson Correlation	1	0,924	0,761	0,641
	Sig. (2-tailed)		0,000	0,004	0,025
	N	12	12	12	12
First Child	Pearson Correlation	0,924	1	0,887	0,781
	Sig. (2-tailed)	0,000		0,000	0,003
	N	12	12	12	12
Second Child	Pearson Correlation	0,761	0,887	1	0,979
	Sig. (2-tailed)	0,004	0,000		0,000
	N	12	12	12	12
Third Child	Pearson Correlation	0,641	0,781	0,979	1
	Sig. (2-tailed)	0,025	0,003	0,000	
	N	12	12	12	12

Source: own calculation

The values of Pearson correlation coefficient for the second analyzed period in years 2006 – 2017 are lower. Higher degree of direct dependence is between the amount of the deduction for the taxpayer and the first child. Since the number of children started to be taken into account since 2015 as well, the correlation coefficient values for the amounts of a payer versus second or third child are lower. This is because the amount for children has increased, while the amount of the taxpayer's deduction has remained unchanged since 2008 until present (with the exception of the year 2011). The reason for increasing the deduction for children is the government's effort to favor socially the families with a higher number of children.

Due to the fact that the amounts of tax benefit for children has been graduated according to the number of children only since 2015, the values of the coefficients for the assessment of the dependence between the number of children reach 0,887 (first child x second child), or 0,781 (first child x third child). On the contrary, the highest rate of dependence is between the amount for second and third child (0,979).

Tax credit or non-taxable portion of the tax base of the taxpayer is the amount to which each taxpayer is entitled, this amount represents a certain non-taxable minimum. This is therefore a deduction that is most widely used in practice. In addition to these two deductions, it is also possible to apply for the discounts to a partial or full disability pension or for a student. Compared to a deduction for children, the amount of these amounts changes rather rarely (the last change took place in 2008).

Conclusion

The aim of this article was to select a variant by means of the selected multi-criterion decision method – the year when taxation of revenues from incomes from employment by means of income tax reaches the highest utility. This

optimal variant differs depending on the amount of the taxpayer's income, on the extent of applied tax deductions decreasing the tax liability.

Taxation is a fundamental policy instrument in the hands of governments (Castenheira 2014), therefore the very form of the tax acts depends on the stage of the economic cycle or the ruling party and its particular political agenda. It is usual that during the recession tax burden is reducing, while increasing the period of expansion. There are a large number of people in any economy who differ with respect to a number of characteristics, in particular their endowments and tastes (Atkinson and Stiglitz 1976).

The nominal tax rate itself does not provide information about the level of the tax burden, there is a need to consider the effective tax rate or other provisions of the law allowing a reduction of either the tax base or the calculated tax. It should be noted that a taxpayer who has a below-average income and who applies the deduction children, does not pay any tax and since 2005 he/she is additionally entitled to a tax bonus. Taxpayers receiving above-average income (in this case at the level of 1,5 fold of the average wage) did not receive a tax bonus in any period, since they have a high tax base.

In many cases there was a decrease in ETR between the years 2007-2008. This fact leads to the conclusion that although there is a reduction in the tax burden of direct taxation, on the other hand, the tax burden by indirect taxes, especially VAT, is gradually increasing. Each country´s government seeks to maximize its tax revenue (Gabsewitz, Tarola and Zanaj 2016).

From the results of the correlation analysis examining dependences between the development of the two most used deductions – for children and a taxpayer, there arises a high degree of dependence between the amount of both deductions. If the level of tax burden on taxpayers is to be assessed only by tax rates, all provisions of the act that either reduce or increase the tax liability would have to be omitted from the act. This step is highly unlikely, since the interest of each state is to support families with children or to create a certain tax threshold that belongs to the taxpayer. This is a trend which governs not only the Income Tax Act in the Czech Republic, but also the tax laws in other developed countries regulating the taxation of income of private individuals. The shift in many countries has been towards a less progressive tax system, at least when all the forms of taxation are taken into account.

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New Sources of Debt Financing Investments in Russian Real Economy

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Abstract:

The article notes that at the present time, when Russia faces the drying-up of access to many external sources of funding and a decline in oil prices, it is necessary to create new financing mechanisms for economic growth and modernization. Lack of funds and unavailability of credit resources are the main factors limiting investment activity. Therefore, of high relevance is the task to search for fundamentally new source of debt financing in the real economy, which will help to solve the problem of availability of borrowed funds for investment in nonfinancial assets, and fixed assets. This source of funding may be funds from the public, since growth of assets (currency, cash and savings, including real estate) is comparable to the total volume of investments in fixed capital.

Keywords: investment; expanded reproduction; financing; structure; own and borrowed funds; savings of the population

JEL Classification: E20; E22

Introduction

The difficulties in economic development of modern Russia, on the one hand, appear to be multi-faceted. But on the other hand, there are some effective ways to overcome them. Together, they represent certain contours of new economic reality, the background for a variety of options for economic growth, which is increasingly discussed at scientific meetings.

As noted in Russian leadership's program materials, new mechanisms should be constructed to finance economic growth and modernization, in particular when the country is simultaneously challenged by the lack of

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external sources of funding, and the decrease in oil prices. It is emphasized that more attention should be paid to domestic sources of financing, households' savings, and increase in their rate (Medvedev 2015).

In turn, investments, reflecting the balance between the current consumption and the accumulation of resources, are classified in two main categories that have a different impact on the parameters of social production: financial (speculative) and real (Bahturazova 2014). Financial investments are associated with investing in various types of financial assets allowing to derive speculative profit, while real investments involve financing the real productive capital. Therefore, the real investments are primarily important for expanded reproduction.

1. Methods

The methodology was built on the systematic approach, complemented by theoretical and empirical generalizations, statistical groups method, calculation and design method, functional and structured analysis, expert method, graphical visualization method.

2. Results

2.1. Theoretical foundations for the analysis of investment processes

As known from classical theories, the life of any society is accompanied by continuous consumption of economic benefits. This circumstance requires a constant renewal of production of these goods. For this purpose, the renewal of necessary resources - the objects (raw materials), and capital goods (machines and equipment, buildings and structures), as well as the manpower - is critical. Besides, the renewal of corresponding forms of economic and industrial relations is required. The process of public goods reproduction covers all these processes within four key stages (production, distribution, exchange and consumption).

It is believed that the first scientifically based view on the problem of public goods reproduction appears in physiocrats' studies justifying the idea of a balanced economic system with a proportional relationship between material and monetary elements of national production. Several alternative views on the public goods reproduction had formulated the provisions under which the annual social product was equal to the sum of all society members income, and labor, capital, land were considered as sources of society members income. Many other works came later: alternative or devoted to the criticism, but also continuing the development of these conceptual positions. However, the most popular, according to many contemporary scientists and economists, became the Marxist doctrine, in which two types of reproduction of public goods had been described in detail: simple and expanded (Blaug 1994).

Simple reproduction is a constant renewal of production cycle with a stable output value. In contrast, the expanded reproduction is characterized by a gradual increase of production.

Accordingly, two major groups were identified based on product criteria for a detailed analysis of reproduction processes in the economy. The first comprised manufacturers and sectors producing the capital goods - industrial products used in subsequent economic activity. The second included manufacturers and sectors producing consumer goods - commodities purchased to satisfy human and social needs or wants. Together, these two groups cover the entire sphere of social production.

Thus, in terms of balance between capital goods production and production of consumer goods, the process of simple reproduction of public goods can be represented in the form of following equations:

$$\text{Group I: } C_I + V_I + m_I = W_I; \qquad \text{Group II: } C_{II} + V_{II} + m_{II} = W_{II}. \tag{1}$$

where: CI and CII are constant capitals, or the cost of material resources used, respectively, in units I and II; V_I and V_{II} are variable capitals, or the labor cost, respectively, in groups I and II; m_I and m_{II} - surplus product created, respectively, in groups I and II; W_I and W_{II} - the total social products, produced, respectively, in I and II groups during the year.

Therefore, at the beginning of the year manufacturers in the groups I and II have at their disposal resources (CI + VI) and (CII + VII), which are transformed during the production into the value of WI and WII products along with the creation of the surplus product mI and Mii. In this case, to restart the production in the following year (simple

reproduction), the same amount of material and labor resources (CI + VI) and (CII + VII) as last year, is required. Thus, the value of the surplus products mI and MII, created by the sale of WI and WII goods produced in the last year, has to be used entirely for consumption in the current year.

In contrast, for the expanded reproduction, a part of the annually produced surplus products should have used to increase the material and human resources in order to expand production of the gross national product in the future. As a result, the expanded reproduction can be represented in the form of the following equations:

$$\text{Group I: } C_I + V_I + m_{(П)I} + (m_{(C)I} + m_{(V)I}) = W_I; \qquad \text{Group II: } C_{II} + V_{II} + m_{(П)II} + (m_{(C)II} + m_{(V)II}) = W_{II}. \quad (2)$$

where: it is evident that the surplus-products of I and II groups are divided between the consumption fund (m (n) I and m (R) II) and the accumulation funds (m (n) I and m (R) II), a portion of which is spent on additional capital goods (m (C) I and m (C) II), and the other portion is allocated to the recruitment of additional manpower (m (V) I and m (V) II).

This circumstance (the need to spend a portion of the surplus product on the expansion of resources (capital goods and labor force)) distinguishes the expanded reproduction from the simple reproduction, under which the entire surplus product is destined for consumption. In turn, the constant expansion of resources in the conditions of expanded reproduction leads to a corresponding increase of the gross national product, which is the cause of socio-economic development.

It should be noted that many economists, who developed in recent decades the idea of division of the whole social production sphere into groups, underlined the possibility of the third group, which includes the sphere of non-material production - the service sector. This area was defined in the frame of popularization of post-industrial development theories. However, later studies provided many science-based counter arguments, in one way or another pointing out the fact that any of the services, depending on their producer's or consumer's orientation, could be distributed between the two previously identified groups of social production.

Analysis of investment processes, providing expanded reproduction, is based on the study of the dynamics of gross capital formation and savings rates. Gross fixed capital formation represents residents' investments in fixed assets, changes in stock reserves and net acquisition of inventories in the reporting period to generate a new revenue in the future by using them in the production cycle.

At the same time, gross fixed capital formation includes the following components: acquisition less disposals of new and existing fixed assets; cost of major improvements of produced tangible assets; cost of the improvement of non-produced tangible assets; costs incurring in transferring ownership of non-produced assets. In turn, gross savings are a part of disposable income that was not spent on final consumption of goods and services during the reporting period (Investments in Russia 2015). The rate of gross capital formation and savings is the ratio of these indicators to the GDP.

Change in the rate of gross capital formation indicates a change in investment activity in the real economy: increase or decrease in the accumulation of fixed assets. In turn, the change in the rate of gross savings characterizes the increase or reduction of resources that can be invested in the gross capital formation in order to expand production in the real sector of the economy.

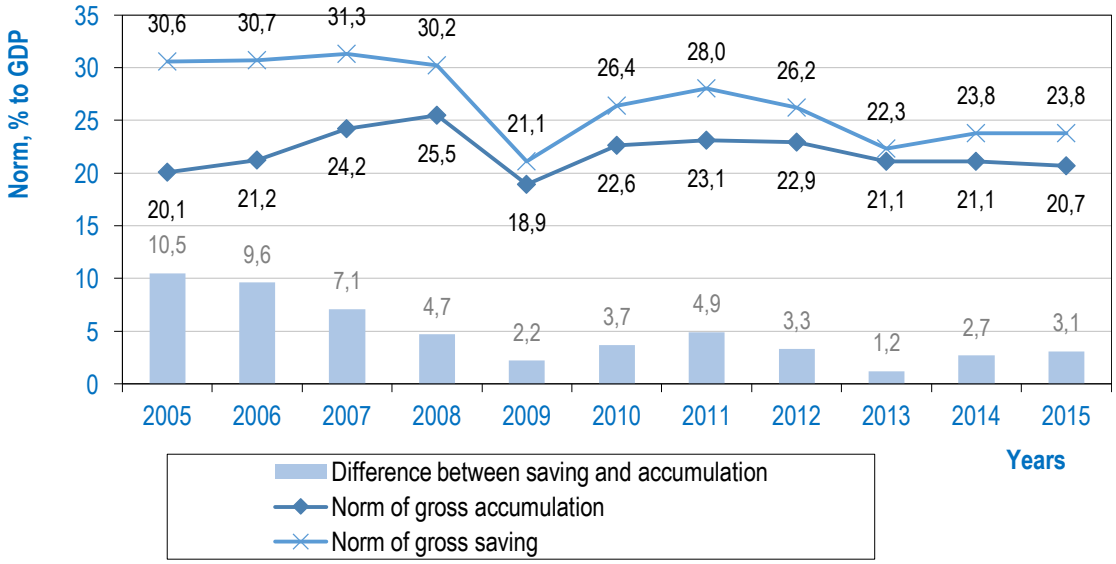
As a rule, the volume of gross savings exceeds the amount of gross capital formation, which preserves the potential increase in investment in real sector. Consequently, the greater the difference between gross savings and gross fixed capital formation, the greater the potential to increase savings in the future, but the resources that participate in the expanded reproduction in the current period would be greater too. Therefore, it is necessary to ensure the balance between savings and fixed capital formation, where the existing resources would be maximally involved in the expanded reproduction (Grigoriev and Ivashchenko 2011).

2.2. Comparison of gross capital formation and gross savings rates

Figure 1 is a diagram illustrating the dynamics of gross capital formation and national savings in the period from 2005 to 2015. During the reporting period, the absolute amount of gross capital formation increased from 4.3 to 16.8 trillion rubles a year at market prices, or 41.0% - in real terms (in 2005 prices). At the same time, the real GDP increased by 36.5% (in 2005 prices), or from 21.6 to 80.8 trillion rubles at market prices. Thus, the rate of gross

capital formation did not significantly changed and varied from 21 to 23%, but sometimes it went beyond and varied from 18,9 to 25,5%. In other words, during the decade in review the average annual capital accumulation was about 1/5-1/4 of GDP.

Figure 1. Comparison of accumulation rate and norms of gross savings in the period from 2005 to 2015 in % of GDP (the graph has been built based on the data from: National accounts. Federal State Statistics Service).



At the same time, the gross savings rate was different. Thus, from 2005 to 2015 gross savings increased from 6,8% to 19.2 trillion rubles in absolute terms. But in real terms, the growth was at the level of statistical error, and amounted to only 6.4%. This led to a decrease of 6,8 p.p. in the gross saving rate - from 30.6 to 23.8% against the background of a real GDP growth. This process illustrates the decrease in resources that could be invested in the gross capital formation in order to expand production in the real sector of the economy.

As a result, we can observe a reduction in the difference between gross savings and gross capital formation (Figure 1). Thus, during the years under review this difference narrowed from 10.5 to 3.1% (reaching 2.2% and 1.2% in 2009 and 2013, respectively). On the one hand, this fact can be interpreted in a positive way: reducing of the gap between the volumes of gross savings and gross capital formation allows for a fuller involvement of resources in the expanded reproduction.

On the other hand, it should be noted that this balance has been achieved by reducing in the rate of gross savings at a constant gross fixed capital formation, *i.e.*, saving of absolute figures of gross savings in real terms by increasing the gross fixed capital formation and GDP. That points to the actual reduction in the volume of investment resources, which should ensure an expanded reproduction in the future. In fact, there is a process of economic growth while reducing the investment resources that can be used for further expanded reproduction. The logical result will be a reduction in the intensity of investment processes and the slowdown of real economic growth.

2.3 Analysis of investments in non-financial and financial assets

Further analysis of investment processes in the real economy confirms the concern expressed above. For *e.g.*, let us consider the dynamics and structure of investments in non-financial and financial assets (Table 1 and Figure 2).

Table 1. Investments in non-financial and financial assets from 2005 to 2015, bln. rubles

	2005	2010	2014	2015
Investments in non-financial assets	2.945,7	6.712,1	10.532,9	10.730,8
incl. investments in fixed assets, %	98,2	98,7	98,5	97,7
Investments in financial assets	9.209,2	41.274,8	78.604,4	127.113,6

	2005	2010	2014	2015
incl. long-term financial investments, %	20,1	11,9	12,5	10,9

Note: * * The table is drawn up based on the data from: Investments in non-financial assets. Federal State Statistics Service; Financial Investments. Federal State Statistics Service; International Investment Forum Sochi-2016. Variety of options for economic growth. The Search for a development model. Panel session.

Investments in non-financial assets include investments in non-produced non-financial assets and investments in fixed assets. At the same time the investments in non-produced non-financial assets include the cost for acquiring land, natural resources, contracts, leases, licenses, business reputation and business linkages. And the investments in fixed assets are defined as the aggregate of expenses incurred in the construction and reconstruction of objects (which leads to an increase in their cost), acquisition of machinery, equipment, vehicles, manufacturing inventories, in the formation of a breeding herds, planting and growing of perennial crops, the acquisition of intellectual property, the cost of research and development, etc. Investments in financial assets (financial investment of companies), in turn, include investments in state and municipal securities, securities of other companies, investments in authorized capitals of other companies, loans granted to other companies, deposits in credit institutions, accounts receivable (acquired on the basis of assignment of claims) *etc*. (Investment in Russia 2015).

Thus, between 2005 and 2015 the volume of investments in non-financial assets in absolute terms increased from 2.9 to 10.7 trillion roubles a year at market prices (Table 1), which in real terms (in 2005 prices) amounted to 33.0% of growth (Figure 2). At the same time, the volume of investments in financial assets increased from 9.2 to 127.1 trillion roubles per year at market prices, or more than 5 times in real terms. This led to a reduction in the share of investments in non-financial assets in the overall structure of legal entities investments from 24.2 to 7.8%. The share of long-term investments (which are defined as investments with the intention of generating revenues, for a period longer than one year) decreased by 2 times - from 20.1 to 10.9%.

Therefore, considering that investments in non-financial assets are mainly represented by investments in fixed assets (about 98% - Table 1), and their growth (averaging 2.6% per annum) is far cry from the growth of investments (Figure 2), we may conclude that between 2005 and 2015 the investment processes in the real economy developed in the tideway of increasing profits from speculative investments, while investments for the purposes of expanded reproduction showed stagnation.

2.4. Analysis of factors affecting growth of investments in non-financial assets

To understand better the identified problem, let us consider the factors affecting the growth of investments in non-financial assets. Table 2 shows the data reflecting the structure of investments in fixed capital by funding source between 2005 and 2015.

The table shows that, during the period under review, almost half of all investments in fixed assets were provided from companies' own funds and the other half by borrowings.

Moreover, funding on the expense of companies' own funds varied from 40% to 50%; and financing through borrowings - from 50% to 60%. Regarding the structure of the borrowed funds, the table also clearly shows that no significant changes occurred, however, the values of individual indicators varied considerably over the years.

Figure 2. Changes in the real level of non-financial and financial investments between 2005 and 2015, in percentage by 2005 (the graph has been built based on the data from: Investments in non-financial assets. Federal State Statistics Service; Financial Investments. Federal State Statistics Service; National accounts. Federal State Statistics Service)

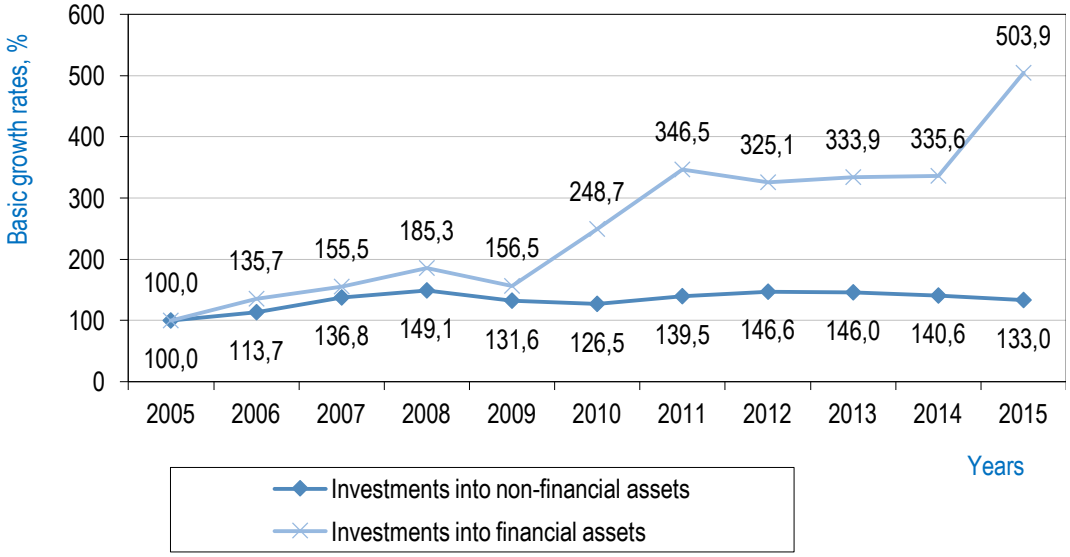


Table 2. Structure of investments in fixed assets by sources of financing between 2005 and 2015, % *

	2005	2010	2014	2015
Investments in fixed assets	2.893,2	6.625,0	10.379,6	10.485,0
of these by source of funding:				
Own funds	44,5	41,0	45,7	50,2
Borrowed funds	55,5	59,0	54,3	49,8
of which :				
Bank loans	8,1	9,0	10,6	8,1
incl. foreign bank loans	1,0	2,3	2,6	1,7
Borrowings from other entities	5,9	6,1	6,4	6,6
Foreign investments	-	-	0,9	1,2
Budgetary funds	20,4	19,5	17,0	18,3
incl.:				
Federal budget resources	7,0	10,0	9,0	11,3
RF subjects budgetary funds	12,3	8,2	6,5	5,7
Municipal budget funds	-	-	1,5	1,3
Extra-budgetary funds	0,5	0,3	0,2	0,3
Other companies and population funds invested in shared construction	3,8	2,2	3,5	3,2
incl. funds of population	-	1,2	2,7	2,4
Others	16,8	21,9	15,7	12,1
incl.:				
Funds from organizations of higher authority	10,6	17,5	13,2	…
Funds from corporate bonds emission	0,3	0,0	0,1	…
Funds from issue of shares	3,1	1,1	1,1	…

Note: * The table has been drawn up based on the data of: Investment in non-financial assets. Federal State Statistical Service.

It is more important to pay attention to the portion of individual sources of funding. Thus, budget and other funds were the most vital for investments in fixed capital at the expense of borrowed funds with a total share of 2/3 in the structure of borrowed funds, or 30-40% of the total investments in fixed assets from all sources. It is remarkable that the structure of budget funds is dominated by federal budget, while the importance of funds from

the budgets of the Russian Federation's regions reduced their importance. The main component of other resources was funding from superior organizations, while financial instruments such as issue of bonds and shares were used very rarely. Bank loans and borrowings from other entities were a less common funding source for fixed investment with 14-20% and 10-13%, respectively. Means of other companies and household savings were even less often invested in shared construction, with a preponderance of funds from population.

2.5. Factors that affected the investment activities of Russian enterprises between 2005 and 2014

In general, as the Table 2 shows, despite the active development of investment in non-financial assets, there were no significant changes in the structure of investment in fixed capital at the expense of borrowed funds during the period under review. Borrowed funds represent only a half of the total volume of investment. Moreover, in the borrowed funds, a significant part is constituted of the budgetary funds and funds from higher authorities, while funds from financial institutions (bank loans, borrowings from other entities, issue of securities, funds from shared construction, and so on) are poorly represented.

Table 3. Factors that affected the investment activities of Russian enterprises 2005 - 2014, (% of respondent enterprises)

	2005	2010	2014	Increase, %
Lack of own funds	65	67	60	-7,7
Uncertain economic environment in Russia	18	32	34	88,9
Investment risk	25	23	30	20,0
High interest rates on commercial loans	31	31	29	-6,5
Lack of demand for the products	21	19	23	9,5
Sophisticated access to loans for investment projects	17	15	16	-5,9
The low profitability of investments in fixed assets	14	11	13	-7,1
Imperfect legal framework regulating investment processes	17	10	11	-35,3
Unsatisfactory state of technical base	9	5	7	-22,2

Note: * the table has been drawn up based on the data of Russian Statistical Yearbook. 2015.

As a result, the lack of own funds and the unavailability of borrowed financial resources are the main factors that affect the investment activities. In particular, the lack of own funds in 2014 was noted by 60% of respondents (Table 3), high interest rates on commercial loans - by 29% of respondents. Although these figures have known a marginal decline, they still remain stable. However, only a small number of respondents point to the sophisticated access to loans and the low profitability of fixed investments - 16% and 13% in 2014, respectively.

3. Discussion

Thus, a situation arises when only a small number of manufacturers said fixed investment unattractive (due to low profitability). At the same time the vast majority of producers are satisfied with the existing mechanisms to obtain loans (the sophisticated access to loans for investment projects).

However, some 2/3 of producers faced a lack of their own funds available for investments. And it is not only about the circumstances in which the decision is made to provide finance exclusively from the own funds. A significant part of this 2/3 of producers lack funds to secure a loan or a credit servicing (Gurvich and Prilepsky 2016). As a result, one in every three manufacturers identifies high interest rates on commercial loans as the main factor affecting investment in expanding production.

In such conditions, the funds of population become the principal renewable source of financing, and this fact draws the attention of scientists and specialists (Tatuyev and Bakhturazova, 2014). First of all, this is due to the growth of population assets (currency, cash and savings) in the past crisis year which amounted to more than 9 trillion rubles. It is noteworthy that in the same year, the total volume of investment in fixed assets was comparable (more than 10 trillion rubles) according to the statistics (Federal State Statistics Service 2016).

Conclusion

Thus, taking into account all the challenges of the new economic reality, it is necessary to form such financing mechanisms of economic growth and modernization, which would be targeted towards effective involvement of population's savings, as an essential source of domestic investment.

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Provincial Inflation Dynamics in Indonesia: Hybrid New Keynesian Phillips Curve Approach

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Abstract:

This paper attempts to analyze the provincial inflation dynamics in Indonesia by utilizing Hybrid New Keynesian Phillips Curve and recent developments in econometric panel data approaches. The approaches follow relevant theory, using dynamic panel data analysis and GMM estimation. In general, the previous studies of inflation dynamics in Indonesia using national data may have some drawbacks because the results tend to be dominated by the behavior of inflation in Java. The results of this study are expected to be able to represent the inflation dynamics in all of provinces in Indonesia. The findings show that the approach can be utilized to estimate the inflation dynamics in Indonesia. The empirical results also indicate that formations of inflation expectations are determined by past- and future- inflation. In other words, the provincial inflation dynamics in Indonesia are dominated by the forward-looking behavior of economic agents. The estimated parameters of the backward- and forward-looking behaviors are relatively lower than those of the previous studies. Those may be resulted by the use of national data instead of provincial data in the previous studies. It is suggested that our economic agents respond quickly to the credible policies introduced by government and future information.

Keywords: hybrid NKPC; inflation dynamics; provincial inflation; panel data; GMM

JEL Classification: E31; E12; C22

Introduction

The previous studies mostly analyzed inflation dynamics in Indonesia using national data. Solikin (2004) and Insukindro and Sahadewo (2010) using backward and forward-looking behaviors found that the latter was more dominating.

The use of national data has some drawbacks because it tends to be dominated by the provinces in Java whereas the provincial panel data give further illustration of the actual condition of the entire region of Indonesia. Mehotra *et al.* (2010) stated that researches on inflation that use provincial data is important for a large country because they potentially have areas with differences in institutions, economic performances, market development rate, as well as inter-regional economic impediments, such as trade barriers, which can be a source of differences in the formation of inflation. Their statement was also supported by their study in China that found a variation of inflations in each province and forward-looking inflation component in 22 of the 29 provinces under investigation. The similar finding was obtained by Chaban and Voss (2012) who studied inflation in Canada and reported the variation of inflation in 10 different provinces.

This study uses the hybrid New Keynesian Phillips Curve (NKPC) and discusses the advantages of using provincial panel data, the validity of using output gap in estimating the hybrid NKPC model and estimation of inflation dynamic models in Indonesia.

1. The advantage of using provincial panel data in estimating inflation

As mentioned above, the weakness of using national data in estimating inflation dynamics in Indonesia is the very dominant influence of certain provinces in the national data. These provinces are those which are given a great weight in the calculation of the average national inflation, have a large GDRP (Gross Domestic Regional Product), and encounter a large amount of change in money supply. Table 1 shows the weight of 6 provinces in Java on the national inflation data, respectively, 22.49%, 5.3%, 18.7%, 6.9%, and 10.9% for Jakarta, Banten, West Java, Central Java and Special Region of Yogyakarta, and East Java. The total weight given to these 6 provinces in Java amount to 64.3% while the remaining 28 provinces outside of Java are only given 35.7%. Moreover, the total weight of the national inflation data given to Jakarta and its surrounding areas, Jabodetabek, is 37.65% which is bigger than the combined weight given to all the provinces outside of Java.

Table 1. The Weight of each Province on the National Inflation Calculation

Region	Proportion (%)
Jakarta	22.5
Banten	5.3
West Java	18.7
Central Java & Yogyakarta	6.9
East Java	10.9
Sumatera	18.9
Balnustra	3.0
Kalisulampua	13.8

Source: Bank Indonesia, Regional Economic Study Jakarta, 2009
Notes: Kalisulampua: Kalimantan, Sulawesi, Moluccas and Papua; Balnustra: Bali and Nusa Tenggara

In estimating the inflation dynamic model, the output gap is used as an important driving force variable. The output gap is computed using GDP (Gross Domestic Product) in Indonesia. However, the role of the provinces with larger output on GDP is dominant. This domination occurs when the output gap of each province is calculated separately before being used to estimate inflation dynamics in Indonesia.

Table 2 reports the average share of GDRP of every province to the total output of 32 provinces. The GDRP share of Banten and Jakarta is 21.74%, East Java 15.51%, West Java 14.58%, and Central Java and DIY 9.44% and the total share of the provinces in Java is 61.27%. Furthermore, the share of GDRP of 10 provinces in Sumatra produced a total of 21.42%, Kalimantan 8.69%, Sulawesi 4.25%, Bali and Nusa Tenggara 2.72%, and the islands of Moluccas and Papua produced 1.39%. The unequal share of the output is caused by the use of GDP in calculating the output gap which will be dominantly influenced by provinces in Java. Consequently, if this output gap is used to estimate the inflation dynamics model, it will also be dominantly influenced by the output gap from provinces in Java.

Table 2. Share of real GDRP of each Province to the total real GDRP of 32 Provinces

Provinces in Java	%	Region	%
Banten and Jakarta	21.74	Java	61.27
East Java	15.51	Sumatera	21.42
West Java	14.58	Kalimantan	8.69
Central Java and DIY	9.44	Sulawesi	4.52
		Bali and Nusa Tenggara	2.71
		Moluccas and Papua	1.39
TOTAL	61.27		100,00

Source: see Table 1

In the previous studies, the money supply is also used as an explanatory variable of inflation. Similar to

other variables, the provincial money change in Java dominates national money change. As a result, if the national money change is used to explain money-inflation relationship then the conclusion will significantly reflect the relationship in Java.

Table 3. The Average Provincial and Regional Share in National Money Change

Name of Provinces in Java	%	Region	%
Banten and Jakarta	77.26	Java	56.75
West Java	-25.67	Sumatera	25.46
East Java	6.82	Kalimantan	9.16
Central Java and DIY	-1.66	Sulawesi	6.16
		Bali and Nusa Tenggara	3.78
		Moluccas and Papua	-1.31
TOTAL	56.75		100,00

Source: see Table 1

Note: The provincial or regional money change is the average provincial or regional share in national money change for the period of 2005.III-2013.III.

Table 3 shows the average percentage change of money supply in each province in Java and other regions in Indonesia compared to the change of national money supply (32 provinces). The average percentage change of money in Banten and Jakarta increased by 77.26% and that of West Java decreased by 25.67%. Similarly, that of Java, Sumatera, Kalimantan, Sulawesi, and Bali and Nusa Tenggara increased by 56.75 %, 25.46 %, 9.16%, 6.16% and 3.78%, respectively, whereas, the islands of Maluku and Papua decreased by 1.31%.

Based on the characteristics of inflation, output, and the change of money that are not equal, it can be suggested that the estimation model of inflation dynamic in Indonesia using the national data will tend to reflect the inflation dynamics in the Java provinces only. This condition is due to the weight of inflation, the number of city in each province calculated in inflation, the GDRP value, and the value of the change of money in most of the large provinces outside of Java is generally lower than those of the provinces in Java. In contrary, the use of provincial panel data in estimating dynamic inflation will more accurately depict the actual condition of inflation in entire area of Indonesia.

2. Hybrid New Keynesian Phillips Curve model

In estimating inflation dynamic model, this study uses the hybrid NKPC theoretical framework which was developed by Gali and Gartler (1999). According to them, every company adjusts their prices at a certain period with fixed probability of $(1-\theta)$ where θ is the probability that the firm does not adjust its price. There are two types of companies; $(1-\omega)$ companies are the forward-looking group which performs as stated by Calvo (1983), while the rest, as much as ω companies, has a backward- looking performance. Based on that condition, the aggregate price rate can be set accordingly as written in the equation (1).

$$p_t^* = (1-\omega)p_t^f + \omega p_t^b \tag{1}$$

where: p_t^f and p_t^b are the price set by a forward-looking company and that set by a backward-looking company.

The forward-looking company performs as stated by Calvo (1983), hence p_t^f can be written as

$$p_t^f = (1-\beta\theta)\sum_{k=0}^{\infty}(\beta\theta)^k E_t\{mc_{t+k}^n\} \tag{2}$$

Where as the price in a backward-looking company, p_t^b, is equal to the average adjustment price at the last period of the adjustment of the actual inflation. This company price can be written as:

$$p_t^b = \bar{p}^*_{t-1} + \pi_{t-1} \quad (3)$$

Thus the hybrid NKPC specification can be written as:

$$\pi_t = \lambda mc_t + \gamma_f E_t\{\pi_{t+1}\} + \gamma_b \pi_{t-1} \quad (4)$$

The relation between the Hybrid NKPC and the form of structural parameters can be written as:

$$\lambda \equiv (1-\omega)(1-\theta)(1-\beta\theta)\phi^{-1}$$
$$\gamma_f \equiv \beta\theta\phi^{-1} \quad (5)$$
$$\gamma_b \equiv \omega\phi^{-1}$$

where: $\phi \equiv \theta + \omega[1-\theta(1-\beta)]$

In empirical study, equation (4) is estimated by using a non-linear instrumental variable (GMM = Generelized Method of Moments) estimator. In their research, Gali and Gartler (1999) concluded several important findings related to inflation behavior. First, the real marginal cost is statistically significant and quantitatively an important factor of inflation determination. Second, forward-looking behavior is very important because most companies behave in that way. In their research, they found that approximately 60 to 80% of companies indicate the forward-looking behavior. Third, the backward-looking behavior is statistically significant, so they conclude that although the forward-looking behavior is very reasonable, empirically, the pure forward- looking model is not acceptable. Finally, the period of time of unchanging prices (stagnant) is quite long.

3. Variable and data

This study uses the panel data of 32 provinces in Indonesia for the period of 2005.III - 2013.III (see Table 4). Most of the data are taken from the quarterly reports of the Regional Economic Development (RED).

Table 4. List of province in study

No	Name in Indonesia	Name in English	No	Name in Indonesia	Name in English
1	Aceh	Aceh	16	Bali	Bali
2	Sumatera Utara	North Sumatera	17	Nusa Tenggara Barat	West Nusa Tenggara
3	Riau	Riau	18	Nusa Tenggara Timur	East Nusa Tenggara
4	Kepulauan Riau	The Islands of Riau	19	Kalimantan Selatan	South Kalimantan
5	Sumatera Barat	West Sumatera	20	Kalimantan Timur	East Kalimantan
6	Jambi	Jambi	21	Kalimantan Tengah	Central Kalimantan
7	Sumatera Selatan	South Sumatera	22	Kalimantan Barat	West Kalimantan
8	Kep. Bangka Belitung	Bangka Belitung Islands	23	Sulawesi Utara	North Sulawesi
9	Bengkulu	Bengkulu	24	Sulawesi Selatan	South Sulawesi
10	Lampung	Lampung	25	Sulawesi Tenggara	Southeast Sulawesi
11	Banten dan Jakarta	Banten and Jakarta	26	Sulawesi Tengah	Central Sulawesi
12	Jawa Barat	West Java	27	Gorontalo	Gorontalo
13	Jawa Tengah	Central Java	28	Maluku	Moluccas
14	Yogyakarta	Yogyakarta	29	Maluku Utara	North Maluccas
15	Jawa Timur	East Java	30	Papua and Papua Barat	Papua and West Papua

Source: BI, Regional Economic Development (RED) and the Regional Economic Study (RES), 2005-2013

Regional Economic Study (RES) published by the Office of Bank Indonesia (KBI) in the region. The RED and RES are consists of 30 regional reports that covering 32 provinces. During the period of this study, there were 34 provinces in Indonesia. However, North Kalimantan and West Sulawesi are not covered because the data of

the 2 provinces were not yet available. The West Sulawesi was established in October 5, 2004 whereas the North Kalimantan was done in October 25, 2012.

Table 5 explains the definition of variables used in this study. For the economic output, GDRP data at constant prices of 2000 $\left(y_{it}^{a}\right)$ are used. Hodrick- Presscot filter (HP filter) is used to obtain the potential output $\left(y_{it}^{*}\right)$ based on the constant price GDRP in 2000. The output gap (y_{it}) is the gap between the real output and the potential output divided by the potential output (Hubbard *et al*. 2014, 340-341).

The change of money supply in this study is the money suppy change in each of the area in question (ΔM_{it}). Because the data of the money supply for each area is not available, therefore net outflow of currency in the Bank Indonesia office is used as a proxy of the changes in currency. If the outflow is greater than the inflow (positive net outflow) it is considered to be an increase in the amount of currency in the region. Data of changes in rupiah deposits of commercial banks (conventional commercial banks and Islamic banks) are used as a proxy for changes in demand deposits. Changes in currency and demand deposits are regarded as M1 changes in the regional economy in question.

Table 5. Definition of variables

Variable	Symbol	Unit	Description
Inflation	$\pi_{i,t}$	Percent	Provincial quarter to quarter inflation
Actual output	y_{it}^{a}	Billion of Rupiah	Real *Gross Domestic* Regional Product
Potential output	y_{it}^{*}	Billion of Rupiah	Estimated using Hodrick–Prescott Filter
Output gap	y_{it}	Percent	$y_{it} = \frac{\left(y_{it}^{a} - y_{it}^{*}\right)}{y_{it}^{*}} \times 100\%$
Provincial money change	ΔM_{it}	Billion of Rupiah	ΔM_{it} is the change in real currencies (ΔK_{it}). plus the change in deposit money (ΔG_{it}). ΔK_{it} is the flow of currency in regional Bank of Indonesia and ΔGM_{it} is the change in deposit in provincial banking.
Monetary variable	m_{it}	Percent	$m_{it} = \frac{\Delta M_{it}}{y_{it}^{a}} \times 100\%$

In the estimated model, we will use several variables: π (inflation), y (output gap) and m (the changes in money supply relative to potential output). Inflation is quarter-to-quarter inflation ($\pi_{i,t}$) which is the percentage change in the general price of goods in a quarter compared to the previous quarter. The inflation data is calculated using the CPI (Consumer Price Index) at the provincial level. Even if the original CPI data are the general price based on city, the RED and RES have provided the provincial inflation data. For Papua and West Papua, as well as Banten and Jakarta, the inflation of the region is composed by using certain proportion based on the reports of RED and RES.

4. Empirical results

4.1. Test for order of integration

The order of integration of the variables, which are π_{it}, y_{it} and m_{it}, are tested using IPS (Im, Peseran and Shin), LLC (Levin, Lin, and Chu), as well as the Fisher ADF and Fisher PP tests (Baltagi 2005, 239). The results are reported in Table 6. The overall tests indicate that all the variables are integrated of order zero or I(0).

Table 6. Unit Root Test for panel data

Variable		LLC	IPS	ADF Fisher	PP Fisher
π_{it}	Statistic Prob	-26.3819 (0.0000)	-24.9242 (0.0000)	582.843 (0.000)	550.468 (0.000)
y_{it}	Statistic Prob	-25.3106 (0.0000)	-28.0247 (0.0000)	569.513 (0.000)	581.775 (0.000)
m_{it}	Statistic Prob	-18.6546 (0.0000)	-21.3171 (0.0000)	493.096 (0.000)	833.747 (0.000)

4.2. Validity of Using Output Gap

Gali and Gartler (1999) stated that the output gap is not an appropriate proxy of economic activity in the model of inflation dynamics. To prove their argument, they consecutively estimated the Phillips Curve (PC) models with the independent variable of lag inflation π_{t-1}, and the output gap y_t and the NKPC with the independent variables of the lead inflation, π_{t+1}. The PC estimation resulted positive parameters of π_{t-1} and y_{it}, which is in line with the prediction of theory. However, on the NKPC model, estimated parameter of π_{t+1} was positive, and that of y_t was negative, which was contrast to the theory (Gali and Gertler 1999, 201). On the other hand, the result of the NKPC estimation using an independent variable π_{t+1} and *labor income share*,s_t showed positive estimation parameter for both. These results became the basis for the use of s_t instead of y_t in the Hybrid NKPC model (Gali and Gartler 1999, and Gali *et a*l. 2005).

Table 7. Phillips Curve (PC) and NKPC

(1) Phillips Curve : $\pi_{it} = \beta\pi_{i,t-1} + \lambda y_{it}$

(2) NKPC: $\pi_{i,t} = \beta E\pi_{i,t+1} + \lambda y_{it}$

		(1) π_{it}	(2) π_{it}
β	Estimated parameter Prob.	0.02543 (0.0000)	
βE			0.07645 (0.0000)
λ		0.29008 (0.0000)	0.24331 (0.0000)
N		930	930
Instrument rank		30	30
Hansen test:	J-stat	29.58940	29.92983
	Prob.	(0.3831)	(0.3665)

Table 7 reports the estimated provincial panel data for the PC and the NKPC models using the GMM with instruments variables $\pi_{i,t-2}$ and $\pi_{i,t-4}$. P-values of J statistic for both estimations are greater than 5% so the null hypothesis of over-identification can not be rejected. PC estimation shows that $\pi_{i,t-1}$ and y_t have significantly and positively influence on inflation [as also found by Gali and Gartler (1999)] and consistent with the theory. On the contrary with Gali and Gartle (1999), the NKPC estimation shows $\pi_{i,t+1}$ and y_{it} are also significantly and positively correlated with inflation. This results reveal that Gali and Gartler's reason for not using the output gap, y_{it}, as a proxy in economic activities can not be accepted in this study.

4.3. Estimation of Hybrid NKPC Model

The hybrid NKPC model which was developed by Gali and Gartler (1999), explains that inflation expectations, $\pi_{i,t+1}$, and *lag* inflation, $\pi_{i,t-1}$, together affect inflation. A company is assumed to determine the price rate based on the information of past inflations (backward-looking-rule-of-thumb), while the rest has a forward-looking behavior.

Table 8 reports the results of the estimation of the reduced form of hybrid NKPC (model 3) and hybrid NKPC with a monetary variable using the GMM method with instrument variables $\pi_{i,t-2}$and $\pi_{i,t-4}$. Model 3 is the hybrid NKPC but uses a driving force variable y_t .The estimation of hybrid NKPC equation shows the estimated parameters of backward looking, forward looking, and output gap which are significant and have positive sign. Similarly, model 4, which is the Hybrid NKPC model plus monetary variable m_{it} also provides the same conclusion as in model 3. The estimation parameters of backward-looking, forward-looking, output gap and monetary variable have positive sign. Furthermore, the value of the p-value and the J-statistic is also greater than 5% so it means that there is over- identification. Table 8 also shows the estimation results of models 3 and 4 reveal that the pattern of the formation of inflation expectation are backward- looking and forward- looking. This means that inflation expectations are influenced by past and future inflation.

As with previous studies, the parameter value of forward-looking is greater than backward-looking. Hypothesis γ_f - γ_b = 0 or $\gamma_b = \gamma_f$ is also rejected in the Wald test. The chi-square calculated value and the p-value for models 3 and 4 indicate that the value of γ_f is similar to that of γ_b. Based on the parameter value and the Wald test, it can be seen that the forward- looking behavior is more dominant in the formation of inflation expectations than the backward- looking behavior in both models. The testing of the number of parameters in backward looking and forward looking which equals to one ($\gamma_b + \gamma_f = 1$) is also carried out by using the Wald test. This test is done in order to find out whether the formulation of the expectations is perfect or full[14]. The result from the Wald test shows that the hypothesis stating $\gamma_b + \gamma_f = 1$ is rejected. This means that the formation of inflation expectations is not full and in the long- term Phillips curve is not vertical. The result also reveals that inflation is influenced by the output gap and the monetary variable.

The estimation results of models 3 and 4 also show that the persistence of inflation in Indonesia is low with an average time of inflation adjustment of 0.039 and 0.062 for models 3 and 4. The calculation of the average output adjustment is obtained using methods introduced by Koyck (Gujarati and Porter 2009, 624-627)[15]. The average inflation adjustment indicates that the adjustment process are relatively fast.

In general, similar to previous researches, the hybrid NKPC estimation models, both in the reduced form or after being added with monetary variables, reveal that the estimated parameter of forward-looking, γ_f and backward-looking, γ_b, are all significant and have positive signs. This results prove that the pattern of inflation expectation are backward- looking and forward-looking. Like in previous researches, it has also been found that the forward- looking behavior is more dominant compared to the backward- looking behavior. This domination shows that economy agents are rational. This condition indicates that future change will immediately affect the behaviors of economic agents.

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[14] According to Solikin (2004), the restriction ($\gamma_b + \gamma_f = 1$) shows the formation of perfect or 'full'expectation.

[15] Koyck Approach: Average *lag* = $\frac{\gamma_b}{1-\gamma_b}$

Table 8. Reduced form Hybrid NKPC and Hybrid NKPC with monetary variable

3) $\pi_{i,t} = \gamma_b \pi_{i,t-1} + \gamma_f \pi_{i,t+1} + \lambda y_{it}$ 4) $\pi_{i,t} = \gamma_b \pi_{i,t-1} + \gamma_f \pi_{i,t+1} + \alpha_\lambda y_{it} + \delta_m m_{it}$			
		3) π_{it}	4) π_{it}
γ_b	Estimated parameter Prob.	0.03725 (0.0000)	0.05803 (0.0000)
γ_f		0.08349 (0.0000)	0.08494 (0.0000)
λ		0.25079 (0.0000)	0.21935 (0.0000)
δ_m			0.07207 (0.0000)
N Instrument rank		900 30	900 30
Hansen test:			
J-stat.		29.6011	28.6615
Prob.		(0.3323)	(0.2783)
Average *lag*		0.039	0.062
Wald- test:			
$\gamma_f - \gamma_b = 0$		19.4640 (0.0000)	9.25237 (0.0024)
$\gamma_b + \gamma_f = 1$		74.0847 (0.0000)	72.7125 (0.0000)

However, in contrast to previous studies, the value of the estimated forward-looking and backward looking parameters are smaller (even less than 0.1), but they are significant and have positive sign. Whereas in the previous studies carried out by Abbas and Sgro (2011), Gali and Gartler (1999), and Gali *et al*. (2005) using the national data found the value of estimated parameter was approximately close to one. The similar results were obtained by researches conducted in Indonesia by Insukindro and Sahadewo (2010) and Solikin (2004) using the national data which resulted high value of estimated parameter. While the research by Arimurti and Krisnanto (2011), which estimated inflation in Jakarta, showed a higher value of both parameters. It is possible that the difference in the result of this research compared to previous researches on inflation is due to the high influence of Jakarta in the national data, so that the conclusion obtained is similar to that of researches on inflation in Jakarta. This argument is supported by Mehrota *et al* (2010) which found a large variation of values of the forward and backward-looking parameter in 29 provinces in China.

Another difference compared to previous researches is that in this research, a low persistent inflation is found, which indicates that economy agents will immediately adjust the inflation prediction if there is a change in information influencing inflation. In the research conducted by Gali and Gartler (1999), it was found that inflation adjustment is a long term process. Solikin (2004) and Insukindro and Sahadewo's (2010) research in Indonesia also found that inflation adjustment needed a relatively long period of time. Arimurti and Krisnanto (2011) found in their research in Jakarta that inflation persistence was high. This difference is likely because of the use of provincial panel data in this study.

In addition, the empirical results point out that output gap significantly affects inflation and the high level of economy leads to high inflation. Conversely, low level of economy also leads to low inflation. This conclusion is consistent with predictions of the theory which states that output gap associated with the use of labor. When output is high, labor employed is also high then they ask for wage increase and it causes inflation. Conversely, when

output is low and unemployment is high then the workers may not ask for wage increase. The effect of output gap on inflation in provinces was also found in study by Mehrotra *et al* (2010) in China. The previous studies in Indonesia conducted by Solikin (2004) and Insukindro and Sahadewo (2010) also found the effect of the output gap on inflation and the effect of output on inflation respectively.

The empirical finding also supports the previous research on the effect of money change on inflation. The results indicate if monetary authority can manage money supply in provincial level, as in the national level, then it can control inflation. The money that rises beyond the target may lead increase inflation. Conversely, the money that increases below the target or even decreases will reduce inflation. The conclusions of this study support the studies of Ramakrishnan and Vamvakidis (2002), Hossain (2005), Anglingkusumo (2005) and Insukindro and Sahadewo (2010).

Conclusion and policy implication

This study has some advantages over other previous studies because it uses the panel data of 32 provinces instead of the national data. Estimating the inflation dynamic in Indonesia by using national data may lead to potentially biased results and conclusions, because of high degree of differences among provinces in Java and outside of Java. In addition, using the same method as in Gali and Gartler (1999) and Gali *et al*. (2005), the findings reveal that the output gap can be used as a proxy of economic activity in estimating our inflation dynamics.

The finding of this study reports that output gap influences inflation. This empirical result shows that if the actual output is above its potential one then this condition will cause high inflation. On the other hand, if the actual output is below its potential output then the inflation will be low. This conclusion is consistent with the prediction of the Phillips Curve theory which states that the output gap is related to the use of labor. When there is a high output gap then this means the workers' working rate is also high so that they will ask for raising wage which will then instigate inflation. In contrast, when the output gap is low, this means that unemployment rate is high, so the workers will not propose to increase their wage.

The results of this study have several implications on policy. First, the government should develop consistent and credible policies that can affect inflation expectations of economic agents. Second, inflation targeting can be optimized to control inflation in the province since forward-looking is the dominant behavior. Third, the government should manage information, especially the information that is relevant to future inflation. Since the persistent inflation is low, the information will be responded immediately and affect inflation as well as economy. Fourth inflation can be controlled by demand side policies. The policy should consider the trade off between inflation and output. Finally, the monetary policy can be used to control inflation in province, then the central bank can set the target of money.

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Evaluation of Influence of Direct Foreign Investments on Economic Growth of Kazakhstan

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Abstract:

The article refers to the notion of 'country competitiveness' which has been described by various authors retrospectively from A. Smith and D. Ricardo to the modern studies of M. Porter, C. MacConell, S. Brue, C. Flynn and the analytics of the World Economic Forum (WEF). This article also makes certain conclusions about the evolution of this notion. The paper also concerns the methods to determine the global competitiveness index proposed by the WEF and the dynamics of BRIC (Brazil, Russia, India and China) country ratings from 2004 to 2014. The causes and factors that drove the positional changes of these countries within the considered rating were analyzed as well as the interconnection of the twelve main components of the competitiveness with the global competitiveness level (according to the WEF estimation) along with the competitiveness of goods, services of BRIC countries, growth of the GNP and the dynamics of citizens' quality of life. The rating data for the global competitiveness of BRIC countries for a period of 8 years was compared and the conclusions were such that the WEF methods that have been governing the calculation of global competitiveness level can be erroneous.

Keywords: economic growth; foreign direct investment; economic and mathematical modeling; Kazakhstan

JEL Classification: G32; F21; F43; F65

Introduction

The economy of Kazakhstan grew at a rapid pace until 2013, fueled by rising oil prices, tax incentives, and simplification of business startups and regulation of minority investors' rights. Since 2014, economic growth has slowed due to fall in oil prices. Thus, the average annual growth rate of GDP in real terms fell from 7.3% in 2010 - one of the highest indicators in the world arena, up to 1%, equaling that of countries with similar economic structure. Kazakhstan, as an active participant in world economic processes and as a country with unique reserves of natural resources, is an attractive place for foreign capital. To date, the most profitable form of attracting foreign capital for the Republic is foreign direct investment, which facilitates the realization of the national interests of the country. From the point of view of state policy and the state of the economy, Kazakhstan, like other CIS countries, in the first years of independence was not able to efficiently process foreign capital flowing into the country, including in the form of FDI.

1. Literature review

Attraction of foreign investments into the economy of Kazakhstan is an objectively necessary process. World experience shows that the foreign capital inflow and state regulation of its use positively impact the economy. Investments contribute to establishing and strengthening of private enterprise in countries with medium and low levels of economic development, as well as contribute to mobilizing capital to implement serious projects, create mixed companies, and loan capital markets. The strategy and tactics to overcome crisis phenomena in the economy depend on how successfully Kazakhstan's economy integrates into world economic relations. It is important to note that a stable, predictable and economically effective state for both the state and the investor is important for a foreign investor. Undoubtedly, all these factors relate to the government's overall economic strategy, so the solution

to these problems requires an integrated approach. A clear benchmark, an action program to attract foreign investment are required; and based on this program, it is necessary to create levers for managing, attracting and stimulating foreign investment.

One of the first statistical studies of the influence of foreign investment determinants was made by Lim (1983), who examined 27 underdeveloped countries in terms of attractiveness for attracting FDI.

The purpose of the research in many cases was to establish factors and analyze their impact on the investment dynamics. Thus, statistical analysis of the data on 25 countries showed that foreign direct investment contributes to economic growth, and the impact of direct domestic investment on growth rates is not statistically significant (Berthelemy and Demurger 2000).

The characteristics of the market (size and rate of GDP growth) and the cost of production factors (wage level, interest rate, etc.) play a big role in direct foreign investment in a developing country. When analyzing the FDI determinants, it is proposed to concentrate on those that meet the specifics of the country, which, in the analysis, will avoid the statistical insignificance of the coefficients under the main determinants.

Existing macroeconomic parameters (for example, per capita income, economic growth level, inflation, exchange rate, industrial output, trade balance, balance of payments, etc.) determine the amount and direction of investment flows. Political risk factors negatively impact the decision-making process of foreign investors.

Globalization and such factors as the rules relaxation on investing foreigners, elimination of trade barriers, and expansion of private sector context worldwide have changed the nature of competition, which has become "a regional and global rather than a national game" (Hoenen and Hansen 2009). The end purpose of global positioning games is "to divide the world between the surviving players" (Hoenen and Hansen 2009).

A multitude of possible organizational ways for companies choosing the best method of entering a foreign market is distinguished (Floyd and Summan 2007). The classifications presented in (Bitzenis 2008, 2016, Agarwal and Ramaswami 1992) detail the modes to enter foreign markets:

- *export*: direct, indirect, intra-company transfers;
- *foreign direct investment* (FDI): acquisition, joint venture, Greenfield FDI, Brownfield FDI, privatization, strategic alliance, representative office, subsidiaries (branches), merger and acquisition (M&A), fading out or planned divestment agreement;
- *portfolio invests* (indirect investment <10%);
- *entry mode* (collaboration): strategic alliance (limited entrepreneurial link, just a strategic agreement, an alliance is not a subsidiary);
- *entry modes with no transfer of money* (licensing, franchising, turnkey project, management contract).

Papers comparing the investment flows in both Eastern and Western countries mention Greenfield as the most popular with reference to the corresponding sources. The choice of the entry mode depends, particularly, on the available resources. More resources are now accessible due to industrialization in Eastern countries, and in the view of this, "more advanced forms of entry mode including Greenfield are becoming more popular" (Floyd and Summan 2007).

A big number of scientific works are dedicated to foreign direct investment studies. The papers deal with, for instance, various links between foreign direct investment, financial markets, and economic growth (Alfaro *et al.* 2004) to investigate whether countries with better financial systems can use FDI more efficiently. The papers examine FDI impact on economic growth (Alfaro *et al.* 2004), as well as several links between FDI, financial markets and growth. These papers conclude that FDI is "a vital player stimulating the economic growth" (Adhikary 2009, Balamurali and Bogahawatte 2004, Buckley 2004). The decisive importance of FDI inflows to the process of transition from planned to market economy for the Central and East European (CEE) countries in the global marketplace is highlighted in the papers by Bitzenis (2006).

Recently we observed the formation of global oligopolies in electronics, aviation, software, steel, automotive domains, etc. The oligopolistic industries have developed through cross border M&A's in the second half of the 90s and in the period starting from 2003-2007. Some scientists argue that "for such industries, it is not adequate to analyze FDI in terms of efficiency or resource leverage only; FDI should also be understood in terms of its

contribution to the global strategic positioning of the investing company". The main idea is that "global strategic interaction in oligopolistic industries is manifest in well-known FDI phenomena such as follow-the-leader, client follower, and first-mover" (Hoenen and Hansen 2009).

Foreign direct investment is studied in reference to retail trade in India (Nandi and Sahu 2007), with a special focus on the interaction of foreign direct investment and stock market development in Pakistan (Malik and Amjad 2013), in relation to macro-economic environment with a proper attention to the importance of its stability (Sultana and Pardhasaradhi 2012). Currency risk is also one of the major factors connected with foreign direct investment (Sultana and Pardhasaradhi 2012), since the exchange rate (ER) volatility is "the major driver and risk for foreign investors in a developing economy" (Billmeier and Massa 2007). High liquidity and activity of the market are also considered regarding the foreign direct investment phenomenon (Boubakari and Jin 2010).

The importance of country-specific legislation, rules and regulations determine the decision whether to invest (Yartey 2008, Floyd and Summan 2007).

The particular motives for foreign direct investment activity have been analyzed by many scientists. Some of them underline the necessity to consider historical and cultural factors as well (Floyd and Summan 2007). Such factors as management skills, skill levels, marketing, and ownership advantage of capital are mentioned among them. Speaking about management skill, scientists mean that foreign companies with such gains may wish to take in these skills to contest with the local companies. As for skill levels, in many cases, Western countries have traditionally shown them on a higher level, but lately skills in Eastern countries have also become better. Besides, Western countries display more mature markets. Lately, Eastern countries started to have greater product diversity. Another factor is also important: ownership advantage of capital, which involves economies of scale. It is obvious that there are "more opportunities for those in Eastern countries since there is a larger supply of low cost labor and a larger market size" (Floyd and Summan 2007). Location factors (market size and labor costs) are often considered as the most substantial in emerging markets (Floyd and Summan 2007). The growing tendency related to investment is that the whole Asia region is developing faster than Europe and, therefore, there is "less substitution taking place" (Floyd and Summan 2007). The transfer from agriculture to production was much more effective in China compared to Eastern Europe.

One more issue is discussed in connection with investments, which is the influence of taxes on the organizational boundaries of international companies. It is stated that "cross-country differences in corporate tax rates and product intangibility play important roles in affecting internalization decisions of a company" (Ma 2017).

A determinant to put off foreign investors is lack of patent protection (Floyd and Summan 2007, Bitzenis 2006). Two simultaneous tradeoffs encountered by developing countries in protecting intellectual property rights are: "(1) between attracting foreign direct investment and deterring international technology spillovers; and (2) between encouraging domestic innovation and suppressing technology diffusion" (Yi and Naghavi 2017). The most advantageous level of intellectual property rights protection is relied upon the technological effectiveness of the host country.

Specific obstacles that foreign investors and foreign multinational enterprises may face while establishing their FDI projects in a transition-economy country are corruption, briberies and bureaucratic procedures (Bitzenis 2006). A number of researches on the relationship between host-country corruption and FDI showed a negative relationship between the two (Wei 2000, Wei and Shleifer 2000, Smarzynska and Wei 2000, Habib and Zurawicki 2002, Voyer and Beamish 2004). Corruption discourages FDI, creates challenges for investors, because "it increases the cost of operating abroad, as well as the uncertainty and risk involved" (Henisz 2000).

However, there are studies demonstrating that "for US companies, corruption tends not to affect their investments, and in some cases it increases the probability of investing in a foreign country" (Henisz 2000). It was found that corruption can positively influence investment by facilitating transactions in countries with undue regulation. Furthermore, "some countries with high levels of corruption, such as China or Nigeria, are the recipients of a great deal of FDI" (Cuervo-Cazurra 2006).

It can be explained by the fact that "investors exposed to bribery at home may not be deterred by corruption abroad, but instead seek countries where corruption is prevalent" (Cuervo-Cazurra 2006). Nevertheless, it is argued that corruption cause not only a decrease in FDI, but also a change in the composition of country of FDI origin

(Cuervo-Cazurra 2006). The influence of corruption on FDI from the two groups of countries (those that signed the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions and those with high levels of corruption) as compared to FDI from the third group of countries (with low levels of corruption and those which did not sign the OECD Convention) is studied. The findings demonstrate that "corruption in the host country results in relatively lower FDI from countries that signed the OECD Convention, but in relatively higher FDI from countries with high levels of corruption. The outcome of these two effects is that countries with high corruption level receive less FDI from countries with laws against bribery abroad, which are the largest sources of FDI, and more FDI from other countries with high corruption levels" (Cuervo-Cazurra 2006).

Kazakhstan is engaged in significant foreign investment since its independence (US Department of State 2015, OECD Investment Policy Reviews 2012, 2017). Agreements signed by Kazakhstan suggest a broad definition of investment, "including investments directly or indirectly through subsidiaries, and assets, claims and rights that constitute investment, including tangible and intangible property" (OECD Investment Policy Reviews 2012). As of December 31, 2014, FDI in Kazakhstan amounted to USD 132.6 billion, primarily in the oil and gas sector. Kazakhstan is widely thought of as having the best investment climate in the region, and numerous international companies opened regional headquarters in Kazakhstan (IBP 2015, Deloitte 2016).

Kazakhstan's government has a strategy for developing a sound and comprehensive business environment. The key directions of Kazakhstan's current investment promotion policy are defined in the "Law of the Republic of Kazakhstan on Investments as of January 8, 2003 No. 373-II (with amendments and additions as of June 12, 2014)", the "Program for Investment Attracting, Special Economic Zone Development and Export Promotion in the Republic of Kazakhstan for 2010-2014", which considers the long-term economic strategy outlined in the "Strategic Development Plan-2020", the "Kazakhstan-2050" strategy and other governmental regulations. The main idea of the governmental programs strategy is the implementation of the principal priorities of economic diversification and the improvement of competitiveness.

The four directions of development in the leading sectors are identified:

- diversifying production in "traditional" industries (oil and gas sector, petroleum chemistry, etc.);
- developing sectors based on domestic demand: machine engineering, pharmaceutical industry, construction and building materials;
- developing sectors with export potential: agro-industrial complex, consumer goods industry, tourism;
- developing sectors of the "economy of the future": information technologies, biotechnologies, space activities, alternative energies.

The government provides a general course of action for state support and incentives accessible for investment projects. The choice and range of incentives are "specified on a case-by-case-basis in agreements signed by individual investors with the Committee on Investment under the responsibility of MINT (OECD Investment Policy Reviews 2012, 2017). The key purpose of these agreements is to promote new production and modernization of existing facilities and resources, improve the quality of the local labor force and provide environmental protection (Dosmukhamedov 2002, OECD Investment Policy Reviews 2012, 2017).

In the aggregate rating of Doing Business index, the country rose from line 53 to line 41; and by setting up enterprises indicator from line 53 to line 21. One of the main drivers of positive dynamics was the implementation of the single-window system started from January 01, 2016 (Buyanov 2016). It is obvious that Kazakhstan's government takes measures "to comply with the principles of openness, transparency and non-discrimination and its policy convergence with international responsible business conduct standards" (OECD 2012, 2017). These measures are directed at creating the policy framework for the balancing of investor protection and the government's right to regulate, investment promotion and facilitation, infrastructure development, trade policy and anti-corruption efforts (OECD 2012).

2. Factors affecting attraction of foreign investment

Economic theory postulates that the interest rate negatively affects the demand for investment and positively effects on the supply. Separate studies of developing countries found that the interest rate at the host market adversely affects the growth of foreign direct investment (Hungary, Poland) (Swain and Wang 1995; Walkenhorst 2004).

From the point of view of the investor country, foreign direct investment is a proposal of investments, therefore, they must respond positively to an increase in the interest rate. This dependence is observed in Kazakhstan and Russia. However, with regard to Ukraine, the interest rate on the host market adversely affects the growth of FDI, and in Russia this influence is virtually non-existent.

The cost of production factors, including labor remuneration, almost always plays a decisive role in making a decision on investing abroad. At that, important is not only the amount of remuneration for labor, but also the relative value of labor costs. For example, this was shown in the study of the Black Sea countries in comparison with labor in the countries of the Organization for Economic Cooperation and Development (Liargovas and Papazoglou 1997).

In accordance with economic theory, low production costs, in this case labor costs, lead to higher profitability and, therefore, attract investors. This is true for Kazakhstan, Ukraine and Russia. In addition, the share of these costs was so small that the movement in one direction or another of the average wage did not play a big role for investors.

Low exchange rate affects FDI as well as the company's financial flows, the expected profitability and attractiveness of assets for foreign investors. Analysis of the research (Floyd 1996,) shows that there is a different dependence of the inflow of foreign direct investment on the exchange rate of currency (Ireland, Hungary, and Taiwan). There are possible conditions under which the exchange rate is not the determinant of FDI, but, on the contrary, the increase in the exchange rate is a consequence of the inflow of financial resources into the country. Then the contributions of foreign investors have a stabilizing effect on the economy.

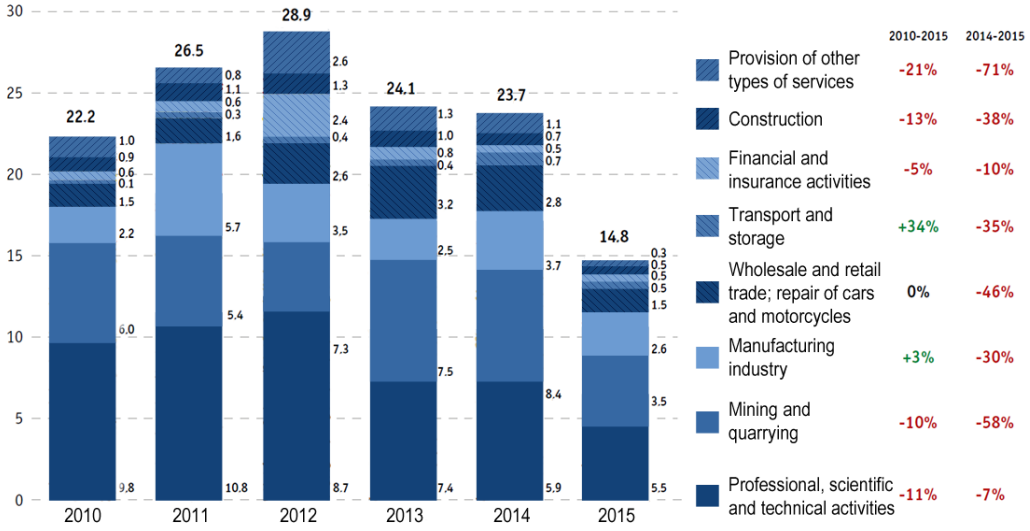
Direct foreign investment in Kazakhstan is quite dependent on the exchange rate. The investors view low exchange rate as a weakness of the currency compared to their own, and therefore its strengthening signals to companies about the possibility of investing in the country. Thus, the exchange rate is an indicator of currency risk. Let us consider the presence and impact of the positive external effect of foreign direct investment, which enhances their impact on economic growth. Countries with low level of development do not have an effective mechanism for transferring positive results of investments from one sector to another, thus the impact of FDI on the development of the economy is minimal. Countries with average level of development make optimal use of foreign investment.

Characteristics of market size (gross domestic product and the rate of its growth) and the cost of factors of production (wages level, interest rate, etc.) play a big role in direct foreign investment in Kazakhstan. As a result of the analysis of the above studies, the factors influencing the inflow of foreign direct investment in the studied countries were classified (Table 2).

Growth in gross domestic product affects economic development positively, which is advisable, since revenues from the real sector are one of the sources of foreign direct investment. Increase in GDP leads to increase in FDI. Direct foreign investment positively influences economic growth, and to a greater extent through gross domestic product volumes. Direct foreign investment positively impacts economic growth, and therefore the standard of living of the population. The investment helps to create new jobs in the country, which directly effects employment and unemployment, which also impacts economic growth.

Amount of gross inflow of investments into Kazakhstan increased to USD 51.8 billion in 2013. By 2015, the inflow of investment fell at average annual rate of -10%. Amount of direct foreign investment continues to decline starting from 2011 with an average annual rate of -17%. In 2015, the share of net FDI in total investment was 15.8%. It is expected that this figure will grow up to 28.3% in 2017.

Figure 1. Dynamics of the amount of foreign direct investment in Kazakhstan by types of activity, billion USD



70% of foreign direct investment in 2015 came from the Netherlands, USA and Switzerland. Japan and France increased their investments by 31% and 15% respectively, compared with 2014. Major companies in 2015-2016 included such companies as Tengizchevroil, Anadolu Group and Eurasian Development Bank.

3. Analysis of attracting Turkish investments to Kazakhstan

Let us briefly consider the Turkish investments in the past ten years, as the investments of Turkish businessmen abroad reached 25 billion. The majority of Turkish companies prefer to invest in the energy and financial sector in the neighboring regional countries. Approximately USD 4 billion came from the Turkish capital energy investments, more than USD 3 billion were the investments in the banking sector, and USD 2.5 billion were the investment in manufacturing industry, and almost USD 2 billion were invested in the information technology industry (The proportion of Turkish investments 2013).

Turkish investment covers 109 countries. The country that attracted most of the Turkish capital was the Netherlands. About 165 Turkish companies invested USD 5.3 billion in the Netherlands between 2000 and 2010.

Almost 20% of all investments were made by Turks. Russia is in the second place in terms of attracting Turkish investments. The crisis did not stop the Turkish Investors Turkish companies invested a total of USD 3.8 billion, in Azerbaijan and USD 2.5 billion in Kazakhstan. Egypt got USD 1.5 billion of investments, mainly in textile and automotive sectors. More than 100 Turkish businessmen invested in 11 countries, Northern Cyprus, Germany, Romania, Russia, Ukraine, United States, Netherlands, Kazakhstan, Azerbaijan, Uzbekistan and Libya.

Thus, if the trade between Kazakhstan and Turkey in 2003 was USD 500 million, then in ten years this figure reached more than USD 4.1 billion. Currently, Kazakhstan has more than 100 enterprises with the share of Turkish capital. Foreign trade turnover between Kazakhstan and Turkey in 2013 amounted to USD 1.4 billion, export making amounted to USD 791.8 million and import - USD 570.9 million (Kulshmanov 2010).

The goal of both countries is to achieve in the shortest possible time a value of more than USD 10 billion. The volume of Turkish direct investment in Kazakhstan is more than USD 2.5 billion. In the context of such investment, employment for more than 15 thousand of Kazakhstani people is provided. Turkey is one of 15 countries making the largest investments in Kazakhstan.

It should be noted that 445 of Kazakhstan's national companies operate in Turkey. Their total investment volume is about USD 700 million. In addition, in 2014 Turkish contracting and consulting companies implemented more than 400 projects worth about USD 17.5 billion. In preparation for EXPO-2017, Turkish companies are working to ensure that Astana is one of branded cities in the world.

Among Asian companies, Turkish companies were among the first to invest in the economies of the Commonwealth of Independent States (CIS). An important feature of the Turkish direct investment in the former Soviet Union countries is their strong diversification in terms of industries. The expansion of Turkish capital in the Commonwealth of Independent States is due to several factors. The first of these is the "neighborhood effect". The second is the liberalization of the Turkish economy and growth of private enterprise. Third factor is the emergence of new niches in the economy in the early 1990-ies as a result of the transition to the market in the "Quarter" CIS, the occupation of which was important for the desires and capabilities of Turkish transnational companies (TNC). The construction industry is the most obvious but not the only example.

All the selected five countries of Eurasia are characterized by increased dynamics of the accumulated amounts exported foreign direct investments (FDI) on the background of global trends (UNCTAD World Investment Report 2014). At the time, this kind of states called us countries with delayed internationalization of the economy, when the number of reasons only in the 1990-2000-ies began to rapidly strengthen their national TNC (Kuznetsov 2007). However, such countries are characterized by not only high dynamics of FDI, but also by other features such as gradual geographical diffusion of capital investment.

Among Asian countries, Turkish companies were among the first who started to invest in the economy of the CIS countries. Such significant investments of Turkish business as the opening of "Ziraat Bank" in Moscow and the establishment of Turkish-Kazakh joint venture in the mining industry using the company in Astana in 1993, that is, by the time when the post-Soviet markets began to open to foreign investors, is important. It is noteworthy that two decades ago Turkish companies themselves just begin to invest abroad and the CIS countries became one of the main directions of their foreign expansion.

According to MDI-Eurasia, the total amount of Turkish FDI in Russia, Belarus, Kazakhstan and Ukraine at the beginning of 2014 amounted to more than $7.8 billion if we consider the deal to exchange assets between Efes Breweries and international brewing company SABMiller, which resulted in construction of the Russian and Ukrainian plants SABMiller, which became the property of the Turkish company in exchange for a 24% stake in the latter, the figure rises to 9.7 billion. Many of the investments (67%) predictably falls on Russia, but Belarus and Kazakhstan (and, to a lesser extent, Ukraine) also attract Turkish investors.

Quantitative estimates of Turkish investments need to pay attention to serious discrepancies between the data of MPI-Eurasia and the statistics offered by official statistical sources. The most notable of these discrepancies can be seen in the case of Turkish FDI in Russia. According to the Central Bank of the Russian Federation in 2012, they amounted to slightly less than USD 1 billion (CBR 2014). OECD statistics says only about USD 625 million (OECD 2013). However, according to information posted on the website of the Ministry of economy of Turkey, FDI from this country reached USD 9 billion (RT ME 2012).

The Confederation of businessmen and Industrialists of Turkey calls an even higher figure — USD 13 billion. Turkish ministries and departments in the gathering of information follow the same principles that the drafters of the MPI-Eurasia, that is, keep records on the basis of calculation of cost of specific transactions, including those committed by Turkish companies outside of Turkey. Technically it is as follows: embassies and trade missions of Turkey abroad working there interview companies with Turkish capital on the amount of the produced investment, the obtained data are summarized and sent to Central authorities. However, the integrated indicators are often too high, which is due, firstly, with the inclusion of the claimed investments that were never implemented, and second, underreporting of completed transactions. Thus, many Turkish construction companies are building in Russia (and other CIS countries) properties for subsequent sale, as, for example, shopping center "Aura", which was built in Novosibirsk and sold for USD 784 million.

Another important feature of Turkish FDI in the post-Soviet space is their strong diversification by industries. In contrast to the Russian investments, Turkish companies are concentrated around a few deals; Turkish projects are very diverse and are evenly distributed by a wide range of sectors and industries (Table 1).

Table 1. Sectorial structure of Turkish FDI in the leading four countries of the CIS

The industry of investing	Accumulated foreign direct investment (FDI) at the end of the year, mln.														
	Russia			Belarus			Kazakhstan			Ukraine			TOTAL		
	2008	2013	2015	2008	2013	2015	2008	2013	2015	2008	2013	2015	2008	2013	2015
TOTAL	3256	5283	5688	300	1023	1155	376	918	1029	565	655	670	4497	7879	8542
Telecommunications	-	-	-	300	600	633	-	-	-	550	550	550	850	1150	1183
Beer prod	1000	1000	1052	-	-	-	10	10	45	-	50	50	1010	1050	1147
Power industry	700	700	725	-	300	350	-	-	150	-	-	-	700	1000	1225
Glass product	289	681	743	-	-	-	-	80	105	-	40	40	289	801	888
Construction, development	210	650	696	-	70	122	30	30	18	-	-	15	240	750	951
Banking	325	385	402	-	-	-	-	-	25	15	15	15	340	400	442
Arms prod.	-	-	-	-	-	-	-	388	388	-	-	-	-	388	388
Others	732	1867	2070	-	53	50	336	410	198	-	-	-	1068	2330	2318

Currently, FDI goes into construction industry, and tourist infrastructure — these industries account for a third of all Turkish investments. However, it was not always like this: initially, the Turkish construction companies were working on subcontracts, and only in 2010 they began to implement projects as the owners. An unexpected result of the study was the second place that was taken by the enterprises working in the sphere of communications, which accounted for about 15% of Turkish FDI. This high figure is due to the presence at the Ukrainian and Belarusian markets of cellular communication services provider — Turkcell. Its assets encounter 55% of the shares of the Ukrainian company "Astelit" (the remaining shares belong to SC "System Capital Management" owned by Rinat Akhmetov) and 80% of shares of CSC "Belarusian telecommunications network". Interesting is the fact that Turkcell is a company with a significant share of Russian capital (among its co-owners are Altimo, part of the "Alfa Group", and Henri Services Limited).

Another sector in which Turkish FDI reached USD 1 billion is infrastructure network become (thanks to the investments of Zorlu Energy Group in the Russian TPP: and CetInsaat Muhendislik Ticaret in Belarusian hydropower production) and agro-food complex (leading role belongs to Efes beer manufacturer). As for the machine-building industry, the amount of the investment is low, because Turkish companies usually invest in small companies for production of electrical equipment and spare parts for cars. The only exception is a Turkish defense company Aselsan, which opened a joint venture for production of optoelectronic devices in Kazakhstan.

Also, the database of MPI-Eurasia includes eight projects in banking, including assets allocated in Russian "Credit Europe Bank", owned by Turkish Fiba Holding. At the same time, Turkish investments in wholesale and retail trade almost disappeared over the past decade, despite the fact that ENKA Insaat Holding the network of shops "Ramstor" in 1997. In 2008, part of the stores was sold to French Corporation Groupe Auchan and the remaining shopping centers and supermarkets were renamed. In 2012, ENKA Insaat was unable to compete with stronger players, and finally left the Russian retail business.

It is noteworthy that of the ten largest transactions with investments in excess of USD 300 million, four are in Russia (Table 2).

Table 2. The largest Turkish investment projects in the leading four countries of the CIS

Investor company	Recipient country	Volume of investments	Sector and industry of investment	Year of project start	Volume of FDI, USD billion
Renaissance Construction (Rönesans Holding)	Russia	“Moscow-City”	The building complex;	2012	1100
Anadolu Efes	Russia	CSC "EfesRus"	Agriculture: production beer	1997	1000
Zorlu Energy Group	Russia	TPS “Tereshkov”, “Kozhuhov”	Infrastructure network; electricity	2005	700
Turkcell	Belarus	CSC “BeST”	Communication and IT; telecommunications	2008	600
Sefalnşaat	Russia	"Alexandrovskaya Sloboda" Technopark	The building complex; construction and development	2012	600
Turkcell (Euroasia Telecommunications Holdings)	Ukraine	LLC "Astelit"	Communication and IT; telecommunications	2004	550
Aselsan A. S.	Kazakhstan	Kazakhstan Aselsan Engineering	Engineering complex; arms production	2011	388
Anadolu Cam Sanayii	Russia	LLC "Rusdzham"	Other industries; glass production	2001	304
Cet Insaat Muhendislik Ticaret	Belarus	HPP Beshenkovichesk aya, HPP Verhnedvinskaya	Infrastructure network; electricity	2012	300
Kastamonu Entegre	Russia	MDF production	Other branches of industry; timber industry	2013	300

In addition, it should be noted that our database recorded quite a large number of projects (30 in Russia, 10 in Kazakhstan, 6 in Belarus, 4 in Ukraine) and the fact that, with rare exceptions, these are different companies. This suggests that the Turkish business considers not only Russia, but neighboring countries as promising and quite independent of the direction of investment expansion, and not a "supplement" to the Russian market.

In the scientific literature, the expansion of Turkish capital in the CIS countries was usually due to two factors. The first of these is the "neighborhood effect" which is manifested in the geographical proximity of Russia, Ukraine, Belarus and Kazakhstan (although, unlike Azerbaijan and Georgia, neither one of these countries with Turkey common borders), a large trade by close humanitarian ties (Bolukoglu 2000). The second is liberalization of the Turkish economy and growth of private enterprise, the emergence of local companies giving more opportunities to enter foreign markets (Gagaev 2010). However, reducing the phenomenon of Turkish investments solely to these two factors would be incorrect, because human contacts were largely due to the development of trade-economic ties and investment expansion of the Turkish business theoretically could be implemented in other regions. We conducted a sectorial analysis to highlight another equally important cause of high rates of FDI: in the early 1990-ies, as a result of the transition to the market, new niches in the economy appeared in the CIS, filling which can meet the desires and capabilities of Turkish companies.

The construction industry is the most obvious but not the only example: other such niches are brewing (this segment of alcoholic beverages showed the fastest growing rate) and network trade. The early inflow of Turkish capital in poorly developed and "unimportant strategic" industries (as opposed to, for example, mining industry, where Turkish investments are almost there), ensured a relatively favorable business environment, which in turn prompted other companies to pay attention to the post-Soviet countries.

The possibility of further development of investment relations between Turkey and the "Quartet" of the CIS countries differs. In the post-crisis period, increasingly vocal downbeat is associated mainly with Turkish FDI in Russia, which may be reduced due to increased inter-state disputes and uncertainty about prospects for growth of the Russian economy (Balcer 2012). Indeed, in 2013 there was a slight decrease in the accumulated Turkish investments caused by the already mentioned sale of shopping center in Novosibirsk, however, the total number of projects with participation of Turkish capital, as already implemented, and declared recently as increased.

When talking about the investment of recent years, the attention should be allocated primarily to those that are currently implemented in the FEZ "Alabuga" near the city of Naberezhnye Chelny. Three companies — Sisecam (glass production), Hayat Kimya (sanitary paper products), and Kastamonu Entegre (manufacture of wood panels) — invested USD 360 million in 2014. It is planned to open five new productions with the participation of investors from Turkey on the territory of FEZ. However, the expansion of Turkish capital in the Republic of Tatarstan is not limited to the investment in FEZ. This subject of the Russian Federation has more than 250 Turkish companies, which, according to estimates of the Turkish government, invest about USD 1.5 billion in the region's economy. It is important to note that new Turkish companies appear mainly in those Russian regions, where investors from Turkey already have strong position. In addition to Tatarstan, such regions include the Vladimir region, where in 2010-2012 Turkey was ranked first among donor countries of FDI: three leading Turkish industrial group Koç Holding, Zorlu Holding (electrical and electronics) and Anadolu Efes (brewery) placed their production capacities over there.

Since many of the Turkish companies that newly arrived on the Russian market have already invested significant funds in the coming years, investment income should be expected, even if due to the economic stagnation of the Russian market they will lose their former attractiveness. However, this does not mean that the total volume of accumulated FDI will increase every year: as shown, sometimes even one sale of asset is sufficient to ensure that this indicator decreases by 10-15% in a year.

Among the remaining three of the four countries of the CIS, Belarus is most likely to attract the Turkish capital, since in Belarus they discuss the number of projects in the construction industry, consumer goods industry, service sector and transport sector (Rudakova 2011). In that case, if the Belarusian authorities will be forced to expand the program of privatization of state property, it will open the way for new Turkish investments. Also we cannot exclude the further growth of FDI in Kazakhstan's economy, where Turkish capital is starting to develop new niches (for example, hospitality). As for Ukraine, the inflow of new capital investment in this country is unlikely. As Turkish FDI mainly go to those industries that are associated with domestic consumption, in conditions of growing economic crisis in Ukraine and the fall in consumer purchasing power and the interest in local assets is gradually declining.

4. Discussion

An important role in the implementation of the planned modernization plans for the development of Kazakhstan is assigned to improving the investment climate. For this purpose, a special program "Road map of business 2020" was adopted, which is designed for implementation in 2010-2020. The program aims to support new business initiatives; Improvement of the business sector and stimulation of export-oriented industries (Resolution of the RK Government 2010). To solve them, it is supposed to provide real assistance to entrepreneurs by expanding access to credit financing, granting preferential terms for lending and leasing operations, developing the industrial infrastructure, servicing business support, reducing the tax burden, etc. Particular attention in the "Business Road Map 2020" is paid to small and medium-sized businesses, primarily involved in the creation of modern industries that can begin export deliveries. In Kazakhstan, the goal is to increase the share of SMEs, which already employ over 2 million people (with a population of 16 million people), in GDP structure up to 40% (Damu Foundation 2010).

To change the role of SMEs in the modernization of the economy, it is planned to substantially reduce the operational costs of business related to the registration and conduct of business by 50-60% by 2015. The goal is to enter the list of 50 countries with the most favorable business climate by 2020.

In Kazakhstan, some important elements of the infrastructure of innovation-industrial development are created - technological parks and business incubators, as well as free economic zones (FEZs). In 2011 there were

six such zones: "Astana - new city"; "Aktau seaport"; Information Technology Park "Alatau" (in Almaty); "Ontustik"; "National Industrial Petrochemical Technopark"; "Burabay" (in Borovoe). However, activity of FEZ did not lead to the expected results in terms of opening new production facilities, attracting investments and creating jobs. In the opinion of Kazakhstani experts, this is primarily due to the ineffectiveness of zoning management at this stage, as well as the lack of consideration for the individual features of the zones, and the instability of tax legislation for FEZ residents. Therefore, foreigners were involved in the management of FEZ by creating special management companies. 51% of the shares of these companies remained with the state, and the remaining 49% in professional international companies specializing in such management.

In order to expand the attraction of investments in non-oil sectors of the economy, Kazakhstan seeks to conduct individual negotiations with every major potential investor. At the same time, the largest and priority investment projects with the participation of recognized foreign investors and transnational companies will be those to enter into separate investment agreements with, providing for special measures of state support: tax privileges and preferences; ensuring minimum long-term state order and order of national companies; other financial and non-financial incentive measures. Decisions on these support measures under investment agreements have already been made at the government level (Minutes No. 26 2010). Kazakhstan, in particular, exempted from taxation dividends for non-residents, if they own shares or have participatory interests for more than three years in enterprises of the non-primary sector.

These and other changes that stimulate the attraction of investments in FEZ are planned to be introduced into the new law on FEZ. It will establish only general benefits for all FEZ, and specific additional benefits for each FEZ will be introduced by decrees of the President of the Republic of Kazakhstan. In particular, the common for all FEZ will be the imposition of VAT at zero rate, the abolition of land rent, the reduction of the social tax by 100%, the increase in the depreciation rate from 15 to 40%, the total exemption from corporate income tax payment for the type of activity of "Construction and commissioning of infrastructure facilities ".

It is planned to create two new FEZs. Kazakhstan's Skolkovo will be a free economic zone on the basis of Nazarbayev University, on the territory of which later the divisions of international companies specializing in scientific research will be established. And the university will form a network of small businesses that will participate in the commercialization of innovation. The University also creates three new scientific centers - the Center for Life Sciences; Center for Energy Studies; Interdisciplinary tool center, which will be an engineering center, a laboratory base and a design office.

Another FEZ will be created on the border trade and economic zone of Hortos between China and Kazakhstan. It will allow Kazakhstan to significantly increase its transit potential.

One of the most important factors of the investment attractiveness of jurisdictions is the level of tax burden on companies and citizens. Comparison of taxation levels in Kazakhstan demonstrates its tax appeal for investment (see Table 3).

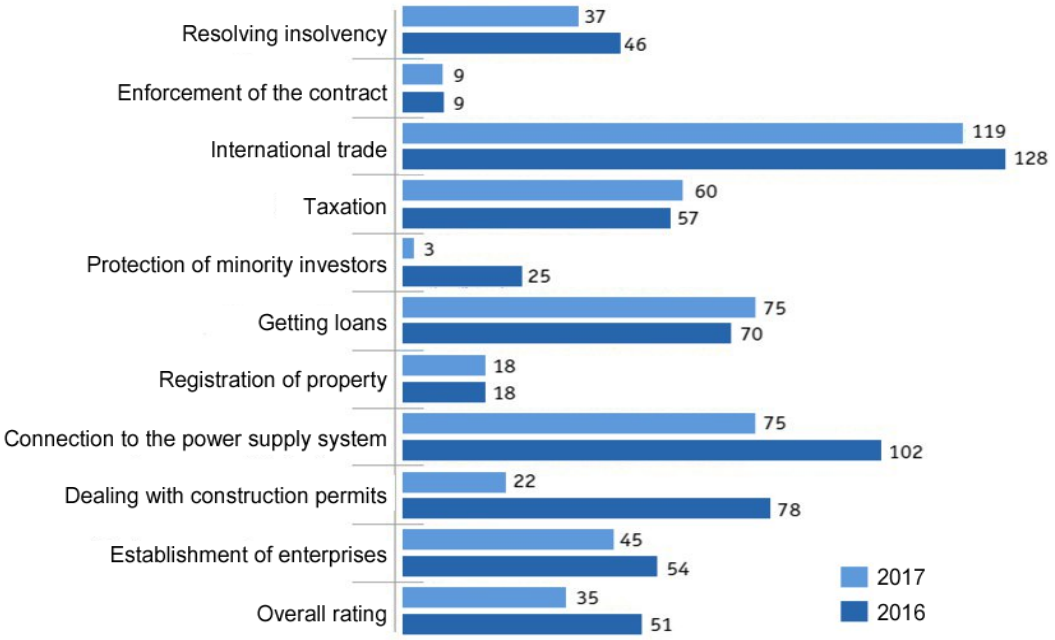
Table 3. Maximum tax rates in Belarus, Kazakhstan and Russia, %

Country	Income Tax	Value added tax	Personal income tax	Insurance premiums
Belarus	24	20	12	34
Kazakhstan	15	12	10	11
Russia	20	18	13	34

Source: The data of tax departments of Belarus, Kazakhstan and Russia (www.nalog.by; www.nalog.kz; www.nalog.ru)

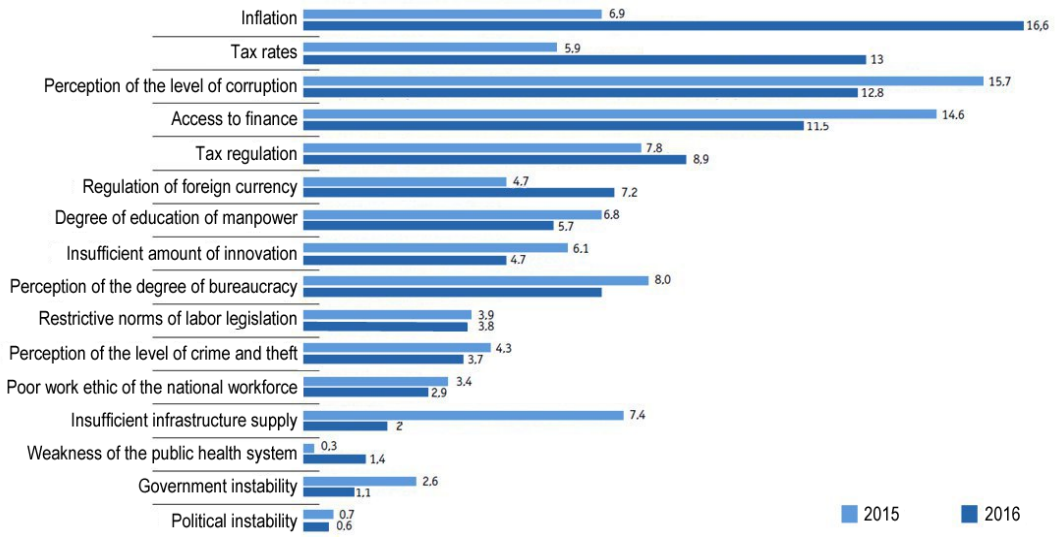
According to the World Bank Doing Business rating, Kazakhstan ranked 35th out of 190 in 2017 (53rd in 2015 and 41st in 2016), improving the result on business regulation by six points compared to 2016. Kazakhstan was among the leaders of the region in terms of the number of adopted reforms aimed at improving business regulation. The requirements for notarization of company documents and signatures of founders were abolished, procedures for obtaining permission for construction by introducing the principle of a "single window" were simplified and optimized, a new Labor Code was adopted that reduced the allowance for work on holidays, eliminating the requirements for reassignment of employees, if necessary, to reduce them, and increasing probationary period, and also other reforms simplifying business in Kazakhstan.

Figure 2. Dynamics of Kazakhstan's positions in the rating of Doing Business (World Bank)



However, according to a survey conducted by the World Economic Forum as part of the definition of the Global Competitiveness Index, the following problematic factors for doing business were identified: corruption, access to finance, tax regulation and stakes, inadequate supply of infrastructure and the level of education of the workforce (Figure 3).

Figure 3. Problematic factors for doing business in Kazakhstan, 2015-2016, %



Source: Global Competitiveness Report World Economic Forum

Kazakhstan rose in the Doing Business ranking from 51st to 35th place as of June 2016 among 190 countries. The republic showed the greatest improvement on the indicators "obtaining construction permits" (56 points

improvement), "connection to the power supply system" (by 27 points) and "protection of minority investors" (by 22 points).

To obtain a building permit, the need for a topographic picture of the land plot was canceled, and now the "single window" principle is in effect, which simplifies the procedure for obtaining the permit as a whole.

The process of connecting to electricity was simplified by removing the previously required official permission for excavation and passing the inspection of the State Energy Supervision Committee. Time required to meet technical requirements and contract signing has been reduced. Also, energy provision was improved to regulatory levels of systems of SAIDI and SAIFI. As a result, Kazakhstan climbed 27 points on the indicator of "connection to the power supply system".

Conclusions

Kazakhstan has strengthened the protection of minority investors through new provisions that require immediate disclosure of information on transactions with related parties and a detailed annual financial report.

Also, changes in shareholder rights must be approved by a vote of 2/3 of the shareholders. Subsidiaries are prohibited from purchasing shares issued by the parent company. In terms of "receiving loans" and "taxation", Kazakhstan dropped by 5 and 3 points, respectively. The legal rights of borrowers and creditors in Kazakhstan are weaker than in other countries in the region. Kazakhstan made the payment of taxes for companies more complicated due to the introduction of an obligatory contribution to the National Chamber of Entrepreneurs and an increase in taxes on transport and ecology.

One of the main problems remains the level of corruption, for further struggle against which, on December 26, 2014, the Anti-Corruption Strategy of the Republic of Kazakhstan for 2015-2025 was approved. The purpose of this strategy is to increase the effectiveness of the state's anti-corruption policy, to involve the entire society in the anti-corruption movement by creating an atmosphere of "zero tolerance" for any manifestations of corruption and reducing its level. Target indicators are the quality of public services, public confidence in the institutions of state power, the level of legal culture of the population, increasing the country's credibility in the international community and improving relevant international ratings.

Also, Kazakhstan is working to join the group of states to combat corruption of GRECO and to sign European conventions on criminal and civil liability for corruption.

To attract investments, Kazakhstan plans not only to continue working to address the problematic factors, but also to focus on two or three of the most attractive sectors of the economy, based on their current and potential shares in GDP, assessing regional competitive advantages by sector, and also from an analysis of global volumes Investments in these sectors. According to such an assessment system, the chemical, food industry and trade in Kazakhstan should become the target sectors for investment.

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Iceland´s Integration Process into the European Union and Assessment of its Economic and Political Alignment with European Legislation

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Abstract:

This research presents the analysis of the integration process of Iceland into the European Union from the outbreak of the global financial crisis until the official withdrawal of the membership application in 2013, particularly in context of the European Commission assessment of alignment of Icelandic legislation with the EU law. Our aim was to describe the methodology of assessment the alignment of laws and point out on the main issues of integration process of Iceland into the EU. Furthermore, this paper indicates the political and economic reasons for the level of alignment of Icelandic law with the EU law supported by figures. Results of this research indicates that the limited progress in 2-years lasting negotiation process was influenced by unwillingness of political elite to align the legislation in the country, not the economical or administrational inability of doing so.

Keywords: Iceland; European Union; acquis; Icesave dispute

JEL Classification: F50

Introduction

Before the outbreak of the global financial crisis, Iceland belonged to the most reluctant country in context of the membership in the European Union (the EU). The closest step towards the EU integration was the membership in European Economic Area (the EEA) in 1994 that provides the free movement of goods, services, capital and persons within the European Single Market. However, the global financial crisis caused the most significant shock of Icelandic economy in recent years, mainly due to open market, liberalized financial services, economic boom on real estate market and fragile Icelandic krona, what resulted in collapse of three major banks in Iceland.

Integration into the regional economic or political organization belongs to one of the stabilization tool in times of crises. After the outbreak of the financial crisis, newly elected Icelandic parliament (Althingi) decided to apply for the EU membership in order to mitigate consequences of the crisis. Therefore, the aim of this paper is to analyse the process of integration of Iceland into the European Union in context of the assessment of alignment Icelandic legislation with the EU law (acquis) provided by the European Commission. We will also focus on negotiation process itself, beginning from the screening stage, and state of negotiation chapters to the point, when Althingi decided to withdraw the membership application. Our partial aim is to analyse the most difficult issue in opened negotiation chapters, the Financial services chapter – the Icesave dispute.

1. Literature review

The data used for this research are based on relevant official documents and research publications. As this paper focuses on the assessment of alignment of Icelandic legislation with acquis, our basis is the official website of the European Commission (the EC) and the Commission´s staff papers – Progress Reports. For the purpose to create figures necessary to explain state of negotiation chapters, we have used also official documents provided by EC.

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For separate Icesave dispute issue we use various sources concerning this object matter. Our basis is mainly a legal study The Resolution of Cross-Border Banking Crises in the European Union by Seraina Neva Grünewald, official documents published by the UK HM Treasury and the Dutch Ministry of Finance, but also the law of the EU or the Deposit Guarantee Scheme Directive. Important sources were also several research articles of Baldur Thorhallsson, an Icelandic professor and researcher.

2. Methodology

The methodological and theoretical bases for this paper are conditions set by the European Commission. The EC developed chapters of acquis that are the ground stone for accession negotiations and thus the integration process of each candidate country in general. The content of negotiation chapters corresponds to various areas where economic, judicial and political reforms are needed to adapt the country's administrative and institutional framework in line with the legislation of the European Union, which means to meet the accession conditions (European Commission 2016b). In so called screening process, an analysis and examination of the acquis negotiation chapters are performed by the EC, in order to familiarize the country with the EU legislation, indicate the level of alignment with this legislation and therefore setting plans for the full compliance with the EU law (European Commission 2016d). Only after this process is completed, the candidate country may enter EU and become EU member state.

Once the country is perceived as a candidate country, the accession negotiations between the candidate country and ambassadors and ministers of the EU governments may start. These negotiations stand on following steps that have to be fulfilled by the candidate country as well as by the EC (European Commission 2016e):

- screening process: in this stage the candidate country has to adapt the EU legislation. However, during this process, also the EC has to determine the country´s preparedness to the legislation alignment. The EC findings are then presented to the Member States chapter by chapter in the form of a screening report with a conclusion to open the accession negotiations;
- submission of negotiation positions: before opening of negotiations with a candidate country, the national position must be submitted and the EC has to adopt a common one. However, for the most of the negotiation chapters the EC used to set closing benchmarks in such position that have to be met in order to close the chapters.

Currently, the acquis contains 35 negotiation chapters where the candidate country has to align its legislation with the EU law. In case of Iceland, the EC assessed 33 negotiation chapters (see Table 1), since in the period of integration process of Iceland, only these chapters were developed. The duration of closing these chapters varies due to different speed of performing reforms and their quantity.

Table 1. Negotiation chapters of acquis (European Commission 2016a)

Negotiation chapters of European legislation in integration process			
1.	Free movement of goods	18.	Statistics
2.	Freedom of movement for workers	19.	Social policy and employment
3.	Right of establishment and freedom to provide	20.	Enterprise and industrial policy
4.	Free movement of capital	21.	Trans-European networks
5.	Public procurement	22.	Regional policy and coordination of structural
6.	Company law	23.	Judiciary and fundamental rights
7.	Intellectual property law	24.	Justice, Freedom and security
8.	Competition policy	25.	Science and research
9.	Financial services	26.	Education and culture
10.	Information society and media	27.	Environment
11.	Agriculture and rural development	28.	Consumer and health protection
12.	Food safety, veterinary and phytosanitary policy	29.	Customs union
13.	Fisheries	30.	External relations
14.	Transport policy	31.	Foreign, security and defense policy
15.	Energy	32.	Financial control
16.	Taxation	33.	Financial and budgetary provisions
17.	Economic and monetary policy		

The negotiation chapters might be closed and reopened several times during the screening process. This depends on the readiness of the candidate country to perform reforms in such field and their full compliance with the EU legislation. The negotiation chapters are perceived as closed and the process finished as whole, only after the EC assessment and agreement of all the member states of the alignment of candidate´s country in every chapter with the EU law. Only afterwards the Accession treaty of the country, which includes the conditions of membership as well as transitional agreements and details of financial agreements, might be signed and the negotiation process is considered as finished.

3. Case studies

The negotiation process of Iceland started a year after the new pro-European Icelandic parliament of Social Democratic Alliance and the Left Green Movement (Bailes and Thorhallsson 2013) officially applied for the EU membership in order to stabilize the country´s economic situation. The Council decided to open accession negotiations with Iceland on 17.06.2010 (European Commission 2016c) and one month later the 1st intergovernmental conference on the EU integration of Iceland took place. In November 2010, when the screening process started, the European Commission begun with the assessment of acquis implementation. Since Iceland was already a member of the EEA, the European Free Trade Association (the EFTA) and the Schengen Area, the country has already implemented a significant part of the EU legislation. Therefore, during the integration process, Iceland complied with the EU law in many areas. Also due to the fact that Iceland was an economically and politically advanced country, but significantly influenced by a global financial crisis in 2008, its accession negotiations were oriented mostly on fulfilment of economic criteria.

In November 2011 the European Commission published 1st Progress Report on the compliance of Iceland´s legislation with the EU law where the period from November 2010 to June 2011 was assessed. The EC identified three main areas, where further alignment with the acquis was necessary (European Commission 2011):

- firstly, improvement in the field of economy, namely in free movement of capital, financial services and economic and monetary policy needs to be undertaken. The EC assessed developments in free movement of capital as incomplete due to perceiving capital restrictions. The Commission also requested for the improvement in financial services, due to slow implementation of EU legislation in areas as insurance, securities and supervisory capacities. Incomplete independence of the Central Bank of Iceland and the monetary financing prohibition on the public sector in area of economic and monetary policy remained insufficient;
- other obstacles were identified in agriculture and rural development, as well as veterinary policy, regional policy and coordination of structural instruments, where any new legislative alignment has been undertaken. The EC also requested for further alignment in area of consumer protection;
- the most significant problem remained fisheries. According to the EC, no developments were reported mainly in inspections and control of fisheries and resources and fleet management. The EC also called for recision of Iceland's legislation that restricts foreign investment in fisheries. Further improvement in the field of environment was also necessary, due to insufficient protection of whales and seals and conservation of natural habitats, fauna and flora.

In the rest of negotiation chapters assessed the EC on full or sufficient level of alignment with acquis in many cases as a result of implementation of significant part of the EU legislation due to the membership in EEA.

Table 2. The European Commission´s assessment of negotiation chapters, state from June 2011

Further alignment with acquis is	High level of alignment	
Free movement of capital	Free movement of goods	Social policy and employment
Financial services	Freedom of movement for workers	Enterprise and industrial policy
Agriculture and rural development	Right of establishment and freedom to	Trans-European networks
Food safety, veterinary and	Public procurement	Judiciary and fundamental rights
Fisheries	Company law	Justice, freedom and security
Economic and monetary policy	Intellectual property law	Science and research
Regional policy and coordination of	Competition policy	Education and culture

Further alignment with acquis is	High level of alignment	
Environment	Information society and media	Customs union
Consumer and health protection	Transport policy	External relations
Financial control	Energy	Foreign, security and defense
	Taxation	Financial and budgetary provisions
	Statistics	

Source: Own processing based on European Commission 2011

The following year the Commission published the 2nd Progress Report on Icelandic alignment with the EU law that covered period from October 2011 to September 2012 during which more attention to political issues was brought. After the economic breakdown in 2008, Althingi changed the foreign policy towards the EU membership and simultaneously focused on structural reforms. However, 4 years after the global financial crisis, the economic situation turned up to be relatively stabilized and euro-skeptical tendencies in Iceland started to be supported again.

Being closer to the end of this assessed period, the accession negotiations remained slowly, also due to the fact that after the membership in the EEA, the EFTA and the Schengen area, Iceland´s parliament expected faster integration process, but no compromises in the most sensitive negotiation chapters were reported. During 2nd assessed period, 14 negotiation chapters were opened, of which 8 chapters were provisionally closed and the EC called for alignment with acquis in the same 3 main areas (European Commission 2012):

- similarly, to previous assessed period, the EC called for further alignment of acquis on free movement of capital, mainly in continuous investment restrictions in *e.g*. fisheries and capital controls. On the other hand, important steps in the field of economic and monetary policy were reported, due to significant progress in insurance, banking and securities policy, but Iceland was challenged for further improvement in supervision and resolving of Icesave dispute. Also the independence of Central Bank and limitations in public sector monetary financing remained insufficient;
- in the field of agriculture and rural development and veterinary and regional policy, the EC did not report any new legislative proposal in order to comply with the EU law, as it was during the 1st assessed period;
- the main obstacle remained fisheries, since this chapter has stayed unopened.

On the other hand, negotiations in a number of areas were assessed as relatively fully aligned with acquis. Mainly in the field of company law, freedom of movement of workers, intellectual property law, health and consumer protection, foreign security, fundamental and judiciary rights and defence policy (European Commission 2012) negotiations, and due to successful reforms, these were provisionally closed.

The slow pace of Iceland´s accession negotiations remained until April 2013, when the parliamentary elections took place and a new government should have decided, whether the country would continue in integration process or not, due to extensive call for withdrawing the EU application from politicians, as well as citizens. The newly elected government, which took office in May 2013, decided to withdraw the membership application and officially informed the Commission that the country should not be perceived as the EU candidate country (Hilmarsson 2017). Still, the EC published 3rd Report in 2013, which contained Iceland's state of alignment with acquis from September 2013 until May 2013 with following conclusions (European Commission 2013):

- Iceland fully meets the political criteria for the EU membership;
- with regards to fulfilment of economic criteria, Iceland is considered as a functioning market economy. Since the breakdown during the financial crisis, the economy has continued to recover, further reforms are needed in order to become in line with international standards. Further improvement is necessary mainly in removing the capital market restrictions, increase of investments, reduction of unemployment, inflation decrease, efficiency in supervision over financial market, or reduction of public debt;
- Iceland has reached a significant level of alignment with the EU legislation as a result of its membership in the EEA, the EFTA or the Schengen Area. Due to its size and therefore administrative capacity, Iceland is not effective enough in implementation of the EU law;
- with regards to alignment of Iceland´s legislation to acquis, in many areas or negotiation chapters Iceland do not comply with the EU law, but on the other hand, in many areas Iceland is highly aligned with acquis due to already mentioned membership in the EEA, but also due to successful reforms during its negotiation

process (see Table 3). The most significant progress in 2-years negotiation process was made in the field of Financial services, Economic and monetary policy and Consumer and health protection, since the EC assessed Iceland´s alignment with acquis as good or satisfactory during the last assessment process while in the 1st and the 2nd Progress Report were assessed as not aligned.

Table 3. The European Commission´s assessment of negotiation chapters, state from May 2013 compared to state from June 2011

Further alignment with acquis is	High level of alignment without	Progress in compliance with acquis
Free movement of capital	Free movement of goods	Public procurement
Agriculture and rural development	Freedom of movement for workers	Company law
Food safety, veterinary and	Intellectual property law	Competition policy
Fisheries	Energy	Financial services
Regional policy and coordination of	Taxation	Information society and media
Environment	Statistics	Transport policy
Financial control	Enterprise and industrial policy	Economic and monetary policy
	Trans-European networks	Social policy and employment
	Judiciary and fundamental rights	Consumer and health protection
	Science and research	Customs union
	Education and culture	External relations
	Foreign, security and defense policy	
	Financial and budgetary provisions	
	Right of establishment and freedom to	
	Justice, freedom and security	

Source: Own processing based on European Commission 2013.

- according to the Table 4, the most of the negotiation chapters, where further progress in order to be aligned with acquis, needs to be done, were not even opened during the 2-years negotiation process, in particular in Free movement of capital, Agriculture and rural development, Food safety, veterinary and phytosanitary policy and Fisheries. These negotiation chapters are the most burdensome political issues where Icelandic parliament is not willing to be aligned with the EU due to its political importance and national interest.

Table 4. State of negotiation chapters from May 2013

	Open negotiation chapters	Provisionally closed negotiation	Never opened negotiation chapters
1.	Free movement of goods	Freedom of Movement for Workers	Right of establishment and freedom
2.	Public procurement	Company law	Free movement of capital
3.	Competition policy	Intellectual Property Law	Agriculture and rural development
4.	Financial services	Enterprise and Industrial Policy	Food safety, veterinary and
5.	Information society and media	Trans-European Networks	Fisheries
6.	Transport policy	Judiciary and Fundamental Rights	Justice, Freedom and security
7.	Energy	Science and Research	
8.	Taxation	Education and Culture	
9.	Economic and monetary policy	Consumer and health protection	
10.	Statistics	Foreign, security and defense policy	
11.	Social policy and employment		
12.	Regional policy and coordination		
13.	Customs union		
14.	Environment		
15.	External relations		
16.	Financial control		
17.	Financial and budgetary		

Source: Own processing based on Source: European Commission 2016c.

The serious obstacle in fnancial service chapter was the Icesave dispute. Icesave was an online saving accounts provider of Icelandic Landsbanki, which offered its products in the UK and the Netherlands through

branches and attracted many savers due to abnormal high interest rates. However, the global financial crisis in 2008 caused absolute collapse in a banking system of Iceland, including Landsbanki and its branches. National authority of Iceland took control over Landsbanki and split it off; new domestic bank Landsbankinn took over all the assets and some amount of liabilities and the rest, including foreign liabilities and derivatives, went into liquidation (Grünewald 2014). In this scenario, former Landsbanki´s domestic depositors were automatically transferred to new Landsbankinn and on the other hand, foreign insured depositors of Landsbanki´s UK and Dutch branches supposed to be refunded by deposit guarantee scheme of Iceland (DGS) (Deposit Guarantee Scheme Directive 94/19/EC).

Due to lack of funding, Icelandic DGS was not able to reimburse foreign insured depositors, therefore the Dutch and British governments accessed their national DGSs to Icesave depositors. In total, the UK DGS paid out 4,5 billion GBP of which 2,3 billion GBP was the reimbursement responsibility of Icelandic DGS (Financial Services Compensation Scheme 2012) and the Dutch DGS paid out 1,53 billion EUR of which 1,34 billion EUR remained the Icelandic DGS responsibility (De Nederlandische Bank 2009).

Following the negotiations between the government of Iceland and governments of the UK and the Netherlands, Iceland concluded that there is an obligation to reimburse Dutch insured depositors of Landsbanki branch (The Government of Iceland and the Government of the Netherlands 2008), however in referendum Icelanders rejected the outcome of these negotiations (Grünewald 2014). Moreover, Icelandic DGS was not still able to repay foreign depositors due to collapse of other 3 major banks in Iceland whose depositors were not fully paid out that time. This is also the reason, why Icelanders rejected in referendum to reimburse depositors of the UK and the Netherlands.

Therefore, the governments of the UK and the Netherlands blocked Icelandic deposits allocated in these countries and conditioned the opening of the financial services negotiation chapter by the judgement of the court. The EFTA Court on 28.01.2013 surprisingly concluded in its judgement that Iceland had not infringed its obligations laid down in Deposit Guarantee Scheme Directive 94/19/EC (The EFTA Court 2013), when the DGS of Iceland was not able to pay out insured depositors of Landsbanki´s branches.

The European Commission, when assessing alignment of Icelandic legislation with acquis, pointed several times on Icesave dispute issue, due to lack of capitalization of DGS of Iceland and thus non-compliance with the EU legislation (Deposit Guarantee Scheme Directive 94/19/EC) in the field of financial services. Also, as already mentioned above, financial services negotiation chapter has not been opened until the official judgement of the EFTA Court was published, due to unwillingness of the UK and the Netherlands because of unresolved Icesave dispute (Avery *et al*. 2011). Although, after publishing this judgement, the financial services chapter was opened and the EC assessed that the significant progress was made in context of alignment in this field. However, at the final stage, all member states would have to agree with the membership with candidate's country, also the UK and the Netherlands, which depositors were not reimbursed by Icelandic DGS.

Conclusion

After the outbreak of the global financial crisis, newly elected Althingi almost immediately applied for the EU membership in order to stabilize its economy, since the country was experiencing the most significant financial shock in recent years. As Iceland was an economically and politically well developed and functioning country, a smooth integration process was expected, also given Icelandic membership in the EEA, the EFTA and the Schengen Area, which means the law of Iceland was highly aligned with acquis in many areas.

The screening process, where alignment of candidate´s country with acquis of the European Union is assessed in separate fields via negotiation chapters, took 2 years in case of Iceland. The European Commission published after the 1st assessment so called Progress report on Icelandic alignment with the EU law in 2011. Out of 33 negotiation chapters, 23 were highly aligned with acquis, however in 10 areas further alignment would have needed to be done. These areas included mainly financial issues, which legislation the EC perceived as insufficient and might have caused the economic destabilization during the global financial crisis and also those areas, which were significant and sensitive for Icelandic economy, such as Free movement of capital, Financial services, Agriculture and rural development, Fisheries, Economic and monetary policy or Free movement of capital.

The 2nd Progress report on Iceland published in 2012 contained the same issues as the 1st one, namely in the field of financial issues (Financial services, Free movement of capital, Economic and monetary policy), rural development (Agriculture and rural development, Food safety, veterinary and phytosanitary policy, Environment, Consumer and health protection) and Fisheries. However, the Commission assessed that Iceland made an important step in alignment its legislation with acquis, but mostly in those fields, where its alignment was already perceived as highly or partially aligned. Due to upcoming parliamentary elections in 2013, the accession negotiations were slowed down and newly elected members of Althingi supposed to deal with sensitive areas from the political point of view.

After the parliamentary elections in 2013, euroskeptical Independence and Progressive Party (Thorhallsson 2014) formed a new coalition; therefore, reluctance towards the EU membership of Icelanders and also political elite was increasing, which resulted in withdrawal of the application for an EU membership in May 2013. Still, the EC published the 3rd Progress report, where all the negotiation chapters were assessed. Even if the negotiation process was officially closed, due to the withdrawal of Icelandic application for the EU membership, the EC assessed areas of Financial services, Economic and monetary policy and Consumer and health protection as aligned with the EU acquis, even if these fields were assessed negatively in the 1st and the 2nd Progress reports, what shows economic and administrational ability of doing compromises and aligning Icelandic law with acquis.

Although Iceland´s administration made a significant progress within 2 years of negotiations with the EU, the progress might be smoother given the high alignment of the EU and Icelandic legislation due to membership in the EEA. The burden stone of these negotiations were following negotiation chapters: Agriculture and rural development, Food safety, veterinary and phytosanitary policy, free movement of capital and Fisheries, since these chapters have never been opened during 2-years period of negotiations. Such a development shows that the failure to open these chapters was a political unwillingness to accomplish compromise in these fields, not the inability of doing so. Agriculture and rural development and Food safety, veterinary and phytosanitary policy are connected with preferred treatment of Icelandic agriculture policy due to arctic climate conditions. Fisheries is the main obstacle, due to this industry is the most important one in Iceland and Free movement of capital is connected with Fisheries, since Iceland imposes capital controls in the field of fisheries.

Another important issue in financial services was the Icesave dispute. Icesave, as an online branch of the biggest bank in Iceland, Landsbanki, offered its products mainly in the UK and the Netherlands. After the outbreak of the global financial crisis and collapse in banking system, the state had to take control over this bank and foreign secured depositors lost their savings and at the same time, the Deposit guarantee scheme of Iceland was not able to repay its losses. Even if the governments of the UK and the Netherlands reimbursed their secured depositors, they were asking also to retroactively repay these losses from Iceland and until this issue would not have been resolved by the court, the British and the Dutch governments froze Icelandic deposits in these countries and also have not allowed Iceland to open negotiation chapter of Financial services. Surprisingly, in 2013 the EFTA Court concluded that Iceland did not break the law and thus is not responsible for pay out. Even if such a development solved this issue and the EC assessed the area of financial services as highly aligned with acquis in 2013, the political issue remains on place. It is still questionable, whether in case Iceland would have continued in negotiations and would have fulfilled all criteria, the UK and the Netherlands would agree with the membership at the final stage.

To conclude, Iceland was a candidate to become the EU member, however the slow integration process was affected by political unwillingness. The Icelandic administration made a significant progress in negotiations given the smallness of the country and progress the EC assessed. But the failure to open most important negotiation chapters and high alignment of the Icelandic legislation with acquis prior to application for the EU membership, shows evident reluctance of the EU membership of political elite in the country.

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The Effect of Government's Health Expenditure on Economic Growth: Case Study of Turkey

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Abstract:

Health, education, and training are the main components of human capital in any country. Hence, nowadays a country's economic growth is explained in terms of its human capital. Accordingly, lots of economic research is done in this field to test the relationship between its components and the gross domestic product as a measurement of economic growth. This paper sheds the light on the relationship between public expenditure on health sector and the gross domestic product in Turkey from 1978 to 2014. This paper tests the relationship in the short run using Vector Auto Regression (VAR) Model. The results in the short run ascertain that there is a small effect of government's health expenditure on GDP in the case of Turkey.

Keywords: GDP; growth; health; human capital; human development.

JEL Classification: H51; I1; I15; I150

Introduction

Human capital refers to the set of skills and knowledge that the labour force has and is considered as an asset or a resource. It has three major components: education, training and health. Human capital is strongly related to economic growth as economic growth is the increase in a country's standard of living over time. Human capital affects economic growth and can help to develop any economy through the knowledge and skills of people.

As Cobb Douglas production function pointed out that inputs like labour and capital stock are necessary to produce output in the form of "y = A L K" being considered the only factors that can explain economic growth. Solow disproved this fact by working on determinants of economic growth and he discovered the concept of "Residual" which is the portion of economic growth that the researchers cannot explain by the increase in physical productive factors such as the capital stock, the number of workers and their hours and weeks of work. Some economic researchers such as Romer tried to explain this residual by including human capital in the form of knowledge to Solow's original model and this addition succeeded in reducing the residual size (Golden 2014).

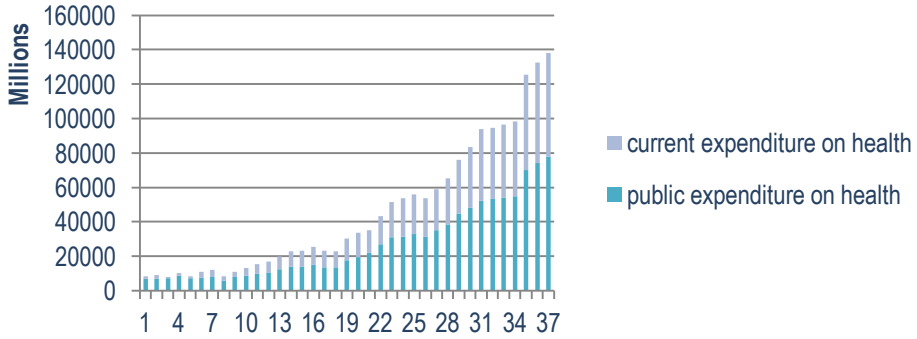
Consequently, it can be concluded that the human capital accumulation which is the investment in people's education, training and health together with factors such as labour and capital stock can explain the increase or decrease in economic growth for a certain country.

Hence, this study aims to investigate the impact of public health expenditure as measure of human capital investment by the government in health sector on GDP for Turkey from 1978 to 2014 by using Solow – Swan growth model as one of the leader theories that captured the relationship between sustainable economic growth and human capital.

The analysis is divided into two main parts. The first part tackles Augmented Dickey-Fuller (ADF) to test the stationary properties of our variables. If the conditions of co-integration are satisfied, it will be used to estimate the long run relationship between mainly the government expenditure on health and GDP. However, if conditions are not satisfied, VAR test will be used to estimate the short run dynamics and results will be interpreted through both impulse response function and variance decomposition.

This paper takes "Turkey" as a case study. According to County Cooperation strategy report issued by World Health Organization 2016, Turkey is one of the countries that achieved successes in health care sector by implementing a health reform called health transformation program. This program makes Turkey one of the pioneering countries in health tourism and attracted the private investments to invest in the health sector. This program required the government to increase its expenditure on health sector to fund infrastructure, equipment and training staff required to improve this sector and this is clearly shown in following figure:

Figure 1. Expenditure on Health (1978-2014)



Source: Done by the authors based on OECD Health Statistics 2015.

1. Literature review

The relationship between human capital, government efforts on human capital investment, and economic growth is analytically tackled and viewed in the literature from diverse perspectives. Sapuan and Sansui (2013) examined the long-run and short-run relationships between economic growth and social services expenditure with human capital indicators in Malaysia for the period from 1975 to 2011. The autoregressive distributed lag (ARDL) bound testing technique was used to ascertain this relationship. This study builds two models. The first model tests the impact of social services expenditure and investments ration the economic growth. While, the second model includes two more additional variables: tertiary enrolment as a proxy for education capital and life expectancy as a proxy for the health capital. The results show that there is co-integration between economic growth and the explanatory variables *i.e*. investment, social services expenditure and human capital indicators. In Model 1, investment and social services expenditure show a positive impact on economic growth in the long run and the short run. While, the results in Model 2 show that life expectancy at birth as a proxy of health indicator and tertiary enrolment as a proxy of education indicator also have a long-run and short run relationship with economic growth.

There are several studies that investigated this relationship in Nigeria. Among those papers are Oluwatobi and ogunrinola (2011), Ogungbenle, Olawumi, Obasuyi (2013), Victoria (2015), Ogbonna *et al.* (2016), and

Hakooma (2017). Most of these studies indicated that there is positive relationship between government efforts on human capital development, and economic growth.

Oluwatobi and ogunrinola (2011), for instance, investigated the impact of government recurrent and capital expenditures on education and health in Nigeria and their effect on economic growth from 1970 to 2008. The human capital augmented Solow model is adopted in this study. The real output is used as dependent variable. While, government capital and recurrent expenditures on education and health, gross fixed capital formation and the labour force used as explanatory variables. The Augmented Dickey Fuller (ADF) and Philip-Perron (PP) tests are used in the study to test for the stationary of the time-series data. Moreover, the Johansen co-integration test and the vector error correction model are used to find out the long run relationship and the speed of disequilibrium adjustment respectively. The findings indicate that there exists a positive relationship between government recurrent expenditure on human capital development and the level of real output, while capital expenditure is negatively related to the level of real output.

Ogungbenle, Olawumi, and Obasuyi (2013) studied also the relationship existing among life expectancy, public health spending and economic growth in Nigeria. A vector Autoregressive (VAR) model approach and Pair wise granger causality Tests were adopted to examine this relationship. The results of the study indicate that there is no bidirectional causality between life expectancy and public health spending in Nigeria. In the same direction, it was also revealed that there is no bidirectional causality between life expectancy and economic growth in Nigeria over the years. However, the study reveals that there is bidirectional causality between public health spending and economic growth in Nigeria. Based on the findings of the study, the study recommends that for Nigeria to achieve a sustainable economic growth, it has become essential to take measures that would promote the life expectancy of its citizens by increasing public health spending as this will serve as a remedy for its economic backwardness.

In the same vein, Victoria (2015) conducted an empirical study on the relationship between investment in education, health and economic growth in Nigeria, using time series data from 1982 to 2011. This study used trend analysis, the Johansen co-integration and ordinary least square technique. The real GDP is used as dependent variable. While, health and education expenditure, secondary and tertiary enrolment rate, and gross fixed capital formation appeared as explanatory variables. Empirical results revealed that there is a long-run relationship between government expenditure on education, health and economic growth. Therefore, this study recommends that in order to accelerate growth and, the government should put in place policies that promote massive investment in the education and health.

Ogbonna *et al.* (2016) yields different conclusion. This study uses Vector Error correlation model to determine if expenditure on health and education has significant effect on economic growth in Nigeria from 1970 - 2013. The results show a 1% increase in the government expenditure on education on the average led to 23.8% increase in GDP (a positive effect) while 1% increase in the government expenditure on health caused 37.6% decrease in GDP (a negative effect).

Hakooma (2017) uses Johansen co-integration test and the error correction model to examine the impact of human capital on economic growth in Zambia from 1970-2013 both in the short and long run. The results indicate the presence of a long run relationship between economic growth proxied by GDP per capita and human capital proxied by government expenditure on health and education. The estimation of long run model reveals that human capital in the form of health proxied by public expenditure on health is the main contributor to real GDP per capita rise followed by education proxied by secondary school enrolment.

Education has been considered as one of the most important types of investments in human capital and has been studied extensively in the literature of economic growth. Among those papers are Idrees and Siddiqi (2013), and Bexheti and Mustafi (2015). It has been argued in most of studies that education and public government expenditure education have a positive effect on economic growth.

Idrees and Siddiqi (2013), for instance, examined the long-run relationship between public education expenditures and economic growth. The study used panel data consisting of 14 cross sections and each cross section covers a time period of 17 years from 1990 to 2006. Panel unit root tests are used to test for the stationary of each variable. The cross sections include seven developed countries and seven developing countries. Panel unit root tests are applied for checking stationary of variables. The single-equation approach of panel co-integration

(Kao 1999) and Pedroni's Residual-Based Panel Co-integration Test (1997, 1999) are used to verify the existence of long-run relationship between public education expenditures and GDP. Finally, the panel group Fully Modified Ordinary Least Square (FMOLS) regression is applied to obtain asymptotically efficient consistent estimates in the panel series. The study concludes that public financing of education is an important determinant of economic growth Moreover, the impact of public education expenditures on economic growth is greater in the case of developing countries compared to the developed ones.

Although it has been argued in most of studies that government on education has a positive effect on economic growth, there are other studies that show public government expenditure on education can have a negative effect on economic growth.

Bexheti and Mustafi (2015), for instance, examined whether all measures of public spending on education promote economic growth in Macedonia. The relationship is investigated using Logarithmic Multiple OLS Regression Models. The real GDP is used as dependent variable. While, direct expenditures on education, capital expenditures on education and indirect expenditures (wages) on education are used as explanatory variables. The findings show that the direct and indirect public expenditures on education have negative effect on real GDP in the case of Macedonia. This means that public expenditures on education are not productive and other channels must be founded to enhance the quality education and skills of labor, by which the productivity will increase and hence the economic growth.

Health has been also considered as one of the significant ways to invest in human capital. However, compared to the empirical literature on the effect of education on growth, the empirical literature on the effect of health on growth is relatively few. Isabel (2012), for instance, provided empirical evidence that shows the impact of health status on economic growth using panel data of the 22 OCED countries and Portugal during 1980 -2004. This study also highlighted that the complex interrelations between health, education and income through a cumulative causation mechanism able to generate a virtuous circle of economic growth with expanding tendencies. The feedback effects between health, education and income are captured using appropriate econometric specifications and estimation techniques that based initially on panel data analysis. Then, a simultaneous equation model is constructed in order to capture the cumulative causation tendencies between the core variables of the model. The results indicate that health is indeed an important factor in explaining growth and convergence in the OECD countries and the Portuguese regions at a district level. The Economic factors and education are also important components in explaining health status of these countries.

Obialer (2017) shows the effect of health investment on economic growth. This study investigates growth effect of three government human capital investment variables of health, education and literacy rate on the economies of three Sub-Sahara African countries of Nigeria, South Africa and Ghana from 1980 to 2013. Through using Co-integration techniques and Vector Error Correction mechanism, the results show a significant positive effect of health and education on growth only in Nigeria at 1% and 5% significance level. The results also show a negative effect of literacy rate on economic growth at these three countries.

To sum up, evidence from the literature shows that education and health are crucial for economic growth. However, little emphasis has been placed on the health component of human capital. There is a need to investigate more about the role of government on human capital investment through government expenditures on health, and its impact on the economic growth.

2. Methodology

The main aim of this study is to examine the human capital investment efforts of the Government on the economic growth of Turkey from 1978 to 2014.

This paper uses the augmented Solow human-capital-growth model adopted from Oluwatobi and ogunrinola (2011). This model is considered as an improvement of the Solow growth model, as original Solow model did not explicitly include human capital. The human capital is incorporated in this model because labour is non-homogenous in the production process either within a nation or across different countries due to their different levels of education and skills. The basic assumption of this model is that improving education will increase workers' quality which in return, will improve output.

$$Y=AK^{\alpha}(hL)^{\beta}U \quad (1)$$

where: Y = Output level; *K* = Stock of physical capital; *h* = Level of Human Capital; *L* = Labour, measured by number of workers; *A*=Level of Total Factor Productivity; α1=Elasticity of capital input with respect to output; *while β* =Elasticity of labour input with respect to output.

Then, the equation is transformed to linear form using the log transformation:

$$\text{Log } Y=\alpha_o + \alpha_1 \log K + \beta \text{ Log } hL + W \quad (2)$$

where: α_o= log A and W=log U.

Following Oluwatobi and ogunrinola (2011) model, this study incorporates additional variable to capture the government investment effort in human capital, as this paper focuses on government's investment in human capital and its impact on economic growth. This additional variable is total government expenditure on health, as the development of health sector is one of main ways of achieving human capital development. It can be represented as follows:

$$\log Y=\alpha_o + \alpha_1 \log K + \beta \text{ Log } hL + \alpha\ 2 \log GTEH + W \quad (3)$$

Output level (Y) is the dependent variable and represented by real Gross Domestic Product (GDP at current PPPs (in mil. 2011US$). There are three explanatory variables. The stock of physical capital (K) is measured by the country's Capital stock at current PPPs (in mil. 2011US$). HL which is a measure of total stock of human capital is the product of the index of human capital per person, based on years of schooling (h) and the total labour force (L). The government human capital investment is proxied by total government expenditure on healthcare (GTEH). The time series data of this study is obtained from the Penn World Table 9.0 and OCED health statistics 2015.

3. The empirical model

3.1 Augmented Dickey-Fuller (ADF) and Co-Integration tests

In attempt to assess the relationship between government expenditure on health services in Turkey and the gross domestic product from 1978 to 2014, equation (3) is analysed and the following results are obtained.

3.1.1. Estimation results

The results for Augmented Dickey-Fuller (ADF) test are represented in the following table:

Table 1. Unit Root Test results

	Variables	ADF [No. of Lags]	Stationary/ Non-Stationary
A. Series in levels	Lny	-1.68[0]	Non-Stationary
	Lnk	-0.28[0]	Non-Stationary
	Lnhl	-1.14[0]	Non-Stationary
	Lngteh	-3.82[0]	Stationary
B. Series in first differences	Δ lny	-6.12[0]	Stationary
	Δ lnk	-3.59[0]	Stationary
	Δ lnhl	-4.96[0]	Stationary

Source: Calculations are done by the authors.

At 5% significance level, t-statistic equals -3.55. The stationary of time series is specified by comparing the absolute value of ADF test with t-statistic value. The series is to be stationary; the absolute value of ADF test must be greater than the absolute value of t-statistics. The previous results in Table (1) show that the first three variables (lny, lnk, lnhl) are non-stationary at levels, while the time series gteh is stationary at the level. And by applying the ADF test again at the first differences for the non-stationary variables, we find them stationary and integrated of order 1. The number of lags is 0 due to the automatic selection of lag length according to Schwarz Info Criterion.

Theoretically, in order to examine the co-integration relation between variables, they must be integrated of the same order. But it has been proved also that if the variables are integrated of different orders, co integration can still be examined if:

- the integration order of dependent variable is less than or equal to the integration order of explanatory variables;
- moreover, there must be either none or at least two explanatory variables integrated of an identical order higher than the order of integration of the dependent variable (Charemza and Deadman 1997).

Since the order of integration of dependent variable which is the GDP is less than the order of integration of one of explanatory variables which is the government expenditure on health, this would violate the condition (a) of the two conditions mentioned above that are necessarily to be satisfied to examine the co-integration relation between the variables of our model. Thus, this paper adopts another methodology called The Vector Autoregression (VAR) model to estimate the effect of the health government expenditure changes on the GDP of Turkey over short run period.

3.2. Short-Run Dynamics (VAR model estimation)

Since the necessary conditions that are required to find co-integration long run relationship between the variables of interest are not satisfied, the Vector Auto Regression (VAR) is employed in order to estimate the effect of the health government expenditure changes on the GDP of Turkey over short run period. In this section, results of the VAR analysis will be reported.

The VAR model is a set of dynamic equations in which each variable is specified as a function of an equal number of lags of its self and all other variables in the system. A VAR model makes minimal theoretical demand on the structure of a model. In order to estimate the VAR model, only two things are needed to be specified: the variables that are believed to interact, as well as the largest number of lags to capture most of effects that variables have on each other (Pindyck and Rubinfeld 1998).

Theoretically, VAR models have several advantages. First, it provides a mean of dealing with non-stationary time series, especially in absence of co-integration. Second, it accounts for short run dynamics. Third, it is considered as a type of non-structural models due to its minimal theoretical demand. Finally, it cures the endogeneity problem. Despite the advantages of the VAR model, there are some potential weaknesses in it. One potential weakness lies in the lag structure specification, which is sometimes chosen arbitrarily due to degrees of freedom considerations. Furthermore, some writers considered the VAR as a statistical rather than an economic model, as it deprives the model from its economic content by treating the all variables as endogenous with no clear reliance on economic theory (Pindyck and Rubinfeld 1998, Charemza and Deadman 1997).

The order in which the variables are entered in the estimation procedure is important, as the results are too sensitive to the ordering of the variables. Because errors are usually correlated, there is no way to identify shocks with specific variables. When this is the case, the usual procedure is to arbitrarily attribute all effects of such common components to the variable that appears first in the system (Brooks 2008). As a result, responses can change dramatically with a different ordering of the variables. To overcome this problem, this paper put the most exogenous and most important variable at first which is the government expenditure on health (ln GTEH), followed by the human capital investment (ln HL), the capital accumulation (ln K), and (ln y).

VAR is estimated twice: one time when all variables entered in levels to settle upon the most appropriate lag structure of the whole model, and another time when all variables enter in their stationary state in order to estimate the final model and reach final results needed for our interpretation (Charemza and Deadman 1997).

First, in order to choose the appropriate lag structure for the whole model, the VAR model should be estimated with all variables entered in their levels. The optimal lag length is determined by Akaike information criterion. The optimal lag length would be the lag that minimizes Akiake information criterion (Pindyck and Rubinfeld 1998). According to Akiake criterion, the most appropriate lag for estimation of this is 6. However, the lag 6 is too big relative to the number of observations which are 37, and the number of variables which are 4. The greater the lags would be, the greater the numbers of parameters that must be estimated, and the fewer the degrees of freedom

which will affect the results of the model (Brooks 2008). Thus, the number of lags in this model is chosen arbitrarily, to be 1.

Second, in order to estimate the final model, all variables should be introduced in their stationary state. Thus, all variables are introduced in first differences to make them stationary except the government expenditure on health which is stationary in its level form after conducting Augmented Dickey- Fuller unit root test. The final estimation of the model is provided in the appendix at the end of this paper. A VAR is given by the following set of *n* linear equations treating all variables as endogenous: Where *t* denotes time and *p* is specified for the whole system and is the same for each variable. *P* is the optimal lag length that is determined by Akaike information criterion, but it is equal to 1 arbitrarily in this case due to lower number of observations and degrees of freedom.

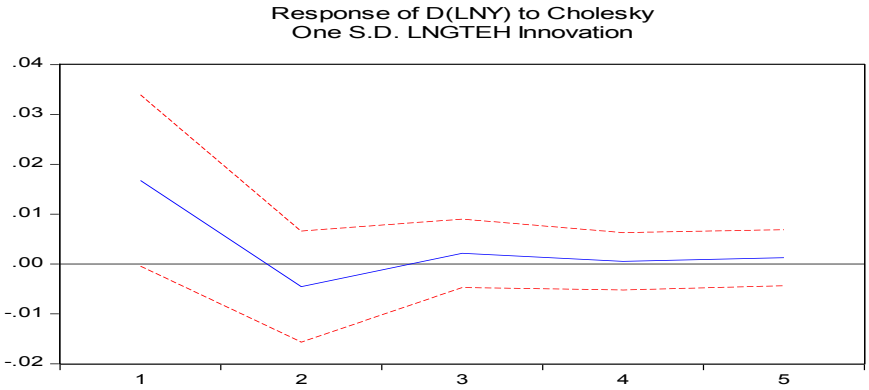
The VAR output is not interpreted in conventional way of using test statistics for significance of the parameters. However, analyses of impulse response function and variance decomposition are the main tools of interpreting the VAR output.

3.2.1. Impulse response function

Impulse response function traces the effect on the current and future values of the endogenous variable of one standard deviation shock of the innovation. Moreover, it allows for better insight into dynamic properties of estimated VAR. It is also considered beneficial to plot the impulse response function to be able to visually represent the behaviour of the variables in response to the various shocks (Pindyck and Rubinfeld 1998).

The responses of the concerned variables to a specific shock are presented over a five years time horizon. The main objective is to estimate the impulse response of GDP to the shocks of government expenditures on heath, shocks of human capital investments and the shocks of capital.

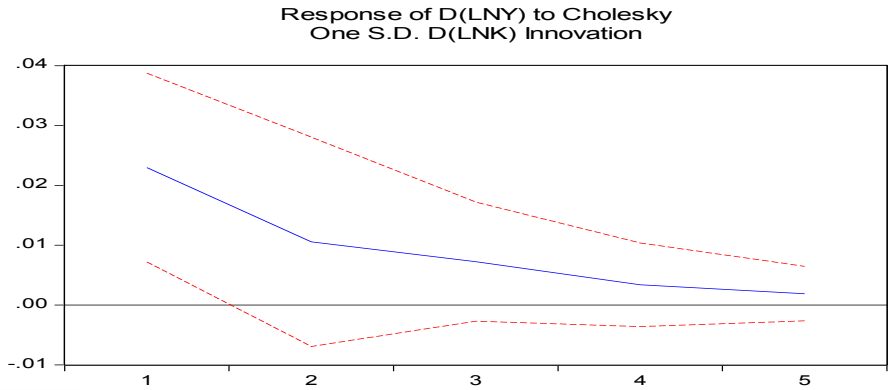
Figure 2. Impulse Response of GDP to the shocks of government expenditure on health



Source: Done by the authors based on WHO (2016) and Penn World Table 9.0

Figure (2) shows that, the response of GDP to the government expenditures on the health is positive. The response of GDP to the government expenditure on health shock shows that a one standard deviation shock to government expenditure on health causes GDP to increase and peak in period 1. Then the GDP begins to decrease eventually until the effect of health government expenditure on GDP almost wears off after around 4.5 periods.

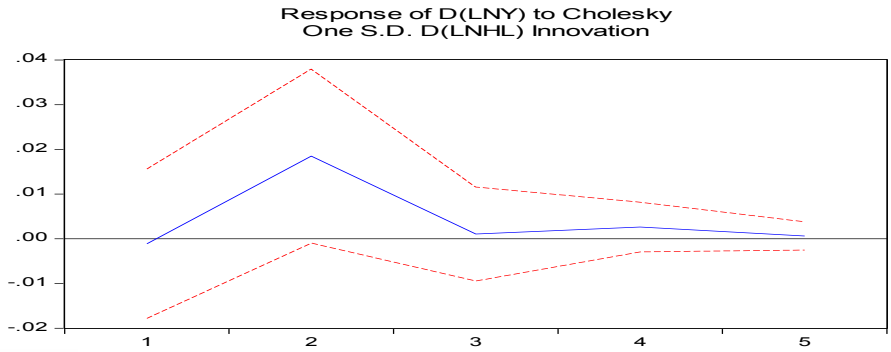
Figure 3. Impulse Response of GDP to the shocks of capital



Source: Done by the authors based on Penn World Table 9.0

As Figure (3) indicates, the response of GDP to capital shocks is positive. The response of GDP to capital shock shows that a one standard deviation shock to capital causes GDP to peak in the first period. Then the GDP begins to decrease eventually until the effect of capital on GDP is negligible in period 5.

Figure 4. Impulse Response of GDP to the Shocks of Human Capital



Source: Done by the authors based on Penn World Table 9.0

It is clear from Figure (4) that, the response of GDP to human capital investment shocks is negative in the first period. The response of GDP to human capital shock shows that a one standard deviation shock to human capital causes GDP to decrease initially at the first period. Then the GDP in response to the human capital shock increases rapidly until the effect of human capital on GDP reaches a maximum in period 2. Then the GDP in response to human capital investment begins to decrease eventually until the response of GDP to shock of human capital is negligible in period 5.

3.2.2. Variance decomposition

Variance decomposition is considered another tool to interpret the VAR output. According to the variance decomposition, the variance of forecast error for each variable is broken down into components that can be attributed to each explanatory variable illustrating the relative importance of individual shocks in determining the variations of the variable (Pindyck and Rubinfeld 1998). Table (2) indicates the variance decomposition of GDP. The second column in the table gives the standard errors of forecast for horizons of 1 year, 2 years, etc. For one year forecast; the standard error of GDP is 0.327872. For two -year forecast, the standard error of GDP is 0.450633.

Table 2. The Variance Decomposition of the GDP

Period	S.E.	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
1	0.327872	10.30489	0.045249	19.368480	70.28138
2	0.450633	9.200722	10.49128	19.512230	60.79577

Period	S.E.	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
3	0.540209	9.140839	10.29960	20.654830	59.90473
4	0.611271	9.097699	10.44190	20.874420	59.58369
5	0.670339	9.129509	10.43849	20.994486	59.48714
Cholesky Ordering: LNGTEH D(LNHL) D(LNK) D(LNY)					

Source: Calculations are done by the authors.

Variance decomposition of GDP indicates that less than 33% of its variation is determined by variables in the system other than its own changes. It is shown that the changes in variable itself are the main source of variation in the GDP which is approximately 70.28138% in the first period. This percentage is decreased over time. Other variables contribute by lower percentages. If the model is used to make a 2-year forecast of GDP, 60.79% of forecast variance is attributed to GDP shocks, 19.51% of forecast variance is attributed to capital shocks, 9.201% of forecast variance is attributed to the government expenditure on health shocks, and 10.49% of forecast variance is attributed to human capital shocks. Not surprisingly, the greater the forecast time horizon, the larger the proportion of forecast variance due to other variables rather than the GDP itself.

Conclusion

The main objective of this paper is to shed the light on the effect of government's health expenditure on the economic growth which is represented by the real gross domestic product. In the beginning to avoid the non-stationary problem, Augmented Dickey-Fuller (ADF) test is applied to test the stationary properties of the four-time series variables. This analysis usually intended to use co-integration test to examine the long run relationship between the variables. However, VAR test is used because the conditions required to use co-integration were not satisfied.

The results show that the response of GDP to the government expenditure on the health is positive. GDP increased in period 1, then it began to decrease eventually until the effect of the shock of government expenditure on GDP disappears in period 4.5. In addition, the variance decomposition of GDP results indicates 9.201% of the forecast variance of GDP is attributed to the government expenditure on health shocks in second period. Moreover, the changes in GDP itself are the main source of variation in the GDP which is approximately 70.281% in the first period. Yet; these results are restricted only to the short run as we were not able to use co-integration and estimate the long run relationship. The investment in human capital through the government expenditure on health is considered a long run phenomenon, as its effects on the GDP of Turkey will appear after a long period. Thus, the effects of the government expenditure of health on the GDP of Turkey may be small in the short run. The VAR model only captures short run dynamics between variables that are believed to interact, and is not concerned with the estimation of long run relationship between variables.

No doubt, in the long run any country will extremely be benefited from investment in human capital mainly health as it is considered nowadays the main real investment. Expanding government expenditure on health became an indispensable pillar represented by improving the quality of health services: better clean hospitals, wide spread medical centers, modern equipments, health insurance covering the poor people. If this happened, any country will be able to have more productive workers, resulting in a significant increase in the economic growth of a country and consequently raise the standard of living of its population.

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APPENDIX

1. ADF test at level:

Null Hypothesis: LNY has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-1.681685	0.7387
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

Null Hypothesis: LNK has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-0.284654	0.9881
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

Null Hypothesis: LNHL has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-1.137564	0.9081
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

Null Hypothesis: LNGTEH has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-3.819268	0.0269
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

2. ADF test at first differences:

Null Hypothesis: D(LNY) has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-6.120963	0.0001
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

Null Hypothesis: D(LNK) has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-3.597750	0.0452
Test critical values:	1% level	-4.234972	

	t-Statistic	Prob
5% level	-3.540328	
10% level	-3.202445	

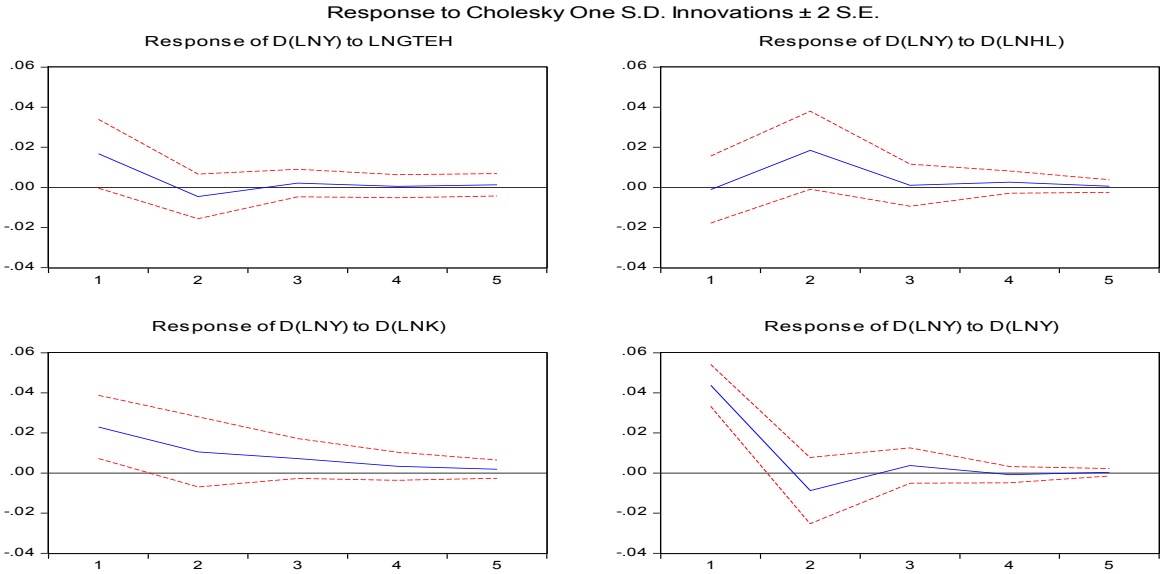
Null Hypothesis: D(LNHL) has a unit root
Exogenous: Constant Linear Trend
Lag Length: 0 (Automatic – based on SIC, maxlag=0)

		t-Statistic	Prob
Augmented Dickey-Fuller test statistic		-4.964760	0.0016
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

3. The Vector Auto regression (VAR) model estimation:

Vector Autoregression Estimates				
Date: *02/22/17* Time: 15:55				
Sample (adjusted): 1980:2014				
Included observations: 35 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
LNGTEH(-1)	0.954245	-0.000297	0.013493	-0.000163
	(0.04980)	(0.00364)	(0.01214)	(0.00793)
	[19.1631]	[-0.08162]	[1.11180]	[-0.02058]
D(LNHL(-1))	0.171548	0.113339	0.397784	0.67906
	(2.47779)	(0.18108)	(0.60387)	(0.39440)
	[0.06923]	[0.62590]	[0.65873]	[1.171629]
D(LNK(-1))	0.307826	0.025690	0.457315	0.191189
	(0.77128)	(0.05637)	(0.18797)	(0.12277)
	[0.39911]	[0.45576]	[2.43293]	[1.55732]
D(LNY(-1))	-0.258966	0.076244	-0.033174	-0.199516
	(1.17291)	(0.08572)	(0.28585)	(0.18670)
	[-0.22079]	[0.88947]	[-0.11605]	[-1.06866]
C	1.145598	0.029313	-0.293117	0.025208
	(1/15345)	(0.08430)	(0.28111)	(0.18360)
	[0.99319]	[0.34774]	[-1.04271]	[0.13730]
R-squared	0.929037	0.075637	0.291255	0.194599
Adj. R-square	0.919576	-0.047612	0.196756	0.87212
Sum sq. resids	3.225007	0.017225	0.191550	0.081711
S.E. equation	0.327872	0.023962	0.079906	0.052189
F-statistic	98.18940	0.613693	3.082085	1.812130
Log likelihood	-7.935620	83.63047	41.47634	56.38573
Akaike AIC	0.739178	-4.493169	-2.084362	-2.714135
Schwarz SC	0.961371	-4.270977	-1.862169	-2.714135
Mean dependent	23.30403	0.030382	0.054486	0.043505
S.D. dependent	1.156141	0.023411	0.089157	0.054625
Determinant resid Covariance (dof adj.)	7.36E-10			
Determinant resid covariance	3.97E-10			
Log likelihood	180.1543			
Akaike information criterion	-9.151672			
Schwarz criterion	-8.262901			

4. The impulse response function of the GDP D(lnY):



5. The variance decompositions of all variables of the model:

Variance Decomposition of D(LNY)					
Period	S.E.	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
1	0.327872	10.30489	0.045249	19.36848	70.28138
2	0.450633	9.200722	10.49128	19.51223	60.79577
3	0.540209	9.140839	10.29960	20.65483	59.90473
4	0.611271	9.097699	10.4419	20.87442	59.58369
5	0.670339	9.129509	10.43849	20.994486	59.48714
		Variance Decomposition of LNGTEH			
Period	S.E.	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
1	0.023962	100.0000	0.000000	0.000000	0.000000
2	0.024679	99.74005	0.029732	0.167001	0.063218
3	0.024864	99.53617	0.040520	0.354988	0.068319
4	0.024902	99.36561	0.056296	0.503950	0.074147
5	0.024913	99.23716	0.068518	0.617866	0.076455
		Variance Decomposition of D(LNHL)			
Period	S.E.	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
1	0.079906	0.521249	99.47875	0.000000	0.000000
2	0.088688	0.651784	95.16948	2.351607	1.827131
3	0.090928	0.651528	94.47574	3.056058	1.816670
4	0.091716	0.656457	94.22685	3.293799	1.822895
5	0.092135	0.695998	94.16608	3.352885	1.821437
		Variance Decomposition of D(LNK)			
Period	S.E.	LNGTEH	D(LNHL)	D(LNK)	D(LNY)
1	0.052189	0.000467	1.891591	98.10794	0.000000
2	0.057219	0.135407	4.234229	95.60358	0.026784
3	0.057843	0.057843	4.674413	94.69960	0.033219
4	0.058008	1.110896	4.809254	94.04720	0.032651
5	0.058057	1.669570	4.821981	93.47609	0.032357
Cholesky Ordering: LNGTEH D(LNHL) D(LNK) D(LNY)					

Corporate Responsibility of Mining Companies: Mechanisms of Interaction with Stakeholders in Projects Implementation

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Abstract:

In resource producing countries, mining companies make a significant contribution to GDP and bring large tax revenues, along with a negative impact on workers due to a number of unfavorable factors, the need to compensate for this impact, and a high anthropogenic load on the environment. Effective communication of stakeholders is a key element in the strategy and tools of interaction with implementing the policy of corporate social responsibility (CSR). The study aims to prove the need for the implementation of a proactive strategy in managing CSR, *i.e.* the development strategies of a mining company that ensures effective interaction with stakeholders. The methods applied in the study include the analysis of the conditions and level of CSR development in large mining companies of the sectors that are most important for the national economy and that ensure energy, economic and food security. The scientific novelty of the research includes a methodology for assessing the CSR development in mining companies, which in turn allowed determining types of CSR strategies (anti-crisis, reactive and proactive); we also grounded the necessity of moving to a proactive strategy of CSR management in the mining companies as it enables a more effective interaction with stakeholders when implementing large projects.

Keywords: mining companies; sustainable development; corporate social responsibility; development strategies; system approach; stakeholders; projects.

JEL Classification: Q01; P28; M14

Introduction

It is believed that large mining companies mostly apply the institutional approach to CSR, in particular, that based on the stakeholder theory. CSR is understood as a multi-level responsibility of a corporation to the society represented by a system of stakeholders with a multitude of conflicting interests. In case of mining companies, one should consider the priority of the state interests, long-term and complex nature of activities in the territory of operation.

In large mining companies, the volume of CSR may vary and is described by different indicators. To evaluate CSR results, we have developed a methodology that assesses the level of the company's development and the type of a CSR strategy being implemented. The CSR strategies of oil and gas companies were evaluated as reactive, while those in the mineral and chemical sector were considered proactive. The research findings confirm that companies implementing a proactive strategy can manage large projects more effectively, whereas companies with a reactive strategy experience significant problems with projects or environmental consequences of their activities. Strategic management of large companies should imply effective interaction with stakeholders, which is confirmed by the example of EuroChem Company. Limitations of the study: we did not consider the interaction with stakeholders abroad, as well as challenges associated with the CSR effectiveness assessment.

1. Relevance of the study

Mining companies' operation in resource-producing countries makes a significant impact on the economy, the society and environment at various levels.

This impact has been assessed by such long established international organizations and agencies as PwC, EY, World Bank, ILO, RUIE (Russian Union of Industrialists and Entrepreneurs), *etc*.

This important issue has been studied in numerous works (Bowen 1953, Davis 1960, Davis and Blomstrom 1975, Drucker 1984, Donaldson and Preston 1995, Porter and Kramer 2006, Freeman and Velamuri 2006, Halme and Laurila 2009, Blagov 2011, Tretyak 2015, Nunn 2015). These studies proposed a CSR methodology and focused on assessing the sustainable development of an industrial enterprise. By present time, researchers have developed theories of strategic and project management (Porter and Kramer 2006, Freeman and Velamuri 2006, Halme and Laurila 2009, Blagov 2011, Tretyak 2015, Nunn 2015), while the development of the concept of social responsibility enabled to integrate it in the theory of strategic management. At the same time, there has been no thorough research on the issues of CSR strategies development for mining companies in relation to their strategic management, which reduces the efficiency of large-scale projects implemented by the companies in the mineral sector. The concept of social responsibility varies from company to company, that is why the extent of CSR application is also different.

It should be noted that the companies of the basic materials sector play an important role in Russian economy, GDP and added value generation. To be more exact, the share of the mining industry reaches 10% in GDP, the share of oil and gas revenues in the Russian budget in 2006-2015 averaged 47.3% (Bocharova *et al.* 2016). In 2016, the corporate earnings of such transnational companies and companies partially owned by the government as Gazprom Neft (5,985 bln rubles), LUKOIL (5,174 bln rubles), Rosneft (4,120 bln rubles) were comparable to the annual GDP of countries like Ecuador (94 bln dollars), Slovakia (89.8 bln dollars), Sri Lanka (84.8 bln dollars), Ukraine (83.6 bln dollars), Angola (81.5 bln dollars) (RBC 2016, Investor School 2016).

Many Russian mining enterprises operate in harsh conditions of the Far North, on the Arctic shelf, in remote areas with poorly developed infrastructure, with severe natural and climatic conditions. Unfavorable natural and climatic conditions affect the quality of life of the population: for example, in 2000-2013 the disease incidence of the population in the northern regions exceeded the Russian average by about 1.2 times per 1000 inhabitants, whereas life expectancy at birth was also lower than in the rest of the country (Giltman 2016).

Every year the Russian mineral and raw materials sector produces over 4 billion tons of industrial and consumption waste, most of which (over 90%) is waste resulting from minerals extraction. Only half of this waste is recycled, while the rest forms man-made sites or is buried, building up in the environment. Over 18 billion tons of waste has been accumulated in dumps and tailing dumps in 2005-2014, which, taking into account the previous production, totals more than 100 bln tons. Thus, the amount of waste annually increases by almost 2 bln tons; over 300,000 hectares of land are occupied by storage landfills, sludge reservoirs and tailing dumps (Nevskaya and Marinina 2015).

Mining enterprises with underground works are potentially dangerous objects, and accidents in them have certain specific features. In some cases, accidents go beyond the territory of the enterprise, affecting the population of nearby settlements and other companies (facilities), as well as the environment.

The extraction of mineral raw materials can be accompanied by dire consequences related to insufficiently studied geological anomalies in the structure of deposits, unexpected combination of natural and technogenic factors, mistakes in the engineering of mining operations and field development. For instance, accidents due to coal dust explosions and underground fires have occurred in the coal mines of China, Poland, Russia, India; the ones associated with water and brine flows – at the potash mines in Canada, Germany and Russia (Ponomarenko *et al.* 2016).

Therefore, mining companies have a significant impact on the economy, the social life and the environment. That is why it is so important to ensure their sustainable development, to develop interaction strategies and mechanisms that would promote corporate social responsibility (CSR).

Stakeholders (state, population, workers, public organizations and others) are becoming more influential, able to suspend the company's operation and projects, reducing its efficiency and preventing its continuation. For example, the implementation of Gazprom Nord Stream-1 project has been repeatedly postponed due to protests of local communities, public organizations and governments. The Rio Tinto coal mine in Mozambique (Aleksandrova 2012) worth 4 bln dollars was sold for only 50 mln dollars, as it was impossible to obtain permission for transportation of coking coal. The consequences of poor communication and interaction with stakeholders lead to a decrease in the company value, and this is which makes this research so relevant.

RQ

1. What CSR concept is most often used in mining companies?
2. What are the specifics and the achieved level of CSR in the mining companies' operation?
3. Is it necessary to move from a reactive approach to a system pro-active one in the management of mining companies' corporate responsibility?
4. Does active interaction with key stakeholders increase the efficiency of mining companies' performance?

Methods used to assess the level of corporate responsibility should consider the specific features of companies' operation. The methodology developed by the authors enables to identify CSR strategies, which makes the interaction with stakeholders better targeted, thus, increasing the efficiency of the projects.

The findings of the research confirm that companies implementing a proactive strategy can manage large projects more effectively, in contrast to companies with a reactive strategy, which in course of their operation encounter significant problems with projects or environmental problems.

2. Methods

The following hypothesis was formulated: both reactive and proactive CSR strategies implemented by mining companies can provide a sufficient level of communication with stakeholders and contribute to an increase in the performance efficiency. The goal of the research is to substantiate the use of a system approach to corporate responsibility management in mining company development strategies.

2.1. Methods and materials

We analyzed the condition and level of CSR development in the companies of the mineral and raw materials sector. Three companies were selected for the following reasons: they are transnational, large and diversified. In addition to that, they operate in the mineral and raw materials sectors that are crucial to Russian economy (oil and gas sector ensuring energy and economic security, food security and production of mineral fertilizers).

We studied the reports on the sustainable development of the mineral and raw materials sector companies to select the initial data, which later was used to form the basis to calculate the indicators describing the achieved level of CSR. The formed database covers 2 years for which indicator indexes were calculated. From the GRI 4 indicators set including 90 indicators of company performance we selected 9 quantitative parameters for economic, environmental and social areas. We chose three groups of indicators, corresponding to three spheres of sustainable development: economy, evironment and social sphere, where indicators are to be grouped according to internal (workers) and external (community) CSR. Table 1 shows the main indicators (9) used to calculate the indices for 2015/2014.

Table 1. Indicators of the company sustainable development

Category	Notation
1. Growth of the average monthly wage	G4-EC1(G4-9)31
2. Turnover rate	G4-LA1
3. Lost Time Injury Frequency Rate (LTIFR)	G4-LA6
4. Hours of training per year per employee	G4- LA9
5. Increase in support costs for local communities	G4-EC1(SO1)
6. Energy consumption per unit of output / activity (energy intensity)	G4-EN3(G4-G9 EN5)
7. Water consumption per unit of output / activity	G4-EN8(G4-9)
8. Generated waste per unit of product / activity	G4-EN23(G4-9)
9. Costs and investments in environmental protection	G4-EN31
G4 - G – general standard elements Specific standard elements GRI G4: G4 - EC– category "Economic"; G4 - EN – category "Environmental"; G4 - LA – category "Social", subcategory "Labor practices and decent work"; G4 - SO – category "Social", subcategory "Society".	

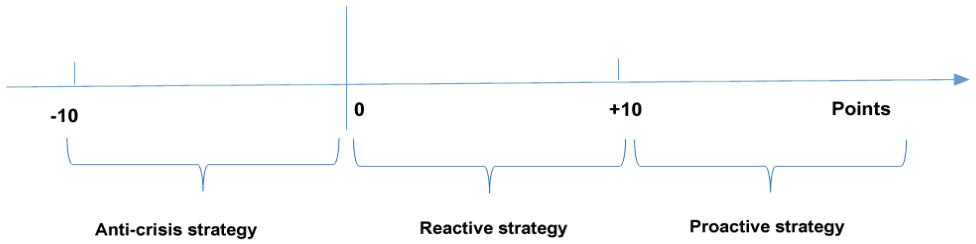
The rate of changes in indicators is converted into scores on a ten-point scale. With no dynamics, as well as a slight change in the indicator (less than 1%), the indicator received 0 points (Table 2):

Table 2. Scale for assessing the CSR level (Borzakov 2016)

Percentage of increase (decrease)	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Points	1 (-1)	2 (-2)	3 (-3)	4 (-4)	5 (-5)	6 (-6)	7 (-7)	8 (-8)	9 (-9)	10 (-10)

Having obtained total values, we classified the CSR strategies adopted by companies as anti-crisis, reactive and proactive. If the total value of the indicator is less than 0, the indicators of sustainable development go down and anti-crisis measures are required, so it is necessary to choose an anti-crisis strategy; the range of values from 0 to 10 indicates the timely response and improvement in the average performance of the company, that is, the implementation of a reactive strategy; the total value of more than 10 points indicates the company takes anticipatory actions and chooses a proactive strategy, Figure 1.

Figure 1. CSR strategies



Source: compiled by the authors

In addition to that, we gathered information on the implementation of major investment projects in the mineral and raw materials sector and analyzed the main factors and consequences, including the rescheduling of the project terms, revision of the project, and project closure.

3. Literature overview

The significance of CSR for business was substantiated in a number of papers the works (Bowen 1952, Davis 1960, Davis and Blomstrom 1975, Drucker 1984, Porter and Kramer 2006), which focused on the companies' social policies and the economic performance: "Business is obliged to "convert" social responsibility into new economic opportunities and benefits, into production capacities, personnel competence, well-paid jobs and, finally, wealth" (Berman *et al*. 1999). This presented the first arguments for the relationship between the growth of the company value for the society and the corresponding actions and their effects, which fully agrees with modern concepts of the value.

In the 1950-1980s interpretations of this phenomenon highlighted social obligations and responsibilities (Bowen 1953, Davis 1960, McGuire 1963, Davis and Blomstrom 1975, Carroll 1979) due to the understanding of the negative impact companies had on the society and the need to develop appropriate compensation mechanisms.

In the 1980-2000s researchers (Drucker 1984, Carroll 1991, Donaldson and Preston 1995, Berman *et al.* 1999, Johnson 2003, Margolis and Walsh 2003) developed the methodology of the stakeholder approach based on Freeman's ideas. Besides, a complex approach that accounted for the obligations to society was developed, and a range of stakeholders' interests was extended. In turn, companies could expand their spheres of influence due to powerful financial resources.

Since the 2000s, with strengthening of large companies, some of which can now be compared to national economies and actually perform the functions of the state, the institutional approach to CSR emerges and becomes dominant. This laid the grounds for formulating some ideas, including the concepts of corporate citizenship, corporate sensitivity, corporate performance and others (Blagov 2011, Halme and Laurila 2009).

Some foreign and Russian studies claim that there is a stable link between the social responsibility of the company which actively interacts with its employees and consumers and its financial results. What is more, this results in the synergetic effect and sustainable business development (Blagov 2004, Berman *et al.* 1999, Tretyak 2015). Some researchers argue that the social activity of the business and rationally planned socially responsible investments can lead to a more intensive interaction and economic effect than traditional methods of increasing the effectiveness of advertising, promoting sales (Weiser and Zadek 2000, Rochlin *et al*. 2015, Nunn 2015). There are various opinions on the volume of the positive impact CSR has on business development; however, it is proven that irresponsible behavior has a negative effect on business (Kang *et al*. 2010, Raza *et al.* 2012).

A number of examples show that large mining and metallurgical companies violate the principles of CSR. For instance, RioTinto, the world's largest transnational mining and metallurgical company, has been reported to violate labor and human rights, as well as inflict environmental damage worldwide, including Papua New Guinea, Indonesia, China and other countries. The International Federation of Metallurgists questioned the sustainable development of the whole steel industry (OECD 2012). For several years, unions around the world have been fighting against the activities of Brazilian mining company Vale, which in 2012 was recognized as the most irresponsible company of the year (IndustriAll 2012). Thus, despite the companies' claims about pursuing the policy of corporate sustainable development, in reality they do not adhere to these principles.

Modern economic papers and regulatory documents present numerous interpretations of the concept of social responsibility, which ends up with different interpretations and actions taken by companies. The analysis of the definitions allows us to conclude that some of them are focused on the fundamental nature of CSR. As a result, some companies can interpret it in quite a broad sense. A number of definitions represent the general idea of social responsibility, its voluntary nature and the link to sustainable development. Some of the detailed definitions emphasize the priorities and specific ways of implementing CSR.

The achieved level of CSR is assessed according to a set of GRI (G4) indicators which includes 90 company performance indicators grouped in three areas, the absolute majority of them being quantitative: 9 economic indicators; 34 environmental indicators; 47 social indicators (GRI 2013, Ponomarenko and Khaertdinova 2015).

4. Main findings

The assessment results of the implemented CSR strategies in PJSC MCC EuroChem, PJSC Gazprom and BP are presented in Tables 3, 4, 5.

Table 3. Rapid assessment of corporate social responsibility of PJSC MCC EuroChem

INDICATOR	PJSC MCC EuroChem			
	2014	2015	Growth Rate, %	SCORE
1. Average monthly wage (RUB '000/person) G4-EC1(G4-9)31	53.2	67.21	+26.3	3
2. Turnover rate (%) G4-LA1	4.0	3.6	-10	1
3. Lost Time Injury Frequency Rate (LTIFR) G4-LA6	1.22	1.08	-11.5	2
4. Hours of training per year per employee G4- LA9	44.5	52	+16.9	-2
5. Increase in support costs for local communities (mln rub.) G4-EC1(SO1)	665	780	+17.3	2
6. Energy consumption per unit of output/activity (energy intensity) G4-EN3(G4-G9EN5)	126.6	118.4	-6.5	1
7. Water consumption per unit of output/activity G4-EN8(G4-9)	2.87	2.58	-10.1	1
8. Generated waste per unit of product/activity (mln tons) G4-EN23(G4-9)	300.3	100.5	-66.5	7
9. Costs and investments in environmental protection (mln rub.) G4-EN31	1622.6	834.4	-48.6	-5
TOTAL				10

Table 4. Rapid assessment of corporate social responsibility of PJSC Gazprom

INDICATOR	PJSC Gazprom			
	2014	2015	Growth Rate, %	SCORE
1. Average monthly wage (RUB '000/person) G4-EC1(G4-9)31	84.8	100.2	+18.2	2
2. Turnover rate (%) G4-LA1	15.2	16.2	+6.6	-1
3. Lost Time Injury Frequency Rate (LTIFR) G4-LA6	0.6	0.52	-13.3	2
4. Hours of training per year per employee G4- LA9	63	67	+5.9	1
5. Increase in support costs for local communities (mln rub.) G4-EC1(SO1)	4632	4543	-2.02	-1
6. Energy consumption per unit of output/activity (energy intensity) G4-EN3(G4-G9EN5)	123.7	115.4	-6.7	1
7. Water consumption per unit of output / activity G4-EN8(G4-9)	7.65	7.5	-2.0	1
8. Generated waste per unit of product/activity (mln tons) G4-EN23(G4-9)	657.2	689.1	+5.0	-1
9. Costs and investments in environmental protection (mln rub.) G4-EN31	15578.3	15750	+1.1	1
TOTAL				5

Table 5. Rapid assessment of corporate social responsibility of British Petroleum

INDICATOR	British Petroleum			
	2014	2015	Growth Rate, %	SCORE
1. Average monthly wage (RUB '000/person) G4-EC1(G4-9)31	73.2	87	+18.9	2
2. Turnover rate (%) G4-LA1	12	16	+33.3	-4
3. Lost Time Injury Frequency Rate (LTIFR) G4-LA6	0.34	0.21	-38.8	4
4. Hours of training per year per employee G4- LA9	-	-	-	0
5. Increase in support costs for local communities (mln rub.) G4-EC1(SO1)	3800	3350	-11.8	-2
6. Energy consumption per unit of output / activity (energy intensity) G4-EN3(G4-G9EN5)	-	-	-	0
7. Water consumption per unit of output / activity G4-EN8(G4-9)	-	-	-	0
8. Generated waste per unit of product/activity (mln tons) G4-EN23(G4-9)	210.8	200.2	-5.03	1
9. Costs and investments in environmental protection (mln rub.) G4-EN31	1522	1751.9	+15.1	2
TOTAL				3

5. Discussion

The analysis of this data allowed us to conclude that EuroChem has the highest level of CSR in comparison to oil and gas companies. This can be explained by its increasingly efficient social and environmental activities. As we can see in Table 3, over the analyzed period of 2014-2015 there was a decrease in the waste generation, water consumption and energy consumption per unit of output, despite the reduction of environmental protection costs. Social indicators demonstrate lower staff turnover rate, a reduction in the injury frequency and an increase in the average wage. Thus, PJSC MCC EuroChem applies a proactive sustainable development strategy.

The findings of the rapid assessment (Table 4) indicate that the CSR strategy of PJSC Gazprom is reactive, as the indicators do not always improve. Along with the average monthly wage, the indicators of staff turnover rate and injury frequency rate increase as well. Regardless of a decrease in water and energy consumption per unit of output, the indicator of waste generation grows, despite the growth of investments in environmental protection. These facts confirm the ineffectiveness of the management of the state company.

The CSR strategy adopted by British Petroleum is also a reactive one, while we should mention the positive dynamics of investment growth on the environment, average wages, a decrease in occupational injuries and waste generation. However, there are such negative factors as a high turnover rate and a reduction in the support costs for local communities. Reduction in the values of indicators makes it necessary to focus on these areas and calls for more intensive investment in them.

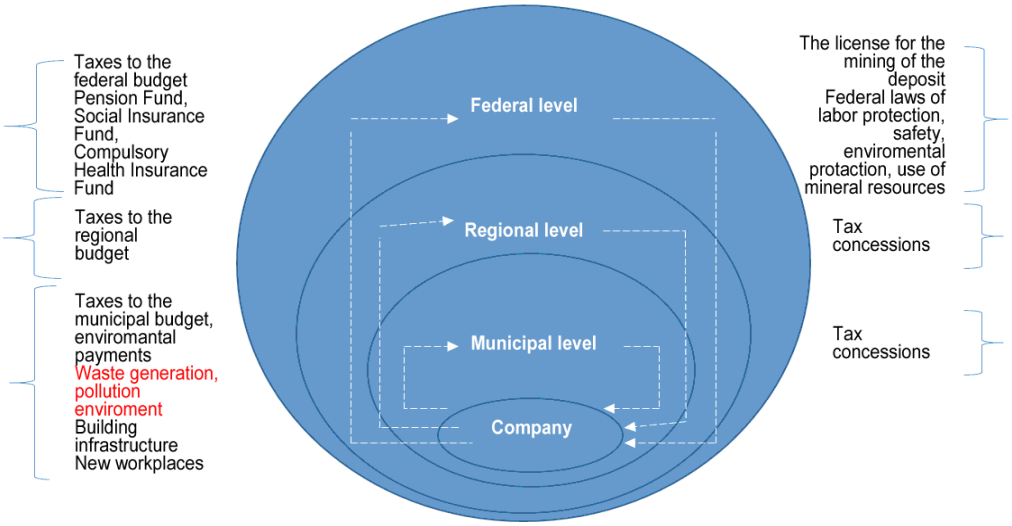
For any company, the society is a system of stakeholders that influence decisions made by the company and/or which are affected by these decisions. These include consumers, owners, employees, suppliers,

competitors, government agencies, the local community, *etc*. Thus, the company has to respond to a complex system of contradictory expectations, forming a strategy within the framework of the company's sustainable development concept (Blagov 2004, Blazovich and Smith 2011, Chen and Delmas 2011). In fact, in today's world CSR turns into the corporate responsibility of large companies.

The state is the most significant stakeholder for the companies in the mineral and raw materials sector, since it regulates macroeconomic parameters of the market and property rights for natural resources, as well as forms demand and constraints in the economic, social and environmental spheres. The state issues licenses for mining operations, regulates the competitive environment, forms tax and budget systems, establishes social guarantees for employees, as well as environmental and legislative regulations.

A large number of subjects and their conflicting interests may result in a conflict of stakeholder interests, in which the preferences of each party do not imply the maximization of the overall benefit. In the course of their operation, companies have to find compromise for the goals of various stakeholders concerning the environment changing which would ensure the growth of the company's value, Figure 2. Due to high uncertainty of both the institutional environment and the stakeholders' behavior, companies are mainly concerned with the selection of valid solutions from a range of possible alternatives, considering their goals and limitations.

Figure 2. Multilevel system of influence, relationships, interactions between a company and stakeholders in the mineral and raw materials sector



Source: produced by the authors.

The operation of large mining companies has certain specific features: capital intensity, complex technological chains, strong interdependence within integrated companies, numerous interests of stakeholders, socioeconomic impact manifested through a significant influence on related sectors and regions, strong state regulation and, in some cases, direct participation of the state. At the same time, mining companies are incapable of flexible adaptation to changing external conditions (lack of resources, reduction in their quality or accessibility) or of production that can generate a steady financial flow. Mining companies are focused on long-term development strategies, accounting for changes in natural, human and financial capital. The creation and growth of added value in the company should be based on long-term benefits for stakeholders (society, economy, sectors and regions) affected by the mining companies' operation.

Modern management is largely based on the theory of stakeholders (Tambovtsev 2008). The paper of Post, Preston and Sachs (2002) highlights the importance of relations with stakeholders, especially for complex "extended enterprises" (corporations). Considering relations with stakeholders as "the most important asset and the ultimate source of organizational wealth", the authors believe that managers should act as agents for the entire set of stakeholders.

The theory is grounded on the assumption that the company objectives are much broader than the creation of wealth for its owners and are concerned with the well-being of a much broader range of stakeholders (Petrov 2004):

- the corporation interacts with a large number of groups and individuals (stakeholders) which make up its environment (internal and external) and influence or are influenced by its decisions;
- it is necessary to study the nature of these relationships: processes (accompanying the relationships) and results (of resource exchange) for the company and its stakeholders;
- it is possible to consider the interests of all stakeholders and satisfy them by an appropriate managerial decision.

The researchers formulated the following principles of the company's relationship with stakeholders: continuous monitoring of interests and understanding of needs, ensuring interaction aimed at joint value creation; their recognition as real subjects with their own values; search for solutions that satisfy several groups of stakeholder at the same time; intensive interaction, also with secondary and demanding stakeholders; the eagerness of the company's management to manage these relationships independently; carrying out negotiations with stakeholders by means of interaction and strategy building; development of business processes aimed at improving relationships; understanding the relationship between economic performance indicators and interaction with stakeholders; foresight and minimization of conflicts between companies and society (Freeman and Velamuri 2006).

By present moment, the development of the concept of social responsibility has made possible its implementation in the theory of strategic management. In addition to that, the categories of relative and social capital are being developed, while CSR is transforming into corporate responsibility. Therefore, modern CSR is an interpretation of the multilevel responsibility of the corporation to the society represented by the system of stakeholders. This modern approach to strategic management is aimed at creating stakeholders trust, which contributes to the development of the local community in the regions of the company's operation and the country as well as sustainable development of companies and the national economy.

Companies may have different understanding of the concept of social responsibility, which results in CSR being applied to varying degrees. A number of companies implement a traditional (limited) understanding of responsibility to employees and counterparties, whereas some understand CSR in a much wider sense.

Analysis of both research papers (Alenicheva *et al.* 2015) and the collected integrated reporting showed that the volume of corporate social responsibility of mining companies varies and is characterized by different indicators reflecting the companies' complex impact on society*, i.e*. the impact on the social, environmental and economic spheres. In the voluntary reporting of mining companies on sustainable development, CSR monitoring indicators are divided into the following areas: involvement in social development, human rights, environmental protection, economic impact, personnel development, labor relations, management (see Table 6).

Table 6. Areas of CSR implementation by Russian mining companies

Companies	Areas (number of indicators)		
	Economic	Environmental	Social
Oil and gas: 1. OAO Gazprom; 2. OAO Rosneft; 3. OAO Tatneft; 4. OAO NOVATEK.	Development of new territories and methods of extraction; R&D (1-2) -	- Level of utilization (2-5) of associated petroleum gas (APG) (2-5); - Emissions, discharges, wastes; power consumption	- Safety; - Social support of workers; - Support of indigenous peoples; - Programs for the territories of company's operation
Chemical, petrochemical; OAO Nizhnekamskneftekhim; OAO Uralkali;	-	- Emissions, discharges, wastes; Consumption and energy saving	-Safety; - Programs for the territories of company's operation.
Metallurgical and other: AK ALROSA;	-	- Reduction/utilization of greenhouse gases;	- Safety; - Social support of workers;

Companies	Areas (number of indicators)		
	Economic	Environmental	Social
OAO SUEK; OAO Holding Company METALLOINVEST		- Emissions, discharges, wastes; - Consumption and energy savings.	- Programs for the territories of company's operation

Source: (Alenicheva *et al.* 2015).

Crucial issues to be included in the reports of mining companies are selected, firstly, according to standards (GRI) as the basis for reporting and according to legislative requirements that impose certain obligations on companies. For example, the one that prescribes reaching 95% utilization of associated petroleum gas in Russia or issues related to energy efficiency management. The reports also reveal other topics that appear to be significant for the society, such as the development of new territories (offshore, Arctic) by oil and gas companies. However, these are covered in the reports, as a rule, as a description of business strategies or business plans, solely based on the company's interests.

Currently, many large mining companies are moving from compensation for negative impacts and responding to stakeholders' requests to active management, impact and influence on their interests. That is, the developed strategy aims to find compromise between the stakeholders' interests, while the mechanism that ensures CSR implies intensive interaction with key stakeholders.

An example of the lack of interaction between mining companies and stakeholders is the currently unimplemented project for the construction of Tominsky Mining and Processing Plant in the Chelyabinsk region. This situation resulted from the negative attitude of locals due to insufficient information on the environmental consequences of the development of the copper deposit. Despite all positive economic and social outcomes of the project including payments to budgets of various levels (about 78.7 billion rubles) and new jobs in the region, 51% of people living in the Chelyabinsk region are against the implementation of the project (Nakanune 2016). Despite the attempts of the Russian Copper Company to make significant changes to the project, for instance, renouncing the launch of hydrometallurgical production and location of tailings in the Korkinsky quarry, strengthening the social and environmental issues of the project, conducting additional tests and involving the academic community, the stakeholders managed to block the project.

On the other hand, the largest in Russia and carried out with private investments, Sakhalin-2 project is an example of effective interaction between the company and the state. This large project includes world-class technological facilities for the extraction and export of crude oil and natural gas, as well as a liquefied natural gas (LNG) plant. For example, the operator of this project, Sakhalin Energy, paid Russia USD50 mln bonuses for the deposits, compensated the state's costs for search and exploration amounting to USD80 mln, made contributions to the Sakhalin Development Fund in the amount of USD100 mln, as well as paid royalties of almost USD548 mln as of January 1, 2010. In addition, the state received a share in the profitable output of the project estimating 10-70%, depending on the internal rate of return. This example shows the state is an incredibly important stakeholder for oil and gas companies (Yakovenko 2012).

Targeted communications with different audiences are built and managed by conducting public assemblies that enable the dialogue with stakeholders and hearing reports on their preparation. For instance, for a number of years, Rosneft Company has conducted up to 15 of such meetings over one report period in the regions of the company's operation and where its main subsidiaries are located.

During potash mines construction, EuroChem Company developed high-quality projects to evaluate the impact on the environment and society, conducted numerous discussions with stakeholders, attempting to assess the effectiveness of interaction with stakeholders and to apply the developed indicators in strategic planning that would not only measure the quality of interaction, but can also be used by international investors to assess the company.

Thus, the company with a proactive CSR strategy demonstrates a well-grounded approach to the development of large-scale projects with focus on social and environmental issues. This enables timely implementation of the project and increasing the value of the company. It should be noted that in the age of

globalization, transnational companies interact with a larger range of stakeholders which includes the population of the territories where the companies operate, regional authorities abroad, international public organizations and others pursuing their own interests.

Therefore, this article was focused solely on national stakeholders, without taking into account the interaction with interested parties abroad, this issue having not been investigated so far and requiring further study.

Conclusion

Having analyzed the evolution of the concept, we investigated the conditions of CSR in the operation of mining companies and established that the institutional approach to CSR prevails in large companies, for instance, the one based on the stakeholder theory.

In large mining companies that actually perform a number of state functions, the volume of corporate social responsibility may vary and is characterized by different indicators in such areas as the role in the development of society, human rights, environmental protection, economic impact, personnel development, labor relations, management. At the same time, in corporate reports, economic interests and profit orientation of the company are the most important. We have developed a methodology for evaluating CSR results, which can be used to determine the type of the implemented CSR strategy: anti-crisis, reactive and proactive.

CSR is understood as a multilevel responsibility of a corporation to the society represented by a system of stakeholders with a multitude of conflicting interests that should be managed consistently, maximizing the value they receive. The study findings confirm that companies implementing a proactive strategy manage large projects more effectively, in contrast to companies with a reactive strategy which encounter significant problems with projects or environmental problems.

The creation and growth of added value should be based on long-term benefits for stakeholders (society, economy, sectors and regions) affected by the operation of mining companies. When determining long-term benefits, priority should be given to the interests of the state, the specifics of the impact produced by mining companies and the long-term nature of their operation in areas of their performance.

The strategic management of the large companies should aim at building the relationship of trust with stakeholders, which means the beneficiaries can consider the effect of these activities, as well as expansion of the management functions, including management of the individual stakeholders and groups' interests, their communication, more effective interaction with stakeholders through their participation in monitoring and evaluation of mining companies' operation. This assumption is confirmed by the example of effective interaction between Eurochem Company and its stakeholders.

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