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The Evaluation of Regional Innovation Systems' Efficiency in New Member States of European Union: A Nonparametric Approach

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Abstract:

In most recent regional studies, especially in endogenous growth theory, regional innovative activities, knowledge spillovers, highly educated work force and investment in high technology products with high value added is considered as main factors of long term regional economic growth. The generation of products with high value added and structural changes in regional production structures require a lot of investment, especially in new member states of EU in Eastern and Central Europe with low level of innovative activity, as being modest or moderate innovators according to EU Innovation Scoreboard (European Commission, 2014). Do investments in an innovative activity pay off and is current regional labor creates efficient level of output – these questions are analysed in this paper by application of nonparametric data envelopment analysis (DEA) that is applied to indicate technical efficiency of regional innovation systems of EU new member states in Central and Eastern Europe.

The most technologically inefficient NUTS2 regions in Central and Eastern Europe are indicated in this research that means more attention from government institutions to these regions should be made to find available strategies to enforce higher level of regional innovative activity with current available resources, as regional maximal potential is not reached. For some inefficient regions it means that a lot of capital is invested in innovative activity but it still does not generate efficient output. From the one side, these regions have potential to growth by enforcing its innovative activity with current inputs, from the other side, it is a question if these regions have an ability to develop high technologies and more investments into innovative activities will pay off.

Keywords: regional innovation systems, regional efficiency, economic growth, data envelopment analysis.

JEL Classification: R10, R11, O00.

1. Introduction

Economic and social disparities remain significant problem in the context of economic integration and single market of the European Union (Burda, Severgnini, 2009; ESPON, 2012; Okubo, 2012). European regions have different business structure and „know how“ technologies, as well as, different levels of specialization in the innovative activities, that forms remaining economic disparities. As stated in „Europe 2020“ growth strategy, member states should strengthen their growth potential by improving productivity and expanding their innovative activities that foster higher value added and impacts better jobs creation (European Commission, 2013).

A systematic approach to innovation spillovers is needed to enforce new innovative activities. Innovative processes is reached by better cooperation and synergy between universities, public and private institutions in the region, forming better characteristics of social capital (Boschma, Martin, 2010).

More intensive innovative activities attract more financial resources to the region. The effective technological development and creation of innovative technologies influences the corporate decision to focus its activities in the economically more developed countries and to direct the flow of funds in these areas (COM (2004) 107). Thus, the high technological level of production and globally competitive production expands the potential for future growth prospects of the region.

Regional Innovation Systems are understood as a loose alliance of private and public interests, governmental institutions, enterprises and other organizations (Cooke 1992; Asheim and Gertler 2005, Doloreux 2003) and are believed to be the cause for the increased competitiveness and productivity in the region (Andersson, 2013). There are a large set of recent research works, analyzing regional innovation systems, their main component and driving factors. For example, Broekel *et al.* (2010), Autant-Bernard, LeSage (2011) evaluated knowledge spillovers between the different regions, Cai ir Hanley (2014) ranked the regions by

innovative system efficiency level, Bosco, Brugnoli (2010), Fritsch, Slavtchev (2011) evaluated a link between the efficiency of innovation system and productivity. It is stated, the region is technically efficient if it reaches maximum production output by efficiently using available resources that are relevant for the development of innovation (Fritsch, Slavtchev, 2011). The concrete contributions to increase competitiveness and productivity become the source of an innovation system and not the result of the regional innovation system, the loose alliance in the innovation system becomes an effect, and not the source, of the efforts to increase competitiveness and productivity (Andersson, 2011).

Our paper is based on the evaluation of regional innovation systems of EU new member states in Central and Eastern Europe by analyzing efficiency of regional innovation production function that was not analyzed in this territorial level.

The aim is to evaluate the efficiency of Central and Eastern European regional innovation systems, by analyzing financial and human resources in the region, that are emphasized in research literature as being important for the development of high level technology. As well as, inefficient European regions, that are lagging to exploit their resources, are identified. According to that, suggestions for better investment distribution between regions are given.

The novelty of this research is that the efficiency of regional innovation production function was not analyzed in this territorial level, even though this group of regions is still lagging in the field of innovative activities, knowledge spillovers and innovative products commercialization processes. The level of NUTS2 regions of new member states (from 2004) in Eastern and Central Europe is analyzed in this paper. Nonparametric methods, such as data envelopment analysis (DEA), full disposal hull (FDH) and order- α analysis is applied in this paper.

This research is made for a more detailed analysis of regional innovation resources, which form a base for regional development policies and a more efficient allocation of financial resources between different regions.

2. Regional innovation systems and its efficiency

New global challenges for both business and government enterprises in global economy require deep knowledge and understanding of highly complex economic problems (Howells, 2012). One of the main challenges of regions is how to develop regional innovation systems that could create high value added products competent worldwide. It is important to analyse regional development opportunities according to innovative factors, as well as, regional innovation systems' efficiency, as they are important for enforcing economic development and for a formation of regional economic policy (De Bruijn, Lagendijk, 2005).

There are three latest theories of economic development which analyze modern economic tendencies (Howells, 2012). The theory of endogenic growth highlights the importance of innovations and technology. The new economic geography analyses the processes of resources concentration and regional specialization. The institutional economics emphasize the importance of business enterprises, science centers, governmental and all other institutions, as being driving factors of economic development and structural changes in regional economies. Regional characteristics, such as cumulative knowledge in science and business enterprises, "know how" technology, the level of specialization and cooperation of regional institutions, are important factors for development of regional innovation systems. In this process activities of higher education institutions are also important. Universities are more concerned to enforce cooperation with business enterprises as it is a new field of their fund supplementation (Dzemyda, Karčiauskas, 2012a, 2012b, Drăgan, Dzemyda, Karčiauskas, 2011).

The system of regional innovations is defined as a combination of companies, organizations and institutions, which influences innovative changes and economic development in a regional level (Cooke, 2004). The definition of regional innovation systems (RIS) is introduced since 1990 (Cooke, 2004) and it combines the competent of knowledge, innovations and human capital into whole and excludes the importance of a certain place-region to proceed innovative activity process.

There are two ways to explain the different level of innovative activity between regions (Fritsch, Slavtchev, 2011). Firstly, regional differences are defined by different amount and quality of resources that generate innovative activity. Secondly, some regions can use their resources in inefficient way. Another way how to evaluate differences of regional efficiency is to analyze regional efficiency – how much output could be made with limited level of innovative resources.

Table 1. Related works of regional innovation systems efficiency by application of nonparametric efficient frontier methods

THE FIELDS OF THE RESEARCH	RESEARCHERS
Quantitative evaluation of knowledge and technology spillovers between different regions.	Broekel <i>et al.</i> (2010); Autant-Bernard, LeSage (2011)
Evaluation of regional efficiency in investing in scientific research and technology.	Zhong <i>et al.</i> (2011); De Bruijn, Lagendijk (2005); Bosco, Brugnoli (2010); Fritsch, Slavtchev (2011)
Evaluation of regional technical efficiency allocations between European regions. Regional innovative and knowledge factors evaluated.	Cai, Hanley (2014), Froddi, Usai (2013)
The research of innovation process based on two stage conceptual model, that consist of technological development and commercialization processes as analytical procedure to measure and explore regional innovation systems.	Chen and Guan (2012), Kaihua and Kingting (2014)
Estimation of regional innovation efficiency as well as for analyzing its relation with collaboration intensity.	Broekel (2012)

Innovations is a complex phenomenon in which the internal and external information, knowledge, competence and creativity interacts between. One of the most important aspects to assure dynamic and persistent competitive ability of regions is gained knowledge (Fischer, 2003). Knowledge cannot be copied implicitly but can be transferred by having the same or similar experience. Therefore it is important to have enough number of experienced employees in region able to intercept and transfer their knowledge. This is one of the most important factors to assure efficiency of regional innovation systems. The differences of regional human capital, gained knowledge form different level of efficiency.

Some researchers try to evaluate the efficiency of region innovation systems by analyzing the production function of knowledge creation which relates the inputs and outputs in one model (D'Agostino *et al.* 2013). Nonparametric mathematical programming methods are commonly used to expand the application of production functioning (Figure 1). The research of technical region efficiency reflects whether a region achieves the desired innovative result with a human capital, investments in new technologies and other resources.

For example, Autant-Bernard and LeSage (2011) examined the knowledge spillover between different French regions by application of nonparametric methods, as well as, estimated a knowledge production function. It was evaluated that the largest indirect and direct effects were influenced by private research activities that spilled across industry boundaries.

Broekel *et al.* (2010) evaluated the relationship between cooperation and successful innovative activity in German regions. Non-convex order-m frontier method was applied. The research revealed a positive relationship between regional innovation systems' efficiency and regional cooperation level. This case revealed that German regions with average regional and inter-regional cooperation intensities were found to outperform those characterized by extremely low, high or unbalanced cooperation behavior.

Zhong *et al.* (2011) examined the efficiency of regional investment for research and technology spillovers, also, evaluated the relative efficiency of China regional investment distribution. The research result reflected that more diversified regional China policy should be formed in order to achieve effective creation process of innovation in different country regions. Chen and Guan (2012) applies nonparametric methods using two stage conceptual transformation framework of an innovation process that consists of technological development and commercialization processes. The research reflects that there are some serious inconsistencies between technology capability and economic performance in most Chinese RISs.

The authors (Chen and Guan, 2012) have found that intensive investment in science and technology, although necessary for catching up with highly developed countries, does not necessarily bring high efficiency of the RIS and cannot guarantee success in innovation. Substantial inconsistencies exist between technological development capacity and commercialization capacity in most regional innovation systems, and that downstream commercialization capacity plays a more important role in the innovation performance of regional innovation systems. Kaihua and Mngting (2014) indicate that the embedded and contextualized policy-oriented environment does not effectively suit China's regional innovation systems. Bai (2013) represents, that the government subsidy, interplays between enterprises and universities, and degree of participation by enterprises had positive impacts

on various degrees on innovation efficiency in the eastern region of China, but significantly a negative impact in the western region. These findings suggest that there could not be implemented universal policy to raise efficiency of regional innovation systems.

Cai and Hanley (2014) made a rating of world countries by evaluating technical efficiency of creating innovations. A method of data envelopment analysis was applied to the research. The research reflected that developed countries which have a number of potential resources for creating innovation such as USA, Great Britain, and Austria, use the resources not efficiently enough. Developing countries such as China and India and a developed country Switzerland, efficiently use its resources for creating innovation and achieves relatively the highest desired result. Although even in the framework of an enlarged European research area, regional wealth should not necessarily be linked only to high-tech profile or scientific excellence, but rather with balanced development (Muller et al 2008).

Bosco, Brugnoli (2010), Fritsh, Slavchev (2011) examined the factors that destined the efficiency of region innovative systems and regional differences. The function of knowledge creation and production, as well as methods of nonparametric mathematical programming was applied. Bosco, Brugnoli (2010), Fritsh, Slavchev (2011) research approved a positive connection between region innovative systems efficiency and productivity. It was evaluated that different factors make different influence for creating innovation in different countries and regions. Since technological progress is a significant indicator of increasing labor productivity, it is necessary to assess the factors that affect the growth of different parameters of technological progress (Svetikas, Dzemyda, 2009). Moodysson and Zukauskaite (2014) illustrates that different industries have different innovation practices and that regional capabilities are the sum of very diverse capabilities embedded in various actors within the region.

A variety of regional innovation systems' efficiency studies reveals an importance to analyze not only the level of available innovative resources in the region but also to evaluate how these resources are used to generate high value added products in different territories, what are the main differences, forming regional economic disparities even with the comparable level of inputs between regions. In other words it is important to evaluate technical efficiency of regional innovation system that is based on investments, knowledge spillovers and social capital, formed in the region. A lot of investment is needed to initiate technological changes in the regional production technology so more attitudes for evaluation of investment efficiency in an enforcement of an innovative activity could form a base for more detailed funding recommendations. In our research data envelopment analysis method (DEA) is applied for more detailed regional analysis. The overall result of current research is chosen an indicator of the whole regional economy– gross domestic product per capita.

3. Regional innovation systems and its efficiency

To evaluate regional innovation systems' efficiency it is important to reflect how far regional production technology is from the efficient frontier. Regions' positioning is evaluated compared to the most efficient regions in chosen regional group. NUTS2 level regions of new member states (from 2004) in Eastern and Central Europe are selected and compared in this paper. Overall 40 regions are selected. This group of regions is basically modest or moderate innovators according to Innovation Scoreboard (European Commission, 2014), that put a lot of attempts to restructure their economic activity and gains EU structural funds. Even though some of the regions are stated as being efficient, it is a conditional evaluation according to the regions' included in the analysis.

In this research a data envelopment analysis method (DEA) is applied which aims to evaluate an effective frontier of production technologies. This method of nonparametric analysis expands opportunities of an application of regional production function, as it is a base for evaluation how far regions are positioned from the efficient frontier (Daraio, Simar, 2007a). Both cases - with several inputs and outputs could be analyzed.

The spatial data envelopment analysis is accepted as a significant quantitative and analytical tool for the evaluation of the efficiency of regional production function. This tool helps to evaluate inefficient regions and in this way to give more accurate decision support for regional development and allocation of funds (Daraio, Simar, 2007b, Dzemydaitė, Galinienė, 2013). Nonparametric analysis helps to evaluate efficiency of the decision making units (DMU) while having certain limited resources. In this research the gross domestic product per capita is selected as the output side of a production function.

The nonparametric methods of effective frontier analysis were applied in a wide range of economic research. The first application of DEA was in the year of 1986 and 1987 in order to evaluate the characteristics of cities in China and Japan. DEA was applied as quantitative and analytical method. After that the increasing

number of methodological and empirical research was announced in this area. For example, near 1500 research paper that applied data envelopment analysis were cited in the survey of Cooper *et al.* (2007).

In modern research the nonparametric methods of effective frontier are applied for the evaluation of the EU regional policy and its efficiency. At the time of economic recovery when there is a lack of financial funds and countries' governments face insolvency problems, the effective distribution of financial resources between different territories and strategies becomes one of the essential challenges of EU cohesion policy. The nonparametric methods of effective frontier are being applied in order to search for effective distribution of financial resources not only according to comparative low gross domestic product per capita but also according to the regional efficiency to generate innovative activity and to produce maximal output.

3.1. The method of data envelopment analysis - DEA

Nonparametric analysis methods for the evaluation of the efficient frontier are based on a model of data envelopment analysis which was set in detail by Daraio and Simar (2007a). It is considered that every region disposes a set of inputs $x \in R_+^p$ that produce a set of outputs $y \in R_+^q$ that are positive numbers. All feasible combinations of inputs and outputs (x,y) are defined as (Schaffer *et al.*, 2011):

$$\psi = \{(x, y) \in R_+^{p+q} | x \text{ can produce } y\} \quad (1)$$

The margin of ψ reflect maximum production that can be generated with given inputs. The regions' efficient frontier is defined as:

$$Y^\delta = \{(x, y^\delta(x)) | y^\delta(x) \in Y(x) : \lambda y^\delta(x) \notin Y(x), \forall \lambda > 1\} \quad (2)$$

$Y(x)$ means the set of technologically feasible outputs. $y^\delta(x)$ is a maximum achievable output with input level x . Efficiency score of a decision-making unit is defined as:

$$\lambda(x, y) = \sup\{\lambda | (x, \lambda y) \in \psi\} = \sup\{\lambda | \lambda y \in Y(x)\} \quad (3)$$

$\lambda(x, y) \geq 1$ in this formula shows how much production of a region could be increased with certain resources, if resources are used efficiently (Schaffer *et al.*, 2011). To determine ψ , the data envelopment analysis DEA is applied. DEA helps to evaluate an effective frontier based on the highest technically possible level of production depending on characteristics of a chosen set of the regions.

In this formula, $\lambda(x, y) \geq 1$ is the proportionate increase of output y of the region operating at output level x for a region to be efficient (Schaffer *et al.*, 2011). To determine the unknown ψ , nonparametric estimators, such as data envelopment analysis and free disposal hull, have been proposed. Free disposal hull and data envelopment analysis define an efficient boundary according to the highest technically achievable output according to a performance of decision making units.

3.2. The choice of region innovation systems' indicators

This research involves the analyzes of complex indicators of the latest research works of regional innovation systems: x_1 - expenses for scientific research and technology development, expressed by a purchasing power standard per capita, x_2 - percentage of labor force working in high technology production and services, x_3 - percentage of human capital working in science and technology development from the active population.

Two possible outputs are evaluated in the first stage of a research: y_1 - gross domestic product per capita calculated by a purchasing power standard, which reflects the overall output of the regional economy and y_2 - number of patents indicator, which is commonly applied as an output of regional innovation system (for example, Bosco, Brugnoli 2010; Fritsch, Slavtchev, 2011).

NUTS2 level regional data is analyzed. NUTS2 is described by the EU nomenclature of territory distribution. In this territorial level the EU cohesion policy is formed (Eurostat, 2014). It was chosen to analyse regional level data, not national economies, because European countries considerably differ according to a geographical size, a number of residents and a size of metropolitan areas. It was chosen to analyze EU indicators

in the spatial point of view. In this case, small countries are considered as one region, for example Lithuania and other Baltic states, and country like Poland have over 15 regions in its territory.

New member states of Eastern and Central Europe which joined the EU in 2004, i.e. regions of Lithuania, Latvia, Estonia, Poland, Slovakia, Slovenia, Hungary, Czech Republic, are analyzed. 40 NUTS2 level regions are analyzed. It was chosen to analyze indicators of regions with comparatively common economic experience with EU structural funding. These countries have experience of the same period of time to implement an integrated the EU regional policy.

In order to evaluate the feasibility of indicators for the DEA, the Pearson correlation coefficient and its significance was calculated. All of the analyzed indicators significantly correlates with the GDP and the number of patents with 0,01 level of confidence (2-tailed).

Table 2. Number of patents (y_2) and the correlation of analyzed indicators

INDICATORS	Expenses for a scientific research and technology development (x_1)	Percentage of working labor in the high technology production and services (x_2)	Percentage of human capital in science and technology (x_3)
Pearson's correlation rate	0,721	0,580	0,474
Importance (<i>p meaning equals 0,01</i>)	0,000	0,000	0,002

Evaluated by the authors according to a data of Eurostat

GDP correlation with input indications of is stronger than the correlation of these factors with the number of patents (Figure 3). According to that, GDP per capita was chosen for the analysis. According to the correlation coefficient, it was not chosen to analyze the number of patents as an output indicator. According to other researches, i.e Bosco, Brugnoli (2010), it was revealed that research results were not clear enough by analyzing the number of patents, because of the differences between numbers of patents recordings in Europe countries, the number of patents remains a comparatively unreliable indicator.

Table 3. The correlation of GDP (y_1) and investigative factors

INDICATORS	Expenses for a scientific research and technology development (x_1)	Percentage of working labor in the high technology production and services (x_2)	Percentage of human capital in science and technology (x_3)	Number of patents (y_2)
Pearson's correlation rate	0,847	0,810	0,878	0,484
Importance (<i>p meaning equals 0,01</i>)	0,000	0,000	0,000	0,002

Evaluated by the authors according to a data of Eurostat.

According to the correlation coefficients, regions are evaluated based on three inputs: expenses for a scientific research and technology development, a percentage of working labor in the high technology production and services and a percentage of human capital in science and technology. The gross domestic product per capita is chosen in the research as a result output

4. The evaluation of innovation systems' efficiency in the regions of European Union new member states

The research involves evaluation of regions in the countries which joined the EU from the year 2004 - Slovakia, Slovenia, Lithuania, Latvia, Estonia, Poland, Czech Republic and Hungary. Overall 40 regions are evaluated. From this regional set all Baltic countries distinguish because each country matches one NUTS2 regional level. Other countries have several regions inside a country: Slovenia has 2, Slovakia - 4, Hungary – 7, Czech Republic – 8, Poland - 16 (Eurostat, 2014).

According to the indicator of GDP per capita (y_1), calculated based on the purchasing power standard, the biggest regions are in Central Europe – territory of Slovakia - Bratislava, region of Czech republic - Praha, region of Hungary - Kozep-Magyarország, in which is the capital Budapest (Figure 4). Baltic States are not between the

TOP10 regions with highest level of GDP. Estonia is in the 20th place, Lithuania in the 22th place and Latvia in the 28th place among 40 regions, although the Baltic States have high level of educated human capital.

Estonia distinguishes from other Baltic countries because it has the highest amount of expenses for scientific research and technological development (x_1 indicator). In the Baltic States there is a relative low number of people working in high technology production and services (according to x_2). Baltic States do not fall into the range of countries with the highest value of x_2 indicator. This reflects a lack of business interest in high technology production and services.

Table 4. Ranking of regions in Central and East Europe by distinguishing TOP10 regions according to the highest levels of indicators in the year 2010.

TOP10 regions according to values of y_1				TOP10 regions according to values of x_1			
No.	Region	Country	y_1	No.	Region	Country	x_1
1	SK01 - Bratislavský	Slovakia	43100	1	CZ01 – Praha	Czech.	1040,2
2	CZ01 – Praha	Czech	42200	2	SI02 - Zahodna	Slovenia	775,7
3	HU10 - Közép-Magyarország	Hungary	26100	3	SK01 - Bratislavský	Slovakia	553,7
4	PL12 – Mazowieckie	Poland	24900	4	CZ06 – Jihovýchod	Czech	394,9
5	SI02 - Zahodna	Slovenia	24500	5	HU10 - Közép-Magyarország	Hungary	384,3
6	CZ06 – Jihovýchod	Czech	17500	6	EE00 – Eesti	Estonia	362,2
7	CZ02 - Strední Čechy	Czech	17200	7	PL12 – Mazowieckie	Poland	336,0
8	PL51 – Dolnoslaskie	Poland	17200	8	SI01 - Vzhodna	Slovenia	294,6
9	SI01 - Vzhodna	Slovenia	17000	9	CZ02 - Strední Čechy	Czech	272,9
10	CZ03 – Jihozápad	Czech	16900	10	CZ03 – Jihozápad	Czech	243,1
TOP 10 regions according to values of x_2				TOP 10 regions according to values of x_3			
Nr.	Regionas	Šalis	x_2	Nr.	Regionas	Šalis	x_3
1	SK01 - Bratislavský	Slovakia	8,6	1	CZ01 – Praha	Czech	59,1
2	CZ01 – Praha	Czech	7,9	2	SK01 - Bratislavský	Slovakia	56,6
3	HU10 - Közép-Magyarország	Hungary	7,6	3	PL12 – Mazowieckie	Poland	44,3
4	SI02 - Zahodna	Slovenia	6,5	4	SI02 - Zahodna	Slovenia	43,8
5	PL12 – Mazowieckie	Poland	5,7	5	EE00 – Eesti	Estonia	43,1
6	CZ02 - Strední Čechy	Czech	5,2	6	HU10 - Közép-Magyarország	Hungary	42,9
7	HU31 - Észak-Magyarország	Hungary	5,1	7	LT00 – Lithuania	Lithuania	41,5
8	CZ05 – Severovýchod	Czech	4,8	8	PL22 – Slaskie	Poland	37,6
9	HU22 - Nyugat-Dunántúl	Hungary	4,8	9	LV00 - Latvia	Latvia	36,3
10	HU21 - Közép-Dunántúl	Hungary	4,8	10	CZ06 – Jihovýchod	Czech	36,0

Evaluated by the authors according to data of Eurostat

The ranking of regional indicators based on the values of the highest and lowest indicators does not reflect how effective available resources in a region are used in a process of production. Therefore a data envelopment analysis is being applied in the research in order to sort out the differences between region efficiency while using available resource. According to the results, 7 efficient regions are indicated while comparing the efficiency of all the territories in the Central and Eastern Europe.

The average efficiency value of the Central and Eastern Europe reaches 0,802. This reveals that if the available resource would be used in more efficient way it may be possible to reach about 20% higher economic output. Among the most inefficient regions is Estonia that distinguishes from other Baltic States (Figure 5). An efficiency score of Estonia is 0,612. It is because a lot of investment for science and technology development is made in Estonian territory, but these investments did not give an efficient economic output according to the level of investments during the period of this research. From the other side, this efficiency score reveals high potential for Estonia to increase up to 40% higher economic output with current available resources if they would be used in efficient way and more innovative activity would be enforces.

The regions of Poland and Hungary fall both between the most effective, as well as, between the lowest evaluated countries. This reflects that there are large regional differences in these countries. The regional efficiency is not certain in all regions; therefore these countries need differential regional policy tools. Also, it is essential to apply acting processes of the effective regions to more backward regions.

Baltic countries are among the least effective regions. This reflects that despite the fact that Baltic countries have relatively good resources for creating innovation, especially high educated work force, they are comparatively inefficient and they did not give an efficient economic output in the period of a research. Higher level of economic output could be created if more innovative activity would be initialized. Although, according to the example of other Central and East Europe regions, there is a possibility to reach higher economic and innovative result with relatively similar level of resources.

Table 5. The best and worst evaluated Central and East Europe NUTS2 regions by application of data envelopment analysis method (DEA)

TOP 10 best evaluated regions				TOP 10 worst evaluated regions			
No.	Region	Country	Efficiency score (λ_i)	No.	Region	Country	Efficiency score (λ_i)
1	SK01 - Bratislavský	Slovakia	1	30	LT00 - Lithuania	Lithuania	0,687
2	SK02 - Západné	Slovakia	1	31	HU23 - Dél-Dunántúl	Hungary	0,685
3	PL41 - Wielkopolskie	Poland	1	32	CZ02 - Strední Cechy	Czech	0,681
4	CZ04 - Severozápad	Czech	1	33	PL31 - Lubelskie	Poland	0,673
5	PL43 - Lubuskie	Poland	1	34	PL32 - Podkarpackie	Poland	0,659
6	PL52 - Opolskie	Poland	1	35	LV00 - Latvija	Latvia	0,656
7	PL33 - Swietokrzyskie	Poland	1	36	PL21 - Malopolskie	Poland	0,647
8	CZ01 - Praha	Czech	0,998	37	HU31 - Észak-Magyarország	Hungary	0,619
9	HU22 - Nyugat-Dunántúl	Hungary	0,966	38	HU32 - Észak-Alföld	Hungary	0,612
10	PL42 Zachodniopomorskie	Poland	0,923	39	EE00 - Eesti	Estonia	0,612
11	PL61 - Kujawsko-Pomorskie	Poland	0,915	40	HU33 - Dél-Alföld	Hungary	0,598

Evaluated by the authors according to the data of Eurostat.

The results indicate most efficient and inefficient Central and Eastern European regions in the field of innovation activity and usage of innovative resources to create higher level of economic output. The efficiency scores indicate how much regional output could be increased if resources would be used in the most efficient way

assessed according to 7 efficient regions. According to the results, more emphasis from regional policy should be made to enforce higher level of innovative and more value added activity in the inefficient region, as current human capital and investments are comparatively sufficient, do not generate maximum return, especially in Baltic States and some Poland and Hungary regions.

If the situation do not change in the dynamic view – during the next year, then there are several reasons for that and more attention should be made from political and strategic point of view. Firstly, the number of highly educated human capital from the society, do not show real capabilities and skills of labor force if they are not involved in innovative activity. High education diplomas are not the certain indicator for human skills to create innovations and be active in this field. It just increases possibility of innovative activity in a region. Secondly, there could be not appropriate strategies for investments if these investments do not really pay off and generate higher value added. These points should be reevaluated in the level of regional innovation policy to find most effective strategy for region to enhance its value added. In inefficient regions, it should be considered how to use available resources more effectively and to reach a higher economic result.

In the technically efficient regions more attention should be given to the increase the level of resources because the highest level of available output is reached that mean “the bottle neck” of regional innovation production is comparatively reached. In efficient regions it is important to find to increase a number of educated residents or to attract more investments in new technologies in order to reach the increase of the regional gross domestic product.

Conclusion

The differences between the regional innovation systems could be expressed by regional different levels of innovative resources and by disparities of regional efficiency to use available resources in optimal way and generate technology efficient output close to efficient frontier. Innovations are a complex factor that relates knowledge, social and human capital, production technology, creativity and “know how” technology. Different characteristics of these factors influence essential regional differences in the process of creating and commercializing innovative and high value added products and service in a region. The increase of resource intended for innovations does not necessarily determine a higher level of value added. It is described by the level of technical efficiency. Both aspects – the level of regional innovative resources and regional efficiency - are analyzed in this paper with more emphasis on regional efficiency evaluated by nonparametric data envelopment analysis method - DEA.

A method of nonparametric mathematical programming – DEA is commonly used for efficient studies and gives opportunities to compare and rank the efficiency of several decision making units, as well as, to identify weak spots of regional innovative development with current resources and investments that could give some clues for a formation of regional policy.

In this study output indicator – gross domestic product - is chosen to evaluate efficiency of a regional production function. In most research of regional innovation production functions the output indicator is a number of patents but it has some weakness in its calculation – the logic could be different between different territories. According to that, overall result of the economy – gross domestic product is chosen to find how innovative factors influence this indicator. Input indicators, as investments in science and technology development, human capital with higher education and workforce in high technology production and services, are analyzed to find whether these resources are used efficiently, in order to achieve a final economic result – the gross domestic product.

Regions of Central and East Europe are analyzed and ranked according to their achieved efficiency and level of innovative resources. From 40 analyzed regions 7 are considered technically efficient, from which 2 regions are of Slovakia's, 4 of Poland's and 1 of Czech Republic, mainly capital regions from more Central Europe. The analysis reflects that countries with efficient regions also have the least efficient regions, especially in Poland and Hungary. It reflects a high diversity of these countries in the process of creating innovative and high value added products because not all of the regions achieved a technically high efficient result with available resources even though investments are made.

Baltic countries are evaluated between the least technically efficient. Estonia distinguishes from Baltic countries because it has a relatively high investment flow into science and technology development and a relatively high level of human capital highly educated. It means a lot of investment is made in this country but in the time of research the appropriate economic result is not reached. According to other countries production technology, with current level of resources Estonia could reach around 40% higher outputs. So more attention

should be made in inefficient countries how to generate economic and more value added activity to generate higher level of innovative activity with current resources.

Regions in the Central and Eastern Europe could achieve 20% higher economic outputs by using available resources in more efficient way. So in technologically ineffective regions it is important to review the programs on how to achieve a higher economic output with available resource, how to evaluate possibilities to involve residents with high education level into high technology product manufacturing, and, how to attract more foreign companies to invest in high value added activity. In the effective regions it is necessary to pay more attention to expansion of resources because current regional inputs give a maximum possible economic result, comparing with analyzed regions.

References

- [1] Andersson, G. 2013. Rethinking Regional Innovation. *Systemic Practice and Action Research*, 26(1): 99-110, <http://dx.doi.org/10.1007/s11213-012-9265-5>
- [2] Asheim, B.T, Gertler, M.S. 2005. The geography of innovation: regional innovation systems. The Oxford handbook of innovation. Oxford University Press, Oxford, pp 291–317.
- [3] Autant-Bernard C., LeSage J.P. 2011. Quantifying knowledge spillovers using spatial econometric models. *Journal of Regional Science*, 5(3): 471-496, <http://dx.doi.org/10.1111/j.1467-9787.2010.00705.x>
- [4] Bai, J. 2013. On Regional Innovation Efficiency: Evidence from Panel Data of China's Different Provinces, *Regional Studies*, 47(5): 773-788, <http://dx.doi.org/10.1080/00343404.2011.591784>
- [5] Boschma, R., Martin, R. 2010. Handbook of evolutionary economic geography. Edward Elgar, Cheltenham, <http://dx.doi.org/10.4337/9781849806497.00012>
- [6] Bosco, M.G., Brugnoli, A. 2010. Regional Efficiency, Innovation and Productivity. RSA Conference proceedings, Pecs.
- [7] Broekel, T. 2012. Collaboration Intensity and Regional Innovation Efficiency in Germany - A Conditional Efficiency Approach. *Industry and Innovation*, 19(2): 155-179, <http://dx.doi.org/10.1080/13662716.2012.650884>
- [8] Broekel, T., Buerger, M., Brenner, T. 2010. An investigation of the relation between cooperation and the innovative success of German regions. Papers in Evolutionary Economic Geography.10.11, Utrecht University, Utrecht.
- [9] Burda, M.C., Severgnini, B. 2009. TFP Growth in Old and New Europe. *Comparative Economic Studies*, 51(4): 447–466, <http://dx.doi.org/10.1057/ces.2009.19>
- [10] Cai, Y., Hanley, A. 2014. Innovation rankings: good, bad or revealing? *Applied Economics Letters*. 21(5): 325-328, <http://dx.doi.org/10.1080/13504851.2013.859366>
- [11] Chen, K., Guan J. 2012. Measuring the Efficiency of China's Regional Innovation Systems: Application of Network Data Envelopment Analysis (DEA), *Regional Studies*, 46(3), 355-377, <http://dx.doi.org/10.1080/00343404.2010.497479>
- [12] Cooper, W.W., Seiford, L.M., Tone, K. 2007. Introduction to Data Envelopment Analysis and Its Uses: With DEA-solver Software and References. Berlin: Springer.
- [13] Cooke, P. 1992. Regional innovation systems: competitive regulation in the new Europe. *Geoforum* 23(3): 365–382. [http://dx.doi.org/10.1016/0016-7185\(92\)90048-9](http://dx.doi.org/10.1016/0016-7185(92)90048-9)
- [14] Cooke, P. 2004. The regional innovation system in Wales: evolution or eclipse. In Cooke P, Heidenreich M, Braczyk H. (Eds) *Regional innovation systems*, 2nd Edition. Routledge, London and New York, p. 214-233.
- [15] D'Agostino, L.M., Laursen, K., Santangelo, G.D. 2013. *The impact of R&D offshoring on the home knowledge production of OECD investing regions*. *Economic Geography*, 13(1): 145-175, <http://dx.doi.org/10.1093/jeg/lbs012>
- [16] Daraio, A., Simar, L. 2007. Nonparametric efficiency analysis: a multivariate conditional quantile approach. *Journal of Econometrics*, 140(2): 375–400, <http://dx.doi.org/10.1016/j.jeconom.2006.07.002>

- [17] De Bruijn, P., Lagendijk, A. 2005. Regional innovation systems in the Lisbon strategy. *European Planning Studies*, 13(8): 1153-1172, <http://dx.doi.org/10.1080/09654310500336519>
- [18] Doloreux, D. 2003. Regional innovation systems in the periphery: the case of the Beauce in Que ´bec (Canada). *International Journal of Innovation Management* 7(1): 67–94, <http://dx.doi.org/10.1142/s1363919603000738>
- [19] Drągan, N., Dzemyda, I., Karčiauskas, A. 2011. An approach to evaluate influence of European Union innovation policy to increase the economic equality between member states Intellectual economics, *Scientific Research Journal*, 1(9): 23-36.
- [20] Dzemyda, I., Karčiauskas, A. 2012a. Inovacijų sistemos ir universitetai: teoriniai aspektai. *Social Sciences Studies: Research Papers*, 4(3): 991-1007.
- [21] Dzemyda, I., Karčiauskas, A. 2012b. Inovacijų sistemos ir aukštojo mokslo sąveikos analizė. *Applied economics: systematic research*. 6(1): 41-59.
- [22] Dzemydaitė, G., Galinienė, B. 2013. Evaluation of regional efficiency disparities using efficient frontier analysis. *Ekonomika*, 92(4).
- [23] Froddi, M., Usai, S. 2013. Regional knowledge Performance in Europe. *Growth and Change*. 44(2): 258–286. <http://dx.doi.org/10.1111/grow.12007>
- [24] Kaihua C., Mingting, K. 2014. Staged efficiency and its determinants of regional innovation systems: a two-step analytical procedure. *The Annals of Regional Science*. 52(2): 627-657, <http://dx.doi.org/10.1007/s00168-014-0604-6>
- [25] Moodysson, J., Zukauskaitė, E. 2014. Institutional Conditions and Innovation Systems: On the Impact of Regional Policy on Firms in Different Sectors. *Regional Studies*, 48(1): 127-138, <http://dx.doi.org/10.1080/00343404.2011.649004>
- [26] Muller, E., Doloreux D., Heraud J. A., Jappe, A. Zenker, A. 2008. Regional Innovation Capacities in New Member States: a Typology. *Journal of European Integration*, 30(5): 653-669 <http://dx.doi.org/10.1080/07036330802439624>
- [27] Ertur, C., Koch, W. 2006. Regional Disparities in the European Union and the Enlargement Process: An Exploratory Spatial Data Analysis, 1995–2000. *Annals of Regional Science*, 40(4): 723–765, <http://dx.doi.org/10.1007/s00168-006-0062-x>
- [28] Fischer, M. 2003. The new economy and networking. In Jones DC (ed.) *New economy handbook*. Academic Press, London, p. 343-367.
- [29] Fritsch, S. 2011. Determinants of the Efficiency of Regional Innovation Systems. *Regional Studies*, 45(7): 905-918, <http://dx.doi.org/10.1080/00343400802251494>
- [30] Howells, J. 2012. The geography of knowledge: never so close but never so far apart. *Journal of Economic Geography*, 12(5): 1003-1020, <http://dx.doi.org/10.1093/jeg/lbs027>
- [31] Svetikas, K.Ž., Dzemyda, I. 2009. An approach to the evaluation of regional inequalities: a case study of Lithuanian counties. *Intellectual Economics*. 2(6): 96-107.
- [32] Oculo T. 2012. Anti-agglomeration subsidies with heterogeneous firms. *Journal of Regional Science*, 52(2): 285–287, <http://dx.doi.org/10.1111/j.1467-9787.2011.00736.x>
- [33] Zhong, W., Yuan, W., Li, X. S., Huang, Z. 2011. The performance evaluation of regional R&D investments in China: An application of DEA based on the first official China economic census data. *Omega*, 39(4): 447–455, <http://dx.doi.org/10.1016/j.omega.2010.09.004>
- *** ESPON 2012. Factsheet Latvia – Lithuania. ESPON Project TERREVI.
- *** European Commission 2004. Commission Communication. Third report on economic and social cohesion. COM (2004) 107 final. Brussels, 18 .2.2004.

- *** European Commission 2014. Innovation Union Scoreboard 2014. [interactive] http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf accessed on 10 10 2014.
- *** European Commission 2013. EU Cohesion Policy 2014-2020: legislative proposals. [interactive] http://ec.europa.eu/regional_policy/what/future/proposals_2014_2020_en.cfm accessed on 10 10 2014.
- *** Eurostat 2014. Database by themes - General and regional statistics. [interactive] http://ec.europa.eu/regional_policy/what/future/proposals_2014_2020_en.cfm accessed on 15 09 2014.

Indicator Structuring and Principles of Assessing Ukraine's Domestic Trade System in the Condition of Transformation

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Abstract

In this article, under the research results, the classification of indicators for evaluating the domestic trade system is carried out, which are structured aiming at conformity with the developed criterion Scheme of assessment of the domestic trade system. To evaluate the efficiency of the domestic trade system in the conditions of transformation the developed methodology is offered to be used, in which by means of calculation methods the institutional and transformational, social, economic and managerial efficiency is defined, which affect the integral efficiency indicator and change in the planned (estimated) period that allows to detect the most "problematic" subsystems, in which sufficient potential is not formed. The developed methodology allows us to estimate in complex the efficiency change of the domestic trade system in all subsystems and paying attention to all the criteria. The set of estimates by efficiency types allows us to calculate the efficiency integral indicator of the domestic trade system in the conditions of transformation during the planned (estimated) period compared with basic (previous). On the basis of the scientific research on the selection of criteria and indicators for the assessment of the domestic trade system basic principles of evaluating the efficiency of the domestic trade system are grounded, which are offered to be considered both in the methodological (systemacy, complexity, dependency, recourse return) and applied (scientism, objectivity, effectiveness, accounting and analysis) sense.

Keywords: domestic trade system, transformation, indicator, criterion, principle, evaluation, methodology

JEL Classification: L 810

1. Introduction

The analyzed theoretical principles of the domestic trade system transformation revealed a number of problems both of theoretical and practical nature, emergence and manifestation of which hinders the development of Ukraine's domestic trade. It is obvious that fundamental and applied scientific research is carried out to solve these problems. Moreover, both the processes taking place in the field, in the system of its management, and the processes affecting the field development outside, where inhibitory factors emerge and so on, are investigated.

To establish and confirm the hypotheses about the nature of the problems it is necessary to conduct empirical research based on the analysis of criteria and relevant indicators, regardless of the subject of study – the system of domestic trade as a whole, its separate subsystem or the system of its management.

Under the selection of indicators on the basis of which it is possible to assess each of the subsystems and which form the potential of the domestic trade system, we should take into account the reasonable structure of the domestic trade system, in which influence factors are defined both by each of the subsystems and considering their division into such ones, which are included into the system of domestic trade management and influence it from outside. The calculation of these indicators will provide an opportunity not only to assess the state of potential formation of the domestic trade system, but also to detect the reasons for changing efficiency – as an integral criterion for the evaluation of the system itself and the domestic trade development in general.

2. Related literature and prediction

Relying on the results of the content-analysis of scientists' works engaged in meaningful empirical studies of the transformation process of the domestic trade, it can be concluded that to assess development trends in the field they often operate the indicators related to an economic subsystem of the domestic trade system. So, Mazaraki A. A., Heiets V. M. (2008), Kriuchkova I. V. (2007) and Yasyn E. (2006) operate the share of gross added value of trade in economics; Antonova O. V (2014), along with the analysis of trade profitability, which directly reflects the state of its efficiency, finds financial state (financial stability, availability of financial resources and value – i.e. financial resources, which are attributed by us to an economic component of the potential of the domestic trade system) not less important; Vynohradska A. M (2004) and Cherdantseva I. H, Klypach A. Ya. (2011), alongside with economic (turnover) attribute the number of business activity entities in the field to such that characterize the general development of the trade – an indicator, which is referred by us to an institutional and transformational subsystem, and which, accordingly, characterizes the institutional and transformational field potential; Yevlakova I. A (2007) in her studies prefers economic indicators, which according to the domestic trade

structure can be attributed to the factors that characterize the state of trade competition in the international market – that is, are attributed to an effective criterion – namely, exports, imports, foreign trade turnover, as well as a purely economic indicator, affirming financial potential of the field – investment volume.

It is obviously that each of these scientists and economists to evaluate the domestic trade development used key indicators that – on the one hand, characterize the transformation degree of individual factors of the domestic trade system, on the other hand, – can be used to evaluate the components by the structure of potential subsystems (Table 1.).

Table 1. Classification of the potential structure of the domestic trade system (causal evaluation criterion) by component subsystems

Grouped potential structures by different scientific approaches	Component subsystem of the potential of the domestic trade system			
	Social	Economic	Institutional and transformational	Managerial
Labor (labor recourses; labor indicator)	+	-	-	-
Scientific and innovative (innovative recourses, innovative indicator)	-	-	-	+
Information (non-material resources, information indicator)	-	-	+	+
Material resources (material and technical indicator)	-	+	-	-
Financial resources (financial indicator)	-	+	-	-
Managerial potential (organizational indicator)	-	-	+	+
Marketing indicator	-	-	-	+

Source: [Yaremenko M. O. (2013; Mitsenko N. H., Kumechko O. I. (2010)]

2. Main text

At the same time, using only these parameters will not allow us to assess in complex not only the potential of the domestic trade system, but also to analyze all the criteria for its assessment aiming at conformity with the developed criterion Scheme of assessment of the domestic trade system (Figure 1).

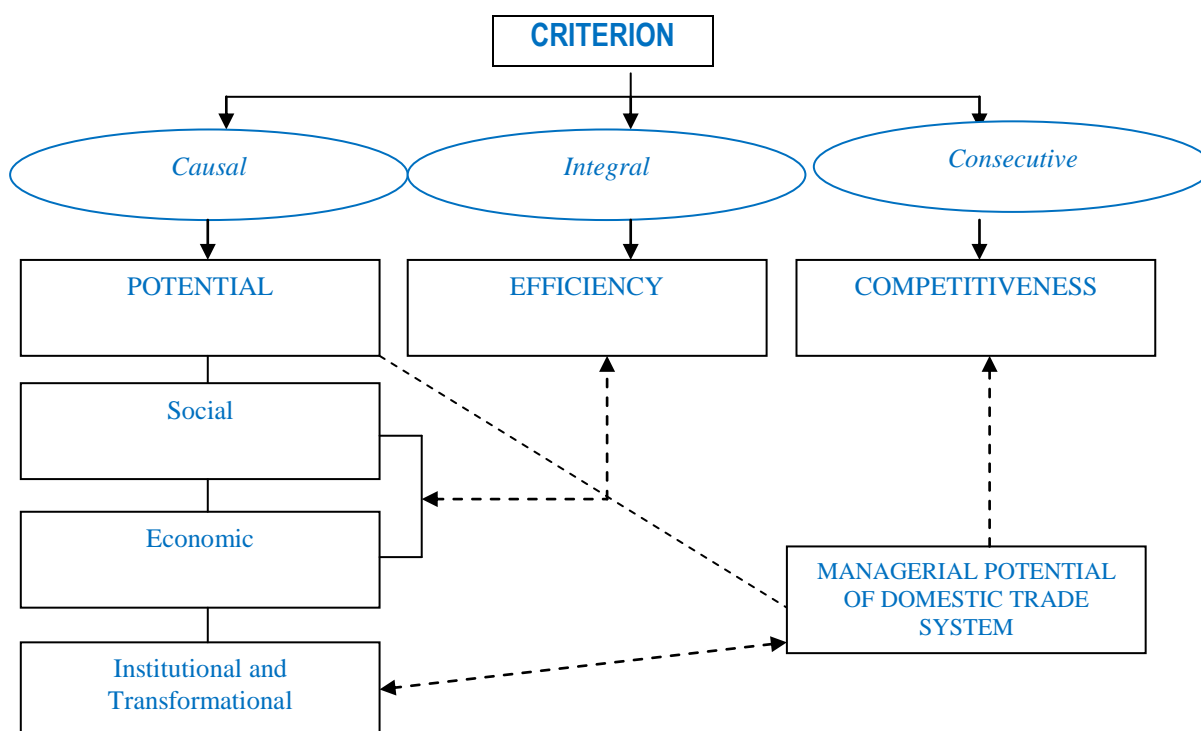


Figure 1. Evaluation criteria of the domestic trade system (developed by the authors)

To solve this scientific problem, the research results of Yaremenko M.O. (2013) and Pikush T. A. (2005) are of great interest, who grouped the indicators by criterion feature with the possibility of integral indicator calculation characterizing the development degree of the research object in the trade field.

Thus, taking into account such an integral indicator as “trade contribution to the development of Ukraine's national economy”, Yaremenko M.O. (2013) operates not only the indicators that can be associated with an economic component of the potential of the domestic trade system (the share of gross added value, investment in working capital, profits or losses before taxation, the volume of goods and services output in the field, the volume of sales), but three indicators that can be attributed to a social component of the potential of the domestic trade system (the share of the employed in the economy, the number and share of employees in the economy, the number and proportion of the employed in the field).

In turn, in the study of Pikush T.A. (2005), to develop a “universal approach to provide a comprehensive assessment of trade development...” and detect actual or potential quantitative and qualitative changes, the scientist has introduced a “development index”, which is calculated on the basis of the assessment of the dynamics of such indicators as net sales, net income, labor productivity, profits, number of cash checks, the market share of sales network in the domestic turnover, profitability and operating costs. Thus, the integral average value of these indicators is calculated by the scientist through the “prism of efficiency”.

Thus, on the basis of the study results, the following classification of indicators for evaluating the domestic trade system (Table 2), which are structured in compliance with the developed criterion Scheme of the assessment of the domestic trade system, are worked out (Figure 1).

Table 2. Classification of the indicators for evaluating the domestic trade system by criterion structure

Evaluation Criterion	Evaluation Indicators	Factors taken into account when assessing
Potential (causal criterion)	<ul style="list-style-type: none"> ▪ Ratio of financial dependence; ▪ Ratio of current liquidity; ▪ Ratio of critical liquidity; ▪ Ratio of absolute liquidity 	Efficiency of resource usage in the field;
SOCIAL	<ul style="list-style-type: none"> ▪ Income level of the population; ▪ Expenses structure of the population (consumer's goods expenses); ▪ Fund of free and working time of the population; ▪ Level of the provision of the field labor market with highly-qualified personnel with necessary skills; ▪ Need of enterprises for highly-qualified personnel with necessary skills; ▪ Wages level in the field; ▪ Motivation level of staff for qualitative service and increased sales of goods; ▪ Quality of customer service. 	<ul style="list-style-type: none"> ▪ Models in F-statistics (income level of the population); ▪ Expenses structure of the population (consumer's goods expenses); ▪ Fund of free and working time of the population; ▪ Saaty Model (level of the provision of the field labor market with highly-qualified personnel with necessary skills); ▪ Need of enterprises for highly-qualified personnel with necessary skills; ▪ Wages level in the field; motivation level of the staff for qualitative service and increased sales of goods; ▪ Quality of customer service.
ECONOMIC	<ul style="list-style-type: none"> ▪ Macroeconomic situation in the country; ▪ Stage of the country's economic development; ▪ Inflation rate in the country; ▪ State of competition in the internal and external markets; ▪ Quality of suppliers. ▪ Capacity of the commodity market; ▪ Costs structure of the trade by gross added value and cost price structure of 	<ul style="list-style-type: none"> ▪ Models in F-statistics (macroeconomic situation in the country); ▪ Stage of the country's economic development; ▪ Inflation rate in the country; ▪ State of competition in the internal and external markets; ▪ Quality of suppliers). ▪ Saaty Model (capacity of the commodity market;

	<ul style="list-style-type: none"> enterprises; ▪ Profitability level at enterprises; ▪ Turnover; ▪ Level of labor productivity and aggregate productivity at enterprises; ▪ Assortment and pricing policy; ▪ Investment policy of enterprises; ▪ Material and technical condition of enterprises. 	<ul style="list-style-type: none"> ▪ Costs structure of the trade by gross added value and cost price structure of enterprises; ▪ Profitability level at enterprises; level of labor productivity and aggregate productivity at enterprises; ▪ Assortment and pricing policy; investment policy of enterprises; material and technical condition of enterprises).
INSTITUTIONAL AND TRANSFORMATIONAL	<ul style="list-style-type: none"> ▪ Image of the country in the international market; ▪ Political situation in the country; ▪ Development level of the trade infrastructure; ▪ Development level of the transport infrastructure; ▪ Development level of the field information and communication networks; ▪ Availability of unions and associations in the field; ▪ Number of business entities in the field (wholesale and retail) 	<ul style="list-style-type: none"> ▪ Models in F-statistics and Saaty Model (when assessing factors by the results of the social study and expert assessments of identified institutional and transformational factors);
EFFICIENCY (integral criterion)	<ul style="list-style-type: none"> ▪ Number of economic entities in the field (wholesale and retail); ▪ Profitability level; ▪ Need of enterprises for highly-qualified personnel with necessary skills; ▪ Wages level in the field; ▪ Level of labor productivity in the field; ▪ Investment volume in the field; ▪ Value of fixed assets in the field. 	<ul style="list-style-type: none"> ▪ Costs and the results in the field (of the domestic trade); ▪ Institutional and transformational factors that are included in the system of domestic trade management.
COMPETITIVENESS (effective criterion)	<ul style="list-style-type: none"> ▪ External and internal efficiency of the field performance. 	<ul style="list-style-type: none"> ▪ Competitiveness of the goods sold; ▪ Rationality of the range of goods offered; ▪ Culture of service; ▪ Conditions of service.
MANAGERIAL POTENTIAL	<ul style="list-style-type: none"> ▪ Resource component (qualification of human resources (personnel (management) resources), organizational competence); ▪ Organizational component (management organizational structure, operational regulations, organizational culture and communication links); ▪ Functional component (decision making process and dynamic skills of managers). 	<ul style="list-style-type: none"> ▪ Institutional and transformational factors

It is obvious that for the assessment of the domestic trade system we must take into account not only the empirical research result based on the analysis of the dynamics of selected indicators, but also the influence degree of factors on the transformation of the system and its subsystem's components. The impact of factors and their significance are assessed on the basis of the expert assessments and opinion surveys.

At the same time, the recognition of efficiency as an integral criterion for the assessment of the domestic trade system, which shows the implementation result of the domestic trade potential in social, economic and

institutional and transformational subsystems, necessitates a more detailed study of the following issues: the nature of efficiency as an economic category and, in particular, – in trade; impact of efficiency on the domestic trade system development and each of its subsystems; approaches to evaluating the efficiency in the trade field; dependence of system's competitiveness and the field itself on performance change.

Considering the nature of efficiency – as an economic category, attention is drawn to the fact that when calculating it we traditionally operate the indicators, in which the rational of using resources and costs are taken into account compared with the result of economic activity –and namely, cost price structure and economic activity costs, compared with the sales dynamics and (or) profits (Loktev 1975). Herewith, efficiency is considered as one of the multidimensional system categories, which appears both as a criterion and a necessary prerequisite that determines the movement of an economic system in the development direction based on satisfaction of social needs in material values in conditions of limited resources (Davydants 1996).

Based on the discovered efficiency essence – as an economic category, it becomes apparent its correlation with productivity, which is recognized as a causal criterion of the assessment of the domestic trade system – firstly, and secondly – like when evaluating productivity, the efficiency of domestic trade system should be assessed taking into account changes in subsystems. In this case, the efficiency change of the domestic trade system to get a balanced assessment must be tied with the managerial potential change. Therefore, under the assessment of the domestic trade system we should operate such criteria as social, economic, institutional and transformation efficiency and also the efficiency of system management, in which the process of implementing managerial potential by the entity of system management should be reflected.

Such a statement about a defined principle of evaluating the efficiency of the domestic trade system does not conflict with existing among scientists views on the assessment of the trade sphere efficiency, by who, on the one hand, in the basis of the efficiency assessment a general principle of matching the efficiency of trade activity with aggregate expenditures or resources for all branches is laid down, and on the other hand, – both economic and social efficiency of trade is considered [Apopii, Lopashchuk 2009]. In our case, in contrast, and with taking into account the necessity of assessment of not only the field in general, but also the system (including – managerial) institutional and transformational and managerial criteria should also be added to component evaluation criteria.

While agreeing with the opinion of Ivanov H. H. (2006) on the statement that "... the potential in the trade sphere to a high degree affects the efficient activity that creates preconditions for the development ...", the process of the domestic trade development itself in the conditions of transformation of the domestic trade system leads to the change of an effective criterion (competitiveness), relying on the developed Scheme (Figure 1). Therefore, it becomes evident that while calculating the efficiency of the domestic trade system in the conditions of its transformation we should select common indicators from the list of classified indicators (Table. 2), the calculation of which will enable to determine the importance of each criterion for the evaluation of the system with the possibility of their comparison and influence analysis on an effective criterion.

While selecting the indicators of evaluating the efficiency of the domestic trade system in the conditions of its transformation we should also take into account the existing scientific approaches on the calculation of efficiency in trade. On the basis of the findings of such scientists as Izhevskiy V.V. (2011), Vichevych A.M., Maksymets O.V. (2004), Vasylichak S.V. (2011), Apopii V.V. Lopashchuk I.A. (2009) and Normatova Sh.M. (2012) the indicators used to calculate the efficiency in trade are generalized.

Among the list of indicators used by scientists to calculate the efficiency in trade, it becomes evident that the correlation of costs and the result is compared by each of them – that is, the basic principle is followed according to which the degree of rational usage of resources in trading activities is taken into account.

It is obvious that most scientists choose a profit (or net profit) as the main effective indicator and as a key indicator, which allows us to assess the degree of rational usage of resources – costs (or price cost). Both that and other indicators belong to an economic subsystem of the domestic trade system, like most of all, used to calculate efficiency.

Attention is drawn to the fact that some scientists to calculate efficiency use the indicators that are attributed to a social subsystem, namely – the number of employees (employed workers), time and payroll fund, which are included in the system of domestic trade management and, respectively, can be managed and controlled by the entity of domestic trade management in order to increase the efficiency and work productivity of staff at commercial enterprises.

Therefore, to calculate the efficiency of the domestic trade system both economic and social indicators should be taken into account, what is natural, relying on the main (socio-economic) function of the field.

Distinguishing the number of enterprises (including – profitable ones) and commercial areas in the research of Vasylychak S. V. (2011) and Normatova Sh. M. (2012) to calculate the efficiency can be considered reasonable since these indicators are available in the structure of the domestic trade system as such, which are included into an institutional and transformation subsystem.

Thus, on the basis of the research and relying on efficiency nature – as an economic category, and selected criteria and indicators for assessment of the domestic trade system, system's efficiency in the conditions of transformation can be estimated by the following calculations (Table 3).

Table 3. Methods of evaluating the efficiency of the domestic trade system in the conditions of transformation

Efficiency kind	Calculation method	Conventional designations, measurement unit
Institutional- transformational (Ei)	$E_i = (X_{137b} : X_{3y3b}) :$ $(X_{137p} : X_{3y3p})$, coefficient Opt. $E_i > 1,0$	<ul style="list-style-type: none"> ▪ X_{137b}, X_{137p} – the number of business entities in the field respectively in the base and planned periods units. ▪ X_{3y3b}, X_{3y3p} – the level of profitability (turnover) respectively in the base and planned periods, thousand UAH.
Social (Ci)	$E_c = [(X_{2y2p} : X_{3y3b}) :$ $(X_{2y2b} : X_{3y3p})] + [(X_{2y3p} :$ $X_{3y3p}) :$ $(X_{2y3b} : X_{3y3p})] : 2$, coefficient Opt. $E_c > 1,0$; $E_c = (X_{3y4p} : X_{2y3p}) :$ $(X_{3y4b} : X_{2y3b})$, coefficient Opt. $E_c > 1,0$	<ul style="list-style-type: none"> ▪ X_{2y2p}, X_{2y2b} – enterprises' need for highly-qualified personnel with necessary skills respectively in the base and planned periods, thousand persons; ▪ X_{2y3p}, X_{2y3b} – wages level in the field respectively in the base and planned periods, UAH. ▪ X_{3y4p}, X_{3y4b} – labor productivity in the field respectively in the planned and base periods, UAH/employee.
Economic (Ee)	$E_{e1} = (X_{3y3p} : X_{3y3b}) :$ $(X_{3y2p} : X_{3y2b})$, coefficient. Opt. $E_{e1} > 1,0$; $E_{e2} = (X_{3y3p} : X_{3y3b}) :$ $(X_{3y6p} : X_{3y6b})$, coefficient. Opt. $E_{e2} > 1,0$; $E_{e3} = (X_{3y3p} : X_{3y3b}) :$ $(X_{3y7p} : X_{3y7b})$, coefficient Opt. $E_{e3} > 1,0$; $E_e = (E_{e1} + E_{e2} + E_{e3}) : 3$	<ul style="list-style-type: none"> ▪ X_{3y2p}, X_{3y2b} – trade costs respectively in the base and planned periods, thousand UAH.; ▪ X_{3y6p}, X_{3y6b} – investment volume in the field respectively in the base and planned periods. thousand UAH; ▪ X_{3y7p}, X_{3y7b} – value of fixed assets in the field in the base and planned periods, thousand UAH.;
Managerial (Ey)	$E_y = [\Sigma(X_{1y:12})_p : \Sigma(X_{1y:12})_b] : (X_{3y3p} : X_{3y3b})$, coefficient Opt. $E_y > 1,0$	<ul style="list-style-type: none"> ▪ X_{1yp}, X_{1yb} – assessment of institutional and transformational factors that are included into domestic trade management system respectively in the base and planned periods (as determined in the expert way) points; ▪ "12" - the number of factors taken to assess "Ey"

The methods allow us to estimate the efficiency change of the domestic trade system in all subsystems, taking into account all the criteria. This is the most important background for complexity of evaluating the efficiency of the domestic trade system in the conditions of transformation.

On the other hand, a set of estimates by efficiency types allows us to calculate an integral indicator of the efficiency of the domestic trade system in the conditions of transformation (E_m) in the planned (estimated) period compared with base (pre) under the formula (1):

$$Em = (Ei+Ec+Ee+Ey):4 \quad (1)$$

Thus, while determining an integral indicator there is a possibility to identify the most “problematic” subsystems, in which sufficient potential is not formed and thus – in which the efficiency level is not sufficient (value $Ei < 1,0$).

It is obvious that in the above mentioned methods (Table 3.) in the calculation of efficiency, both indicators characterizing the costs of the field and indicators characterizing the result – lucrativeness and profitability (or turnover), are taken into account. Thus, the methods do not conflict with the general principle of calculating efficiency.

In contrast to the calculation order of institutional and transformational, social and economic efficiency, in which it is supposed to operate indicators that have specific statistical load when assessing management efficiency, the obtained results of this social research and expert assessment on determining the importance degree of the factors that are included into the system of domestic trade management and characterize institutional and transformational change of subsystems are used.

Relying on the developed methodological approaches on evaluating the efficiency of the domestic trade system in the conditions of transformation it becomes apparent that the change of this criterion directly depends on generated potential in general and in particular – implementation of managerial potential – its resource, organizational and functional components. At the same time, the efficiency change of the domestic trade system directly affects an effective criterion – trade competitiveness both in the domestic and foreign outlets. Thus, in assessing the efficiency of the domestic trade system it becomes possible to establish the existence of field potential – its ability to form necessary resources and use them efficiently in economic activities to meet the needs of consumers and their own needs (getting profits). Therefore, it can be concluded that the efficiency of the domestic trade system affects the ability of the field to use internal capabilities to achieve competitive advantages in both domestic and international outlets.

On the basis of the research on the selection of criteria and indicators for the assessment of the domestic trade system and, in particular, – efficiency evaluation – as an integral criterion, it is possible to ground basic principles on evaluating efficiency – as an integral criterion of assessing the efficiency of the domestic trade system.

The necessity to ground the principles of assessing the efficiency of the domestic trade system just around this criterion is stipulated by its integral value compared with the others. It is in this criterion to implement the methodological meaning of “principle”. The assessment principles of the domestic trade system have both methodological and methodical (applied) importance.

In methodological terms, efficiency valuation of the domestic trade system is a kind of key to implementing in practice the concept of transformation of the domestic trade system, because it is the result of this assessment to establish the problems that hinder the domestic trade development and emerge both at the stage of potential formation (causal criterion) and at the stage of its implementation, affecting the competitiveness of the field on the whole (effective criterion). Thus, in methodological terms, the evaluation result of the efficiency of the domestic trade system can be considered to be a starting point, in which objective problems of the field are established and decisions are made on their solution, which, a priori, can be considered a fundamental and crucial force for taking categorical measures in favor of the field development within the concept of transformation of the domestic trade system.

In methodological (applied) terms, efficiency evaluation of the domestic trade system is the result of the conducted empirical research (socio-logical surveys and expert assessments). Consequently, the principles of the efficiency of the domestic trade system may be considered both in methodological and applied terms. The essence of the grounded principles lies in the following:

In methodological terms:

- systemacy: supposes usage of the structured classification of indicators and selected factors to evaluate each criterion and a corresponding subsystem where an integral criterion is efficiency, and an evaluation object is domestic trade, external factors of influence on domestic trade systems and the system of field management;
- complexity: supposes obtaining potential evaluation, efficiency, competitiveness and managerial potential aiming at conformity with the developed criterion Scheme of transformation of the domestic trade system, where efficiency criterion is recognized as integral;

- dependence: is to establish direct dependence of efficiency change of the domestic trade system on the productivity and competitiveness of the domestic trade on efficiency change of the domestic trade system, and the efficiency of the domestic trade system on managerial potential;
- resource efficiency: is to consider the efficiency of the domestic trade system as an economic category, in which the effectiveness of trade activities is characterized by rational usage of resources;
- in methodological (applied) terms the following principles of efficiency evaluation of the domestic trade system are grounded:
 - scientism: is to use the developed methods of efficiency evaluation of the domestic trade system in the conditions of transformation, on the basis of which an integral indicator is calculated, and also modeling to evaluate the importance degree by types of potential criteria using models “F-statistics” and “Saati”;
 - objectivity: is to use in the process of carrying out empirical, socio-logical research, and expert assessments of the classified system of indicators and factors for assessment of the domestic trade system by criterion feature with the possibility of obtaining an objective assessment of each criterion and transformation state of each of the subsystems;
 - effectiveness: is the ability while assessing efficiency to get the result of formation and implementation of the domestic trade potential by each of the sub-systems of the domestic trade system, and also to determine the efficiency influence on the change of basic effective indicators (profits and profitability, or turnover in the field);
 - accounting and analysis: is to conduct ongoing monitoring of the indicators selected for evaluation by the classified structure to diagnose currently the state of the transformation of the domestic trade system and field in general, and governance adoption by the entity relying on the obtained data of operational decisions on the solution to domestic trade problems.

Conclusion

On the basis of the studies on determination of indicators and principles of assessing the efficiency of the domestic trade system in the conditions of transformation the following conclusions can be drawn:

- for assessing the domestic trade system in the conditions of transformation all the criteria, among which efficiency is integral, should be taken into account for which appropriate classification by criterion structure is used;
- assessment of the domestic trade system is not complete and objective, without taking into account the influence of factors on the potential, efficiency, competitiveness and managerial potential of the system and each of the subsystems, for which on the basis of social researches and expert estimates the importance of these factors is established;
- while assessing the efficiency of the domestic trade system its essence is taken as a basis – as an economic category, in which a relationship with productivity and efficient usage of resources is established;
- in the efficiency of the domestic trade system the degree of potential formation is reflected and the result of its implementation, which is manifested in changing the competitiveness of the field and major result indicators (including – profit, profitability and turnover);
- for assessing the efficiency of the domestic trade system in the conditions of transformation the developed methods are used in which by means of calculation methods institutional and transformational, social, economic and managerial efficiency is determined, affecting the integral efficiency indicator and change in the planned (estimated) period, allowing you to identify the most “problematic” subsystems, in which sufficient potential is not formed;
- assessing the efficiency of the domestic trade system is based on reasonable principles that have both methodological and methodical importance.

Summing up the mentioned above, we can state that the studies allowed us to ground the necessary set of instruments to develop the diagnosis methods of the domestic trade system in the conditions of transformation,

the usage of which will enable the management entity to get current information about the state of the field, its problematic subsystems and make sensible decisions on the problem solution to the field development.

References

- [1] Antonova, O.V. 2014. *Assessment of financial security retailers*, Dissertation Abstracts, Kharkiv, State University of Food Technology and Trade.
- [2] Apopii, V.V., Lopashchuk, I.A. 2009. *Social and Economic Efficiency of Trade: Theoretical and Methodological Aspects*, Newsletter of the Lviv Academy of Commerce, 31: 3-9.
- [3] Cherdantseva, I.H., Klypach A.Ya. 2011. *The historical development of the concepts of trade marketing in Ukraine*, available at: http://www.nbu.gov.ua/portal/soc_gum/товары/2011_1/3.pdf.
- [4] Davydiants, D.E. 1996. *Topical issues of market economy: the cost break-even, efficiency*, Stavropol, CNTI.
- [5] Ivanov, H.H. 2006. *Methodology transformation potential of trade organizations*, Unpublished dissertation, Moscow, Russian Academy of Economics im. G.V. Plekhanov.
- [6] Izhevskiy, V.V. 2011. *Innovative development of retail business and restaurant economy in a market environment*, dissertation, Lviv, Lviv Academy of Commerce.
- [7] Kriuchkova, I.V. 2007. *Structural Harmonization of Ukraine's Economy as a Factor of Economic Growth*, Kiev, Express.
- [8] Loktev, V.P. 1975. *Learn economic accounts*, Moscow, Polytyzdat.
- [9] Mazaraki, A.A., Heiets, V.M. 2008. *Priorities for National Economic Development in the Context of Globalization Challenges*, Kiev, KNTEY.
- [10] Mitsenko, N.H., Kumechko, O.I. 2010. The resource potential of an enterprise: essence, structure, strategy of use, in: *Scientific Bulletin NLTU*, No. 20.9: 193-198.
- [11] Normatova, Sh.M. 2012. *Formation and development of the retail segment as a basic service sector*, Dissertation Abstracts, Dushanbe, Tajik State University of Commerce.
- [12] Pikush, T.A. 2005. *Criteria and indicators for assessing the development of distribution network*, Proceedings from The second scientific-practical conference "Alliance Sciences: scientist to scientist", available at: http://www.confcontact.com/Okt/11_Pikus.php.
- [13] Yaremenko, M.O. 2013. *Managing potential commercial establishments* (Unpublished dissertation), DNUET, Donetsk.
- [14] Yasyn, E. 2006. State and the Economy on the Stage of Modernization, *Problems of Economics*, 4: 15-16.
- [15] Yevlakova, I.A. 2007. *The Economic Security of the State, Foreign Trade, Investment and Innovative Aspect*, *Scientific Bulletin DonDUU*, VIII(76): 141-151.
- [16] Vasylychak, S.V. 2011. Evaluating the Effectiveness of Commercial Enterprises Ukraine, *Scientific Bulletin NLTU*, 21(9): 146-149.
- [17] Vichevych, A.M., Maksymets O.V. 2004. *The analysis of foreign trade activities*, Lviv: Afisha.
- [18] Vynohradska, A.M. 2004. *Commercial Entrepreneurship: the current state of*, Kiev, CNL.

The Role of Participation in the Design of Time Equations in the Time-Driven Activity based Costing – A Systematic Review of the Literature

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Abstract:

This article presents a systematic review of the literature related to the design of Time Equations in Time-Driven Activity Based Costing. In these linear equations, the times to perform activities can be collected through interviews or observation. The first method, including the participation of employees, has been seen a source of inaccuracy that hinders the success of the model. To dispel these critics, on the basis of the studies that support the participation of the users in the design of management accounting information systems, the review has been conducted around three research questions. First of all, the article wants to find the reasons that encourage the involvement of employees in the design of a TDABC system. Secondly, the article wants to search the conditions that able the participation of the employees to become a driver of success of TDABC. Lastly, the article wants to highlight the negative effects in work measurement models, such as the Time Equations, where only the stopwatch is used and employees do not have a say. The analysis of the literature shows a lacking and incomplete consideration of these aspects. For these reasons we leave a few suggestions for future research.

Keywords: time-driven activity based costing, time equations, participation, work measurement models, cost system design, literature review.

JEL Classification: M10, M41, L20

1. Introduction

The Time-Driven Activity Based Costing (TDABC), known as a system able to overcome the technical limits of the Activity-Based Costing (ABC), in order to work, needs equations built on the time measurements of activities. These times can be obtained using two techniques: observation or interview (Kaplan, Anderson, 2004; 2007). To these methods of time measurements can be given a traditional connotation of scientific management's techniques, using them as a Taylorized control device, or they can be viewed in a participatory system where the times equations are defined by involving employees. In this way, they may also enhance staff members' understanding of work processes and their commitment, which, in turn, might result in operational improvements (Hoozée, Bruggeman, 2010). Although the involvement of the employee in the design of Time Equations has been seen as a limit for the well functioning of the TDABC information system, which may produce noisier signals (Adkins, 2008; Namazzi, 2009), in this work we try to find evidence of the reasons and conditions that enable the participation to become the driver of success of this costing model (Anderson, 1995; Shields, 1995; Hunton, Gibson, 1999). Very few studies analyzed this research perspective and the present systematic review, to our knowledge, is the first to examine the participation of the employee in the design of Time Equations in the TDABC.

For our analysis, we use an interactive model, on the basis of the studies of Shields and Shields (1998), summarizing the objectives of the review in three research questions:

1. What are the reasons to consider the participation of the employee in the design of Time Equations?
2. What are the conditions that able the participation to become a driver of success of TDABC implementation?
3. What are the effects of a work measurement model where times are recorded only through the use of a stop watch?

The paper is divided in six sections. After a brief presentation of TDABC, the article overviews the studies on participation, the model of Shields and Shields (1998) and the time studies in scientific management. Subsequently, after a detailed description of the protocol used, the results are discussed and some suggestions for future research are presented.

2. From activity based costing to time-driven activity-based costing: a brief presentation

Activity-Based Costing, emerged at the end of the 1980s, was rapidly considered by many academics and practitioners as one of the most important innovation in management accounting for its ability to overcome the limits of traditional costing systems and for its potential benefits in providing more reliable cost information about products, customers, services and processes, profitability of a company. However, as observed by Gosselin (2007, p.642) «...despite favourable context for the adoption and implementation of ABC and even though ABC exists since almost 20 years, survey have shown that the diffusion process of ABC has not been intense as it may have been expected. This is the essence of what has been called the ABC paradox». In fact, despite its theoretical superiority over traditional method of cost accounting, empirical data on the degree of adoption of the ABC model have shown low percentages of companies around the world that use this costing system and many of ABC implementations did not sustain in the long run (Gosselin, 2007)¹.

The most common reasons of failure in ABC implementation methods, as outlined by Kaplan, and Anderson (2007), can be summarized as follows (Gosselin, 1997; Innes *et al.*, 2000; Kaplan, Anderson, 2004; Baird *et al.*, 2004; Cinquini, Mitchell, 2005; Cohen *et al.* 2005; Everaert *et al.*, 2008; Van Der Merwe, 2009; Gervais *et al.*, 2010):

- high time and resources commitments in the process of implementation. Many companies decided to abandon the full implementation of the ABC system and use the information gathered from the performing analysis of organizational activities to improve their existing cost systems;
- the data for the ABC model were subjective and difficult to validate and it were expensive to store, process, and report;
- lack of integration between ABC models and other parts of organizational information systems;
- lack of management support since most ABC models were local and did not provide an integrated view of enterprise-wide profitability opportunities;
- the model was theoretically incorrect when it ignored the potential for unused capacity;
- complexities of maintaining ABC systems in large organizations since it could not be easily updated to accommodate changing circumstances (changes in performed processes, adding new activities, increasing complexity of individual orders, channels, customers, etc).

Time-Driver Activity Based Costing was introduced, by Kaplan and Anderson (2004; 2007) to overcome the limits of the ABC model, assigning resource cost directly to the cost objects using only two parameters: the cost per time unit of supplying resource capacity and the unit times of estimated consumption of resource capacity by transactions, products, customers, etc. The Authors (2004, 133) highlight how this method is «...simpler, less costly, and faster to implement, and allows cost driver rates to be based on the practical capacity of the resource supplied».

The time driven approach can be illustrated using six steps (Kaplan, Anderson, 2007; Everaert, Bruggeman, 2007):

- Identification of the various resource groups that performs activities;
- Estimation of the cost of each resource group;
- Estimation of the practical capacity of each resource group expressed in the number of working hours;
- Calculation of resource costs per time unit (by dividing the total costs of each resource group by the practical capacity expressed in hours);
- Definition of the time required for each event of an activity based on different time drivers;
- Multiply the resources costs per time unit with the time required by the cost object.

The time required to perform an activity (as in step 5), breakthrough of the TDABC model, is inserted in a linear equation, so called Time Equation (or T.E.), that allows to include time required to perform the standard (or constant) variant of activities, and additional amounts of time, depending on the characteristics and variations of each activity, and handling complexity, contrarily to ABC that used only a single activity driver (Kaplan, Anderson, 2004; Gilbert, 2007; Demeer *et al.*, 2009). In this way, the TDABC allows to include the variations in the time demand in cost calculation which stems from the consideration, for example, that not all customers orders are the same and do not require the same amount of time to be processed. For this reason, TDABC can be used in any industry or company with complexity in customers, products, processes, channels, and segments (Cooper, Kaplan, 1998; Kaplan, Anderson, 2007).

Time Equation is generally represented as follows:

¹ See for a complete analysis of the Italian context, Cinquini, *et al.* (1999); Cinquini *et al.* (2009).

$$t_{j,k} = \beta_0 + \beta_1.X_1 + \beta_2.X_2 + \dots + \beta_p.X_p \quad (1)$$

$t_{j,k}$ = time required for event k of activity j

β_0 = constant amount of time for activity j , independent of the characteristics of event k

β_i = estimated consumption of time for 1 unit of time driver i ($i = 1 \dots p$)

X_i = time driver i ($i = 1 \dots p$)

p = number of time drivers which determine the time required to perform activity j

Source: Everaert and Bruggeman, 2007

Information about the times required in TE can be obtained with interview or *in situ* observation (Kaplan, Anderson, 2007). As we will explain later, the way times are collected can give a negative connotation to Time Equations, reproducing a typical technique of scientific management in which times are used as a control device and employees do not have a say. However, Time Equations could be used to gain a better understanding of the activities when employees are involved in their design and consecutively the organization can gain more benefits from TDABC implementation (Hoozée, Bruggeman, 2010).

Time Equation allows a better understanding of the company's actual economics, enabling to improve internal processes and eliminate waste, and supports managers in identifying multiple actions that transform loss or break-even operations into profitable ones, and in performing simulations of sensitivity analysis of the future. Furthermore, if the company has some form of ERP systems, the definition of time in TE integrates easily and dynamically with data made available by them. The time-driven ABC software easily imports from ERP systems the extensive data on all transactions, which includes the special features of transactions that can be exploited in the design of Time Equations. In this way in the TE can be added, quickly and easily, new activities and changes due to changed business conditions (i.e. including different order characteristics, processes, suppliers and customers; introducing new production technologies; increased efficiency in performing activities as a result of BPR, etc), as the factors of time parameters of the equation (Gilbert, 2007; Kaplan, Anderson, 2007).

Time-Driven Activity Based Costing creates more accurate allocation of costs and more cost transparency than the traditional model, since Time Equations clearly show which activities demand more time and which ones leads to higher cost. Consequently, the TDABC offers operational insights and improvements concerning activities and their added value (Demeer *et al.*, 2009). Hence, this model costing provides visibility to process efficiencies and allows comparing the value of used capacity with the value of available capacity and thereby to determinate the cost of under activity (Kaplan, Anderson, 2007; Tse, Gorg, 2009; Tanış, Özyapıcı, 2012).

Most of the differences between the two systems are related to the weaknesses of ABC (Kaplan, Anderson, 2007, Gervais *et al.*, 2010, Dejenega, 2011, Siguenza-Guzman *et al.*, 2013).

Even if ABC had the capacity of using time as a cost driver, time in TDABC plays a different role because it allocates cost to cost objects (Hoozée *et al.*, 2009). Precisely, ABC applies duration drivers in the second stage of a cost allocation process, after those resource costs have already been mapped to the activity. In contrast, TDABC uses time to drive cost directly from resources to cost objects (Kaplan, Anderson, 2007).

Another distinction is that ABC systems require the time percentage that employees spend on activities, whereas TDABC the time needed to perform each activity (Hoozée, Bruggeman, 2010). Kaplan and Anderson (2007) are critical about the practice in which employees are asked to estimate the percentage of time spent on their activities. The percentage is often equal to 100%, hiding idle capacities. The Authors prefer to measure the time necessary to perform tasks by means of a direct estimation in minutes or hours (based on, as mentioned above, interviews, observations, and comparative information). However, Cardinaels and Labro (2008) show with an experimental analysis that an evaluation in minutes results in an overestimation of the time spent in an activity, greater than an estimation in percentage, which seems to contradict what affirmed by Kaplan and Anderson (Gervais *et al.*, 2010). However, even though labor times are difficult to measure, as shown by studies on work measurement models, sometimes is the use of the direct labour hour, as a means of sharing indirect charges, to be criticized in the TDABC model because no longer up to date with changing production technology and the modern organizations processes (Van der Merwe, 2009; Gervais *et al.*, 2010).

In addition, Namazi (2009) observes that the time information generated by TDABC may be less reliable than the ABC because now it can be collected through the estimation process from two different information sources, employees and managers, which may produce noisier signals. As pointed out by the Author, the problem of inaccurate information reported would be due to moral hazard problems or adverse selection in an agency relationship such as the one between employee and manager. This problem, as we will see, can be

lessened in TDABC increasing the role of the participatory system in the definition TE. This can be explained considering that managers are not primarily interested in knowing the exact true times. Rather, they want to understand and reach some consensus and commitment, starting from low levels of organization, on feasible time standards (Hoozée, Bruggeman, 2010).

Despite the criticism on the reliability of TDABC information and considering the last point of view exposed, on the basis of the studies on the participation of employees in decision making and on the basis of the negative connotation that Time Equation can have as a technique of scientific management (Hoozée, Bruggeman, 2010), the present paper wants to highlight the benefits of the participation of the employee, in the definition of the times, to support the design of Time Equation in a process of TDABC implementation.

3. The participation as a central variable of behavioral management accounting: its role in the design of Time Equations

To support our research questions we want to provide a significant overview of the role that the participation of the employee has in the design of TDABC model, according to previous studies that analysed its effects in the design of Management Accounting Information System and, especially, on how information is used to identify operational improvements at the lowest levels of an organization, with the intention to supply a solid base to the objectives of the review. In particular, the systematic review wants to give evidence that Management Accounting Information System developers must consider concerns, opinions and suggestions of different system users, providing them the opportunity to do so and offering a better understanding of the use and usefulness of accounting information at the operational level (Barki, Hartwick, 1994; Shields, 1995; Lukka, 1998; Choe, 1998; Hunton, Gibson, 1999; Lee, 2003; Snead *et al.*, 2005; Tse, 2011).

The participation, the central topic of this paper, and also, included in the first and second research question, is considered a relevant variable in behavior management accounting (Brownell, 1981; Merchant, 1981; Shields, Young, 1993; Hunton, Gibson, 1999; Choe, 1998; Riahi-Belkaoui, 2002; Chong, Johnson, 2007), related to motivational and cognitive processes (Locke, Schweiger, 1979; Shields *et al.*, 1981; Erez, Arad, 1986; Locke, Latham, 1990; Latham *et al.*, 1994; Magner *et al.*, 1995; Chong, Chong, 2002). In fact, behavioral research paradigm offers researchers a framework to examine and understand the relationships between accounting information and individuals' behaviors (Shields, Young, 1989; Haynes, Kachelmeier, 1998; Kwok, Sharp, 1998; Koonce, Mercer, 2005). Human factors also played an important role in decisions related to the adoption of ABC in organizations (Anderson, 1995; Shields, 1995; Gosselin, 1997; Briers, Chua, 2001).

With regard to motivational processes, one of the factors that plays a significant role in participatory decision making, with particular relevance to our study, is self-efficacy (Latham *et al.*, 1994). The basic principle behind Self-Efficacy Theory is that individuals are more likely to engage in activities for which they have high self-efficacy and less likely to engage in those they do not (Van der Bijl, Shortridge-Baggett, 2002). Self-efficacy has influence over people's ability to learn, their motivation, their commitment and their performance, as people will often attempt to learn and perform only those tasks for which they believe they will be successful (Wood, Bandura, 1989; Lunenburg, 2011).

On the other hand, cognitive effects allow interpreting the relationship between the definition of the objectives and the results, within the goal setting theory, when employee participates in decision making (Stasser, Titus, 1985; Hirst, Lowy, 1990; Magner *et al.*, 1996; Locke, Latham, 2002). This particular relation is interpreted with the cognitive dissonance theory which explains why the employee who participates in decision making is more committed to pursue the objective which he sets to avoid the sensation of discomfort that comes from not achieving the set objective (Hirst, 1983; Tiller, 1983).

The participation, for its motivational and cognitive effects, plays a central role in facilitating some organizational processes such as change, helping the acceptance of the changes (Coch, French, 1948; Sagie *et al.*, 1990; Jermias, 2001) and allowing learning opportunities during this process of change (Valleala *et al.*, 2014).

Another process where participation has a relevant role is related to the design of the budget system. Different studies have highlighted how individuals can be motivated to behave in a certain way and, among the variables mostly able to influence people towards the achievement of their goals, the literature has identified the participation in the design of the budget (Argyris, 1977; Govindarajan, 1986; Brownell, McInnes, 1986; Mia, 1989; Magner *et al.*, 1995; Nouri, Parker, 1998; Chong, Chong, 2002; Covalleski *et al.*, 2003; Marginson, Ogden, 2005).

In particular, the studies have concentrated on the setting of the budget, analysing the relationships between the participation of the employee as an independent variable in interaction with a dependent variable, such as satisfaction, motivation or performance (Shields, Shields, 1998; Chong, Johnson, 2007; Tse, 2011).

Furthermore, in the design of the budget, the participation enables to reduce information asymmetries between manager and employee, from the moment that the employee has a better understanding of the task he is carrying out than the manager (Baiman, Evans, 1983; Sivaramakrishnan 1994). Hall (2008), expanding the analysis from the budget system to the wider field of Performance Measurement Systems, has highlighted the effects of these last systems on clarifying the role in the organization.

The Author has underlined the importance of the psychological impact of clarifying the role in the organization, induced by the budget process, on the performance of the individuals and of the organization.

Some studies have outlined that participation influences directly organizational commitment, encouraging increasing or maintaining the involvement of employees in decision making (Wentzel, 2002; Ohana *et al.*, 2013). Moreover, other studies have also observed a positive relationship between participation and managerial performance in presence of a decentralized structure (Gul *et al.*, 1995). Others have studied the relationship between employees' participation and satisfaction revealing a positive relationship in presence of effective supervisory communication (Soonhee, 2002).

However, there have been studies that have shown negative effects of participation. In particular in relation with performance in presence of a centralized structure and when manager pretends to listen to employees opinion (Gul, *et al.*, 1995; De Vries *et al.*, 2012). In this line of study are also included the works of Bryan and Locke (1967) that have highlighted a negative relationship between participation and performance and of Morse and Reimen (1956) who have shown indifferent effects on performance considering or not the involvement of the employee in decision making. The different results in terms of association with the dependent variables considered can be due to specific factors, such as contextual factors. These factors are the ones that under certain conditions provide a positive association between the participation and one other variable, for example, the productivity of the organization or that provide a negative association (Hopwood, 1976). Furthermore, many studies related to the design of Management Accounting Information Systems indicated the necessity to consider contextual variables and, in particular for a successful design the contingency relationship between contextual variables and characteristics of the system (Kim, Lee, 1986; Choe, 1996; Haynes, Kachelmeier, 1998; Choe, 1998).

These conditions, in the present work, are included in the second research question since there are considered essential on defining the participation not as a limit but as the driver of success of the TDABC, where success is considered the consequence of the dependent variable of the study. In this stream of research are also included studies based on ABC which studied how contextual factors could affect the usefulness of activity-based cost information in decision making (Bhimani, Pigott, 1992; Anderson, Young, 1999; Lee, 2003).

For this reason after understanding why employees have to participate in design of the Time Equations, we also research the conditions that influence the effects that the participation has on its success. We do so employing as a reference the study of Shields and Shields (1998) related to participative budgeting and transferring the suggestions of the Authors on our research. Precisely, the Authors offer a model of analysis in which a series of variables, extrapolated from a variety of studies on the participation, are considered in an interactive framework of study (Birnberg *et al.*, 2007), in which the participation is employed as a independent variable.

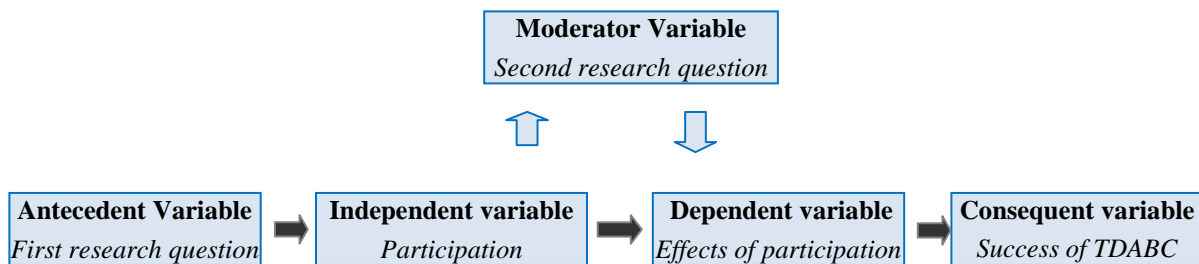
In the model Shields and Shields (1998) look for:

- “*antecedent*” variable which is the cause of an independent variable, in other words is the variable that enables to understand the reasons to consider the participation of employees in decision making. The antecedents found by the Authors were mainly related to the uncertainty (of the environment, of task and interdependence of task) or to information asymmetry;
- “*moderator*” variable is the variable that affects the relationship between the independent variable and the dependent one, while the “*intervening*” variable is both caused by an independent variable and is cause of the dependent variable. Among the studies on participation the Authors found as moderator variables the ones related to characteristic of the employees (locus of control, leadership style), task characteristics (tightness, incentive – contingent), management style (budget emphasis in performance evaluation, management by exception) organization structure (decentralization, functional) and to environmental characteristics (uncertainty).
- “*consequent*” variable is known as the variable caused by a dependent variable.

For the present work the model represents a key of interpretation of the articles that consider the design of Time Equation involving the employees in their definition. Assuming the participation as an independent variable, our review wants to identify antecedents and moderators in the design of Time Equations. Precisely, the model

allows us to find answers to the first research question "What are the reasons to consider the participation of the employee in the design of Time Equation?" and to the second one "What are the conditions that enable the participation to become a driver of success of TDABC implementation?" through the definition of antecedent and moderator variables.

Moreover, the model is a way of assessing the completeness of the articles found coherent with the objectives of the present review and the reference to eventually suggest ways to improve studies on TDABC. The model used represents a readjustment of the one illustrated by Shields and Shields (1998) in which the participation is considered as the "independent" variable while the "consequent" variable is represented by the success of TDABC implementation, caused by the dependent variable, represented by the effects on the design of Time Equation involving the employees in their definition. Established these two variables, the unknown variables to find in the literature on TDABC are the antecedent, the moderator and the dependent variable as summarized below:



Source: Readjstment of Shields and Shields (1998)

Figure 1. Model of interpretation of the articles

To confirm our results on the role of the participation for a efficient definition of T.E., the third research question wants to highlight the side effects of a work measurement model where times are recorded only through the use of a stopwatch. The T.E, as already mentioned, can be defined through observaion or interviews. While the interviews for their nature simplify the development of the mentioned participatory system, the exclusive use of the stopwatch in the design of Time Equations can recall the technique used as a control device in scientific management to record the time of performing activities, risking to connote these phase of TDABC merely as another type of Taylorism (Hoozée, Bruggeman, 2010). In particular, the stopwatch was used in scientific management to determine a standard time within which the worker had to carry out his task and identify, in this way, the optimal method for performing a task that guarantees maximum efficiency (Epstein, Epstein, 1974; Freedman, 1992).

However, this instrument, widely used in the system proposed by Taylor as a work measurement, has been seen as an oppressive eye, capable of invading the privacy of the employee, even against the respect of their dignity and cause of processes of depersonalization of the human being. This way of working, typical of the scientific management, is related to the way the employee is seen in this system. The employee is considered in the scientific management as an individual who is interested in the satisfaction of his needs, even going against the organization where he works, hiding the time required to perform a certain task (Epstein, Epstein, 1974; Kanigel, 1997). Therefore the instructions given regarding the time of performing a certain activity are used as a Taylorized control device to enforce employee compliance. But used in this way, they can also have negative effects on the employee's ability to make decisions not allowing the identification of operational improvements at the lowest levels of an organization. This way of recording times in the TDABC can recall this way of thinking and although designing a time-driven ABC system might result in operational improvements, such benefits may not always materialize (Hoozée, Bruggeman, 2010).

On the basis of these assumptions, the systematic review wants to highlight the effects that a work measurement model in which times are recorded only from observation, by the use of a stopwatch, has on the employee and on the organizational performance. Therefore, we try to find answers to the third research question: "What are the effects of a work measurement model where times are recorded only through the use of a stopwatch?". The results that highlight the effects of this technique will be used and discussed with the intention to strengthen the role of the participation as the driver of success in the design of Time Equations.

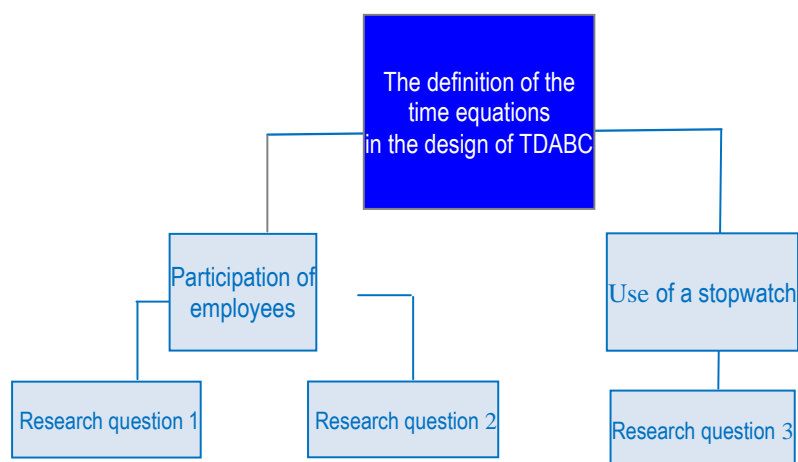
4. The research

First of all, a protocol of work has been formulated to specify the methods used for undertaking the present systematic review to reduce to possibility of researcher bias (Kitchenham, 2004), setting a valid path to follow in the research of the articles aligned with the objectives of the present systematic review. In the protocol we defined the search engines where to find the articles and the parameter to select the journals to include in the review. Furthermore, we selected a few relevant keywords that were mostly related with the objectives of the work. Precisely, the keywords used are related to the participation of employee in decision making: *participation, negotiation, operational improvements, involvement, information asymmetry* and with the scientific management: *stopwatch, chronometer, scientific management*. The single keyword has been used twice either with the acronym TDABC and with the extension “time driven activity based costing” to avoid excluding articles that have used only one of these ways of naming the system of costing. Moreover, we decided also to select the option “search for similar keywords” and “search inside the article”. Lastly, we built a flow sheet to set a standard to analyse the articles and select relevant information. The protocol has been set up aware that the articles on TDABC that study how, why and when the design of Time Equation results in identifying operational improvements at the lowest levels of an organization, are limited, as well as the ones that examine the participation of the employees in the design of TDABC as a driver of success of the model (Hoozée, Bruggeman, 2010). The period under review goes from 2004, the year in witch TDABC was introduced by Kaplan and Anderson, to 2014, year from which our research started.

Following our protocol, the work has been carried out in a set of passages. Initially, the articles have been found using a set of keywords on four well-known search engines: EBSCO Discovery, Emerald, J. Store, Wiley Online Library. The keywords used are as follows:

TDABC participation, “time driven activity based costing” participation, TDABC involvement, “time driven activity based costing” involvement, TDABC negotiation, “time driven activity based costing” negotiation, TDABC “operational improvements”, “time driven activity based costing”, TDABC “information asymmetry”, “time driven activity based costing” “information asymmetry”, TDABC stopwatch, “time driven activity based costing” stopwatch, TDABC chronometer, “time driven activity based costing” chronometer, TDABC “scientific management” and “time driven activity based costing” “scientific management”.

Once the articles have been identified in the mentioned search engines, they have been selected on the basis of their presence on the Quality Guide Version of the ABS 4 (2010) to assess the quality of the studies. The ABS has been chosen as a standard of selection for its popularity in the last years (Hussain, 2011). In addition, the ranking presented in the Guide is used to assess where to publish, to take informed decisions and as an reference widely used for reviews in UK and other countries (ABS, 2010). In the present work, we have considered all the ratings presented by the ABS from the first till the fourth grade and all the areas of study, since the proposed topic cannot be limited to one single area of research (Dejnega, 2011; Siguenza-Guzman *et al.*, 2013). The articles selected were 30 in number. These thirty articles have been read thoroughly, using as a guide the following flow sheet (Figure 1) that summarises the objectives of the systematic review:



Source: Own elaboration

Figure 2. The criteria used to select relevant articles by content

The flow sheet indicates the criteria used to select the article for the discussion on the basis of the information present in the article. First, we tried to gain information about the technique used or discussed in the article for collecting the times to include in the Time Equations with the intention of identifying if the technique used, or exposed, was related with the involvement of the employees or to the use of a stopwatch. On the basis of the technique used we selected, if present, information related with the research questions.

Precisely, if the times were recorded involving the employees we tried to see if there was any information that could explain why the participation of the employees was considered (research question 1) and/ or the conditions that explained the effect of the participation (research question 2) with a successful aspect of the model (so called dependent variable). Instead, if the times were collected through observation we tried to gain information about the effects that these technique had on the employee and/ or the organizational performance (research question 3). We also decided to consider articles that respected the flow sheet and gave useful information about the role of the participation or the use of the stopwatch, even if doing so didn't give a straight forward answer to any of the three research questions.

Twenty articles have been excluded for lack of information on the topic chosen as outlined in the flow sheet. The ten articles, then re-analysed to give a proper discussion on them as shown in the next paragraph, are listed in the Table 1.

Table 1. Articles selected for relevant content

Author	Title of the Article	Research Method	Journal	Year	Rating	Study Area
S. Hoozée W. Bruggeman	Identifying operational improvements during the design process of time driven ABC system: the role of collective worker participation and leadership style	Case study	<i>Management Accounting Research</i>	2010	3	Accounting
K. Reddy H.S. Venter M.S. Olivier	Using time driven activity based costing to manage digital forensic readiness in large organizations	Experimental	<i>Information Systems Frontiers</i>	2012	2	Information Management
P. Everaert W. Bruggeman	Cost modeling in logistics using time driven ABC: Experiences from a wholesaler	Case study	<i>International Journal of Physical Distribution & Logistic Management</i>	2008	2	Operations management and technology
E. Cardinaels E. Labro	On the determinants of measurements error in Time driven Costing	Experimental	<i>Accounting Review</i>	2008	4	Accounting
S. Hoozée W. Bruggeman L. Vermeire	The impacts of refinement on the accuracy of time driven ABC	Mathematical Model	<i>Abacus</i>	2012	3	Accounting
I. Dalci V. Tanis L. Kosan	Customer profitability analysis with time driven activity based costing: a case study in a hotel	Case study	<i>International Journal of Contemporary Hospitality Management</i>	2010	2	Tourism and hospitality Management
P. Everaert W. Bruggeman G. De Creus	Teaching an educational note: Sanac Inc: From ABC to time driven ABC (TDABC) – An Instructional case	Case Study	<i>Journal of Accounting Education</i>	2008	2	Journal of Accounting Education
R.S. Kaplan M.L. Witkowski	Better Accounting transforms health care delivery	Action Research Program	<i>Accounting Horizons</i>	2014	2	Accounting
K. Stouthuysen K. Schierhout F. Roodhooft E. Reusen	Time driven activity based costing for public services	Case study	<i>Public Money & Management</i>	2014	2	Public Sector
C. Campanale L. Cinquini A.Tenucci	Time driven based costing to improve transparency and decision making in healthcare: A case study	Case study	<i>Quality Research in Accounting & Management</i>	2014	1	General Management

5. Results and discussion

In the last phase of the work, as outlined in the previous paragraph only 10 articles were selected as aligned with the objectives of the paper as shown in the flow sheet. Of the ten articles, only five permitted to identify relevant variables, considering the participation as the independent variable of the study. In these five not all the variables were identified since some of these didn't give enough information to understand the reasons that brought the participation to be considered (first research question) or the conditions (second research question) that enabled the participation to give certain effects regarding the implementation of the TDABC. In other words, it wasn't possible from the information present in some of the five articles to identify so called antecedent or moderator variables and so to satisfy both the first two research questions.

Precisely from the information present in the articles, have been identified as antecedent variable that justify the need for involving the employees: the presence of information asymmetries between manager and employee (Hoozée, Bruggeman, 2010), the existence of resistance against the introduction of a new model such as the TDABC by the employees (Reddy *et al.*, 2012; Everaert, Bruggeman, 2008), and the need to increase the commitment and motivation of the employees (Campanale *et al.*, 2014).

Instead, as moderator variables have been determined: the adoption of democratic leadership in opposition with an autocratic leadership style (Hoozée, Bruggeman, 2010), the organizational culture (Reddy *et al.*, 2012), the level of aggregation of the activities, the moment of notification of the times, incoherence in the task (Cardinales, Labro, 2008).

Considering the participation as the independent variable of the model, there have been associated as dependent variables: the realization of operational improvements (Hoozée, Bruggeman, 2010), better informed decisions from the management (Reddy *et al.*, 2012), an increased knowledge of the activities performed and the feasibility of the model (Campanale *et al.*, 2014).

However, it is worth highlighting that from the five articles only the one of Hoozée and Bruggeman (2010) has reported a detailed and full analysis of the participation of the employee in the definition of the time driver to insert in the Time Equations. This is due to the fact that these Authors have studied in their case study the participation as the central argument while the others have considered the participation just as a secondary subject to their article. Hoozée and Bruggeman (2010), contrarily from the other articles, have focused on the behavioral aspects of the model directly relating them to the technical issues of its implementation to show how collective worker participation and leadership style influence the possibility of operational improvements in the design of a TDABC model. The other articles presented, in the previous presentation of the variables, have concentrated mainly on the technical aspect of the TDABC leaving a vague interpretation of the involvement of the employee in its construction. Although, they are some other articles selected in last phase of our research work that haven't been presented in the list of the variables above, since they didn't answer to the first two research questions and neither to the third one. However, they haven't been eliminated since some useful information has been identified regarding the participation, even if not enough to include this information in a certain type of variable. In these articles is included the study of Hoozée *et al.* (2012) since it presents a mathematical – statistical model to minimize the measurement errors due to the involvement of managers and employee in the definition of the time drivers.

Elsewhere, Everaert *et al.* (2008) in relation to our first research question, in the technical analysis of the deliveries in TDABC, outlined that there are difficulties for the manager to identify the time drivers due to an incomplete knowledge of the activities performed. Consecutively, this seems to confirm that the involvement of the employee is needed since the manager doesn't have the right knowledge to give a accurate time of performance. Kaplan and Witkowski (2014), instead, have left some relevant suggestions for future research concerning aspects related with behavioral management accounting. In particular, the Authors suggest to study the effect of a certain leadership style to face the resistance of the employee towards the adoption of new system of costing, such as TDABC. Interesting is the consideration of Stouthuysen *et al.* (2014) that see the participation as a way of obtaining information on the characteristics of the activities but not on the time of performing them, leaving a vague information on this matter without any further detail on the topic.

Our third research question regarding the use of the stopwatch to determine the time driver has found a complete analysis again only in the article of Hoozée and Bruggeman (2010) because in their case study they reported the effect that the use of the stopwatch and in other words the non- involvement of the employee has on their behavior and on the performance of the model. Precisely, the two Authors through the case study revealed that the non involvement of the employees brought anxieties for the employees because they felt controlled.

On the other hand, there weren't any operation improvement with these techniques. The other article selected as part of the research in the last phase of work has given some vague information on the use of the stopwatch, describing the stopwatch as an instrument to verify the times that were defined previously (Dalci *et al.*, 2010) without giving further information about the use of these method to record the time of the task carried out by the employee.

Conclusion

As outlined in the previous paragraphs, there are very few articles that satisfy the three research questions. In these few articles just one considers, as a central argument, the reason to involve the employee (first research question), the conditions that able the participation to gain benefits from the implementation of TDABC (second research question) and the effects of the use of the stopwatch as a technique to record the time drivers on the employee and on the performance of the model (third research question).

For the future research, first of all, we suggest that more attention should be paid to the behavioral management aspects of the model, in particular to the involvement of the employee in the definition of the Time Equations, since more attention has been focused on its technical side. Secondly, we suggest that successive case study on TDABC focus on the role of the involvement of the employee on the design of the Time Equations, showing like Hoozée and Bruggeman (2010) why the participation is needed and the conditions that enable the participation to achieve benefits from the implementation of the model. We suggest that future research could continue to use, as a parameter of their studies, the model proposed by Shields and Shields (1998) and so relate the antecedent of participation with social, economical and psychological theories to give a valid base to their findings. For what concerns the moderator variables, future studies should give a full description of the conditions that effect the relation between the participation of the employee and the success of the work measurement models. Future case studies concerning the design of the TDABC that continue to use a stopwatch should pay attention to the behavioral aspects of this technique, describing the effects that this technique has on the employee, during the implementation process of Time Equations, and the effects on the performance of the organization. In present of more articles that answer the research questions it would be interesting to do further research on those articles to gain more information about other issues, such as, for example, the business sector or the national culture. In relation with these two issues it would be instrumental to find eventual different effects that a participative approach has in different sectors and in different nations due to the different culture in the implementation of the model.

However, we need to take into account that in the present work the lack of results in number of articles could be due to the lack of articles, in management accounting, focused on the behavioral issues in the design of the TDABC and especially on the participation of the employee in the definition of Time Equations. Lastly, we should, also, consider that our protocol of work is not without any limits. We used as a parameter of selection of the article the Quality Journal Guide of ABS that is still used in the reviews but that has also been criticised on the way that the journals are selected (Hussain, 2011); consecutively this could have affected the number of articles found and commented in this paper.

References

- [1] Adkins, T. (2008). Activity Based Costing Under Fire Five Myths about Time-driven Activity Based Costing, Beye Network, <http://www.b-eye-network.com/view/7050> [Accessed 2015, February 7].
- [2] Anderson, S.W. (1995). A Framework for Assessing Cost Management System Changes: The Case of Activity Based Costing Implementation at General Motors 1986–1993, *Journal of Management Accounting Research*, 7:1–51.
- [3] Anderson, S.W., Young, S. M. (1999). The Impact of Contextual and Process Factors on the Evaluation of Activity-Based Costing Systems, *Accounting, Organizations and Society*, 24 (7): 525–559. [http://dx.doi.org/10.1016/S0361-3682\(99\)00018-5](http://dx.doi.org/10.1016/S0361-3682(99)00018-5)
- [4] Argyris, C. (1977). Organizational Learning and Management Information Systems, *Accounting, Organizations and Society*, 2(2):113-123.
- [5] Baiman, S., Evans, H. (1983). Pre – decision Information and Participative Management Control Systems, *Journal of Accounting Reserach*, 21(1): 371-395.

- [6] Baird, K. M., Harrison, G.L., Reeve, R.C. (2004). Adoption of activity management practices: a note on the extent of adoption and the influence of organizational and cultural factors, *Management Accounting Research*, 15: 383-399. <http://dx.doi.org/10.1016/j.mar.2004.07.002>
- [7] Barki, H., Hartwick, J. (1994). Measuring User Participation, User Involvement, and User Attitude, *MIS Quarterly*, 18(1): 59-82. <http://dx.doi.org/10.2307/249610>
- [8] Bhimani, A., Pigott, D. (1992). Implementing ABC: A Case Study of Organizational and Behavioral Consequences, *Management Accounting Research*, 3(2):119–132. [http://dx.doi.org/10.1016/S1044-5005\(92\)70007-9](http://dx.doi.org/10.1016/S1044-5005(92)70007-9)
- [9] Birnberg J. G., Luft, J., Shields M. D., (2007), Psychology Theory in Management Accounting Research, *Handbooks of Management Accounting Research*, 1:113 – 135.
- [10] Briers, M.L., Chua, W.F. (2001). The Role of Actor-Network and Boundary Objects in Management Accounting Change: A Field Study of an Implementation of Activity-Based Costing, *Accounting, Organization and Society*, 26(3): 19 – 41. [http://dx.doi.org/10.1016/S0361-3682\(00\)00029-5](http://dx.doi.org/10.1016/S0361-3682(00)00029-5)
- [11] Brownell, P. (1981). Participation in Budgeting, Locus of Control and Organizational Effectiveness, *The Accounting Review*, 56(4):844-860.
- [12] Brownell, P., McInnes, M. (1986). Budgetary, Participation, Motivation, and Managerial Performance, *The Accounting Review*, 61(4): 587-600.
- [13] Bryan, J.F., Locke, E.A. (1967), Goal Setting as a Means of Increasing Motivation, *Journal of Applied Psychology*, 51(3): 274 – 277. <http://dx.doi.org/10.1037/h0024566>
- [14] Campanale C., Cinquini, L., Tenucci, A. (2014). Time Driven Based Costing to Improve Transparency and Decision Making in Healthcare: A Case Study, *Quality Research Accounting & Management*, 11(2): 165 – 186.
- [15] Cardinaels E., Labro, E. (2008). On the Determinants of Measurement Error in Time Driven Costing, *The Accounting Review*, 83(3): 735 – 756.
- [16] Choe, J.M. (1996). The Relationships among Performance of Accounting Information Systems, Influence Factors, and Evolution Level of Information Systems, *Journal of Management Information Systems*, 12(4): 215–239.
- [17] Choe, J.M. (1998). The Effects of User Participation on the Design of Accounting Information Systems, *Information & Management*, 34(3): 185 – 198. [http://dx.doi.org/10.1016/S0378-7206\(98\)00055-X](http://dx.doi.org/10.1016/S0378-7206(98)00055-X)
- [18] Chong, V.K., Chong, M.K. (2002). Budget Goal Commitment and Informational Effects of Budget Participation on Performance: A structural Equation Modeling Approach, *Behavioral Research in Accounting*, 4(1): 65 – 86.
- [19] Chong, V. K., Johnson, D. (2007). Testing a Model of the Antecedents and Consequences of Budgetary Participation on Job Performance, *Accounting and Business Research*, 37(1): 3 - 19.
- [20] Cinquini, L., Mitchell, F. (2005), Success in management accounting: lessons from the activity-based costing/management experience, *Journal of Accounting & Organizational Change*, 1(1): 63 – 77.
- [21] Cinquini, L., Collini, P., Marelli, A., Quagli, A., Silvi, R. (1999). A survey on Cost Accounting Practices in Italian Large and Medium Size Manufacturing Firms, 22th Annual Congress of the European Accounting Association, May 5-7, Bordeaux.
- [22] Cinquini, L., Collini, P., Marelli, A., Tenucci, A. (2009). Changes in costing in Italy, 9th Manufacturing Accounting Research Conference Cost and Performance in Services and Operations, Muenster, Germany, June 21-24, 2009.
- [23] Cohen, S.; Venieris, G.; Kaimenaki, E. (2005), ABC: adopters, supporters, deniers and unawares, *Managerial Auditing Journal*, 20(9): 981 - 1000.
- [24] Coch, L., French, J.R.P. (1948). Overcoming Resistance to Change, *Human Relations*, 1(4): 512 – 532. <http://dx.doi.org/10.1177/001872674800100408>

- [25] Cooper, R., Kaplan, R.S. (1998). *Cost & Effects: Using Integrated Cost Systems to Drive Profitability and Performance*, Harvard Business School Press, Boston
- [26] Covaleski, M.A, Evans, J.H. III, Luft, J.L., Shields, M.D. (2003). Budgeting Research: Three Theoretical Perspectives and Criteria for Selective Integration, *Journal of Management Accounting Research*, 15(1): 3 - 49.
- [27] Dalci, I., Tanis, V., Kosan, L. (2010). Customer Profitability Analysis with Time Driven Activity Based Costing: a Case Study in a Hotel, *International Journal of Contemporary Hospitality Management*, 22(5):609 – 637. <http://dx.doi.org/10.1108/09596111011053774>
- [28] De Vries, G., Jehn, K., Terwel, B. (2012), When Employees Stop Talking and Start Fighting: The Detrimental Effects of Pseudo Voice in Organizations, *Journal of Business Ethics*, 105(2): 221– 230.
- [29] Dejenega, O. (2011), Method Time Driven Activity Based Costing – Literature Review, *Journal of Applied Economic Sciences*, 1(15): 7 – 15.
- [30] Demeere, N., Stouthysen, K., Roodhooft, F. (2009). Time – Driven Activity – Based Costing in an Outpatient clinic environment: Development, Relevance and Managerial Impact, *Health Policy*, 92(2 – 3): 296 – 304. <http://dx.doi.org/10.1016/j.healthpol.2009.05.003>
- [31] Epstein, M.J, Epstein, J.B., (1974), An Annotated Bibliography of Scientific Management and Standard Costing to 1920, *ABACUS*, 10(2): 165-174.
- [32] Erez, M., Arad, R. (1986). Participative Goal – Setting: Social, Motivational, and Cognitive Factors, *Journal of Applied Psychology*, 71(4): 591 – 597. <http://dx.doi.org/10.1037/0021-9010.71.4.591>
- [33] Everaert, P., Bruggeman, W. (2007). Time-Driven Activity – Based Costing: Exploring the Underlying Model, *Cost Management*, 22(2): 16 – 20.
- [34] Everaert, P., Bruggeman, W. (2008). Cost Modeling in Logistics Using Time Driven ABC: Experiences from a Wholesaler, *Journal of Physical Distribution & Logistic Management*, 38(3): 172-191.
- [35] Everaert, P., Bruggeman, W., De Creus, G., (2008), Teaching an Educational Note: Sanac Inc: from ABC to Time Driven ABC (TDABC) – An Instructional Case, *Journal of Accounting Education*, 26(3): 118 – 154. <http://dx.doi.org/10.1016/j.jaccedu.2008.03.001>
- [36] Freedman, D.H. (1992). Is Management Still a Science?, *Harvard Business Review*, 70(6): 26 – 38.
- [37] Govindarajan, V. (1986). Decentralization, Strategy and Effectiveness of Strategic Business Units in Multibusiness Organizations, *Academy of Management Review*, 11: 844 – 856.
- [38] Gervais, M., Levant, Y., Ducrocq, C. (2010). Time-Driven Activity-Based Costing (TDABC): An Initial Appraisal through a Longitudinal Case Study, *JAMAR*, 8(2):1-20.
- [39] Gilbert, S.J. (2007). Adding Time to Activity Based Costing, Harvard Business School, *Working Knowledge*, <http://hbswk.hbs.edu/pdf/item/5657.pdf> [Accessed 2015, January 10]
- [40] Gosselin, M. (1997). The Effect of Strategy and Organizational Structure on the Adoption and Implementation of Activity Based Costing, *Accounting, Organizations and Society*, 22(2): 10 – 122. [http://dx.doi.org/10.1016/S0361-3682\(96\)00031-1](http://dx.doi.org/10.1016/S0361-3682(96)00031-1)
- [41] Gosselin, M. (2007). *A Review of Activity-Based Costing: Technique, Implementation, and Consequences*, C.S Chapman, A.G. Hopwood and M.D. Shields (Ed), *Handbook of Management Accounting Research*, Elsevier.
- [42] Gul, A.F, Tsui, J.S.L, Fong, S.C.C, Kwok, H.Y.L. (1995). Decrelisation as a Moderating Factor in Budgetary Participation – Performance Relationship: Some Hong Kong Evidence, *Accounting and Business Research*, 25(98): 107 – 113. <http://dx.doi.org/10.1080/00014788.1995.9729933>
- [43] Hall, M. (2008). The Effect of Comprehensive Performance Measurement Systems on Role Clarity, Psychological Empowerment and Managerial Performance, *Accounting, Organizations and Society*, 33(2-3): 141 – 163. <http://dx.doi.org/10.1016/j.aos.2007.02.004>

- [44] Haynes, C.M., Kachelmeier, S.J. (1998). The Effects of Accounting Contexts on Accounting Decisions: A Synthesis of Cognitive and Economic Perspectives in Accounting Experimentation, *Journal of Accounting Literature*, 17: 97–136.
- [45] Hirst, M.K. (1983). Reliance on Accounting Performance Measures, Task Uncertainty, and Dysfunctional Behaviour: Some Extensions, *Journal of Accounting Research*, 21: 596 – 605. <http://dx.doi.org/10.2307/2490793>
- [46] Hirst, M.K., Lowy, S.K. (1990). The Linear Additive and Interactive Effects of Budget Goal Difficulty and Feedback on Performance, *Accounting, Organization and Society*, 15: 425 – 436. [http://dx.doi.org/10.1016/0361-3682\(90\)90026-Q](http://dx.doi.org/10.1016/0361-3682(90)90026-Q)
- [47] Hoozée, S., Bruggeman, W.(2010). Identifying Operational Improvement during the Design Process of Time – Driven ABC System: The Role of Collective Worker Participation and Leadership Style, *Management Accounting Research*, 21(3): 185 - 198.
- [48] Hoozée, S., Bruggeman, W., Vermeire, L. (2012). The Impacts of Refinement on the Accuracy of Time Driven ABC, *Abacus*, 48(4): 439 – 472.
- [49] Hoozée, S., Vermeire, L., Bruggeman, W. (2009). A Risk Analysis Approach for Time Equation-Based Costing, *Working Paper*, No. 2009/556.
- [50] Hopwood, A. (1976). *Accounting and Human Behaviour*, Prentice – Hall.
- [51] Hunton, J.E., Gibson, D. (1999). Soliciting User-Input during the Development of an Accounting Information System: Investigating the Efficacy of Group Discussion, *Accounting, Organizations and Society*, 24(7): 597–618.
- [52] Hussain, S. (2011). Food for Thought on the ABS Academic Journal Quality Guide, *Accounting Education: An International Journal*, 20(6):1- 15.
- [53] Innes, J., Mitchell, F., Sinclair, D. (2000). Activity-Based Costing in the U.K.'s Largest Companies: A Comparison of 1994 and 1999 Survey Results, *Management Accounting Research*, 11(3):349–362.
- [54] Jermias, J. (2001). Cognitive Dissonance and Resistance to Change: The Influence of Commitment Confirmation and Feedback on Judgement Usefulness of Accounting Systems, *Accounting, Organizations and Society*, 26(2):141–160.
- [55] Kanigel, R. (1997). *The One Best Way: Frederick Winslow Taylor and the Enigma of Efficiency*, London: Little Brown and Co.
- [56] Kaplan, R.S., Anderson, S.R. (2004). Time-Driven Activity-Based Costing – Tool Kit, *Harvard Business Review*, 82(11):131–138.
- [57] Kaplan, R.S., Anderson, S.R. (2007). *Time-Driven Activity-Based Costing*, Harvard Business School Press.
- [58] Kaplan, R.S., Witkowski, M.L. (2014). Better Accounting Transforms Health Care Delivery, *Accounting Horizons*, 28(2): 353 – 413. <http://dx.doi.org/10.2308/acch-50658>
- [59] Kim, E., Lee, J. (1986). An Exploratory Contingency Model of User Participation and MIS Use, *Information and Management*, 11:87-97.[http://dx.doi.org/10.1016/0378-7206\(86\)90038-8](http://dx.doi.org/10.1016/0378-7206(86)90038-8)
- [60] Kitchenham, B., (2004). Procedures for Undertaking Systematic Reviews, *Technical Report TR/SE-0401*, Department of Computer Science, Keele University and National ICT, Australia Ltd, Joint Technical Report.
- [61] Koonce, L., Mercer, M. (2005). Using Psychology Theories in Archival Financial Accounting Research, in: *Journal of Accounting Literature*, 24: 175 – 214.
- [62] Kwok, W.C.C., Sharp, D.J., 1998, A Review of Construct Measurement Issues in Behavioral Accounting Research, *Journal of Accounting Literature*, 17(1): 137–174.

- [63] Latham, G.P., Winters, D.C., Locke, E.A. (1994). Cognitive and Motivational Effects of Participation: a Mediator study, *Journal of Organizational Behavior*, 5(1): 49 – 63.
- [64] Lee, J.Y. (2003). Cost System Research Perspectives, *Advances in Management Accounting*, 11: 39–57.
- [65] Locke, E.A., Latham, G.P. (1990). *A Theory of Goal Setting and Task Motivation*, Englewood Cliffs, Prentice-Hall, NJ.
- [66] Locke, E. A., Schweiger, D. M. (1979). *Participation in Decision-Making: One More Look*, B. M. Staw (Ed.), *Research in Organizational Behavior*. Greenwich: Conn., JAI Press, 265-339.
- [67] Locke, E.A., Latham, G.P. (2002). Building a Practically Useful Theory of Goal Setting and Task Motivation: A 35-Year Odyssey, *American Psychologist*, 57(9): 705- 717. <http://dx.doi.org/10.1037/0003-066X.57.9.705>
- [68] Lunenburg, F. (2011). Self-Efficacy in the Workplace: Implications for Motivation and Performance, *International Journal of Management, Business And Administration*, 14(1): 1 – 6.
- [69] Lukka, K. (1998). Total Accounting in Action: Reflections of Sten Jönsson's Accounting for Improvement, *Accounting, Organizations and Society*, 23(3): 333–342. [http://dx.doi.org/10.1016/S0361-3682\(97\)00037-8](http://dx.doi.org/10.1016/S0361-3682(97)00037-8)
- [70] Magner, N., Welker, R., Campbell, T. (1995). The Interactive Effect of Budgetary Participation and Budget Favourability on Attitudes toward Budgetary Decision Makers: A Research Note, *Accounting, Organization and Society*, 20(7-8): 611-618. [http://dx.doi.org/10.1016/0361-3682\(95\)00006-U](http://dx.doi.org/10.1016/0361-3682(95)00006-U)
- [71] Magner, N., Welker, R., Campbell, T. (1996). Testing a Model of Cognitive Budgetary Participation Process in a Latent Variable Structural Equation Framework, *Accounting and Business Research*, 27(1): 41 – 50. <http://dx.doi.org/10.1080/00014788.1996.9729530>
- [72] Marginson, D., Ogden, S. (2005). Coping with Ambiguity through the Budget: the Positive Effects of Budgetary Targets on Managers Budgeting Behaviours, *Accounting, Organizations and Society*, 30(5): 435-456.
- [73] Merchant, K.A. (1981). The Design of the Corporate Budgeting System: Influences on Managerial Behaviour and Performance, *The Accounting Review*, 56(4): 813-829.
- [74] Mia, L. (1989). The Impact of Participation in Budgeting and Job Difficulty on Managerial Performance and Work Motivation: A Research Note, *Accounting, Organizations and Society*, 19(4):1-14.
- [75] Morse, N.C., Reimer, E. (1956). The Experimental Change of Major Organization Variable, *The Journal of Abnormal and Social Psychology*, 52(1): 120-129. <http://dx.doi.org/10.1037/h0048893>
- [76] Namazi, N. (2009). Performance Focus ABC: a Third Generation of Activity Based – Costing System, *Cost Management*, 23(5): 34 – 46.
- [77] Nouri, H., Parker, R. (1998). The Relationship between Budget Participation and Job Performance: The Roles of Budget Adequacy and Organizational Commitment, *Accounting, Organizations and Society*, 23(5 – 6): 467 – 483. [http://dx.doi.org/10.1016/S0361-3682\(97\)00036-6](http://dx.doi.org/10.1016/S0361-3682(97)00036-6)
- [78] Ohana, M., Meyer, M., Swaton, S. (2013). Decision- Making in Social Enterprises: Exploring the Link between Employee Participation and Organizational Commitment, *Non Profit & Voluntary Sector Quarterly*, 42(6): 1092 – 1110.
- [79] Reddy, K., Venter, H.S., Olivier, M.S. (2012). Using Time Driven Activity Based Costing to Manage Digital Forensic Readiness in Large organizations, *Information System Frontiers*, 14(5): 1061 – 1077. <http://dx.doi.org/10.1007/s10796-011-9333-x>
- [80] Riahi-Belkaoui, A. (2002). *Behavioral Management Accounting*, Quorum Books, Westport.
- [81] Sagie, A., Elizur, D., Koslowsky, M. (1990). Effect of Participation in Strategic and Tactical Decision on Acceptance of Planned Change, *The Journal of Social Psychology*, 130(4):459 – 465. <http://dx.doi.org/10.1080/00224545.1990.9924607>

- [82] Shields, M.D., Birnberg, J.G., Frieze, I.H. (1981). Attributions, Cognitive Processes and Control Systems, *Accounting, Organizations and Society*, 6(1): 69 - 93. [http://dx.doi.org/10.1016/0361-3682\(81\)90023-4](http://dx.doi.org/10.1016/0361-3682(81)90023-4)
- [83] Shields, M.D., Young, S.M. (1989). A Behavioural Model for Implementing Cost Management Systems, *Cost Management*, 3(4): 17 - 27.
- [84] Shields, M.D., Young, S.M. (1993). Antecedents and Consequences of Participative Budgeting: Evidence on the Effects of Asymmetrical Information, *Journal of Management Accounting Research*, 5(1): 265 - 280.
- [85] Shields, M.D. (1995). An Empirical Analysis of Firms's Implementation Experiences with Activity-Based Costing, *Journal of Management Accounting Research*, 7(4): 148-166.
- [86] Shields, J.F, Shields, M.D. (1998). Antecedents of Participative Budgeting, *Accounting, Organization and Society*, 23(1):113 - 135. [http://dx.doi.org/10.1016/S0361-3682\(97\)00014-7](http://dx.doi.org/10.1016/S0361-3682(97)00014-7)
- [87] Sivaramakrishnan, K. (1994). Information Asymmetry, Participation and Long Term Contracts, *Management Science*, 40:1228-1244. <http://dx.doi.org/10.1287/mnsc.40.10.1228>
- [88] Siguenza-Guzman, L., Van den Abbeele, A., Vandewalle, J., Verhaaren H., Cattrysse, D. (2013). Recent Evolutions In Costing Systems: A Literature Review Of Time-Driven Activity-Based Costing, *Review of Business and Economic Literature*, 58(1): 34-64.
- [89] Snead, K.C., Johnson, W. A., Ndede-Amadi, A.A. (2005). Expectancy Theory as the Basis for Activity-Based Costing Systems Implementation by Managers, *Advances in Management Accounting*, 14: 253-275.
- [90] Soonhee K. (2002). Participative Management and Job Satisfaction: Lessons for Management Leadership, *Public Administration Review*, 62(2): 231-241.
- [91] Stasser, G., Titus, W. (1985). Pooling of Unshared Information in Group Decision Making: Biased Information Sampling during Discussion, *Journal of Personality and Social Psychology*, 48(6): 1467-1478. <http://dx.doi.org/10.1037/0022-3514.48.6.1467>
- [92] Stourhuysen, K., Schierhout, K., Roodhooft, F., Reusen, E. (2014). Time Driven Activity Based Costing for Public Services: A Field Study in Belgium Swimming Pools, *Public Money & Management*, 34, (4): 289 - 296.
- [93] Tanış, V. N., Özyapıcı, H. (2012). The Measurement and Management of Unused Capacity in a Time Driven Activity Based Costing System, *JAMAR*, 10(2): 43-55.
- [94] Tiller, M. (1983). The Dissonance Model of Participative Budgeting: An Empirical Exploration, *Journal of Accounting Research*, 21(2): 581 - 595. <http://dx.doi.org/10.2307/2490792>
- [95] Tse, M.S.C. (2011). Antecedents and Consequences of Cost Information Usage in Decision Making, *Advances in Management Accounting*, 19: 205-223.
- [96] Tse, M.S.C., Gong, M.Z. (2009): Recognition of Idle Resources in Time - Driven Activity- Based Costing and Resource Consumption Accounting Models, *Journal of Applied Management Accounting Research*, 7(2): 41 - 54.
- [97] Valleala, U.M., Herranem, S., Collin, S., Paloniemi, S.K. (2014). *Forecasting Learning Opportunities through Employee Participation amid Organizational Change*, Vocation and Learning Press, Kluwer Academic Publishers. <http://dx.doi.org/10.1007/s12186-014-9121-0>
- [98] Van der Bijl, J.J., Shortridge-Baggett, L.M. (2002). *The Theory and Measurement of the Self-Efficacy Construct*, in E.A. Lentz & L.M. Shortridge-Baggett (Eds.), *Self-efficacy in nursing: Research and Measurement Perspectives*, New York: Springer: 9 -28.
- [99] Van der Merwe, A. (2009). Debating the principles: ABC and its dominant principle of work, *Cost Management*, 23: 20-28.
- [100] Wentzel, K. (2002). The Influence of Fairness Perceptions and Goal Commitment on Manager's Performance in a Budget Setting, *Behavioral Research In Accounting*, 14(1): 247 - 271. <http://dx.doi.org/10.2308/bria.2002.14.1.247>

[101] Wood, R., Bandura, A. (1989). Social Cognitive Theory of Organizational Management, *Academy of Management Review*, 14(3): 361-384.

*** ABS, Academic Journal Quality Guide. (2010). Version 4, London: 1-46.

<http://www.associationofbusinessschools.org/sites/default/files/Combined%20Journal%20Guide.pdf>

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Strategies and Coordination among the Countries of the Euro and the Rest of the World

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Abstract

The following work aims to highlight how the coordination of budgetary policies and coordination between these and the monetary policy of the European Central Bank can take advantage of the relationships of interdependence among the countries of the Euro-zone, in order to maximise the welfare of the area or to minimise losses due to shocks. Cooperative strategies will be analysed, and their effects compared with those arising from non-cooperative strategies. The analysis is conducted through a model that describes the European Monetary Union as a set consisting of two countries (Italy and Germany) open to the rest of the world. Eventually we will attempt to demonstrate that cooperative solutions are more effective than non-cooperative solutions.

Keywords: budget policy, coordination, strategies, monetary policy, stabilization.

Jel Classification: E6, E62, E63

1. Introduction

Interdependencies between the Euro countries and the rest of the world may become apparent through a three-country model. The analysis is intended to represent the interdependence of Italy and Germany, which are part of the Euro area, and the interdependence between this area and the rest of the world.

In this context, an increase in government expenditures in one of two non-EMU countries leads to an increase in demand of global products of this country and the rest of the world, and a reduction of the global product of the second Euro country. In addition, this increase leads to a worsening of the trade balance and an improvement of the other country's trade balance and of the country-rest of the world.

As regards budgetary expansion in the country-rest of the world, it exerts a positive effect on the three global products and trade balance of the two European countries, while worsening the trade balance of the country-rest of the world.

Our speculation is that the trade balances of the three countries can be affected by external shocks. These influences are expressed by equations in reduced forms that bind the global product and the trade balance of each country to its own public expenditures and those of others. These relations form the constraints of the three budgetary authorities, of which each minimises a function of loss dependant on the amount of surplus between the current values and those deriving from their global product and their trade balance.

If the three countries behave in an uncooperative manner, we have a *Nash equilibrium*, which corresponds to policies whose effectiveness could be improved through a process of cooperation between the three countries.

If, on the other hand, cooperation concerns only the countries of the Euro zone, it does not guarantee better results than in the absence of coordination. In fact, let us see what happens, if we assume that external shocks worsen the trade balances of the countries of the Euro area and improve the balances of the rest of the world. The Euro-zone countries react to these shocks with restrictive budgetary policies that reduce the negative effect of shock on the trade balance. At the same time, we have a reduction in their activity and that of other countries, while the rest of the world will decide on a budgetary expansion that worsens their trade balance, improving that of other countries.

If the two Euro-zone countries coordinate their budgetary policies, but do not cooperate with the rest of the world, they will internalise the externalities of their economic policy measures, also conceding to the externalities of policies of the rest of the world. Therefore, without a coordination between the countries of the Euro area and the rest of the world, the intra-European externalities will be offset, at least partially, by the externalities of the policy of the rest of the world.

However, if the external shocks affect the Euro-zone countries and those of the rest of the world in the same manner, a limited cooperation will allow the European countries to achieve better results when compared to the absence of coordination (Godley and Lavoie 2007). In fact, in this context, the Euro-zone countries will bear only the externalities of economic policy of the rest of the world, instead of being affected negatively by infra-European externalities and of the rest of the world, of the same sign.

Therefore, in the absence of cooperation between the Euro-zone countries and those of the rest of the world, Italy and Germany will have an interest in accepting, or forgoing, such a coordination of their policies, depending on whether the shocks affecting Europe and the rest of the world are symmetrical or asymmetrical.

2. Economic policies and structural interdependency: a model

The analysis is developed through a variant of Bryson's model (1994)¹, which aptly describes the structural and strategic interdependence of the two Euro-zone countries. The effects will be compared between coordinated and uncoordinated reactions of the budgetary and monetary authorities, as a response to shocks from supply and demand, if the two policies have the same goals. The model taken into account represents the structural interdependence and functions of social losses in two symmetrical countries, Italy and Germany, where the relations with the rest of the world are not considered.

In both countries, global supply, Y or Y^* , depends on the relative production prices P or P^* and on a shock on productivity, with a default salary rate:

$$Y = Y(P, z);$$

$$Y^* = Y^*(P^*, z^*); \quad (1)$$

The shock is represented by the variable z and is equal for the two countries. The conditions of equilibrium on the market of products of Italy and Germany are defined as follows:

$$Y = D[(1-T)Y, P^*/P, (1-T^*)Y^* \gamma] + G; \quad (2)$$

$$Y^* = D^*[(1-T^*)Y^*, P^*/P, (1-T)Y \gamma^*] + G^*; \quad (3)$$

Taking into consideration equations (2) and (3), the demands for Italian goods D and German goods D^* depends on the relative prices and on the income available for residents and non-residents, defined on the basis of tax rates T and T^* . The two demands are subject to the impact of random shocks γ and γ^* , which determine transfers in demand from one country to another.

Italian public expenditure G and French public expenditure G^* are financed through a proportional fiscal system:

$$G = TY;$$

$$G^* = T^*Y^*; \quad (4)$$

The European monetary balance is represented by the equality between the nominal supply of Euros M_κ by the European Central Bank and the demand $P_\kappa L_\kappa$ for an average European price P_κ and income Y_κ ;

$$M_\kappa = P_\kappa L_\kappa(Y_\kappa) \quad (5)$$

3. Stabilisation policies

Our speculation is that in the two Euro-zone countries, the social losses Ψ or Ψ^* are dependent on the square of the surpluses between the current value of consumer prices P_e or P_e^* , employment L and L^* and public expenditure, when compared to the desired values that are not taken into account in the following equations:

$$\Psi = \Psi(P_\kappa^2, L^2, G^2);$$

$$\Psi^* = \Psi^*(P_\kappa^{*2}, L^{*2}, G^{*2}); \quad (6)$$

In both countries, the consumer price is equal to the average of the production prices in the countries in question. In order to achieve the social objectives that include the topics of the loss functions, the budgetary and

¹ For further discussion on the topic, see Mundschenk and Von Hagen (2003); Ferré (2008).

In the case of coordination of the budgetary policies, the two countries consider any advantages from which they may benefit, as a result of the policy of the other country. They react to shocks in demand with stronger variations in public expenditures compared to the conditions of lack of cooperation, since the marginal gain in terms of prices and employment is higher than the loss from public expenditure.

Therefore, a shock from an asymmetric demand, accompanied by coordinated monetary and fiscal policies, causes a lower decrease in social welfare than the lack of cooperation (Morselli, 2013). But it causes a change in the stronger fiscal policies in case of cooperation than in the absence of coordination.

It follows that the provisions of the "fiscal compact", which limits the flexibility of budgetary policies, are likely to become more stringent in the first case than in the second.

4. Coordination between monetary policy and budgetary policy

We can postulate some form of coordination between the centralised monetary policies and decentralised budgetary policies. The combination of these two policies can be represented within the European Monetary Union, as a particular form of policy mix governed by the rules of the "fiscal compact".

Monetary policy and budgetary policy cannot be regarded as completely independent. If they operate synergistically, they could increase the effectiveness of the action of the European Central Bank.

It is often said that price stability is ensured only by a centralised monetary policy, while the level of activity is a matter of pertinence of budgetary policy. In this framework, money is neutral in the long run and can only affect prices and nominal variables. Inflation is a monetary phenomenon, and if it is anticipated by private operators, it does not affect the natural rate of unemployment, which is determined by non-monetary factors and corresponds to the balance of the labour market.

In this view, there is no certainty that we can achieve balanced solutions. Therefore, in a scenario where inflation rates or under-employment rates are higher than desired, the authorities adopt restrictive measures, reducing inflation and increasing unemployment, while they adopt expansionary fiscal policies to achieve the opposite effects.

The adoption of monetary policy and budgetary policy can be considered in the context of coordination.

Therefore, these applications of instruments to the chosen objectives can produce perverse effects, in an analysis that does not accept an explanation of inflation in only monetary terms. Thus, an increase in real interest rates, with the objective of decreasing inflation, causes an increase of the financial burdens and the real income of consumers, acting negatively on investment. The result could be inflation from costs and demand.

Therefore, in this case, it is precisely budgetary policy, which could prove more effective than monetary policy in the fight against inflation (Creel and Sterdyniak 1998).

Let us now consider the case in which the European Central Bank announces a weak increase in monetary liquidity to fight inflation, hoping that the economic agents will adapt their anticipations to such an announcement. If the economic agents make perfect anticipations, they are in a position to predict such an attempt by the European Central Bank. Therefore, they will not adapt their forecasts to the inflation rate announced, but to the highest rate charged. As a result, there will be a stable rate of unemployment and inflation.

It follows that a monetary policy whose goal is a weak rate of inflation is not credible, and that credibility is questioned by budgetary policies. Indeed, in order to ensure as soon as possible a low rate of inflation, the European Central Bank can prevent that the budgetary authorities finance their deficits through monetary financing. However, if the real interest rate exceeds the rate of monetary growth, public debt risks becoming no longer sustainable. To avoid this risk, the European Central Bank can monetise a portion of the public debt, with more or less significant effects on the rate of inflation. Therefore, without sufficient cooperation between the European Central Bank and fiscal policies, a restrictive monetary policy can trigger, in the future, a higher rate of inflation (Sargent and Wallace, 1981).

5. Study case

The strategic analysis is part of a two-country model explained by Bryson (1994) and by Mazier and Tiou-Tagba Aliti (2012). It assesses the fiscal policy-makers as two players capable of making anticipations. Their behaviour can be uncooperative to the extent that budgetary policies are decided on an individual country level. However, the sub-optimal character of balances determined by these strategies can push to consider cooperative solutions.

The model, therefore, defines the objectives of budgetary authorities of member countries of the EMU and describes the relationships that stabilise between these objectives and fiscal instruments.

It is assumed that the EMU is formed by two countries (Italy and Germany), which adopt the Euro and both entertain relations with the rest of the world. The budgetary authority of each of the two countries have set an internal goal represented by a global product value, respectively Y° and Y^* and a goal of balance of the trade scale B_c° or $B_c^* = 0$.

The pursuit of the external objective can be justified with the need for each country to contribute to the stabilisation of the exchange rate of the Euro or by the will to keep under control the stock of foreign assets, whose variation depends on the commercial balance. These objectives are independent of price stability established by the European Central Bank (ECB).

Since the budgetary authorities have only an instrument of intervention, they cannot pursue their two objectives simultaneously. The result is damage to the national community which governments want to minimise.

It is supposed that the respective damage to the authorities of Italy and France is defined as B_c° or $B_c^* = 0$; hence Π and Π^* :

$$\begin{aligned}\Pi &= (Y^\circ - Y^*)^2 / [2 + (kB_c^2 / 2)] \\ \Pi^* &= (Y^\circ - Y^*)^2 / [2 + (kB_c^2 / 2)]\end{aligned}\quad (10)$$

In the expression (10), the square of global product waste (Y°) and (Y^*) and of commercial balances B_c° and B_c^* , in relation to their desired amounts, are weighted for the same coefficients (10) and (k). Their relative values translate the importance accorded by the authorities to one or more of the objectives.

The relationship between the objectives and instruments of budgetary policies is derived from the reduced form of the model describing the structural interdependence of European countries, which form a kind of small monetary union and that are tied to the rest of the world by flexible exchange rates.

This analysis includes determining relationships of global products on the basis of their demand, the equality between supply and demand and the specification of the commercial and financial relations between the EMU and the rest of the world. There is speculation that European interest rates differ from the international interest rate, which points to a greater integration of European financial markets. In this context, an increase in government expenditures (G) or (G^*) in one of the European countries and its funding through debt produces:

- an increase in its domestic production and a trade deficit compared to the rest of the world. In fact, the demand for domestic goods is encouraged by national public expenditure and, conversely, reduced by an increase in European interest rate. The rise in that rate and the national product involve respectively an influx of capital and a trade deficit that determine, depending on their relative importance, an appreciation or depreciation of the Euro. It is supposed that a possible increase of the Euro exchange rate in relation to other currencies has only a halting action on the trade deficit.
- A reduction of the manufacturing process in the country and an improvement in its trade balance. In fact, the rise of European interest rate implies a decline in demand and production. This effect is strengthened, or reduced, by the evolution of the exchange rate of the Euro. It is mitigated by the positive effect exercised by the increases in production of the country whose government spending increases on the exports of the other country.

These effects are expressed by the following equations with positive parameters (a_1) and (b_1):

$$Y^\circ = a_1G - a_2G^* - z + \mu; \quad Y^* = a_1G - a_2G^* - z + \mu \quad (11)$$

where $a_1 > a_2$

$$B_c^\circ = b_1G + b_2G^* + b_3\mu; \quad B_c^* = -b_1G + b_2G^* - b_3\mu; \quad (12)$$

where $b_1 > b_2$

where $b_1 > b_2$

The use of these parameters a_1, a_2, b_1, b_2 , in in the relations (11) and (12) interprets the assumption of symmetry of the two prices. Sizes (z) and (μ) represent, respectively, a symmetric offer shock affecting the two

countries in the same manner and an asymmetric demand shock that corresponds to a shift of expenditure from one country to another (Morselli 2013).

5.1 Non co-operative equilibrium with a supply shock

The authorities of individual countries react to *shocks* in the supply and demand with fiscal policy behaviours, which may lead to different uncooperative balances between which privileges the *Nash equilibrium* (Nash 1951).

In the case of *shocks* from supply ($z > 0$), ($\mu = 0$), which has a simultaneous effect and to the same extent in Italy and France (symmetrical *shock*), the budgetary authority in each country shall determine the strategy that it considers best, given the one implemented by others. Therefore, the heads of the two countries minimise their respective loss functions defined in (10), having regard to the relations (11) and (12) that define their constraints. The latter derive from the first-order conditions of these optimisations ($\partial\Pi / \partial G = 0; \partial\Pi^* / \partial G^* = 0$) the following functions of their reactions to the objectives of identical income ($Y^* = Y^\circ$):

$$G = A_2(G^* / A_1) + a_1[(Y + z) / A_1]; \quad (13)$$

where $A_1 = a_1^2 + kb_1^2$ and with $A_2 = a_1a_2 + kb_1b_2$

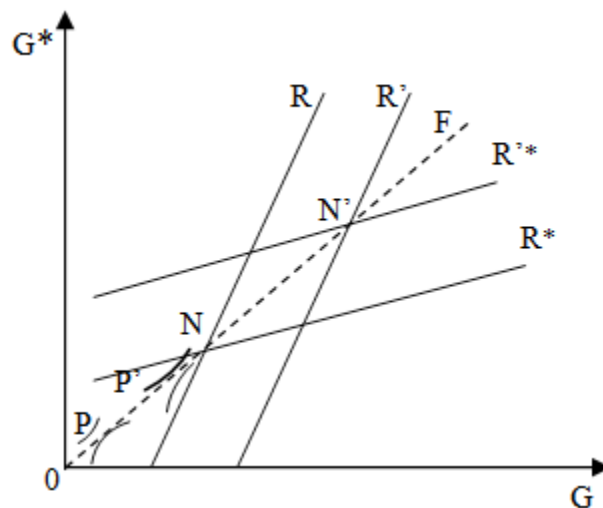
$$G^* = A_2(G / A_1) + a_1[(Y + z) / A_1] \quad (14)$$

The solution of the system formed by (13) and (14) makes it possible to determine the following values in government expenditures that match the *Nash equilibrium*.

$$G = G^* = a_1[(Y + z) / (A_2 - A_1)]; \quad (15)$$

where $A_1 > A_2$

In graph 1, it is possible to represent the reaction functions (13) and (14) through the lines R and R' for Italy and R^* and $R^{*'}$ for France, in the absence ($z = 0$) or presence ($z > 0$) of a *shock* from the offer.



Graph 1. Effects of a shock to supply

Intersection N of lines R and R^* represents the *Nash equilibrium*, defined for void *shocks* that correspond to the combination of expenditure determined by relation (15) with ($z = 0$).

In N , no legislation thinks it can obtain better results, taking into account the other's strategy, which is considered as given. A *shock* from supply ($z > 0$) results in a shift of lines R and R^* to R' and $R^{*'}$ and in defining a new *Nash equilibrium* (N') through the most important expenditure levels defined through (15). In fact, it exerts pressure on the budgetary authority to correct the negative effects on the global product. But this

correction is only partial. It also determines trade deficits of countries Italy and Germany with the rest of the world. These effects can be measured algebraically on the basis of relations (11) and (12) in integration to (15).

5.2 Non-cooperative equilibrium with a demand shock

The reactions of the budgetary authorities in Italy and Germany to asymmetric *shocks* on the demand side are not determinable a priori. In fact, a *shock* ($\mu > 0$) that leads to a global growth in Italy and a reduction in Germany, pushes the budgetary authorities of Italy to reduce public expenditure and those of Germany to increase it. But these reactions increase the effects of the *shock* on these balances and push the authorities to increase expenditure in Italy and to decrease it in Germany. Based on the relative importance of the parameters of the model, one or the other prevails, as the comparison of the following expenditure values in the presence of *shock* ($\mu > 0$), or its absence ($\mu = 0$) shows:

$$G = [(a_1 Y^*) / (A_2 - A_1)] - [(A_3 \mu) / (A_1 + A_2)];$$

$$G^* = [(a_1 Y^*) / (A_2 - A_1)] - [(A_3 \mu) / (A_1 + A_2)];$$

where: $A_3 = a_1 - kb_1b_3$ (16)

The relation (16) is deduced from reaction functions of the two countries that result from minimisation of losses as defined by (1), under constraints (11) and (12) specified for $z = 0$ and $\mu > 0$.

If A_3 is positive, the *shock* from demand determines, in graph 1, displacements of R and R^* upward. The new *Nash equilibrium*, which is represented by a point in the top right, compared to N is Italy's public spending less relevant than in N and to the more relevant expenditure of Germany.

The *shock* causes opposite effects in case the value of A_3 is negative. But, whatever the reaction of the authorities, they result in an increase of Italy's production and a trade surplus and have reverse effects in France. These effects can be measured on the basis of relations (11) and (12) in integration to (16).

5.3 Shock to supply and coordination

In the event of a *shock* from supply, if Italy and Germany that are facing a *shock* from supply, common to both, agree to cooperate, they have to coordinate to make a combination of their public expenditure that minimises the weighted sum of their losses (Π) and (Π^*). The latter are defined for values of $z = 0$ and $\mu = 0$ or through the relationships that make up the expression (10) and incorporating constraints (11) and (12). They have, moreover, the same weight, because the two countries are symmetric.

First-order conditions of this minimisation can derive a system of two relationships between (G) and (G^*), whose solution allows for the definition of public expenditure corresponding to the cooperative solution:

$$G = G^* = [(a_1 - a_2)(Y^* + z)] / [(A_1 - A_1^1 - 2A_2)];$$

where $A_1^1 = a_2^2 + kb_2^2$; where $A_1 + A_1^1 - 2A_2 > c$ (17)

On the basis of (17), a *shock* from supply, which occurs on a cooperative balance, translates into a rise in public spending in the two countries.

The comparison of reactions (15) and (16) points out that public expenditure in the absence of *shock* ($z = 0$) and its increase induced by a *shock* ($z > 0$) can be more or less in the cooperative equilibrium compared to the *Nash equilibrium*.

This indeterminacy derives from two different externalities related to budgetary policies, which are neglected in the non-cooperative strategies, while they are internalised in cooperative strategies:

- budgetary expansion caused by the *shock* from supply in each country increases the losses of the other by reducing the current value of its global product, which is assumed to be lower than desired;
- the expansion of each country's budget increases the trade balance; this reduces its negative effect on the national balance. Taking into account these reciprocal effects, the cooperative solution implies a major increase in government expenditures in relation to the absence of coordination.

The first prevails on the second if the value of b_2 is weak. In this case, the cooperative equilibrium, represented in Graph 1 by the point P, corresponds to lower public spending than those decided in *Nash equilibrium*.

Point P is on bisector (OF) because the two countries are symmetric. Moreover, it is placed on the exchange curve, which is formed by the points of tangency of the curves of iso-losses. The latter have an elliptical shape and indicate all combinations of G and G^* , which provide the same level of losses.

The effects of *shock* from supply on public spending translate into a shift from N to N' in the absence of cooperation and in a less relevant shift of P in P' , in the case of cooperative agreement that makes it possible to internalise the externalities of budgetary policy measures. In fact, the diversion of global product in relation to its desired value is more pronounced and the less relevant trade deficit in the presence of coordination with respect to the absence of the same.

In the event that the value of b_2 is high, point P lies on the right of N in absence of *shock*, and moves further, under the effect of a *shock* from the supply. In any case, the cooperative agreement on budgetary policy involves an *excellent Pareto distribution* characterised by social losses that are less relevant than those which can be determined in the presence of independent policies (for further discussion on the topic, see Albuлесcu 2012).

5.4 Shock to demand and coordination

If the two countries cooperate to cope with an increase in demand for goods in Italy against the demand in Germany, they set the following combination of direct public expenditure to reduce the sum of their losses, as defined by (1) and given the constraints of (2) and (3):

$$G = [(a_1 - a_2)Y^*] / (A_1 - A_1^1 - 2A_2) - [(A_3 + A_3^1)\mu] / (A_1 - A_1^1 - 2A_2);$$

$$\text{where } A_3 = a_1 - kb_1b_3 \quad (18)$$

$$G^* = [(a_1 - a_2)Y^*] / (A_1 - A_1^1 - 2A_2) - [(A_3 + A_3^1)\mu] / (A_1 - A_1^1 - 2A_2) \quad (19)$$

Based on (18) and (19), the effect of variations in government expenditures derived from the *shock* to demand in both countries depends on the sign of the sum $(A_3 + A_3^1)$. In addition, by comparing (18) and (19) with relation (16) defined for $z = 0$, it is evident how these variations may be more or less important in the presence of a coordination agreement rather than without.

This further indeterminacy, as in the case of *shock* to supply, derives from the importance of externalities that affect global products and trade balances. So, in the case of weak externalities on trade balances (b_2 weak), budgetary contraction in Italy and expansion in France are most relevant if derived from a coordination than isolated and independent decisions.

In fact, cooperative policy internalises the effects of stabilisation of variations in government expenditures of each country in the global product of the other; this cannot occur in *Nash equilibrium*.

Conclusions

The work has highlighted the problems that arise in the absence of any coordination between the budgetary policies of the Euro-zone countries, and between these and the monetary policy of the European Central Bank. Without sufficient coordination, the Member States and the European Central Bank are engaged in a series of uncooperative and inefficient games, where no player is able to improve its position unilaterally by changing its policy.

The coordination of fiscal and monetary policies will generate a benefit for society as a whole (Šehović, 2014), leading every State, and the Central Bank, to modify coherently their strategies.

References

- [1] Albuлесcu, C.T. (2012). Financial stability, monetary policy and budgetary coordination in EMU. *Theoretical and Applied Economics*, 8(573): 85-96
- [2] Bryson, J. H. (1994). Macroeconomic stabilization through monetary and fiscal policy coordination. *Open Economic Review*, 5(4). 307-326.

- [3] Creel, J. and Sterdyniak, H. (1998). Du bon usage des politiques monétaire et budgétaire”. *Revue d'économie financière*. 45.
- [4] Godley, W., and Lavoie, M. (2007). A simple model of three economies with two currencies: the eurozone and the USA. *Cambridge Journal of Economics*. 31(1): 1-24.
- [5] Mazier, J., and Tiou-Tagba Aliti G. (2012). World imbalances and macroeconomic adjustments: a three-country stock-flow consistent model with fixed or flexible prices. *Metroeconomica*, 63 (2): 358-388.
- [6] Mundschenk, S. and Von Hagen, J. (2003). Fiscal and Monetary Policy Coordination in EMU. *International Journal of Finance and Economics*. 8: 279-295.
- [7] Morselli, A. (2013). Cooperative or non-cooperative solution to an optimal fiscal policy in the European Monetary Union. *Journal of Game Theory*, 2(2): 9-12.
- [8] Nash, J. (1951). Non-cooperative games. *Annals of Mathematics*. 54: 286-295.
- [9] Sargent, T.J., Wallace, N. (1981). Some unpleasant monetarist arithmetic. *Federal Reserve Bank of Minneapolis Quarterly Review*, 5(3): 1- 7.
- [10] Šehović, D. (2014). Coordination of monetary and fiscal policy in the European monetary union. *Management*, 19(73): 69-83.

Inward Foreign Capital Flows and Economic Growth in African Countries

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Abstract

The broad objective of the present study is to investigate empirically the impact of inward foreign capital flow along with some other explanatory variables namely gross capital formation, trade and human capital on economic growth using a balanced panel data spanning from 1977-2013 for 10 African countries. The Hausman's test suggests the use of random-effects model is preferable to fixed-effects model. The panel data estimates reveal that role of foreign capital inflows in the forms of FDI inflows and remittance are growth encouraging, whereas, the role of external debt is growth discouraging for African countries. In the same way, gross capital formation and human capital are positively related to economic growth. The empirical findings of the study suggest that policy makers should formulate a healthy and conducive business environment that stimulates both foreign and domestic investors in the host countries. Along with intensive and sincere efforts are also required to develop human capacity through sufficient educational funding across all levels and countries.

Keywords: foreign capital flows (i.e. FDI, remittances, debt), economic growth, panel data, Africa.

JEL Classification: C33, F21, F24, O16, N17

1. Introduction

The provision of much food, clothing, shelter, self-esteem and freedom are the utmost responsibility of every state. Where, economic growth and development needs to be sustained for long term without environmental degradation. Mostly, low incomes countries confront of a series of problems include adverse geography, fractionalization, corruption, lack of resource endowments, paucity of capital and finance. Therefore, low income countries require capital and finance to expedite the process of their growth and economic development. For that reason, one way is to enhance foreign capital flows which will largely help to exploit their resources efficiently. The Two-Gap model indicates that low income countries have to rely on the international capital flows to fill import-export and the savings-investment gaps Ghulam (2006). Foreign capital plays a significant role in focusing real resources into the desirable social overhead investment and of supporting an import surplus of consumer and capital goods that helps in the development process North (1956).

The role of foreign capital flows in the economic growth and development process in the host country has become one of the most discussed issues in the literature. Several erstwhile studies suggests that low incomes countries face saving-investment gap problem, while capital inflows influence the economic growth process by filling up this gap, expanding productivity, shifting technologies and improving competition (Moran *et al.*, 2005; Kobrin, 2005; Le & Atallah, 2006; Bashir *et al.*, 2014). Copious benefit provides by the foreign capital flow comprises contribution to the recipient economies capital formation and production capacity, modern technology, knowledge and enhance tax revenue. Along with the provision of capital, technologies and managerial skill, FDI inflows also may create job opportunities, activate domestic investors, broaden government revenue and as a result helps to improve living standards (Ngowi 2001; Gumus & Gungor, 2013). The inflows of foreign capital have long term impact on stock market development and promote investment (Yartey, 2008; Malik & Amjad, 2013; Azam & Ibrahim, 2014). Foreign capital flows encompasses on Foreign Direct Investment (FDI), foreign remittances, foreign debt and foreign aid. While, this study deals only with the first three forms of foreign capital flows.

In a report by UNCTAD (2004) mention that due to the insufficient resources to finance long run development particularly in Africa and to alleviate poverty looking for enhancing FDI has expected a noticeable place in the policies of African countries. The experience of some rapid-growing East Asian newly industrialized

economies has made stronger the belief that enhancing FDI could fill the resource gap of developing countries and get out of further build-up of chronic debt while mostly undertaking the causes of poverty Sachs (2004); Fasanya (2012). Mostly African countries as well as other emerging economies required extensive foreign capital flows to bridge their savings-investment and foreign exchange gaps, augment capital accumulation and economic growth indispensable to overcome pervasive poverty in these countries. However, in a study Asiedu (2004) note that even in the Sub-Saharan Africa's the policy environment improvements in, still the share of FDI in developing countries continues to decrease. The study also maintains that many reforms including institutional, upgraded its infrastructure and liberalized its FDI regulatory framework, while the degree of reforms are yet mediocre as compared to the other developing countries.. More and more economic development literature indicates that there is a strong constructive link between incoming foreign capital and economic growth (Alfaro *et al.*, 2004; Borensztein *et al.*, 1998; Orji *et al.*, 2014).

Regarding workers remittances inflow which is one another form of capital flows, the IFAD (2014) reported that "Remittances are the traditional means of financial support to family members back home". The report further added that remittances "promote effective and efficient regulation, adopt new technologies, expand access to financial services, and make more financial services available in rural areas through savings and investments." While, the study of Gupta *et al.* (2007), expounds that migrant remittances inflows are neither a remedy nor a substitute for a continued and internally persuaded development effort for curing the problems of poor countries.

Africa, a continent gifted with enormous natural, human resources, prodigious cultural, environmental and economic diversity, remains undeveloped. Maximum African nations undergo from military dictatorships, endemic corruption, civil turbulence and war, underdevelopment and extreme poverty, therefore, the UN classified it as least developed are in Africa. Several development plans have failed to provide the likely results. It has also been observed that the continent is fated to continuous poverty and economic servitude, even Africa has massive potential (Global Policy Forum 2014). According to the African Economic Outlook (2014, 2015) most African countries retained an average growth rate of around 4% in 2013. However, the data shows that growth performance heterogeneous extensively across regions. Growth in sub-Saharan Africa is recorded 5% in 2013 and is expected to be 5.8% in 2014. The fastest growth is recorded for East and West Africa in 2013 with 6% or above.

African Economic Outlook (2014, 2015) further added that foreign financial flows and tax revenues play a progressively imperative role in Africa's growth and development prospects. In 2013, total foreign inflows to Africa are recorded at US\$ 186 billion, and it is estimated that the external financial flows to be reached over US\$ 200 billion in 2014. Their composition has also improved increasingly with foreign investments and remittances from non-OECD countries supporting this constructive trend. Where, foreign investment, both direct and portfolio investment have now completely recovered from the 2009 economic crisis and is likely to touch over a record US\$ 80 billion in 2014, which is the biggest financial flow to Africa. Similarly, foreign remittances have been persistently increasing since 2009 and are estimated to touch US\$ 67.1 billion in 2014. In particular, FDI can be contributory to develop productive capacities and eliminate infrastructure bottlenecks, particularly energy and transport networks. Huge remittances inflows have been more buoyant to the economic and financial crisis of past years and, have appeared as a committed source of revenue for some 120 million African's people, while satisfying consumption, education and health expenditures.

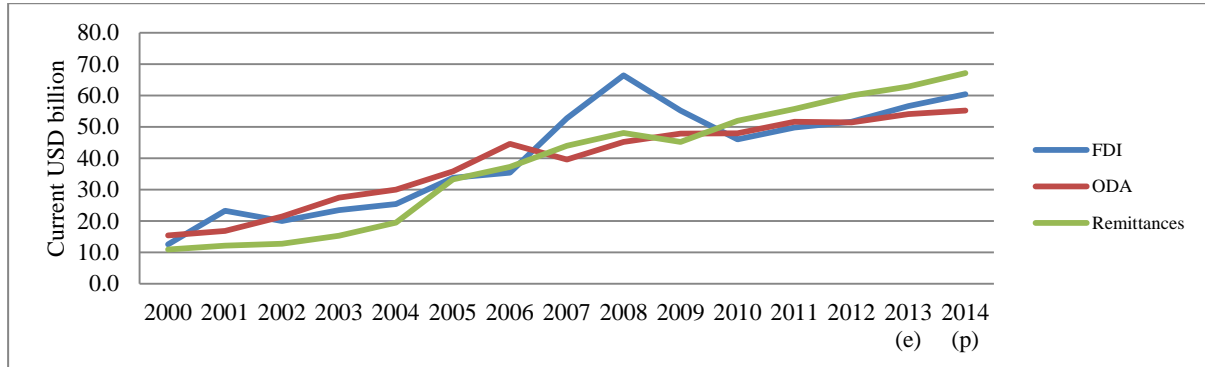
Considerable progress in African's human development has been observed, where poverty levels are decreasing, incomes are increasing, and education and health results are improving. Africa's exports, driven by solid commodity prices, flourished quicker than any other region in the world in 2012 at 6.1%. In spite of this, in the same year Africa accounted for only 3.5% of world merchandise exports, and this has continued low over the years. Regional bodies have started essential initiatives to enhance regional industrialization and investment in regional infrastructure. Table 1 portrays international capital flows to Africa and Figure 1 show the trend analysis for foreign inflows to Africa and Figure 2 depicts the trend of Gross Domestic Product (GDP) growth (%) of Africa.

Table1. External capital flows to Africa

Years/ Capital flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 (e)	2014 (p)
FDI	12.5	23.3	20.0	23.4	25.4	33.8	35.4	52.8	66.4	55.1	46.0	49.8	51.7	56.6	60.4
Portfolio investments	1.5	-3.6	-0.4	-0.7	6.9	6.3	22.5	14.4	-24.6	-0.3	21.5	6.8	22.0	12.2	23.9
ODA	15.5	16.8	21.4	27.4	30.0	35.8	44.6	39.5	45.2	47.9	48.0	51.7	51.5	54.1	55.2

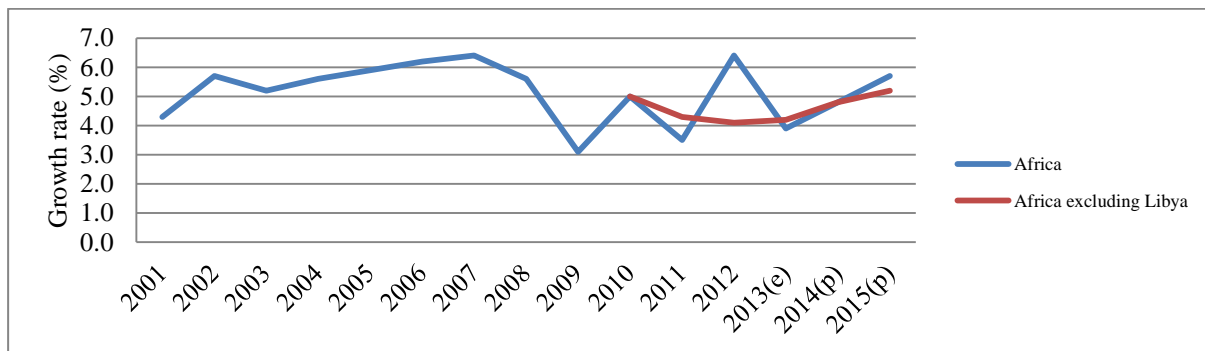
Remittances	10.9	12.1	12.8	15.4	19.5	33.3	37.3	44.0	48.0	45.2	51.9	55.7	60.0	62.9	67.1
% GDP	6.8%	8.4%	9.3%	9.3%	9.7%	11.0%	12.3%	11.4%	8.7%	10.0%	9.6%	8.6%	9.1%	8.9%	9.3%
TOTAL	40.4	48.7	53.8	65.5	81.9	109.2	139.7	150.6	135.0	147.9	167.3	164.0	185.2	185.7	206.5

Source: OECD/ World Bank, IMF and African Economic Outlook data, 2014; <http://dx.doi.org/10.1787/888933032681>
 ODA= official development assistance, (e) estimates and (p) projections



Source: OECD/ World Bank, IMF and African Economic Outlook data, 2014; <http://dx.doi.org/10.1787/888933032681>

Figure 1. International financial flows to Africa (2000-2014)



Source: OECD/World Bank, IMF and African Economic Outlook data, 2014; <http://dx.doi.org/10.1787/888933032681>

Figure 2. African's GDP growth rate (%)

Due to the lack of capital and finance which are direly needed to speed up the process of economic growth and development, it is important to focus on the enhancement of more inward foreign capital flows in the form of inward FDI and remittances to Africa. Therefore, the broad objective of this study is to evaluate the impact of various forms of inward foreign capital flows namely FDI, remittances and external debt along with some other explanatory variables include trade, gross capital capital and human capital on economic growth using a balanced panel data spanning from 1977 to 2013 for 10 African countries, more particularly from Sub-Saharan Africa. All countries are low income and lower middle incomes countries according to the World Bank classification on the basis of 2011 GNI per capita (Where, Lower middle income= US\$1026 to US\$ 4035, and Low income: US\$1025 or less). Countries included in this study are Benin (low income), Burkina Faso (low income), Cameroon (lower middle income), Kenya (low income), Lesotho, (lower middle income), Mali (low income), Niger (low income), Nigeria (lower middle income), Rwanda (low income), and Senegal (lower middle income). The outcomes of the study are expected will help the policy makers to formulate appropriate policy to boost economic growth and development as well as eliminate poverty. Also this study will add to the literature on the relationship between foreign capital flows and economic growth for Africa.

Following this introduction, Section 2 deals with the related literature review on the topic. Section 3 provides an overview of the empirical methodology used to estimate the parameters of the model and also explain variables and data. Section 4 interprets the empirical findings of the study, and Section 5 concludes the study.

2. Literature review

On the relationship between inward foreign capital flows and economic growth for different countries and using different methodologies as well as time periods, prior studies yield yet elusive results. Several prior studies including Levine and Renelt (1992), Borensztein *et al.* (1998) and Ray (2012) have shown that FDI has the direct impact on economic growth process. (Though, in a study Papanek (1973) find significantly negative effects of different types of capital on national savings for a sample of 85 developing countries. Particularly, the study suggests that foreign aid, private investment and other capital crowded out national savings, and a decrease in local savings could lead to further enlarge on the dependency on foreign capital. The study of Amar (2003) also reveals that under usual depreciation of foreign capital and the natural rate of growth of labour force, foreign capital inflows may or may not rise the per capita domestic capita and consumption of the recipient country.). The study of Baharumshah and Thanoon (2006) find that incoming FDI is growth augmenting and that its effect is felt both in the short and long-terms for eight Asian countries (China, South Korea, Fiji and five countries in ASEAN) during 1982-2001. Similarly, short run foreign capital inflow has unfavorable impact on the long as well as short terms growth prospects and it seems to be sensitive to long run incoming capital. In addition, long run debt has positive impact on economic growth but its impact does slightly evaporate in the long-term. A study by Fayissa and Nsiah (2010) investigates the aggregate effect of foreign remittances on economic growth using an unbalanced panel data ranging from 1980-2004 for 37 African countries. The study observes that remittances improve growth in countries where the financial systems are yet not properly developed by offering a substitute way to finance investment and facilitating overcome liquidity restraints. In addition, the study finds that FDI, the terms of trade and the institutional variable (political rights index) were not significant, while, gross capital formation, and the human capital have significant growth promoting roles. The positive and significant relationship between workers remittances and economic growth for Azerbaijan and Armenia during 1995-2010 has also observed by Azam and Khan (2011).

The results of Fasanya (2012) study indicates that inward FDI has significantly positive impact on economic growth in Nigeria and so does Nigerian's domestic investment during 1970-2010. Azam (2013) find that an inflow of FDI has significantly positive impact on economic growth in case of Kazakhstan and statistically insignificant in case of Azerbaijan during 1995-2011. The empirical findings of Azam *et al.* (2013a) study shows evidence of the positive and statistically significant impact of incoming FDI and foreign remittances on economic growth in a set of five South and South East Asian countries during 1985-2011. An another study by Azam *et al.* (2013b) finds that external debt has significantly negative impact to economic growth in Indonesia during 1980-2012, while, exports variable (Vital role plays by the exports as an engine of growth has long been acknowledged in the literature (Feder, 1992; Rodriguez & Rodrik, 1999)) has positive and significant effect on economic growth. Debbiche and Rahmouni (2015) observe that foreign debt has positive and significant impact on growth in a sample of 38 countries considered as emerging by the Capital Market Consulting Group. Raheem and Oyinlola (2013) study reveals that FDI inflows and governance have positive impacts on economic growth process in seven Economic Community of West African States countries during 1996 - 2010. Though, the study of Soi *et al.* (2013) observe that FDI and gross capital formation had no statistically significant impact on GDP growth rate in Kenya during 1960-2010, while, trade openness is the main determinant of economic growth in the country. Ekwe and Inyama (2014) investigate the impact of foreign capital inflows on the growth performance of the Nigeria economy during 1982-2012. The results indicate that the inflows foreign capital had a positive and statistically significant impact on economic growth measured by GDP. In case of Turkey, the study of Cambazoglu and Karaalp (2014) observe robust associations between economic growth, FDI inflows, and exports during the period 1980-2010.

The study of Atanda and Charles (2014) examine the effect of remittances on output growth in sub-Saharan Africa over the period from 1982-2012. The findings of the study show that foreign remittance boost output growth in the Sub-Saharan African region and that financial development and investment played paramount role in the remittance economic growth nexus. However, the impact of human capital development on output growth find is negative, whereas the impact of trade openness is positive on output growth, and gross capital formation impact is found statistically insignificant and even the coefficient sign in case of random-effects method is negative. Azam *et al.* (2014) find that FDI, human capital and workers remittances have significantly positive effects on economic growth for 7 Asian countries during 1990 - 2012. Gyimah-Brempong *et al.* (2006) findings reveals that that all levels of education human capital, comprising higher education human capital have significantly positive impact on the growth rate of per capita income during 1960 - 2000. Orji *et al.* (2014) explores the impact of various types of foreign capital inflows namely FDI, foreign aid, foreign private investment and

remittances on economic growth of the West Africa Monetary Zone economies during 1981-2010. The empirical results reveal that more than one form of inflows of capital contributes positively to economic growth in Nigeria. While, foreign aid positively contributes more to economic growth in Sierra Leone and Ghana, whereas, FDI inflows raise more economic growth in Nigeria and Gambia. Similarly, workers remittances have the maximum contribution in case of Liberia and none of the inflows of capital have positive affect on Guinea's economic growth.

In a recent study by Azam and Ather (2015) detects that human capital development is vital for economic growth in ten countries from Commonwealth of Independent States during 1993-2011. Likewise, inward FDI has been found to have an accelerating role in fostering economic growth. Nwaogu and Ryan (2015) examines that how FDI inflows, foreign aid and remittances effect the economic growth of 53 African and 34 Latin American and Caribbean countries using a panel data set involving of eight separate 5-year periods (1970-1974, 1975-1979, 1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004 and 2005-2009). The results reveal that foreign aid and FDI impacts economic growth in Africa. Foreign aid and foreign remittances affect economic growth in Latin America and the Caribbean, while remittances affect economic growth when they are regressed simultaneously. However, the study of Kanu (2015) analyzed the impact of foreign capital inflows on economic growth in three sub-Saharan countries namely Nigeria, Ghana and South Africa during 1980- 2010. The study finds that there is no significant long-term association between foreign capital flows and the economic growth in Nigeria and South Africa during the period under the study.

3. Empirical methodology and data description

To determine the impact of international capital inflows consists of FDI, worker remittances and foreign debt along with some other control variables namely gross capital formation, trade and human capital on economic growth of African countries, the study employ, the following general multiple linear regression model, which can be expressed symbolically as follows:

$$Y_{it} = \beta_i + \beta_1 FDI_{it} + \beta_2 REM_{it} + \beta_3 DEBT_{it} + \beta_4 GDI_{it} + \beta_5 HK_{it} + \beta_6 X_{it} + \varepsilon_{it} \quad (1)$$

$$Y_{it} = \beta_i + \beta_1 FDI_{it} + \beta_2 REM_{it} + \beta_3 DEBT_{it} + \beta_4 GDI_{it} + \beta_5 HK_{it} + \beta_6 X_{it} + w_i + v_{it} \quad (2)$$

where, $i = 1, 2, \dots, N=10$; $t = 1, 2, \dots, T=37$

Similarly in equations (1 and 2) $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are the coefficients; i and t symbolize the i^{th} country and the t^{th} time period, respectively. Y represent economic growth measured by GDP per capita (current USD), FDI indicate foreign direct investment, net inflows (BoP, current USD), REM is personal remittances, received (current US\$), DEBT is external debt stocks, total (DOD, current USD), GDI is gross capital formation (% of GDP) (formerly gross domestic investment), X is exports of goods and services (% of GDP), and HK is human capital measured by school enrollment, secondary (% gross). The data on all variables are gleaned from the World Bank Development Indicator (2015), the World Bank database.

The term β_i in equation (1) indicates the constant parameter that varies across countries, but not over time. Every individual constants control for country-specific differences, though, the error terms (ε_{it}) are supposed to be independent, with mean zero (0) and constant variance (σ_{ε}^2) for all contained countries and through the time periods. In the same way, μ_i is the country-specific random-effects that take the variation across countries. It is presumed to be random and un-correlated with the explanatory variables incorporated in the model. As well, the v_{it} term is the country-specific error. Data on all variables are transformed into natural log form in order to avoid any nonlinearity in the data.

The expected estimated coefficient signs of the different variables for equations (1 and 2) are as follows:

- The expected impact of inward FDI, remittances, human capital, trade and gross domestic investment variables are postulated to be positively related to the economic growth.
- The foreign debt is hypothesized to be negatively related to the economic growth.

Balanced panel data set of 37 years is used for 10 low and lower middle income African countries. A concise summary of the descriptive statistics and Pearson correlation matrix are presented in Table 2. It is evident from Table 2 that correlation results have expected signs and support largely hypotheses of the study.

Table 2. Descriptive statistics and correlation matrix

Statistics/ Variables	Y	FDI	DEBT	GDI	REM	X	HK
Mean	6.030	17.137	21.388	2.933	18.323	2.982	2.884
Median	5.925	17.332	21.264	2.943	18.346	3.045	2.964
Maximum	8.008	22.902	24.325	4.315	23.750	4.192	4.102
Minimum	4.879	-20.101	17.018	1.147	13.979	1.639	0.647
Std. Dev.	0.563	3.192	1.276	0.435	1.787	0.473	0.721
Y	1.000						
FDI	0.455	1.000					
DEBT	0.392	0.472	1.000				
GDI	0.145	0.003	-0.356	1.000			
REM	0.492	0.325	0.235	0.165	1.000		
X	0.415	0.399	0.392	0.099	0.468	1.000	
HK	0.634	0.398	0.454	0.226	0.499	0.483	1.000

4. Empirical results and interpretations

The traditional panel data techniques are employed because the main objective of the study is to verify the magnitude of the impact of inward foreign capital on economic growth. Therefore, the use of traditional panel method is relatively acceptable for empirical investigation. Starting from the use of the Hausman's specification test (Hausman, 1978) to select whether the fixed-effects or random effects models is to be preferable (see Greene, 2008). Where, statistically insignificant P- value ($p > 0.05$) suggest that using random-effects model is better; otherwise the fixed-effects model ought to be employed. Nevertheless, in the present study the Hausman's test suggests that random-effects model is desirable to the fixed-effects model because Prob > Chi² is more than 0.05. Though, both Random Effects (RE) and Fixed Effects (FE) are used and their respective results are reported in Table 3. The panel estimates of RE and FE given in Table 3 reveals that the estimation has predominantly significant explanatory power based on the adjusted R² values of 0.565 and 0.728 from RE and FE methods respectively. It indicates that the adj. R² explains almost 57 percent and 73 percent variations by the included control variables namely FDI, remittances, external debt, gross capital formation, trade and human capital in the dependent variable GDP per capita. The stated F-statistics is fairly large to accept that there is joint significance of the chosen independent variables for both RE and FE techniques. Curiously, five explanatory variables regressed do in fact affects economic growth in African countries, and are also individually statistically significant which further corroborate and imply that the model is almost technically and statistically suitable.

The random-effects results show inward FDI has significantly positive on economic growth at 1% level of significance. The estimated coefficient of the FDI variable precisely reflects theoretical expectations. The estimated coefficient of 0.018 and 0.017 are found for the FDI variable from RE and FE respectively. The results reveal that one percent increase in the FDI will spur almost 0.017 percent in the GDP per capita. The empirical findings are in accordance with the findings by Fasanya (2012), Azam (2013) and Cambazoglu and Karaalp (2014). In a similar vein, the result on foreign remittances shows that it is positively linked to economic growth, meaning that high level of remittances encourages economic growth. The estimated coefficient of the remittances variable found is according to the study hypothesis. The coefficient of 0.112 (RE) and 0.111 (FE) are found for the remittances variable and significant statistically at 1 percent level. The results suggest that one percent increase in the remittance inflows will stimulate almost 0.112 percent in the GDP per capita. The results of this study are in accordance with the findings by Fayissa and Nsiah (2010) Orji *et al.* (2014) and Nwaogu and Ryan (2015). Similarly, the relationship between external debt and economic growth has been found negative and statistically significant at 1 percent level in both RE and FE models. The empirical results do support the hypothesized inverse impact of external debt on GDP per capita. The estimated coefficient of -0.087 and -0.096 are found for the external debt variable using RE and FE respectively. The empirical result demonstrates that if the external debt upsurges by one percent, it will impair GDP per capita by -0.087 to -0.096 percent. The significantly negative impact of external debt on economic growth is consistent with the erstwhile studies like Checherita and Rother (2010), and Azam *et al.* (2013b), and contradictory to the findings of Debbiche and Rahmouni (2015).

The empirical results on other variables reported in Table 3 reveals that the impact of gross domestic investment (gross capital formation) on economic growth of 10 African countries is significantly positive at 5 percent and 1 percent levels using RE and FE respectively. The panel estimates do support the hypothesized positive impact of gross domestic investment on GDP per capita. The estimated coefficient of 0.105 and 0.110 are obtained for the gross domestic investment variable employing RE and FE respectively. The result demonstrates that if the gross domestic investment upsurges by one percent, it will increase GDP per capita by 0.105 to 0.110%. In this study, the strong, robust, positive effect of gross domestic investment (gross capital formation) on economic growth is consistent with the prior studies like Fayissa and Nsiah (2010) and contradictory to the findings of Choe (2003) and Soi *et al.* (2013). Unexpectedly, the impact of trade measured by exports on economic growth is found insignificant. Whereas, human capital has significantly positive impact on African's economic growth at 1% level in both random-effects and fixed-effects models during the period under the study.

Table 3. Panel estimates (time period 1977 to 2013)

Methods/ Variables	Random-Effect		Fixed-Effect	
	Coefficient (Std. Error)	P-values	Coefficient (Std. Error)	P-value
Constant	3.737 (0.686)	0.000	3.870 (0.687)	0.000
FDI	0.018 ^a (0.007)	0.006	0.017 ^a (0.007)	0.010
REM	0.111 ^a (0.014)	0.000	0.112 ^a (0.014)	0.000
DEBT	-0.087 ^a (0.029)	0.003	-0.096 ^a (0.030)	0.001
GDI	0.105 ^b (0.051)	0.042	0.110 ^a (0.052)	0.034
HK	0.447 ^a (0.049)	0.000	0.457 ^a (0.050)	0.000
X	0.068 (0.057)	0.229	0.073 (0.057)	0.203
Hausman test (P-value)	4.259 (0.642)			
adj. R²	0.565		0.728	
F-stat	77.351	0.000	66.1035	0.000

Note: asterisk *a* and *b* indicates estimated coefficients are significant at 1% and 5% level respectively. All variables are in log form. Response variable is GDP per capita denoted by *Y*.

Concluding remarks

The constructive role played by foreign capital inflows in the process of economic growth and development is evidently well documented by erstwhile studies. International capital inflows are equally important for African countries in order to boost their economic development process, where, African countries yet face many economic, social and administrative problems. Therefore, the main aim of this study was to investigate the impact of inward foreign capital flow (i.e. FDI, remittances and debt) along with some other explanatory variables namely gross capital formation, trade and human capital on economic growth of 10 African countries over the period ranging from 1977 to 2013. To select the appropriate method for parameters estimation, the Hausman's test suggest the use of random-effects model, however, the results of both the random-effects and fixed-effects are reported in the study. The panel data estimates reveal that foreign capital inflows in the forms of incoming FDI and remittance have significantly positive impact on the economic growth of African countries. By and large, the detected positive contribution of inward FDI and remittances in the growth process of African countries are a robust finding. It implies that the role of FDI and remittances are growth prompting, whereas the role of external

debt is growth discouraging. Similarly, gross capital formation and human capital are positively related to economic growth.

The aforementioned empirical findings have an important policy implication. For each country to successfully reap the benefits of foreign capital inflows and domestic investments, its policy makers should formulate a healthy and enabling business environment that stimulates both foreign and domestic investors. Where, receiving external debt needs to be minimized to reduce further burden on the economy. Similarly, the government and management authorities should make intensive and sincere efforts in developing human capacity through sufficient educational funding across all levels as well across countries. This remains relatively the foremost way of achieving sustainable economic growth and development for African countries.

References

- [1] Alfaro, L., Chanda, A., Kalemli-Ozcan, S., Sayek, S. (2004). FDI and economic growth: the role of local financial markets. *Journal of International Economics*, 64(1): 89-112.
- [2] Amar, K. P. (2003). Foreign capital inflow and economic growth in LDCs. *Applied Economics Letters*, 10 (6): 377-379.
- [3] Asiedu, E., (2004). Policy reform and foreign direct investment in Africa: absolute progress but relative decline. *Development Policy Review*, 22(1): 41-48.
- [4] Atanda, M.S., Charles, O. (2014). Inward remittances and economic growth in Sub-Saharan African countries: application of panel cointegration approach. *Research Journal of Finance and Accounting*, 5(12):105-115.
- [5] Azam, M., Ather, M.A. (2015). Role of human capital and foreign direct investment in promoting economic growth: evidence from Commonwealth of Independent States. *International Journal of Social Economics*, 42(2): 98-111.
- [6] Azam, M., Ibrahim, Y., (2014). Foreign direct investment and Malaysia's stock market: using ARDL bounds testing approach. *Journal of Applied Economic Sciences*, Volume IX, 4(30): 591-601.
- [7] Azam, M., Ibrahim, Y., Bakhtiar B. (2014). Foreign direct investment and economic growth in Asia. *Actual Problems of Economics*, 11(161): 58-67.
- [8] Azam, M., Hassan, S., Khairuzzaman (2013a). Corruption, workers remittances, FDI and economic growth in five South and South East Asian countries: a panel data approach. *Middle-East Journal of Scientific Research*, 15 (2): 184-190.
- [9] Azam, M.; Emirullah, C., Khan, A.Q., Prabharker A.C. (2013b). The role of external debt in economic growth of Indonesia – A Blessing or Burden? *World Applied Science Journal*, 25(8): 1150-1157.
- [10] Azam, M. (2013). Foreign direct investment, financial deepening and economic growth in Azerbaijan and Kazakhstan: A Comparative Empirical Study. *The Empirical Economic Letters*, 12(6): 611-618.
- [11] Azam, M., and Khan A. (2011). Workers' Remittances and Economic Growth: Evidence from Azerbaijan and Armenia. *Global Journal of Human Social Science*, XI(VII): 41-46.
- [12] Baharumshah, A.Z., Thanoon, M.A.M. (2006). Foreign capital flows and economic growth in East Asian countries. *China Economic Review*, 17:70- 83.
- [13] Balasubramanyam, V.N., Salisu, M., Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *Economic Journal*, 106, 92–105.
- [14] Bashir, T., Mansha, A., Zulfqar, R., Riaz, R. (2014). Impact of FDI on economy growth: a comparison of South Asian States and China. *European Scientific Journal*, 10(1): 446–469.
- [15] Borensztein, E., De Gregorio, J., Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, 45(1):115–135.
- [16] Cambazoglu, B., Karaalp, H.S. (2014). Does foreign direct investment affect economic growth? The case of Turkey. *International Journal of Social Economics*, 41(6): 434-449.

- [17] Checherita, C. Rother, P. (2010). The Impact of high and growing government debt on economic growth- an empirical investigation for the Euro area. Working Paper Series, No 1237, European Central Bank.
- [18] Choe, L. (2003). Do foreign direct investment and gross domestic investment promote economic growth? *Review of Development Economics*, 7(1): 44-57.
- [19] Debbiche, I., Rahmouni, O. (2015). Does foreign capital enhance economic growth in emerging countries: flow decomposition approach? *The Journal of Applied Business Research*, 31(1): 221-230.
- [20] Ekwe, M.C., Inyama, O.I. (2014). Foreign capital flows and growth of the Nigeria economy: an empirical review. *International Journal of Economics and Finance*, 6(4): 103-109.
- [21] Fayissa, B., Nsiah, C. (2010). The impact of remittances on economic growth and development in Africa. *The American Economist*, 55(2): 92-103.
- [22] Fasanya, I.O. (2012). Capital flows- growth nexus in Nigeria: has foreign direct investment played a role in accelerating economic growth? *Journal of Sustainable Development in Africa*, 14(8): 34-52.
- [23] Feder, G. (1992). On exports and economic growth. *Journal of Development Economics*, 12: 59-73.
- [24] Ghulam, M. (2006). Impact of foreign capital inflows (FCI) on economic growth in Pakistan (1975-2004). *Journal of Independent Studies and Research*, 5(1): 24-29.
- [25] Gupta, S., Pattillo, C. Wagh, S. (2007). Impact of remittances on poverty and financial development in Sub-Saharan Africa. IMF Working Paper
- [26] Gumus, G. K., Gungor, B. (2013). The relationship between foreign portfolio investment and macroeconomic variables. *European Scientific Journal*, 9(34): 209-226
- [27] Gyimah-Brempong, K., Paddison, O., Mitiku, W. (2006). Higher education and economic growth in Africa. *Journal of Development Studies*, 42(3): 509-529
- [28] Hausman, J.A. (1978). Specification tests in econometrics. *Econometrica*, 46(6): 1251-1271.
- [29] IFAD (2014). International Fund for Agricultural Development. Trends in Global Remittances and Opportunities for Development. UNCTAD, Geneva, 20 June, 2014, www.ifad.org
- [30] Kanu, S.I. (2015). Foreign capital inflows and economic growth in Sub-Saharan Africa: a study of selected countries. *Research Journal of Finance and Accounting*, 6(1): 52-64.
- [31] Kobrin, S. (2005). The determinants of liberalization of FDI policy in developing countries: a cross-sectional analysis. *Transnational Corporations*, 14 (1): 67-103.
- [32] Le, M.H., Atallah, A. (2006). Foreign capital and economic performance of Pakistan. *The Lahore Journal of Economics*, 7(1): 1-32.
- [33] Levine, R., Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *The American Economic Review*, 82(4): 942-963.
- [34] Moran, T.H., Graham, E.M., Blomstrom, M. (2005). Does direct investment promote development? The Peterson Institute for International Economics. <http://bookstore.piie.com/book-store/3810.html>
- [35] Ngowi, H.P. (2001). Can Africa increase its Global share of foreign direct investment (FDI)? *West Africa Review*, 2(2): 1-9.
- [36] North, D. C. (1956). International capital flow and development of American West. *Journal of Economic History*, 16(4): 493-505.
- [37] Nwaogu, U.G., Ryan, M.J. (2015). FDI, foreign aid, remittance and economic growth in developing countries. *Review of Development Economics*, 19(1): 100-115.
- [38] Papanek, G.F. (1973). Aid, foreign private investment, saving and growth in less developed countries. *Journal of Political Economy*, 8: 120- 130.
- [39] Orji, A., Uche, A.S., Ilori, E.A. (2014). Foreign capital inflows and growth: an empirical analysis of WAMZ experience. *International Journal of Economics and Financial Issues*, 4(4): 971-983.

- [40] Raheem, I. D., Oyinlola, M.A. (2013). Foreign direct investment, governance and economic growth trilogy: new evidence from ECOWAS countries. *Journal of Global and Scientific Issues*, 1(2): 5-14.
- [41] Ray, S. (2012). Impact of foreign direct investment on economic growth in India: a co-integration analysis. *Advances in Information Technology and Management* 2(1): 187-201.
- [42] Rodriguez, F., Rodrik, D. (1998). Trade policy and economic growth: A skeptic's guide to the cross-national evidence. NBER Working Paper, 1781.
- [43] Sachs, J.D. (2004). Ending Africa's poverty trap. *Brookings Papers on Economic Activity*, 1:117-240.
- [44] Soi, N., Koskei, I., Buigut, K., Kibet, J. (2013). Impact of Openness, Foreign Direct Investment, Gross Capital Formation on Economic Growth in Kenya. *Journal of Economics and Sustainable Development*, 4(14): 130-135.
- [45] Yartey, C.A. (2008). The determinants of stock market development in emerging economies: is South Africa Different? International Monetary Fund WP/08/32.
- *** African Economic Outlook (2014, 2015): External financial flows and tax revenues for Africa. Retrieved from http://www.africaneconomicoutlook.org/outlook/financial_flows
- *** Global Policy Forum (2014). [Poverty and Development in Africa](https://www.globalpolicy.org/social-and-economic-policy/poverty-and-development/poverty-and-development-in-africa.html). PO Box 3283 | New York, NY 10163 USA. Retrieved from <https://www.globalpolicy.org/social-and-economic-policy/poverty-and-development/poverty-and-development-in-africa.html>
- *** United Nations Conference on Trade and Development (2004). Economic development in Africa, debt sustainability: Oasis or Mirage. New York and Geneva
- *** World Development Indicator (2015). The World Bank database. Retrieved from <http://data.worldbank.org/data-catalog/world-development-indicators>

Selection, Productivity Growth, and Multinational Subsidiaries: New Evidence from Korea

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Abstract:

This paper uses Korean firm-level manufacturing data to study the selections and productivity growth of multinational subsidiaries. A simple cross-sectional comparison may overstate the superior performance of multinationals by not controlling properly for the selection effects in acquisitions and divestures. This paper shows that multinational enterprises tend to acquire firms in the upper range of the productivity distribution and to divest relatively less productive affiliates. This study also shows that multinational subsidiaries tend to grow in productivity faster than domestic firms, but productivity growth is significant only in R&D intensive subsidiaries. The results emphasize the importance of complementarity between foreign ownership and R&D.

Keywords: multinational enterprises, productivity.

JEL Classification: F23, D24

1. Introduction

Foreign direct investment (FDI hereafter) has recently become an increasingly important phenomenon across the globe, especially for developing economies. The value of the worldwide stock of FDI amounted to 25 trillion U.S. dollars in 2013, having more than trebled since 2000. Meanwhile, a steady expansion in the share of FDI has flowed to developing and transition economies. The share reached 61.0% in 2013 compared to 19.3% in 2000 (UNCTAD 2014).

FDI is believed to be instrumental in the economic growth of host countries by, among others, facilitating the transfer of advanced technologies or organizational practices. It is generally taken for granted that multinational enterprises (MNEs hereafter) possess some technologies superior to those of local firms in the host countries. Existing empirical evidence suggests that multinational subsidiaries indeed have higher productivity than local firms. Their superior performance, however, could be due to MNEs' selective decisions to acquire higher-performing domestic firms. To assess fairly the advantages of multinationals and their contributions to the host countries, it is necessary to understand which domestic firms are more likely to be multinational subsidiaries. The need to control for this selection is particularly important as the most prevalent form of multinational entry is through cross-border acquisitions (or brownfield FDI) rather than through greenfield FDI (Guadalupe *et al.* 2012, Stiebale and Reize 2011).

This paper analyzes Korean manufacturing firms over the period 2006 to 2011 to examine the selection on productivity in acquisitions and divestures by MNEs and to compare productivity growth between multinational subsidiaries and domestic firms. The data available for the Korean manufacturing sector, due to its panel structure, allows one to follow the evolution of firm ownership and other characteristics over time. Compared to the experiences of developed countries, the case of Korean manufacturing will be more relevant to other developing economies which pursue growth strategies by opening domestic markets to foreign investors.

The results of this study show that firms with higher productivity are more likely to be multinational subsidiaries. This positive selection is in action not just in the process of acquisitions but of divestures as well: relatively less productive subsidiaries of MNEs tend to be divested. These findings suggest that the superior performances of multinational subsidiaries are overstated unless the selection of higher performing firms is properly controlled for. This paper also estimates the effects of foreign ownership on productivity growth. According to the results, foreign ownership per se does not enhance productivity growth. However, R&D intensive multinational subsidiaries tend to grow faster in productivity than other types of firms. This complementarity between R&D and foreign ownership partly explains the heterogeneity in the productivity within the group of multinational subsidiaries.

The remainder of this paper is organized as follows. Section 2 reviews related literature and section 3 describes the data set. In section 4, empirical results are presented. In the conclusion, policy implications and the limitations of this paper are discussed.

2. Related literature

Existing theories in international economics usually assume that multinational companies have superior productivity or firm-specific assets (Helpman *et al.* 2004 and Markusen 1995). Superior productivity is necessary to overcome language barriers, the ignorance of local business networks, and the large sunk costs that arise in cross-border market entries. Part of this superior productivity can be transferred to their subsidiaries in host countries. Various forms of mechanisms through which local firms benefit from being part of multinationals have been proposed. These include productivity enhancing innovations (Teece 1977), superior management practices (Bloom and Van Reenen 2010), stronger protection of intellectual property rights (Branstetter *et al.* 2006), and R&D complementarities (Cassimen *et al.* 2005).

Accumulated empirical evidence shows that multinational subsidiaries are indeed more productive than domestic firms. Doms and Jensen (1998) analyzed the U.S. data on manufacturing plants for 1987 to show that foreign-owned manufacturing plants have superior operating characteristics relative to the average U.S.-owned plant. Foreign-owned plants are found to be more capital intensive, more technology intensive, and more productive. They found no large differences among foreign-owned plants based on country of ownership. Griffith and Simpson (2003) described the characteristics of manufacturing establishments in Britain over the period 1980 to 1996 to assess the effects of different ownership nationalities. Their findings suggest that foreign-owned establishments have higher labor productivity than domestic establishments. Moreover, the proportion of skilled workers, wages, and productivity growth are also higher in foreign-owned establishments.

Globerman, Ries and Vertinsky (1994) used Canadian plant-level data to show that there are significant differences between domestic and foreign-owned plants. Foreign-owned establishments are found to have higher labor productivity, but these differences vanish after controlling for size, capital intensity, share of non-production workers, and share of male workers. Pfaffermayr and Bellak (2000) used Austrian manufacturing firms over the period 1997 to 2000 to examine performance gaps between foreign-owned firms and domestic firm. They found that foreign-owned firms are superior in productivity and profitability, but the performance gap does not depend on the ownership nationality of multinational firms. Therefore, they argued not foreign ownership per se but the multinational network is responsible for better performance. Investment propensity and growth are found to be largely unrelated to foreign ownership. Djankov and Hoekman (2000) used firm-level data from the Czech Republic. They found that firms with foreign partnership or foreign ownership tend to be significantly larger than independent domestic firms. Firms with FDI are shown to have the highest average TFP growth, followed by firms with joint ventures and then domestic firms.¹

Despite consistent empirical evidence, existing studies are not fully satisfactory in at least two respects, which this paper attempts to address. First, the ramifications of selections are not thoroughly explored. In fact, the question of which domestic firms are more likely to be the targets of cross-border acquisitions is largely unexplored in the international economics literature (Guadalupe *et al.* 2012). If multinationals choose to acquire high-performing firms in the host country, the productivity advantages of their subsidiaries documented in previous studies are likely to be overstated. Such positive selection, however, is not the only possible outcome. Some corporate finance literature suggests that low-performing firms are the most likely to be acquired (Lichtenberg and Siegel 1987). Currently, the nature of selection is far from fully understood. Recent papers begin to address the selection issues in comparing the performances of foreign-owned and domestic firms (Criscuolo and Martin 2009, Arnold and Javorcik 2012). However, these papers treat the selection as an ancillary consideration in order to estimate correctly the relationship of primary interest.

Secondly, there remains a large degree of heterogeneity in productivity within the group of multinational subsidiaries, leading to substantial overlap in productivity with domestic firms. In fact, this heterogeneity in performance is not unique to multinational subsidiaries. It is a well-established fact that firms in narrowly defined groups or industries continue to perform differently (Ichniowski and Shaw 2010). Further explanations are necessary to account for the remaining heterogeneity.

3. Data

The sample is drawn from the Survey of Business Activities (SBA) published by Statistics Korea, the national statistical agency that produces and distributes official statistics. The SBA is annually conducted for firms

¹ See Schffbauer *et al.* (2009) and Arnold and Javorcik (2012) for the survey of additional papers.

employing 50 workers and more, and the resulting data set is made available to the public.¹ The survey gives a representative description of the Korean manufacturing sector, accounting for approximately 70% of value-added (Cho *et al.* 2014). The SBA data contains the information on the financial status and business strategies of surveyed firms. More appropriate to this study, it reports whether each surveyed firm has a parent company and if it does, the data reports in which country the parent company is located. The sample for this study forms a balanced panel of 3,810 manufacturing firms for six years from 2006 to 2011, amounting to 22,860 firm-year pairs. To keep track of productivity changes of individual firms over time, I exclude firms that are in and out of the original data during the six-year sample period. The resulting sample is completely balanced. However, the analysis results with the full data are also provided at the end of section 4.

Table 1. Transition matrix of ownership status

	Domestic firms in period $t+1$	Multinational subsidiaries in period $t+1$	TOTAL
Domestic firms in period t	20,970 (99.5) [99.4]	110 (0.5) [6.2]	21,080 (100.0) [92.2]
Multinational subsidiaries in period t	128 (7.2) [0.61]	1,652 (92.8) [93.8]	1,780 (100.0) [7.8]
TOTAL	21,098 (92.3) [100.0]	1,762 (7.7) [100.0]	22,860 (100.0) [100.0]

Note: First entries in each cell represent the number of observations. Row-wise percentages are reported in parentheses and column-wise percentages in brackets.

Firms in the sample can be divided into two groups based on whether the firm has a foreign parent company: multinational subsidiaries and domestic firms.² The sample consists of 21,080 domestic firms (92.2%) and 1,780 subsidiaries of foreign multinational companies (7.8%). Table 1 is a transition matrix that describes the proportion of firms going from one state in the current period to another state in the next, where two states are considered: being a domestic firm and being a subsidiary of MNEs. Transitions from domestic firms to multinational subsidiaries represent acquisitions by MNEs, and transitions in the other direction represent divestitures. The status is quite persistent, with no change for a great majority of firms. Only 0.5% of domestic firms become multinational subsidiaries in the next year. The share of multinational subsidiaries that become domestic in the next year is 7.2%. In the first part of the main analysis, I examine how these transitions are affected by firm productivity.

Key variables for analysis must be defined. SUB is a dummy variable indicating whether the firm is owned by a foreign multinational enterprise: SUB = 1 if the firm is a multinational subsidiary and SUB = 0 if it is not. I use the following two variables to measure firm size: ASSET refers to the total assets and WORKER to the number of employees. The next two variables can potentially explain productivity growth. RDI is the ratio of expenditures for R&D to annual sales, and REL is the ratio of the sum of import and export amounts with affiliated parties to annual sales.

TFP is the measure of firm-level total factor productivity. I construct TFP using the chained-multilateral index number approach developed by Good, Nadiri, and Sickles (1996) and employed by Aw, Chen, and Roberts (1997). The TFP measure uses a separate reference point for each cross-section of observations and chain-links the reference points together over time as in the Tornqvist-Theil index. This approach allows one to make consistent comparisons both cross-sectionally and over time, which is essential to comparing productivity growth between groups in this study. More precisely, I estimate TFP in the following way.

$$\log TFP_{it} = (\log Y_{it} - \overline{\log Y_t}) + \sum_{r=2}^t (\log Y_r - \overline{\log Y_{r-1}}) - \left\{ \sum_{n=1}^N \frac{1}{2} (S_{nit} + \overline{S_{nt}}) (\log X_{nit} - \overline{\log X_{nt}}) + \sum_{n=1}^N \sum_{r=2}^t \frac{1}{2} (\overline{S_{nr}} + \overline{S_{nr-1}}) (\log X_{nr} - \overline{\log X_{nr-1}}) \right\} \quad (1)$$

¹ Statistics Korea provides firm-level micro data including the Survey of Business Activities through the official website (<http://mdss.kostat.go.kr>).

² Following this definitions, domestic firms include multinational enterprises whose parents are located in Korea.

where Y , X , and S denote output, input, and input share respectively. Symbols with an upper bar are corresponding measures for hypothetical firms with average characteristics. The subscript r and n are indices for time and inputs, respectively. As a measure of output, I use the annual sales deflated by the producer price index at a disaggregated level. Three inputs are included: capital, labor, and materials. I calculate the capital stock as the value of fixed assets deflated by the capital goods deflator. As a measure of labor, the number of employees is used. The measure of materials is derived from the direct production cost deflated by the intermediate input priced index.

Table 2. Description of variables

VARIABLE	DEFINITION
SUB	Dummy variable which takes the value 1 if the firm is a subsidiary of foreign MNEs
TFP	Total factor productivity
ASSET	Total assets measured in billion Korean won
WORKER	Number of employees in persons
RDI	Ratio of expenditures on research and development to annual sales
REL	Ratio of the sum of import and export amounts with affiliated parties to annual sales

Table 3. Summary statistics

VARIABLE	MEAN	STD. DEV.	MIN	MAX
SUB	0.08	0.27	0	1
Log(TFP)	0.74	0.39	-2.21	3.35
Log(ASSET)	3.67	1.33	-0.20	11.65
Log(WORKER)	5.06	0.87	2.64	11.53
RDI	0.02	0.04	0.00	1.97
REL	0.04	0.13	0.00	1.75
No. obs.	22,860			

Table 2 summarizes the definitions of variables and Table 3 reports summary statistics. In Table 4, I summarize the variables for each group of firms. The first column reports the means and standard deviations of the variables for multinational subsidiaries and the second column for domestic firms. I also perform tests for differences in the means of the variables between the two groups. The third and fourth columns present the differences in means and corresponding t-statistics. Compared to domestic firms, multinational subsidiaries are more productive and larger in size, and the differences are statistically significant. It is also notable that there is significant heterogeneity within each group. The standard deviation of $\log(\text{TFP})$ for multinational subsidiaries is 0.36, greater than the mean difference between the two groups, 0.22. This point is better illustrated in Figure 1, where kernel densities of $\log(\text{TFP})$ are drawn for each group in the chemical industry. The solid line represents multinational subsidiaries and the dashed line, domestic firms. The solid line is located to the right of the dashed line but with substantial overlap.

R&D intensities, surprisingly to some observers, are on average greater in domestic firms. But from a theoretical viewpoint, the relationship between R&D and foreign acquisitions is ambiguous. Firms tend to locate their R&D activities close to their headquarters (Howell 1984, Sanna-Randaccio and Veugelers 2007, Falk and Falk 2006).

Table 4 . Comparison between domestic firms and subsidiaries of MNEs

VARIABLE	Multinational subsidiaries (SUB = 1)	Domestic firms (SUB = 0)	Difference	t-statistic
Log(TFP)	0.93 (0.36)	0.73 (0.39)	0.22	22.5
Log(ASSET)	4.20 (1.24)	3.62 (1.33)	0.58	17.9

VARIABLE	Multinational subsidiaries (SUB = 1)	Domestic firms (SUB = 0)	Difference	t-statistic
Log(WORKER)	5.42 (0.96)	5.03 (0.85)	0.39	18.5
RDI	0.01 (0.02)	0.02 (0.04)	-0.01	-6.2
REL	0.18 (0.28)	0.03 (0.10)	0.16	51.6
No. Obs.	1,780	21,085		

Note: Entries without parentheses are the mean values. Standard deviations are in parentheses.

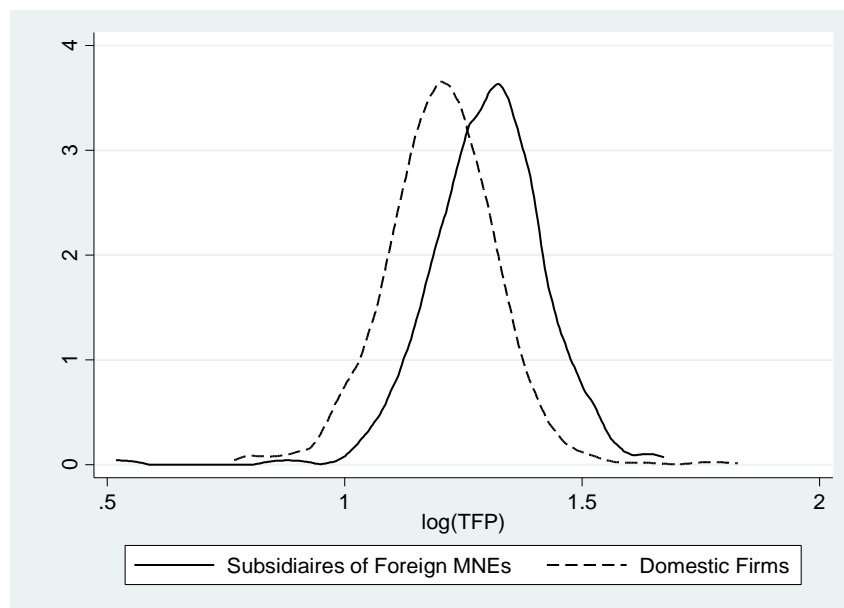


Figure 1. Productivity comparison in the chemical industry

4. Empirical Analysis

(1) Selection

The previous section shows that multinational subsidiaries are on average more productive than domestic firms. Although the productivity differential can reflect MNEs' superior technologies, it may arise from MNEs' selective decisions to acquire productive domestic firms. If MNEs extend their international presence by acquiring productive local firms, one would still observe similar difference in the mean productivity levels between domestic firms and subsidiaries of MNEs, even without productivity gains from being a part of MNEs.

In this section, I empirically test the extent to which such selection matters. To fix ideas, I specify an empirical model as follows. First, I create a dummy variable: $SWITCH_t = 1$ if SUB_{t+1} differs from SUB_t and 0 if $SUB_{t+1} = SUB_t$. This dummy variable indicates whether the firm switches its status in the next period from domestic firms to subsidiaries of MNEs or vice versa. Then, I use $SWITCH$ as a dependent variable and set up a logit model as:

$$SWITCH_{it} = \begin{cases} 1, & \text{if } \alpha + \beta \log(TFP_{it}) + \gamma \log(SIZE_{it}) + \kappa_i + \eta_i + \varepsilon_{it} > 0 \\ 0, & \text{if } \alpha + \beta \log(TFP_{it}) + \gamma \log(SIZE_{it}) + \kappa_i + \eta_i + \varepsilon_{it} \leq 0 \end{cases} \quad (2)$$

where: $SIZE$ is firm size, κ and η represent industry and year effects respectively, ε is a logit error following the type I extreme value distribution, and α , β , and γ are unknown parameters. I first estimate the model for the subsample of domestic firms, in which case the dependent variable $SWITCH$ indicates the transition to becoming a subsidiary of foreign MNEs and the estimation equation describes MNEs' decision to acquire affiliates. Next, I run the logit model for the subsample of multinational subsidiaries, where $SWITCH$ represents the transition to domestic firms, that is, divestures.

Table 5 reports the estimation results. Columns 1 and 2 list results for the subsample of domestic firms and columns 3 and 4 for subsidiaries of MNEs. The coefficient for log(TFP) is estimated to be significantly positive in columns 1 and 2. It implies that productive domestic firms are more likely to become multinational subsidiaries. This result is consistent with the view that MNEs selectively acquire productive local firms. The results in columns 3 and 4 show a different kind of selection at play. The coefficient for log(TFP) is found to be significantly negative, suggesting less productive subsidiaries of MNEs are more likely to become domestic firms. This result is consistent with the view that MNEs divest less productive local affiliates. Both types of selection would contribute to the observed difference in productivity between domestic firms and multinational subsidiaries.

Table 5. Logit analysis of selection

	1	2	3	4
Log(TFP)	2.613*** (0.598)	2.416*** (0.610)	-2.288*** (0.720)	-2.675*** (0.729)
Log(WORKER)	0.354*** (0.081)		0.307*** (0.100)	
Log(ASSET)		0.230*** (0.064)		0.266*** (0.079)
Constant	-8.611*** (0.889)	-7.535*** (0.799)	-5.793*** (0.995)	-5.265*** (0.898)
Log likelihood	-625.770	-627.784	-415.130	-414.082
No. Obs.	21,080	21,080	1,780	1,780

Note: The dependent variable is SWITCH, a dummy variable that takes the value 1 if the firm switches its ownership status in the next year. The results in columns 1 and 2 are based on a sample of domestic firms. Columns 3 and 4 use a sample of multinational subsidiaries. All specifications include industry and year effects. Standard errors are in parentheses. ***, **, * indicate 1%, 5%, 10% significance, respectively.

(2) Productivity Growth

The previous subsection shows that MNEs acquire and divest local affiliates based on firm productivity and this selection is partly responsible for the superior productivity observed in multinational subsidiaries. In this subsection, I turn to the other source of productivity differential, that is, productivity growth. To test whether multinational subsidiaries grow at a faster rate than domestic firms, I propose an empirical model as follows.

$$\Delta \log(TFP_{it}) = \alpha + \beta SUB_{it} + \gamma RDI_{it} + \delta \log(SIZE_{it}) + \kappa_i + \eta_t + \varepsilon_{it} \quad (3)$$

where κ and η represent industry and year effects respectively, and ε is an error term. $\Delta \log(TFP_{it})$ is interpreted as the growth rate of TFP and differencing eliminates the unobserved heterogeneity in levels. To the extent that selection involves the level of productivity, Eq. (3) does not suffer selection effects. The coefficient of SUB, β is the parameter of most interest, as it captures the effect of an affiliation with foreign MNEs on the growth rate of total factor productivity after other factors are controlled for.

Table 6 reports the estimation results with alternative sets of explanatory variables. RDI, that is R&D intensity, and log(ASSET) are strongly significant in all three specifications. The positive coefficient of RDI means the expenditures on R&D are indeed an important contributing factor in firms' productivity growth. The negative coefficient of log(ASSET) implies firm productivity growth tends to slow with the increase in size. SUB is significant at the 10% significance level in column 1 but loses statistical significance in column 2, where the interaction term of SUB and RDI is statistically significant. According to this result, the affiliation with foreign MNEs per se does not boost productivity growth in firms. However, being part of foreign MNEs makes R&D more effective in raising productivity growth. In columns 2 and 3, the coefficient for RDI is 0.157 and the coefficient for SUB*RDI is 0.264. This implies the effect of R&D intensity is about three times greater for multinational subsidiaries compared to domestic firms. The complementarity between R&D and foreign ownership has significant implications for policy makers.

The specification of column 3 includes REL, the ratio of the sum of import and export amounts with affiliated parties to annual sales. This variable measures the degree of vertical linkage among affiliates belonging to the same MNE. The trade literature distinguishes two types of FDI. In horizontal FDI, the affiliate replicates the production process of the parent firm elsewhere in the world. Vertical FDI refers to the case where parts of the production stages are transferred to the affiliate location. A larger value of REL suggests the relationship between

the subsidiary and the parent is closer to the one in vertical FDI. The estimation results, however, find no significant effect of this variable.

These results together with the analysis on selection in the last subsection cast light on the role of foreign MNEs in the host countries. Existing studies often take it for granted that MNEs are the conduit through which local firms benefit from access to advanced knowledge. The analysis above largely confirms such belief but suggests that the beneficial effects are somewhat overstated. It further shows that the potential for productivity growth will be reduced without further investment. The results also help to infer the nature of advantages that can be transferred to multinational affiliates, implying that the transfer of such advantages will be most effectively realized through local R&D, but not in the form of intermediate goods.

Care should be taken, however, in interpreting the findings above. This paper is limited in that it cannot separately analyze potential spillovers, whereby MNEs might generate technological learning externalities for domestic firms for instance through labor training and turnover (Fosfuri *et al.* 2002) or through the provision of high-quality intermediate inputs (Rodriguez-Clare 1996). To the extent that such spillovers raise the productivity of domestic firms, the productivity difference between domestic firms and MNEs would be reduced, understating the beneficial contributions of MNEs. However, according to data described in section 3, notable differences are found between domestic firms and multinational subsidiaries. Technological externalities, if any, are unlikely to be realized immediately and completely.

Table 6. Regression of productivity growth

	1	2	3
SUB	0.006* (0.004)	0.003 (0.004)	0.003 (0.005)
RDI	0.165*** (0.027)	0.157*** (0.027)	0.157*** (0.027)
SUB*RDI		0.263* (0.147)	0.264* (0.148)
REL			0.001 (0.012)
Log(ASSET)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)
Constant	0.035*** (0.009)	0.035*** (0.009)	0.035*** (0.009)
No. obs.	22,860	22,860	22,860

Note: The dependent variable is the growth rate of TFP. All specifications include industry effects and year effects. Standard errors are in parentheses. ***, **, * indicate 1%, 5%, 10% significance, respectively.

(3) Robustness check

The above analysis is based on the sample of firms that form a balanced panel during the six-year period. I have dropped from the sample the firms that appear in the data only for part of the sample period. The resulting balanced panel helps to follow consistently over time the productivity and ownership of firms. On the other hand, such omission is obviously not random, excluding firms that newly enter and firms that cease to operate. Furthermore, productivity levels are likely to be related to firm entry and exit (Jovanovic 1982 and Hopenhayn 1992). It is worth checking whether the main results stay robust if the omitted observations are included.

Table 7. Estimation results with the full sample

	1	2	3	4
Log(TFP)	1.281** (0.561)	-1.822*** (0.511)		
SUB			0.008** (0.004)	0.002 (0.004)
RDI			0.047*** (0.004)	0.046*** (0.004)

SUB*RDI				0.562*** (0.136)
Log(ASSET)	0.255*** (0.056)	0.203*** (0.073)	-0.002** (0.001)	-0.002** (0.001)
Constant	-9.861*** (0.959)	-6.484*** (1.143)	0.033*** (0.008)	0.034*** (0.008)
No. obs.	29,576	2,145	31,721	31,721

Note: Columns 1 and 2 are the results from re-estimating Eq. (2) with the full data. Columns 3 and 4 apply the full data to estimating Eq. (3). In column 1, the dependent variable is SWITCH and the sample is comprised of domestic firms. In column 2, the dependent variable is SWITCH and the sample consists of multinational subsidiaries. In columns 3 and 4, the dependent variable is the growth rate of TFP. All specifications include industry effects and year effects. Standard errors are in parentheses. ***, **, * indicate 1%, 5%, 10% significance, respectively.

I re-estimate Eqs. (2) and (3) using the expanded sample of firms that appear in the raw data for at least two years adjacent in time. The dependent variables of Eqs. (2) and (3), SWITCH and $\Delta\log\text{TFP}$, cannot be defined if a firm appears in the data for a single year and then disappears. The “full sample” consists of an unbalanced panel of 7,493 firms, amounting to 31,721 firm-year pairs. Estimation results with the full sample are reported in Table 7. Columns 1 and 2 present the results from estimating Eq. (2) for the selection effect. Column 1 reports the results in acquisitions and column 2 for divestures. Columns 3 and 4 are the results from estimating Eq. (3).

The results with the full sample confirm the earlier findings. Results are not qualitatively changed and in some cases, they become statistically more significant. In columns 1 and 2, the coefficient estimates for $\log(\text{TFP})$ are smaller in the absolute value than those in Table 5 but the estimates remain highly significant. The smaller coefficient is partly because entering and exiting firms, which are newly added to the full sample, are less likely to be the targets of acquisitions by MNEs. In columns 3 and 4, coefficient estimates are similar in size to those in Table 6. The statistical significance of SUB*RDI has improved from 10% to 1%, strengthening the earlier findings.

Conclusion

This paper examines the selections and productivity growth of multinational subsidiaries by analyzing Korean firm-level manufacturing data. An empirical analysis reveals that multinational enterprises tend to acquire and divest local affiliates based on productivity. This selection contributes to the observed productivity differences between multinational subsidiaries and domestic firms, in addition to the intrinsic advantages of MNEs. This study also shows that multinational subsidiaries tend to grow in productivity faster than domestic firms but productivity growth is visible only in R&D intensive subsidiaries. The results show the importance of the complementarity between foreign ownership and R&D and cast light on the nature of the benefits of the presence of foreign MNEs.

Some policy implications flow from the analysis of this paper. First, the beneficial effects of foreign ownership on the local economy may be limited without further R&D investment. To maximize the benefits of FDI, host countries need to design policies that encourage MNEs to engage in further R&D efforts at local affiliates. On the other hand, the study shows that R&D activities in domestic firms are much less effective in raising productivity than those of multinational subsidiaries. Thus, the growth strategies of developing countries will be less successful unless they tap into the superior technologies of MNEs.

Finally, a couple of limitations of this study should be mentioned. First, this study focuses on MNEs' acquisitions of local firms but mostly ignores the other mode of entry, green-field FDI. Although green-field investments warrant a study of their own, the data set for this study is not suitable to the purpose, as it does not cover small and young firms. Second, as discussed in the main text, positive externalities (or spillovers) would lead one to understate the differences between domestic firms and multinational subsidiaries. The literature, however, is inconclusive on the importance of such spillovers (Lipsey and Sjöholm 2005) and further studies are needed.

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References

- [1] Arnold, J. M., Javorcik, B.S. (2009). Gifted kids or pushy parents? Foreign direct investment and plant productivity. *Indonesia, Journal of International Economics* 79(1): 42-53, DOI <http://dx.doi.org/10.1016/j.jinteco.2009.05.004>
- [2] Aw, B., Chen, X., Roberts, M.J., (1997). Firm-level Evidence on Productivity Differentials, Turnover, and Exports in Taiwanese Manufacturing. *NBER Working Paper* No. 6235, DOI <http://dx.doi.org/10.3386/w6235>
- [3] Bloom, N., Van Reenen, J. (2010). Why Do Management Practices Differ across Firms and Countries? *Journal of Economic Perspectives* 24(1): 203-224, DOI <http://dx.doi.org/10.1257/jep.24.1.203>
- [4] Branstetter, L., Fisman, R., Foley, F. (2006). Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from U.S. Firm-Level Panel Data. *Quarterly Journal of Economics* 121(1): 321-349, DOI <http://dx.doi.org/10.1093/qje/121.1.321>
- [5] Cassiman, M., Colombo, B., Garrone, P., Veugelers, R. (2005). The impact of M&A on the R&D process: an empirical analysis of the role of technological- and market relatedness. *Research Policy* 34(2): 195–220, DOI <http://dx.doi.org/10.1016/j.respol.2005.01.002>
- [6] Cho, J., Chun, H., Hur, J. (2014). Choosing multiple offshoring strategies: Determinants and complementarity. *Journal of the Japanese and International Economies* 34: 42-57, DOI <http://dx.doi.org/10.1016/j.jjie.2014.04.002>
- [7] Criscuolo, C., Martin, R. 2009. Multinationals and U.S. Productivity Leadership: Evidence from Great Britain. *Review of Economics and Statistics*, 91(2): 263-281, DOI <http://dx.doi.org/10.1162/rest.91.2.263>
- [8] Djankov, S., Hoekman, B. (2000). Foreign Investment and Productivity Growth in Czech Enterprises. *World Bank Economic Review*, 14(1): 49-64, DOI <http://dx.doi.org/10.1093/wber/14.1.49>
- [9] Doms, M. E., Jensen J. B. (1998). Comparing Wages, Skills, and Productivity between Domestically and Foreign-owned Manufacturing Establishments in the United States. *NBER Studies in Income and Wealth*, University of Chicago Press.
- [10] Falk, M., Falk, R. (2006). Do foreign-owned firms have a lower innovation intensity than domestic firms. *WIFO Working Paper* No. 275.
- [11] Fosfuri, A., Motta, M., Ronde, T. (2001). Foreign direct investment and spillovers through workers' mobility. *Journal of International Economics*, 53: 205–222, DOI [http://dx.doi.org/10.1016/S0022-1996\(00\)00069-6](http://dx.doi.org/10.1016/S0022-1996(00)00069-6)
- [12] Globerman, S., Ries, J., Vertinsky, I. (1994). The Economic Performance of Foreign Affiliates in Canada. *Canadian Journal of Economics*, 27(1): 143-156, DOI <http://dx.doi.org/10.2307/135807>
- [13] Good, D. H., Nadiri, I., Sickles, R. C. (1996). Index Number and Factor Demand Approaches to the Estimation of Productivity. *NBER Working Paper* No. 5790, DOI <http://dx.doi.org/10.3386/w5790>
- [14] Griffith, R., Simpson, H. (2003). Characteristics of Foreign-Owned Firms in British Manufacturing. *NBER Working Paper* No. 9573, DOI <http://dx.doi.org/10.3386/w9573>
- [15] Guadalupe, M., Kuzmina, O., Thomas, C. (2012). Innovation and Foreign Ownership. *American Economic Review*, 102(7): 3594-3627, DOI <http://dx.doi.org/10.1257/aer.102.7.3594>
- [16] Helpman, E., Melitz, M., Yeaple S. (2004). Export Versus FDI with Heterogeneous Firms. *American Economic Review*, 94(1): 300-316, DOI <http://dx.doi.org/10.1257/000282804322970814>
- [17] Hopenhayn, H. A. (1992). Entry, Exit, and Firm Dynamics in Long Run Equilibrium. *Econometrica*, 60(5): 1127-50, DOI <http://dx.doi.org/10.2307/2951541>
- [18] Howell, J. (1984). The location of research and development: some observations and evidence from Britain. *Regional Studies*, 18: 13–29, DOI <http://dx.doi.org/10.1080/09595238400185021>
- [19] Ichniowski, C., Shaw, K. (2010). Insider Econometrics: A Roadmap to Estimating Empirical Models of Organizational Performance, in: *The Handbook of Organizational Economics*, Gibbons R. and Roberts J. ed. Princeton University Press.

- [20] Jovanovic, B. (1982). Selection and the Evolution of Industry. *Econometrica*, 50(3): 649-670, DOI <http://dx.doi.org/10.2307/1912606>
- [21] Lichtenberg, F., Siegel, D. (1987). Productivity and changes in ownership of manufacturing plants. *Brookings Papers on Economic Activity* 3: 643-683.
- [22] Lipsey, R., Sjöholm, F. (2005). Host Country Impacts Of Inward FDI: Why Such Different Answers? in: *Does Foreign Direct Investment Promote Development*, Moran, T., Graham, E., Blomström, M. ed. Institute for International Economics.
- [23] Markusen, J.R. (1995). The boundaries of multinational enterprises and the theory of international trade. *Journal of Economic Perspectives*, 9: 169–189.
- [24] Pfaffermayr, M., Bellak, C. (2000). Why Foreign-Owned Firms are Different: A Conceptual Framework and Empirical Evidence for Austria. *HWWA Discussion Paper* No. 115, Hamburg Institute of International Economics.
- [25] Rodriguez-Clare, A. (1996). Multinationals, Linkages, and Economic Development. *American Economic Review*, 86(4): 852-873.
- [26] Sanna-Randaccio, F., Veugelers, R. (2007). Multinational knowledge spillover with decentralized R&D: a game-theoretic approach. *Journal of International Business Studies*, 38(1): 47–63.
- [27] Schiffbauer, M., Siedschlag, I., Ruane, F. (2009). Do Foreign Mergers and Acquisitions Boost Firm Productivity? *ESRI Working Paper* No. 305.
- [28] Stiebale, J., Reize, F. (2011). The impact of FDI through mergers and acquisitions on innovation in target firms. *International Journal of Industrial Organization*, 29: 155-167, DOI <http://dx.doi.org/10.1016/j.ijindorg.2010.06.003>
- [29] Teece, D. (1977). Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-how. *Economic Journal*, 87: 242-261, DOI <http://dx.doi.org/10.2307/2232084>
- *** UNCTAD. (2014). *World investment report 2014*, United Nations.

The Effect of Financial Market Development on Corporate Capital Structure: Dynamic Panel Evidence from African Economies

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Abstract

Financial intermediaries, through their intermediation role in financial markets, play an important part in the financing choice of firms by reducing transaction costs and information asymmetries and providing liquidity to the financial system. To enhance the role played by banks and stock markets, some countries in Africa introduced a series of measures in their respective financial sectors. Consequently, this study examines how the banking sector and stock market development in selected African countries influenced the use of debt financing by non-financial firms. The study used a dynamic framework estimation technique on panel data of non-financial firms listed on the selected countries domestic stock exchange for the period 2003-2012. The results revealed a significant reduction in the use of debt by the firms, following banking sector development while stock market development did not have any significant effect on debt usage. This suggests that developments in the banking sector instituted efficient risk pricing which raised the cost of finance, thereby, leading to a lower use of debt. In addition, the reduction in use of debt suggests the presence of high information asymmetries associated with use of long-term debt.

Keywords: capital structure, banking sector development, stock market development, dynamic panel, Africa.

JEL Classification: G20, G32

1. Introduction

Extant literature suggests that development of financial markets usually result in reduction in costs due to use of external finance by firms and other businesses. Such costs include but are not limited to transaction costs, financial distress costs, bankruptcy costs and agency costs. Furthermore, the development of the markets lead to reduction in problems associated with moral hazard and adverse selection due to the use of external finance (Agarwal & Mohtadi, 2004; Demirguc-Kunt & Maksimovic, 1996).

In developed financial markets, market imperfections, such as information asymmetry, illiquidity of the market and high transactions costs are less likely to influence financing decisions of firms residing there. This is because the markets usually have high liquidity levels that encourage trading and well-organized mechanisms for efficient risk management and capital allocation (Chami, Fullenkamp, & Sharma, 2010). Hence, firms have fewer constraints towards accessing external finance. This is in contrast to the developing financial markets that are characterised by illiquidity, high transaction costs, thinness of trading, information asymmetry, limited source of external finance and other problems that arise in markets with imperfections (Murinde, 2012). These imperfections, in addition to a risky macro – economic operating environment, limit a firm's access to external finance (Bokpin, 2009). Firms in developing countries take into consideration these issues in their choice of financing methods for optimal investments and maximizing firm's value.

There are several motivations for this study. The first is that, most of the capital structure studies done in the African context focus on firm specific determinants of capital structure (Abor & Biekpe, 2009; Akinlo, 2011; Boateng, 2004; Gwatidzo & Ojah, 2009; Salawu & Agboola, 2008). Secondly, there are few cross-country studies examining the effects of financial market development on capital structure decisions, both in developed and developing markets (De Jong, Kabir, & Nguyen, 2008; González & González, 2014; Gungoraydinoglu & Oztekin, 2011). Cross-country studies, according to Fan, Wei, and Xu (2011), make it difficult to disentangle the effects of key institutional factors from other unimportant factors. Furthermore, the combination of developed and developing markets in a panel data set might lead to biased results. This is because the results could be driven by the developed market data, where the institutional environment and structure is quite different from the emerging markets (Fan, Titman, & Twite, 2012; Narayan & Narayan, 2013). We therefore cannot generalise results obtained from such estimations to both developed and emerging markets. For this reason, we chose

markets that have similar classifications and comparable level of development. Lastly, according to Kearney (2012), emerging financial markets are increasingly serving as avenues for investigation and re-examination of theories derived from developed markets.

Accordingly, this paper seeks to determine the aftermath of debt and equity market development in selected African countries on firms' capital structure decisions. This would enable us to ascertain the extent to which development of the debt and equity market has succeeded in promoting the use of either debt or equity, through alleviation of problems associated with the use of external finance. We therefore focus on countries classified as emerging and frontier economies in Africa¹. The classification is premised on their potential to become investment havens for international investors, who are seeking new investment opportunities and outlets to diversify their wealth to obtain higher returns.

The remainder of the paper is structured as follows. Section 2 presents an overview of financial market development in emerging and frontier markets in selected African economies. Section 3 reviews theoretical and empirical literature on financial market development and capital structure decisions. Section 4 describes the variables, sample selection, model and method of estimation. Section 5 presents the results and discussion of findings. Section 6 concludes with relevant policy implications drawn from the findings of the study.

2. Overview of Financial Market Development in Emerging and Frontier Markets in Africa

As postulated by the finance – growth literature, development of financial markets has a positive and significant effect on the economy (Beck & Levine, 2004; Djililov & Piesse, 2011; Levine, 2005; Zhang, Wang, & Wang, 2012). According to the proponents of this strand of literature, well-developed financial systems enhance economic growth, given the intermediary role played by financial markets. Theoretically, the financial markets through the intermediation role are able to reduce transaction and agency costs, provide ample liquidity to the system and alleviate information asymmetry issues, such as moral hazard and adverse selection (Murinde, 2012). Similarly, developed financial markets are able to create wealth and opportunities for efficient re-allocation of resources from lenders to borrowers, and establish a favourable environment for efficient risk diversification (Chami *et al.*, 2010). Prior to the introduction of the reforms, issues such as difficulty in the allocation of external resources for productive use and constraints in accessing external finance for investment purposes, were some of the problems encountered by firms (Beck, Maimbo, Faye, & Triki, 2011; Dahou, Omar, & Pfister, 2009). These issues affected a firm's decision to use either debt / equity as a source of external finance.

Accordingly, some of the African countries introduced reforms² to the financial system to develop the financial markets and promote growth, apart from reducing constraints encountered in the market due to market imperfections. The focus of this study is on equity and debt market development. In terms of debt, the paper focuses on the private debt market rather than the public debt (bond) market as the bond markets in Africa are underdeveloped. The developments in equity and debt markets (private debt) come under four headings as shown in Table 1.

Table 1. Summary of developments recorded in the banking sector and stock market in selected African countries

TYPE	RELATED DEVELOPMENT MEASURES
Ownership structure	<ul style="list-style-type: none"> ▪ Relaxation of foreign ownership of banks and investing in the stock markets³; ▪ Introduction of investor and creditor protection laws in both the banking sector and the stock market; ▪ Introduction of corporate governance codes; ▪ Privatization of state-owned banks; ▪ Bank consolidation exercise that lead to mergers and acquisitions⁴;

¹ Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa, Tunisia

² Most of the reforms were introduced in the 1990s (Murinde, 2012).

³ In Egypt, although the socialist reform policies of pre-nineties had negative effects on the financial markets, opening up the markets to foreign investors in 1990s succeeded in freeing up the markets with activities picking up.

⁴ For instance in Nigeria, commercial banks were required by law to increase the minimum capital from \$15 million to about \$192 million in 2004. These set in a series of mergers and acquisitions in order to meet up with the requirement. The banking consolidation exercise saw a reduction in the number of banks from 89 to 24 but with stronger capital base (www.cenbank.org).

TYPE	RELATED DEVELOPMENT MEASURES
Technology	<ul style="list-style-type: none"> ▪ Automation of trading platforms from manual based ones in the stock market ▪ Cross listing of shares across different stock exchanges¹
Manpower development	<ul style="list-style-type: none"> ▪ Investment in human capital development to acquire the requisite skills needed in the system
Bank / Stock Market Activities	<ul style="list-style-type: none"> ▪ Increase in the number of stock exchange in the continent² ▪ Increase in the value of stock market capitalization³ ▪ Adoption and implementation of Basel II framework in the banking sector

Source: Beck *et al.*, 2011; Bolbol, Fatheldin, & Omran, 2005; Mlachila *et al.*, 2013.

Consequent upon the development measures noted in Table 1, Table 2 shows the average values of selected banking sector and stock market development indicators, for the period 2003 to 2012 for the selected countries used in this study. A steady increase is observed in the indicators over the period. For instance, the banking sector development indicators showed an upward trend. A similar trend is recorded for stock market development, except for total number of listed domestic companies. This suggests that some level of success was achieved in developing the banking sector and the stock market.

Consequently and based on theoretical grounds, we expect these positive developments to significantly influence the way firms finance their investments using external finance (debt or equity), as discussed in the next section.

Table 2. Selected financial market development indicators in selected countries⁴
(Average statistics: 2003-2012)

YEAR	Banking sector development indicators			Stock market development indicators		
	Domestic credit to private sector by banks (%GDP)	Domestic credit provided by financial sector (%GDP)	Domestic credit to private sector (%GDP)	Market capitalization of listed companies (current US\$' million)	Stocks traded, total value (current US\$' million)	Listed domestic companies, total
2003	39.88	64.92	46.88	36,624	12,027	1,827
2004	40.57	66.44	48.46	60,854	19,174	1,633
2005	41.23	66.62	49.94	78,626	25,935	1,585
2006	41.28	65.11	51.24	101,921	42,116	1,461
2007	44.92	66.45	54.85	129,706	58,271	1,384
2008	48.10	67.19	55.88	80,044	57,404	1,288
2009	48.17	71.15	56.83	102,490	47,950	1,211
2010	46.23	72.16	55.71	97,563	44,061	1,114
2011	47.57	73.25	56.36	78,417	45,271	1,117
2012	49.05	77.48	58.58	90,907	38,041	1,111

Source: World Development Indicators, World Bank

3. Related Literature

This section is in two parts. The first part reviews theoretical literature on financial market development and capital structure while the second part covers relevant empirical literature.

¹ For example, the Johannesburg Stock Exchange (JSE) in South Africa has an agreement with the London Stock Exchange (LSE), which allows cross dealings between the two exchanges. The aim of this agreement is to open up the market and increase participation by outside investors in addition to injecting liquidity into the domestic market (www.jse.co.za)

² An increase from 5 in 1960 to 29 in 2012

³ Market capitalization of the 29 stock exchanges increased from \$250 billion to over \$1 trillion between 2002 and 2007.

⁴ Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia

3.1 Theoretical literature. Financial market development and capital structure

In the introductory section of this paper, we pointed out that the development of the financial markets, in addition to enhancing growth; also affect the financing decisions of firms in terms of rebalancing the capital structure. Corporate finance theory emphasizes the role of banks and stock markets in ameliorating information asymmetry and reducing transaction costs through the financial intermediary role. Well-developed markets are associated with low information gathering and transaction costs, which ease constraints encountered with the use of external finance (Beck & Levine, 2004; Levine, 2005). This affirms the earlier argument of Demircug-Kunt and Maksimovic (1996) that the developmental level of a country's financial market alters the capital structure of a firm when the firm optimises its financing option to reduce costs associated with taxes and other market imperfections. For this reason and as the market develops, the relative significance of the different imperfections changes, such that the firm issues only beneficial securities that eventually alter the capital structure.

Stock market development opens up opportunities for risk diversification and information aggregation that minimise moral hazard and adverse selection issues. This makes lending to firms less risky for investors and the firms are able to borrow more from the stock market. Furthermore, in developed markets, there is substitution of equity for debt financing (Demircug-Kunt & Maksimovic, 1996). The banking sector (debt market) helps to minimise problems that arise due to information asymmetry between debt holders and firms through close monitoring (Diamond, 1984). By closely monitoring borrowers, banks are able to gather useful information for market participants who incorporate this into their decision making process. Banking sector development also opens up alternative financing options for firms. This leads to increased debt availability that increases competition in the industry and ultimately lowers the costs of debt (Schmukler & Vesperoni, 2006). In addition, a firm's decision to take advantage of tax shield from debt financing also increases the level of debt usage (Fan *et al.*, 2012).

Theoretical literature on capital structure dates back to Modigliani and Miller (1958) with the capital structure irrelevancy theory. They argue that under perfect market conditions¹, the capital structure of a firm does not matter, i.e. the capital structure the firm adopts does not have any effect on the value of the firm. However, subsequent theoretical and empirical studies invalidate this line of argument. The invalidation is premised on the existence of transaction costs, agency costs and bankruptcy costs, amongst other costs, encountered by the firm in carrying out its day-to-day operations. From these studies, different theories of capital structure have been developed to explain the capital structure of firms. Notable among these theories are the trade-off theory, the pecking order theory and recently, the market timing theory. Nevertheless and despite the multitude of research on capital structure theory, it remains an unresolved issue that lies at the core of corporate finance and one that requires further work (Barclay & Smith, 2005).

The trade-off theory relaxes the assumptions of irrelevancy theory of capital structure. It posits that a firm tries to balance the tax advantage of debt against the associated costs (bankruptcy and financial distress costs). Furthermore, it assumes that a firm has a target debt ratio that it tries to achieve and subsequently makes adjustment towards this target. By so doing, optimal capital structure is achieved when the present value of the marginal benefits and marginal costs are equal (Frank & Goyal, 2003; Gungoraydinoglu & Oztekin, 2011; Myers, 1984; Shyam-Sunder & Myers, 1999). However, critics of the trade-off theory opine that in reality, adjustment costs make it difficult for a firm to have an optimal capital structure and that the theory overemphasises the benefit of debt financing (Jensen & Meckling, 1976; Myers & Majluf, 1984). For these reasons, Myers and Majluf (1984) came up with the pecking order theory.

With pecking order theory, the firm follows a hierarchical financing schedule. The firm uses retained earnings to fund its financing need as the first choice and where not sufficient, uses debt financing and equity finance as the last resort. This is because of the agency costs and information asymmetry associated with debt and equity finance, with the costs being higher in equity. The pecking order theory is also subject to criticism. Adedeji (1998) argued that it ignores the effects of factors such as interest rate, supplier of capital and government intervention on a firm's decision to use retained earnings, debt or equity. Cull and Xu (2005) put forth a similar view that cost of debt financing might be lower than cost of internal funds when monetary policy is introduced in an economy during periods of financial crisis. This motivates the firms to use debt finance rather than retained earnings. The points raised in these arguments imply that factors other than agency cost and information asymmetry are taken into consideration when firms choose the capital structure to adopt.

¹ These conditions include absence of tax, transaction costs, existence of perfectly rational investors and information is readily to all market participants.

The recently developed market timing theory is premised on firms issuing equity when the cost of issuance is favourable to the firm. Conversely, the firms use debt financing when cost of debt is favourable (Baker & Wurgler, 2002; Huang & Ritter, 2009). The underlying assumption of this theory is that firms examine the current conditions of the market (debt and equity) when financing is required and use one which is the most favourable. Celik and Akarim (2013) recently noted that this occurs more in inefficient and segmented markets where the debt / equity ratio of firms fluctuate with money and capital market movements. When conditions in both markets are not favourable, the managers delay issuance and if favourable, they raise funds, despite it not being required (Frank & Goyal, 2009). Supporting this view, Graham and Harvey (2001) reported that managers agree to have timed the market at one point of time.

The various theories suggest that firms take into consideration different factors before adopting a particular theory in explaining the capital structure choice.

3.2. Empirical evidence: Financial market development and capital structure decisions

Following the theoretical arguments, empirical studies that investigated the effects of financial market development on capital structure present a few contrasting results. Some of these studies found that developments in the debt and equity markets have statistically significant effects on capital structure, as argued within the theoretical context. For instance, Demircuc-Kunt and Maksimovic (1996), using aggregated firm-level data, examined the effects of stock market development on financing choices of firms in 30 developed and developing countries and found that it leads to the use of less debt in a firm's capital structure. This implies that as the stock market develops, firms use more equity financing. On the other hand, the study also found that firms use more debt financing as the banking sector develops i.e. development of the banking sector encourages the use of debt as a source of external finance.

In another study, Schmukler and Vesperoni (2006) examined the effects of financial globalization on firms' financing choices in Latin American and East Asian countries. They found statistically significant effects of financial market globalization on firms' financing choices. Specifically, they found that long-term debts increase when firms have access to international markets but decrease after financial liberalization in lesser-developed financial systems in Latin American countries.

Agarwal and Mohtadi (2004) reported findings similar to Demircuc-Kunt and Maksimovic (1996) in their examination of the role of financial market development on financing choices in 21 developing countries. Using firm-level aggregate data within a dynamic fixed effects model, they found that while equity market development encouraged the use of equity, banking sector development favoured the use of debt. In contrast, Bokpin (2009) in an investigation of the effects of macroeconomic development on capital structure decisions of firms, did not find any significant relationship between equity market and capital structure in a sample of 34 emerging market economies but found statistically significant evidence that development in the banking sector gave rise to use of more debt.

Recent empirical studies however indicate that development in the equity and banking sector, especially in emerging markets, might not always lead to the use of more equity or debt. For instance, Ađca, De Nicolò, and Detragiache (2013) investigated the effects of banking sector reforms on corporate leverage in 17 emerging market economies and found that following banking sector reforms, which improve banking supervision and credit allocation process, firms use less debt in their capital structure. They argue that the reforms lead to a tightening in the lending standards that result in higher cost of financing and thus a reduction in debt availability. González and González (2014) also analysed the impact of banking liberalization on debt structure in a sample of 37 developed and developing economies. They found a negative and statistically significant effect of bond market development on long-term debt. They attributed the negative effect to prevalence of adverse selection and moral hazard issues in the use of long-term debt.

The various empirical studies reviewed suggest that debt and equity market development alter the supply of finance to firms, leading to a change in the capital structure. Moreover, Mitton (2008) argued that changes in the supply of finance play a prominent role in capital structure decisions of firms. For this reason, we expect to see evidence of the effects of financial market development on capital structure decisions from a focused group of countries with similar institutional qualities, using recent data set for the analysis. A focused-country study, according to Fan *et al.* (2011), provides better data quality control than a cross-country study and enables examination of the detailed effects of important institutional factors on several issues, which might be difficult to separate in a cross-country study.

In this section, we give the description of variables used in the study, sample and summary statistics for the variables, model and estimation techniques employed in the study.

3.3. Variable Description

We select variables from previous capital structure studies. The main dependent variable leverage, which is our proxy for capital structure is ratio of book value of total debt¹ to book value of total assets, TD, (Ağca *et al.*, 2013; Fan *et al.*, 2012; Frank & Goyal, 2009). For the robustness test, we use the ratio of long-term debt to book value of total assets (LTD) as the dependent variable (Fan *et al.*, 2012; Frank & Goyal, 2009). The firm-specific variables include profitability (Prof), tangibility of assets (Tan), non-debt tax shield (Ndt), growth opportunity (Grw) and firm size (Size). Stock market development, proxied by stock market turnover ratio (Sto), measures the liquidity of the stock market while banking sector development, proxied by domestic credit to the private sector by commercial banks (Bcr) measures the size of the bank relative to the economy. This study differs from previous studies on the use of domestic credit to proxy development in the banking sector because it captures credit made available to the private sector and excludes government credit (Beck & Levine, 2004). Previous studies, such as Agarwal and Mohtadi (2004) and Bokpin (2009), used measures that do not exclude government credits e.g. broad money. We use two control variables in our estimation namely: inflation (Inf) and gross domestic product (GDP). Appendix A gives the detailed description of the variables.

3.4. Sample selection and summary statistics

The selection of the countries used for the study is premised on two criteria. The first is their classification as emerging and frontier markets in Africa. The basis for this classification lies on their growing importance as investment havens for potential international investors. The second reason stems from the fact that we are able to divide the countries into two legal origins² .i.e. English common law and French civil law. This enables us to determine whether legal origins have any effect on capital structure decisions of firms, following financial market development. Based on standard and previous studies on capital structure, the sample firms in the countries comprise non-financial firms that are active and listed on the domestic stock exchange of each country. Firms excluded are real estate firms, holding asset management companies and other regulated firms. The sample period is from 2003 to 2012 and is guided by the availability of data. Each firm has at least three years consecutive annual data to enable us to run the regression. The final sample consists of 599 firms³.

We obtain firm level data from Datastream while country level data is obtained from World Development Indicators. Table 3 presents the mean debt ratio for non-financial firms in the nine selected countries, which is further sub-divided into English common law countries and French civil law countries, using both total debt and long-term debt as leverage proxy. The ratios show that firms in English common law countries have higher mean debt ratio than those in French civil law countries suggesting that firms in the former countries use more debt than those in the latter. This suggestion is in line with the argument of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) that legal rules and the efficiency of its enforcement are better in English common law countries than in French civil law countries. They further contend that investors' attitude in providing funds for firms partly depends on the legal protection offered by the legal system. If the system is able to offer protection in ways that reduce agency problems; it then follows that investors would be willing to provide funds to the firms. Hence, the availability of more debt financing in English law countries.

Table 3 - Summary statistics

	TD	LTD	PROF	TAN	NDTS	GRW	SIZE	BCR	STO	INF	GDP
	All Countries										
Mean	0.189	0.094	0.083	0.351	0.037	0.068	13.59	0.908	0.383	0.073	0.043
Std. dev	0.224	0.094	0.369	0.302	0.035	1.967	2.449	0.551	0.199	0.044	0.023
Min	0	0	-	0	-0.001	-	0	0.111	0.016	0.009	-0.078

¹ It is argued that book value is less susceptible to fluctuations when compared to market values. In addition, it is a broader measure which includes total liabilities and ownership claims on firms (Matemilola *et al.*, 2012).

² Countries that follow the English common law include Botswana, Ghana, Kenya, Mauritius, Nigeria, South Africa, while those that follow the French civil law are Egypt, Morocco, and Tunisia.

³ Botswana-8, Egypt-132, Ghana-17, Kenya-37, Mauritius-24, Morocco-50, Nigeria-59, South Africa-244 and Tunisia-28. Further splitting into legal origins gives 389 firms for English common law and 210 for French civil law.

	TD	LTD	PROF	TAN	NDTS	GRW	SIZE	BCR	STO	INF	GDP
			17.642			122.798					
Max	1	1	1.850	6.705	0.688	6.619	20.190	1.675	0.643	0.262	0.150
English Common Law											
Mean	0.195	0.103	0.079	0.351	0.038	0.048	14.045	1.124	0.391	0.073	0.042
Std. dev	0.238	0.186	0.445	0.337	0.036	2.413	2.582	0.557	0.211	0.041	0.024
Min	0	0	-	0	0	-	0	0.111	0.016	0.014	-0.078
Max	1	1	17.642	6.705	0.688	122.798	20.189	1.675	0.643	0.262	0.150
French Civil Law											
Mean	0.178	0.078	0.089	0.351	0.036	0.106	12.713	0.484	0.366	0.073	0.047
Std. dev	0.193	0.131	0.117	0.219	0.033	0.169	1.878	0.133	0.172	0.049	0.019
Min	0	0	-0.864	0	-0.001	-0.969	6.498	0.291	0.062	0.009	0.019
Max	1	1	0.964	0.993	0.306	1.052	18.714	0.755	0.618	0.183	0.078

Source: Authors' computation from data obtained from DataStream and World Bank Development Indicators

Table 4 shows the trend in the mean of the two dependent variables (total debt ratio and long-term debt ratio) from 2003 to 2012. The values reported in the Table suggest a declining trend during the period of study. The correlation matrix reported in Appendix B shows the absence of multicollinearity.

Table 4. Trend in Total Debt and Long-term Debt Ratios (2003-2012)

Year	Total debt (TD)	Long-term debt (LTD)
2003	0.191	0.109
2004	0.211	0.127
2005	0.216	0.107
2006	0.196	0.093
2007	0.183	0.085
2008	0.186	0.087
2009	0.183	0.092
2010	0.173	0.086
2011	0.189	0.093
2012	0.179	0.088

Source: Author's computation from annual firm level data obtained from DataStream

4.3 Model and estimation technique

We make use of panel data because the study is a longitudinal one, which involves both cross-sectional and time series data. Longitudinal studies relate information about objects over time (Gujarati & Porter, 2009). Some of the advantages put forward for using panel data include handling issues related to heterogeneity of data, treatment of omitted variables, reducing the likelihood of collinearity among independent variables and allowance for a dynamic study of the unit of interest¹.

Consequently, leverage is modelled as a function of various firm-specific variables, financial market development variables and some macroeconomic variables as control variables. Following Antoniou, Guney, and Paudyal (2008), we include a one-period lagged leverage as an explanatory variable to take care of the dynamic nature of the estimation in Eq. (1)

$$Y_{it} = \alpha_0 + \alpha_1 Y_{i,t-1} + \sum_{k=1} \gamma^k X_{k,it} + \mu_i + \eta_t + \varepsilon_{it} \quad (1)$$

¹ Baltagi (2008) provides further explanation on the use and advantages of panel data.

In Eq. (1), Y_{it} is the measure of leverage for firm i in year t , X is a vector of k explanatory variables (firm-specific, financial market development and macroeconomic), μ_i is the time invariant unobservable firm specific fixed effects, η_t is time specific effects, α_0 and α_1 are coefficients to be estimated and ε_{it} is the time varying error term.

Flannery and Hankins (2013) noted that most corporate finance studies e.g. capital structure, have data sets that are sometimes made up of unbalanced panels and explanatory variables that have serial correlation and endogeneity issues. In addition, they point out that the use of firm fixed effects in controlling unobserved time invariant differences across firms to understand capital structure decisions leads to a biased estimate of the coefficients in a dynamic panel model. This implies that estimating Eq. (1) with either ordinary least squares method (OLS) or the generalised least squares method (GLS), consisting of fixed effects and random effects methods, yield inconsistent and biased estimates. Hence, we use the generalised method of moments (GMM) instrumental variable approach developed by Hansen (1982), and which was further improved by Arellano and Bond (1991); Arellano and Bover (1995) and Blundell and Bond (1998). GMM is more efficient than the other methods because it takes care of the problems arising from OLS and GLS methods. In addition, we consider GMM to be a better estimation technique due to the nature of our sample and data. The panel data is unbalanced with short time dimension and large sample size. Furthermore, Antoniou *et al.* (2008) argues that GMM models are robust to issues of non-normality and heteroskedasticity.

In order to eliminate time-invariant fixed effects and the omitted variable bias, Arellano and Bond (1991) suggest transforming Eq. (1) by first differencing the regressors. This process sets up a system of equations where the instruments used for each equation are different. The instruments used consist of suitable lagged levels of the endogenous and strictly exogenous variables. This technique is known as the difference GMM. As the lagged levels provide little information about the first differenced variable especially if they are serially correlated, Arellano and Bover (1995) and Blundell and Bond (1998) suggest using the lagged first differences as instruments in addition to the first differencing of Arellano and Bond (1991). This technique, known as the system GMM, uses the levels equation to obtain two equations; one at differences and the other at levels. This creates more instruments that could be used in the estimation. The variables in levels in the second equation are instrumented by their own first differences. This process increases the efficiency of the estimation. However, because of the additional instruments created by the system GMM, it might be inappropriate for use with a small sample size (Mileva, 2007), such as the one in this study. For this reason, we estimate Eq. (1) using the two-step difference GMM.

To confirm the validity of our results, we report the Sargan / Hansen test for the joint validity of instruments. The null hypothesis is that the instruments are exogenous as a group and valid only if the null is not rejected. We also report the Arellano and Bond test for autocorrelation, AR(1) and AR(2), which both follow a normal distribution $N(0,1)$ with a null hypothesis of no autocorrelation. Arellano and Bond (1991) contend that instruments are valid only in the absence of no second order serial correlation in the residuals. We employ STATA software in analysing the data.

5. Results and discussion

We estimate Eq. (1) using the two-step difference GMM with three different models. Table 5 reports coefficient estimates and results of the diagnostics tests. Model 1 consists of firms in the nine countries, Model 2 has firms in countries that use the English common law code and Model 3 consists of firms in the French civil law countries.

Table 5 - Two-step difference generalised method of moment's estimates

	Full Sample (1)	English Common law (2)	French Civil Law (3)
TD _{it-1}	0.4414***	0.3620**	0.3612**
Prof	-0.0092 (0.0203)	-0.0324 (0.0214)	-0.1631* (0.0838)
Tan	0.1777*** (0.0673)	0.1649* (0.0872)	-0.0676 (0.0632)
Ndts	-0.4960* (0.2655)	-0.3261 (0.3199)	-0.7309*** (0.2705)
Grw	0.0046***	0.0257***	0.1888***

	(0.0036)	(0.0059)	(0.0601)
Size	0.0169 (0.0241)	0.0139 (0.0339)	0.0056 (0.0083)
Bcr	-0.0698** (0.0336)	-0.0548** (0.0439)	0.1511*** (0.0482)
Sto	-0.0033 (0.0341)	0.0448 (0.0731)	-0.0152 (0.0227)
Inf	-0.0010 (0.0628)	0.0133 (0.0805)	-0.0861 (0.0713)
GDP	-0.1760** (0.0895)	-0.1365 (0.1015)	-0.0272 (0.1252)
AR(1) (p-value)	-3.06 (0.002)	-2.17 (0.030)	-1.40 (0.162)
AR(2) (p-value)	-0.65 (0.513)	-1.42 (0.156)	1.02 (0.306)
Hansen (p-value)	33.15 0.192	34.90 (0.141)	33.65 (0.176)
No. groups	587	377	206
No. instruments	38	38	38
Wald chi ²	2.62***	5.43***	5.74***
No. Observations	3441	2212	1145

Note: Dependent variable is TD. Standard errors robust to heteroskedasticity and small sample bias are in parenthesis. AR(1) and AR(2) refers to first and second order serial correlation of residuals respectively. The Wald statistics test the joint significance of estimated coefficients. *, **, *** denotes statistical significance at 10%, 5% and 1% respectively.

The result for the full sample (column 2) showed that bank credit to the private sector has a statistically significant and negative effect on leverage ratio at 5% significance level while stock market turnover ratio does not have any effect on the leverage ratio, despite the development measures put in place. In relation to firm-specific variables, both tangibility of assets and growth opportunity have statistically significant and positive effect on leverage ratio while non-debt tax shield has a statistically significant and negative effect. GDP equally has a statistically significant and negative effect on leverage.

Dividing the full sample into English common law and French civil law countries, we found that for firms in countries whose legal system follow the English common law, bank credit has a statistically significant and negative effect on leverage ratio while stock market turnover ratio does not have any effect. Tangibility of assets and growth opportunity both have positive and statistically significant effect on leverage ratio. Contrary to the results in the full sample and English common law countries, for firms in French civil law countries, bank credit to the private sector has a positive and statistically significant effect on leverage ratio. Firm-specific variables such as profitability and non-debt tax shields have negative and statistically significant effect on leverage ratio. Growth opportunity is seen to have a positive and statistically significant effect.

The result of the AR(2) test in the three models shows the absence of second order serial correlation while the Hansen test indicates that the instruments used are valid since we are unable to reject the null hypothesis of instrument exogeneity. The positive and significant coefficients of the one period lagged leverage suggest that capital structure decision is a dynamic process which further strengthens our argument for the inclusion of the lagged leverage variable.

Table 5 presents some interesting findings with respect to the effects of financial market development on capital structure decisions. The results are in contrast to Agarwal and Mohtadi (2004) findings that development of the debt and equity markets leads to increase in the use debt and equity financing, respectively in emerging markets. On the contrary, our results show that banking sector development has a negative and significant effect on the use of debt financing by firms in both the full sample and in English common law countries while stock market development has no effect on the capital structure choice of firms in the three models. This lends empirical support to the declining trend observed in Table 4.

The negative and significant coefficients of the banking sector development variable suggest that development of the banking sector brought about a decrease in the use of debt as source of external finance. Theoretically, banking sector development is expected to lower agency cost, transaction costs and reduce information asymmetry, resulting in an increase in debt availability and use (Demirguc-Kunt & Maksimovic, 1996). Though the results are contrary to theoretical literature, they are consistent with findings in Ağca *et al.* (2013) and González and González (2014) who presented similar results. Ağca *et al.* (2013) argued that banking sector reforms led to increased efficiency in bank risk management and supervisory functions. This improved the standard of lending and tightened the lending process resulting to better pricing of risks, thus reducing the amount of debt used by firms due to higher transaction costs. On the other hand, González and González (2014) based their argument on moral hazard and adverse selection issues that are associated with the use of long-term debt. They noted that developments in the banking sector worsened lending relationship, which in turn increased information asymmetry problems and reduced the use of debt. We had discussed earlier in Section 2, the various market development measures that were introduced in these markets. These include increased and improved corporate governance policies and staffing in the various markets with personnel who have the requisite skills. This suggests that these measures contributed to the increased efficiency in risk management and supervision.

Our finding that banking sector development leads to reduced use of debt by firms in English common law countries is also in contrast with La Porta *et al.* (1998)'s view that the use of debt as a source of external finance by firms should be more in countries where the legal system has English origins. Our results may be due to increased risk management efficiency and supervision in these countries as argued in the preceding paragraph. We also interpret the negative relationship to be due to higher information asymmetry associated with the use of long-term debt, as argued by González and González (2014).

However the results in column 3 (French civil law) is in line with the theoretical view that banking sector development leads to an increase in leverage ratio i.e. the firms in these countries use more debt as the banking sector develops. This finding suggests that developments in the banking sector in these countries lead to reduction in cost of debt financing and information asymmetry problems, resulting in increased debt availability and use for firms that need external financing. This finding is also consistent with the findings of Agarwal and Mohtadi (2004) and Bokpin (2009) of an increase in debt availability and use following banking sector development.

Consistent with the pecking order theory, growth opportunity is seen to have a positive and statistically significant effect on leverage in the three models. This suggests that if a growing firm's retained earnings is not enough to finance its investments, it would use debt finance rather than equity due to the higher information asymmetry and agency costs associated with equity finance. The significant and negative coefficient of GDP similarly implies the pecking order theory. Frank and Goyal (2009) argue that expansion in the economy leads to cash retention by firms that they use to finance investments. Furthermore, an upward trend in past profits reduces agency problems between managers and investors. These two factors lead to the use of less debt and further strengthen our selection criteria, that is, this group of countries has been experiencing growth in their various economies, hence, the renewed investors' interest in them. The negative and statistically significant effect of profitability in Model 3 also suggests the presence of the pecking order theory for firms in countries that follow French civil law. This implies that firms prefer to finance investments with retained earnings rather than external finance. As pointed out by Antoniou *et al.* (2008), the ability of firms to retain earnings depends on their profitability. In other words, the more profits a firm makes, the more earnings it could retain to finance investments whose net present values (NPV) are positive. Consequently, the firm has a lower debt ratio. Similar results were obtained by Antoniou *et al.* (2008) and Frank and Goyal (2009).

Some studies show that theories of capital structure need not be mutually exclusive because they find evidence of more than one theory explaining capital structure decisions (Antoniou *et al.*, 2008; De Haan & Hinlopen, 2003; Hovakimian, Opler, and Titman (2001). Likewise, results in Table 5 also show evidence of the trade-off theory as seen in the positive effect of asset tangibility (full sample and English common law countries) and negative effect of the non-debt tax shields (full sample and French civil law countries) in the full sample. All the three variables are statistically significant. The positive effect of asset tangibility implies that the more tangible assets a firm has, that serve as collateral for a loan, the more debt the firm would employ in its capital structure. This is because the market value of tangible assets is usually higher than that of intangible assets at times of bankruptcy and hence lenders face reduced risks. This finding is consistent with the findings of Antoniou *et al.* (2008) and Frank and Goyal (2009). In the case of non-debt tax shield, our findings align with the argument of DeAngelo and Masulis (1980) that tax deduction from depreciation serves as an alternative for the benefits

derived from tax savings because of using debt finance. This sheds more light on the inverse effect of non-debt tax shield on leverage ratio and implies that firms with low amount of non-debt tax shield have a higher debt level and vice-versa.

The non-significance of stock market variable may also suggest that managers are not keen on diluting the ownership structure of the firm and prefer to raise external finance from banks than issue equity.

To ascertain the robustness of our results, we use long-term debt as a ratio of total assets in Eq. (1) as the dependent variable and re-estimate the equation. The results are not quantitatively different from those obtained in Table 5 and show that banking sector development has a negative and statistically significant relationship with leverage¹.

Conclusion

Pursuant to several financial market development measures put in place by emerging and frontier markets in Africa, this study investigates the extent to which these measures have been successful in achieving the desired objective of easing access to either the debt or equity market. To carry out this investigation, we use the two-step difference GMM estimation technique on firm level and macroeconomic data from 599 firms in nine selected African countries, for the period 2003 to 2012. Our findings reveal that despite the financial reform measures introduced in the equity market, the use of equity as source of external finance does not have any effect on capital structure. Banking sector development on the other hand is significant and inversely associated with capital structure decision, as proxied by the leverage ratio for firms in the full sample and those in English common law countries. However, for firms in French civil law countries, banking sector development has a positive effect on the use of debt. The study also finds evidence of both the trade-off and pecking order theory of capital structure.

Given the inverse relationship of banking sector development with the use of debt, we suggest that policy makers put in place measures that not only increase and ease a firm's access to debt finance but that ensure that the cost is affordable, as the main objective of developing the market is to promote the use of debt. At the same time, they should introduce measures that would reduce information asymmetries and improve lending relationship. We also recommend that policy makers review stock market development measures to enable them to distinguish between the effective and non-effective ones, so that the equity market serves as an alternative source of long-term finance for firms. Future research could build on the limitations of this study. Firstly, it is difficult to generalize the findings to single country studies hence future research could investigate country specific effects. Secondly, the study did not take into account industrial classification of the firms that affect the level of debt in a firm's capital structure. Future studies could examine the extent industrial classification of firms affect the level of debt, following banking and equity market development.

References

- [1] Abor, J., & Biekpe, N. 2009. How do we explain the capital structure of SMEs in Sub-Saharan Africa?: Evidence from Ghana. *Journal of Economic Studies*, 36(1): 83-97. <http://dx.doi.org/10.1108/01443580910923812>
- [2] Adedeji, A. 1998. Does the pecking order hypothesis explain the dividend payout ratios of firms in the UK? *Journal of Business Finance & Accounting*, 25(9-10):1127-1155.
- [3] Agarwal, S., Mohtadi, H. 2004. Financial markets and the financing choice of firms: evidence from developing countries. *Global Finance Journal*, 15(1), 57-70. <http://dx.doi.org/10.1016/j.gfj.2003.10.004>
- [4] Ağca, Ş., De Nicolò, G., Detragiache, E. 2013. Banking sector reforms and corporate leverage in emerging markets. *Emerging Markets Review*, 17(0), 125-149. doi: <http://dx.doi.org/10.1016/j.ememar.2013.08.003>
- [5] Akinlo, O. 2011. Determinants of capital structure: Evidence from Nigerian panel data. *African Economic and Business Review*, 9(1), 1-16. <http://dx.doi.org/10.1177/097215091201300301>
- [6] Antoniou, A., Guney, Y., Paudyal, K. 2008. The determinants of capital structure: Capital market-oriented versus bank-oriented institutions. *Journal of Financial and Quantitative Analysis*, 43(1): 59-92. <http://dx.doi.org/10.1017/S0022109000002751>

¹ Not shown here but available from the authors on request

- [7] Arellano, M., & Bond, S. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2): 277-297.
- [8] Arellano, M., & Bover, O. 1995. Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1): 29-51.
- [9] Baker, M., Wurgler, J. 2002. Market Timing and Capital Structure. *The Journal of Finance*, 57(1): 1-32.
- [10] Baltagi, B. 2008. *Econometric analysis of panel data* (4th ed.). Chichester: Wiley.
- [11] Barclay, M.J., Smith, C.W. 2005. The capital structure puzzle: The evidence revisited. *Journal of Applied Corporate Finance*, 17(1): 8-17.
- [12] Beck, T., Levine, R. 2004. Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance*, 28(3), 423-442. [http://dx.doi.org/10.1016/S0378-4266\(02\)00408-9](http://dx.doi.org/10.1016/S0378-4266(02)00408-9)
- [13] Beck, T., Maimbo, S. M., Faye, I., Triki, T. 2011. *Financing Africa : Through the crisis and beyond*. Washington, DC: World Bank. <http://dx.doi.org/10.1596/978-0-8213-8797-9>
- [14] Blundell, R., & Bond, S. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1): 115-143.
- [15] Boateng, A. 2004. Determinants of capital structure: Evidence from International joint ventures in Ghana. *International Journal of Social Economics*, 31(1/2): 56-66. <http://dx.doi.org/10.1108/03068290410515411>
- [16] Bokpin, G. A. 2009. Macroeconomic development and capital structure decisions of firms: Evidence from emerging market economies. *Studies in Economics and Finance*, 26(2): 129-142. <http://dx.doi.org/10.1108/10867370910963055>
- [17] Bolbol, A. A., Fatheldin, A., Omran, M. M. 2005. Financial development, structure, and economic growth: The case of Egypt, 1974–2002. *Research in International Business and Finance*, 19(1): 171-194. <http://dx.doi.org/10.1016/j.ribaf.2004.10.008>
- [18] Celik, S., & Akarim, Y. D. 2013. Does market timing drive capital structure? Empirical evidence from an emerging market. *International Journal of Economics and Financial Issues*, 3(1): 140-152.
- [19] Chami, R., Fullenkamp, C., Sharma, S. 2010. A framework for financial market development. *Journal of Economic Policy Reform*, 13(2): 107-135. <http://dx.doi.org/10.1080/17487871003700804>
- [20] Cull, R., & Xu, L. C. 2005. Institutions, ownership, and finance: The determinants of profit reinvestment among Chinese firms. *Journal of Financial Economics*, 77(1): 117-146. <http://dx.doi.org/10.1016/j.jfineco.2004.05.010>
- [21] Dahou, K., Omar, H. I., & Pfister, M. 2009. *Deepening African financial markets for growth and investment*. Paper presented at the Ministerial Meeting and Expert of the NEPAD-OECD Africa Investment Initiative.
- [22] De Haan, L., Hinloopen, J. 2003. Preference hierarchies for internal finance, bank loans, bond, and share issues: evidence for Dutch firms. *Journal of Empirical Finance*, 10(5), 661-681. [http://dx.doi.org/10.1016/S0927-5398\(03\)00010-0](http://dx.doi.org/10.1016/S0927-5398(03)00010-0)
- [23] De Jong, A., Kabir, R., & Nguyen, T. T. 2008. Capital structure around the world: The roles of firm-and country-specific determinants. *Journal of Banking & Finance*, 32(9): 1954-1969. <http://dx.doi.org/10.1016/j.jbankfin.2007.12.034>
- [24] DeAngelo, H., & Masulis, R. W. 1980. Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, 8(1): 3-29.
- [25] Demirguc-Kunt, A., & Maksimovic, V. 1996. Stock market development and financing choices of firms. *World Bank Economic Review*, 10(2): 341-369.
- [26] Diamond, D. W. 1984. Financial intermediation and delegated monitoring. *The Review of Economic Studies*, 51(3), 393-414.
- [27] Djalilov, K., & Piesse, J. 2011. Financial development and growth in transition countries: A study of central asia. *Emerging Markets Finance & Trade*, 47(6): 4-23. <http://dx.doi.org/10.2753/REE1540-496X470601>

- [28] Fan, J., Titman, S., & Twite, G. 2012. An International comparison of capital structure and debt maturity choices. *Journal of Financial and Quantitative Analysis*, 47(1): 23-56. <http://dx.doi.org/10.1017/S0022109011000597>
- [29] Fan, J.P.H., Wei, K.C.J., Xu, X. 2011. Corporate finance and governance in emerging markets: A selective review and an agenda for future research. *Journal of Corporate Finance*, 17: 207 - 214. <http://dx.doi.org/10.1016/j.jcorpfin.2010.12.001>
- [30] Flannery, M.J., Hankins, K.W. 2013. Estimating dynamic panel models in corporate finance. *Journal of Corporate Finance*, 19(0), 1-19. <http://dx.doi.org/10.1016/j.jcorpfin.2012.09.004>
- [31] Frank, M. Z., & Goyal, V.K. 2003. Testing the pecking order theory of capital structure. *Journal of Financial Economics*, 67(2): 217-248.
- [32] Frank, M.Z., & Goyal, V.K. 2009. Capital structure decisions: which factors are reliably important? *Financial Management*, 38(1): 1-37.
- [33] González, V.M., González, F. 2014. Banking liberalization and firms' debt structure: International evidence. *International Review of Economics & Finance*, 29(0): 466-482. <http://dx.doi.org/10.1016/j.iref.2013.07.008>
- [34] Goyal, V.K., Lehn, K., & Racic, S. 2002. Growth opportunities and corporate debt policy: the case of the U.S. defense industry. *Journal of Financial Economics*, 64(1): 35-59. [http://dx.doi.org/10.1016/S0304-405X\(02\)00070-3](http://dx.doi.org/10.1016/S0304-405X(02)00070-3)
- [35] Graham, J.R., Harvey, C. R. 2001. The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, 60(2): 187-243.
- [36] Gujarati, D., Porter, C. Dawn 2009. *Basic Econometrics* (Fifth ed.): The McGraw-Hill, New York, USA.
- [37] Gungoraydinoglu, A., Oztekin, O. 2011. Firm - and country -level determinants of corporate leverage: Some new international evidence. *Journal of Corporate Finance*, 17: 1457 - 1474. <http://dx.doi.org/10.1016/j.jcorpfin.2011.08.004>
- [38] Gwatidzo, T., Ojah, K. 2009. Corporate capital structure determinants: Evidence for five African countries. *African Finance Journal*, 11(1): 1-23.
- [39] Hansen, L.P. 1982. Large sample properties of generalized method of moments estimators. *Econometrica*, 50(4): 1029-1054.
- [40] Hovakimian, A., Opler, T., Titman, S. 2001. The debt-equity choice. *Journal of Financial and Quantitative Analysis*, 36(1): 1-24.
- [41] Huang, R., Ritter, J.R. 2009. Testing theories of capital structure and estimating the speed of adjustment. *Journal of Financial and Quantitative Analysis*, 44(2): 237-271. <http://dx.doi.org/10.1017/S0022109009090152>
- [42] Jensen, M.C., Meckling, W.H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4): 305-360.
- [43] Kearney, C. (2012). Emerging markets research: Trends, issues and future directions. *Emerging Markets Review*, 13(2): 159-183. <http://dx.doi.org/10.1016/j.ememar.2012.01.003>
- [44] La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. 1998. Law and finance. *Journal of Political Economy*, 106: 1113-1155. <http://dx.doi.org/10.1086/250042>
- [45] Levine, R. 2005. Finance and growth: theory and evidence. *Handbook of economic growth*, 1: 865-934. [http://dx.doi.org/10.1016/S1574-0684\(05\)01012-9](http://dx.doi.org/10.1016/S1574-0684(05)01012-9)
- [46] Matemilola, B., Bany-Arifin, A., Azman-Saini, W. 2012. Financial leverage and shareholder's required returns: Evidence from South Africa corporate sector. *Transition Studies Review*, 18(3): 601-612. <http://dx.doi.org/10.1007/s11300-012-0214-x>
- [47] Mileva, E. 2007. *Using Arellano-Bond dynamic panel GMM estimators in Stata*. Economic Department, Fordhan University. Retrieved from <http://www.fordhan.edu/economics/mcleod/ElitzUsingArellano%E2%80%9393BondGMMEstimators.pdf>

- [48] Mitton, T. 2008. Why have debt ratios increased for firms in emerging markets? *European Financial Management*, 14(1): 127-151. <http://dx.doi.org/10.1111/j.1468-036X.2007.00430.x>
- [49] Mlachila, M., Dykes, D., Zajc, S., Aithnard, P.-H., Beck, T., Ncube, M., Nelvin, O. 2013. *Banking in Sub-Saharan Africa; Challenges and opportunities*. Luxembourg: European Investment Bank.
- [50] Modigliani, F., Miller, M.H. 1958. The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3): 261-297.
- [51] Murinde, V. 2012. Financial development and economic growth: Global and African evidence. *Journal of African Economies*, 21(suppl 1), i10-i56. <http://dx.doi.org/10.1093/jae/ejr042>
- [52] Myers, S.C. 1984. The capital structure puzzle. *The Journal of Finance*, 39(3): 574-592.
- [53] Myers, S.C., Majluf, N.S. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13: 187-221.
- [54] Narayan, P.K., Narayan, S. 2013. The short-run relationship between the financial system and economic growth: New evidence from regional panels. *International Review of Financial Analysis*, 29: 70-78. <http://dx.doi.org/10.1016/j.irfa.2013.03.012>
- [55] Salawu, R.O., Agboola, A.A. 2008. The determinants of capital structure of large non-financial listed firms in Nigeria. *The International Journal of Business and Finance Research*, 2(2): 75-84.
- [56] Schmukler, S.L., Vesperoni, E. 2006. Financial globalization and debt maturity in emerging economies. *Journal of Development Economics*, 79(1): 183-207. <http://dx.doi.org/10.1016/j.jdevco.2004.12.006>
- [57] Shyam-Sunder, L., Myers, S. 1999. Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics*, 51(2): 219-244.
- [58] Zhang, J., Wang, L., & Wang, S. 2012. Financial development and economic growth: Recent evidence from China. *Journal of Comparative Economics*, 40(3): 393-412. <http://dx.doi.org/10.1016/j.jce.2012.01.001>

Appendix A - Variable Description

VARIABLE	VARIABLE DEFINITION	RELATED LITERATURE
Dependent variables		
Total debt (TD)	Book value of total debt to book value of total assets	Ağca <i>et al.</i> , 2013; Fan <i>et al.</i> , 2012; Frank and Goyal, 2009
Long-term debt (LTD)	Long-term debt to book value of total assets	Fan <i>et al.</i> , 2012; Frank and Goyal, 2009
Firm Specific Variables		
Profitability (Prof)	Operating income divided by total assets	Antoniou <i>et al.</i> , 2008; Fan <i>et al.</i> , 2012; Frank and Goyal, 2009
Asset Tangibility (Tan)	Net fixed assets divided by book value of total assets	Antoniou <i>et al.</i> , 2008; Fan <i>et al.</i> , 2012; Frank and Goyal, 2009
Non-Debt Tax Shield (Ndots)	Depreciation divided by book value of total assets	Antoniou <i>et al.</i> , 2008; Fan <i>et al.</i> , 2012; Frank and Goyal, 2009
Growth Opportunity (Grw)	Capital expenditure divided by book value of total asset	Goyal, Lehn, & Racic, 2002
Firm Size (Size)	Natural logarithm of sales	Antoniou <i>et al.</i> , 2008; Fan <i>et al.</i> , 2012; Frank and Goyal, 2009
Financial Market Development Variables		
Banking sector development (Bcr)	Domestic credit to the private sector by commercial banks divided by GDP	Beck and Levine, 2004; Beck <i>et al.</i> , 2008
Stock market development (Sto)	Value of traded shares for the period divided by the average market capitalization for the period	Agarwal and Mohtadi, 2004; Beck <i>et al.</i> , 2008
Control Variables		
Inflation (Inf)	Annual change in the consumer price index expressed as percentage	Fan <i>et al.</i> , 2012
Gross domestic product (GDP)	Annual growth rate of gross domestic product of a country expressed as percentage	Frank and Goyal, 2009

Appendix B - Correlation Table

	TD	prof	tan	Ndots	Grw	LTD	Sto	Bcr	Inf	Gdp	Size
TD	1.000										
Prof	-0.107***	1.00									
Tan	0.124***	0.035**	1.000								
Ndots	0.100***	0.010	0.211***	1.000							
Grw	-0.013	0.033**	0.071***	0.035**	1.000						
LTD	0.778***	-0.109***	0.139***	0.099***	-0.006	1.000					
Sto	-0.042***	-0.024*	-0.131***	-0.048***	0.001	0.0312**	1.000				
Bcr	0.006	-0.035**	-0.144***	0.020	-0.006	0.108***	0.437***	1.000			
Inf	-0.019	0.032**	0.112***	-0.089***	0.001	-0.060***	-0.053***	-0.423***	1.000		
gdp	0.017	0.023	0.060***	0.020	-0.014	-0.040***	-0.245***	-0.378***	0.163***	1.000	
Size	0.010	0.164***	0.120***	0.040**	0.034**	0.005	-0.034**	0.061***	0.047***	-0.025*	1.000

The Dependency of E-Market Seller Reputation on Buyers Behaviour

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Abstract:

Electronic market trust building mechanisms and related issues are commonly discussed topics in which identity identification and trust issues play a significant role in buyer behaviour. Current related research papers have identified several types of trust building mechanisms that vary in complexity. Almost all studies placed reputation mechanisms on the first place as the most trust generating mechanisms currently used on e-marketplaces. This paper captures partial results from a larger study on procurer's behaviour on e-markets that provide reputation mechanism in a form of rating and historical transactions information. Main objective of this paper is to identify the role of sellers' reputation affecting the procurers purchase behaviour. Analysis is based on data gathered by experimental approach based on Design of Experiment using a web based platform. Hypothesis testing is based on statistical and econometrical approach and also on data mining tools.

Keywords: reputation, trust, e-markets, sellers, decision tree.

JEL Classification: M15, O33.

1. Introduction

Despite the globalization trends, fast information transfer and availability of information sources is the business buyer seller relation in most cases characterised by a certain degree of information asymmetry, while it is usual that better knowledge and information about the quality of goods and services lies on the seller's side (Mishra *et al.*, 1998; Vajda *et al.*, 2009). In electronic markets where the physical interaction is replaced by almost anonymous electronic means can the information asymmetry lead often to seller's opportunistic behaviour.

Opportunistic behaviour on electronic markets has mostly the form of unexpected shipment delays caused on the seller's side, undelivered goods against payment or other frauds not respecting the contract conditions. Concerns about such practices can lead to buyers mistrust in on-line products and services, and so become a threat to e-markets in general (Choi *et al.*, 1997; Jarvenpaa *et al.*, 2000). All these undesirable practices increase buyers costs especially for hedging purposes (Šoltés and Rusnáková, 2013) and can also increase mistrust in e-markets.

Relatively early after the „boom“ in electronic commerce was the lack of trust identified as one of the most important barriers in usage of e-markets (Lee and Turban, 2001; Kuller, 2005; Delina and Dráb, 2010; Bálint, Bucko and Vejačka, 2012).

2. Trust building mechanisms – reputation systems

Trust is considered as the belief or expectation in positive business partner behaviour on one side and as the vulnerability and uncertainty in this partner on the other side.

Mostly two components of trust are identified: benevolence and credibility. Benevolence is a goodwill trust of the seller to act honestly in a situation without previous historical interactions and the positive buyer's belief in seller's honesty even in an opportunistic situation. Credibility is the seller's ability, reliability and competency to carry out the transaction. Most complex definition of trust related to electronic environment is described by Delina (2009) who state, that trust is objectively and subjectively quantified faith of trustee in certain degree of competence, honesty, security and reliability of the other entity or in third entity within the specific context build on the basis of historical activities and functions of the environment.

Trust building process especially on electronic markets is very complex and difficult. Several authors (Delina, Vajda and Bednár, 2007; Delina and Dráb, 2010; Ba and Pavlou, 2002; Pavlou and Dimoka, 2006) stated that those can be achieved by implementation of relevant functionalities of electronic environment – so called trust building mechanisms. Among these mechanisms were identified: quality of provided information, certificates,

references, reputation mechanisms, online dispute resolutions, escrow services, standardization and contracts execution support.

Quality of provided information is one of the most important trust building mechanisms. According to several studies carried out by Pavlou and Dimoka (2006), Ba and Pavlou, (2002), Resnick, Zeckhauser, Swanson and Lockwood (2006), Delina (2009) and other are reputation mechanisms considered as the most trust generating mechanisms currently used on e-marketplaces Delina and Dráb (2010). According to a congenial IT provider several weaknesses of these reputation mechanisms on eProcurement B2B marketplaces were identified. They stated that rating mechanisms at company level are only short time trust building boosters, but later rating becomes only a control mechanism for opportunistic behaviour prevention (Dráb, 2011). Nevertheless electronic auction platforms for general public (for example eBay, Aukro or Amazon) have already implemented in procurement process components of reputation mechanisms at various levels of complexity. Business to business electronic procurement platforms however implement or use these mechanisms to a very limited extent.

The most of the studies in the field of reputation mechanisms focus on impact of seller rating on the purchased goods prices and on purchase probability. All these studies are based on data obtained from auction platform eBay, which is a C2C market (customer to customer) and B2C (business to customer). Resnick *et al.* (2006) in his study investigated the impact of seller's rating on the level of price premium, which Pavlou and Dimoka (2006) for electronic market define as the amount of money above the average price that was reached by other sellers providing completely identical product in a certain period on the same market. They confirmed that the market rewarded sellers with high rating better than the sellers unrated, respectively rated negative. The average difference in this assessment was 8.1 %. Other studies like Livingston (2002), Eaton (2002) or Jin and Kato (2004) analysing relation between purchasing price and seller's rating have identified positive correlation between price and rating. Problem of these studies is usage inconsistent data.

In business to business B2B commerce are companies facing risk of costs increase from unfair practices (uncollectible claims), that can often lead to sellers or buyers insolvency (Andrejovská, 2013). Trust and implementation of trust building mechanisms enable companies to decrease these costs. In the current B2B markets and e-procurement markets usage of these mechanisms is only in very limited extent and therefore there is an absence of studies concentrated on how reputation mechanisms impact on procurement price and probability of contract realization. Also there is an absence of analyses focusing on impact of reputation mechanisms on buyers' behaviour within the seller selection process. Considering these facts, this paper is concentrated on impact analysis of reputation mechanisms on procurement process and on buyers' decisions within electronic procurement.

This paper analyses how rating, price and historical transaction evidence affects procurers behaviour in seller selection process. This paper should clarify the research question if procurers' eSkill or previous experience does have an impact on his decisions, and so does have an impact on a seller's price premium. What are the key reputation mechanism values of a successful seller, or what rules to follow to achieve a purchase?

3. Methodology of research

According to findings mentioned above it's obvious that the reputation mechanisms on any online marketplace do play a significant role in building trust and can affect the price creation. This paper focuses on identification of behaviour model of procurers participating on eProcurement electronic market.

Two main scientific questions were assessed in this paper:

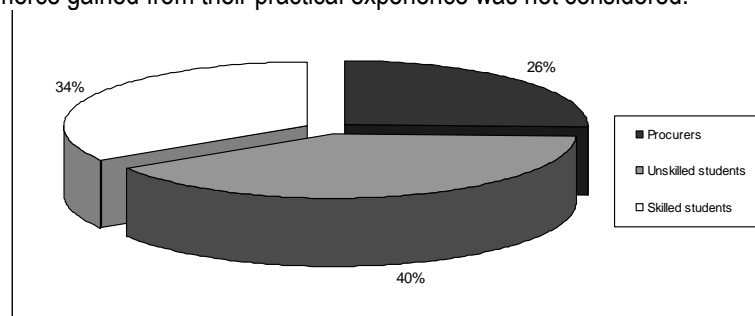
1. *Procurers' eSkills or previous experiences do have an impact on their decisions and so have an impact on a seller's price premium.*
2. *What are the key reputation mechanism values of a successful seller, or what rules to follow to achieve a purchase?*

To accomplish these objectives a controlled experimental game using a theoretical online marketplace with various sellers characterized by several factors including rating, historical transactions and price was performed. The platform for controlled experiment was a theoretical electronic market where only identical product can be provided by many various sellers. These sellers were assigned by five randomized factors, according to the design of experiment (DOE) methods. Using these methods a set of sellers with these factors grouped into six-member groups was created. For experiment execution a sequential approach was used. Procurers in each sequel were asked to sort available sellers from the best to the worst according to their individual preferences. Data was than recorded into a SQL database after each round.

To obtain relevant and comparable results related also to perceived respondents' eSkills three separate groups of experiment respondents were used in three parallel experiments. First respondent database (A) consisted of procurers and procurement division employees of private and public sector. An assumption of their higher eSkill and rich procurement experiences was expected. Private sector respondent should be aware of fraud probabilities, or they should already have their own purchasing model or strategy that they will apply. These strategies are usually highly affected by the situation and information available. A very significant role by these decisions plays the role of trust represented in this research by reputation mechanism and historical evidence. On the other hand respondents from public sector mainly in Slovakia are bound by the law when entering public procurement and therefore can stick to the lowest price rule. To support this claim a future more detailed research could be carried out.

To compare these results according to eSkills and previous experience two other respondent groups were involved (B and C). Second group (B) of respondents consisted of university students in the field of finance, banking and investment who already have passed exams on subjects regarding ecommerce, therefore it was assumed that they already possess knowledge regarding electronic markets and issues related to trust and reputation mechanisms. Those respondents should behave according to theory and act with awareness of rating and historical transaction evidence.

Last database consisted of university students that have not passed subjects related to ecommerce yet. For this group an assumption of mostly low price strategy application was set. With some degree of their knowledge about ecommerce gained from their practical experience was not considered.



Source: Authors

Figure 1. Groups of respondents

This experiment is a combination of comparative and screening experiment such as: identification of an ordered set of sellers (comparative part) and identification of the most influencing factors that affected the ordering (screening part).

At the experimental electronic marketplace each seller is characterised by 5 factors: internal rating, external rating, internal historical transactions evidence, external historical evidence and price.

Reputation mechanisms in this experiment consisted of two rating types constructed as internal and external rating. Those rating types are described below and were properly introduced for each participant at the beginning of the experiment:

- *Internal rating* represents the current respondent's satisfaction with the past experiences of the current seller. It is assumed that this rating was assigned to the current seller in the past by the respondent currently making the decision. The set of possible values of this rating is 0, 5-10 where 5 is the worst, 10 is the best and 0 means that this seller is a newcomer on the market with no rating.
- *External (global) rating* represents market (other procurers, buyers) satisfaction with past experiences with the current seller. This rating was assigned by other market participants. Range of this variable is same as for the internal rating
- Historical transactions evidence is also divided into two parts, internal and external transactions.
- *Internal transaction* evidence represents the amount of past transaction made between current respondent and current seller. Due to simplicity of the experiment is the range of this variable set to a scale of three, while the 0 represents zero transactions, 1 represents the range 1 to 10 transactions and 2 represents more than 10 past transactions.
- *External transaction* evidence represents the historical amount of all past transactions made on current market. Also the range of this variable is the same as for the internal transactions; with the change that 1 represents interval from 1 to 30 transactions and 2 represents more than 30 past transactions.

Price - purchasing price is a unique factor and is represented as an amount of fictional currency that has to be paid for the goods. For the experiment simplification 5 different price levels were used. Base price was set to 100, and other 4 prices are increased by 5, 10, 15 and 20 %.

In accordance with the DOE methodology randomised block design (RBD) for variable assignment was used. Each of the specified factors had a pre-set range of values and to ensure randomisation of all possible combinations a random section of all 720 unique factor combination was performed.

For execution of the experiment a web platform based on php and sql database was used. Data gathering and execution of the design was sequential. To each respondent was shown 48 sellers, 6 in each round, in total of 8 rounds. This was set to limit the least number of participants. As mentioned above 3 separated experiments with 3 different respondent groups were run.

To each of the logged in procurers a random set of 6 anonymised sellers randomly sorted from 1 to 6 was shown. Procurers were in each from 8 rounds asked to sort these sellers from best (the one he would buy from) to worst one by drag and dropping them into the specified order. After his decision he approved the order and moved to next round with another set of sellers. Using this approach it can be easily stated the order preference between any two of the six sellers in a round. Altogether 131 respondents from private sector took part at the experiment and altogether 3736 sellers were ordered.

For hypothesis testing methods of higher statistics were used. To test the significance of relationships between the represented rating and probability of successful purchase nonparametric tests like Kruskal-Wallis test were used. All those tests were performed in SPSS with corresponding pre-testing of preliminary hypotheses conditions.

To determine the core set of rating and historical evidence values of a successful seller a decision tree was used. Decision trees are the most popular classification methods for their simplicity and easy interpretation of discovered knowledge. A decision tree is described by these properties:

- an intermediate node represents current attribute (or group of attributes),
- a Leaf node represents one of the classes,
- an edge represents a test on the attribute (or group) from the parent node.

Only one node from two intermediate nodes can pass those tests. Decision trees are constructed based on objects from training set. New objects, which class is unknown proceed through the tree from the root node through individual edges based on test results and result in one of the leaf node. Value of this node so classifies "new" objects based on its classification. Decision rules can be easily derived from the decision tree. For each leaf node easily one rule set can be derived. Conditional part of those rules is a conjunction of edges tests of the path leading from the root node to a corresponding leaf node (Paralič, 2003). The decision tree was created using SPSS Clementine and C50 method.

4. Data analysis and results of research

Experiment described above was running for 3 months to access the subjects from private and public sector. All the gathered data were screened and pretreated for testing and datamining using specified software. At the first place the assumption of significant differences in behaviour of procurers with different eSkills and experiences was tested. In accordance with the methodology it was assumed that respondent groups' different eSkills and experiences will result in different behaviour patterns. This assumption was tested using nonparametric Kruskal–Wallis test. Results of this test are show in Table 1.

Table 1. Results of nonparametric test

Test Statistics a,b	
	Order
Chi-Square	60,870
df	9
Asymp. Sig.	,000
a. Kruskal Wallis Test	
b. Grouping Variable: Group	

Source: Authors, computation in SPSS

Chi-Square is the squared value of the difference between group's order average and total average, while the group's frequencies are the wages. P-value is close to zero, therefore the null hypothesis of equal means can be rejected, and assumed that a significant difference between groups does exist.

Price premium is according to Pavlou and Dimoka (2006) defined as the difference between purchasing price and the average market price of purchased good. When constructing the experimental platform a more simple approach to price premium was adapted. Price premium according to the experiment conditions is the difference between the purchasing price and the minimal price in the set of the 6 sellers. When analysing the differences in price premium the same approach as for the previous part was used. Descriptive statistics for price premiums as a percentage is provided in Table 2.

Table 2. Statistics for price premiums

		Price premium A	Price premium B	Price premium C
N	Statistic	402	606	540
MINIMUM	Statistic	-5,1493	-6,5842	-5,3889
MAXIMUM	Statistic	14,8507	13,4158	14,6111
MEAN	Statistic	4,626819	3,374546	4,527767
	Std. Error	,3458332	,2852126	,3012905
STD. DEVIATION	Statistic	6,9339331	7,0210979	7,0013582

Source: Authors, computation in SPSS

What rules to follow to achieve a purchase?

Second part of this analysis is focused on crucial values identification of reputation mechanisms that had to be met to execute a purchase (to be ordered on first place). For this part a datamining tool called SPSS Clementine was used. These results are part of a larger analysis. Each respondent has sorted sellers from the best one to the worst, and so the best seller can be easily identified. Objective of this part is to identify the crucial values of these sellers.

For decision tree execution several parameters had to be defined as those for inputs and for outputs from the model. Condition for decision tree type C5.0 is a discrete value of output variable – which is in this case met, because order is ordinal, therefore discrete value. Input variables can be all types of variables. This type of decision tree were applied on all three databases. Results were interpreted as a graphical interpretation of decision tree and for the C5.0 type tree also as a rule set that has to be met to pass through the nodes. The decision tree for the first database (respondents from private and public sector) is illustrated on the next picture (Figure 2).

All the nodes that were identified by the C5.0 model correspond to the econometric model carried out in previous research. As the first node used to split the decision edges C5.0 model identified the purchase price (in the picture above described as CENA). Second most important node was internal rating. When using an econometric model approach it is difficult to order the significance of identified independent variables. In this case a clear precedence of price information and internal rating can be seen. From a tree it is quite difficult to identify the key values for order 1, therefore a rule set using the same algorithm C5.0 was created.

Rule set for order 1 declares what sellers conditions have to be met for a successful purchase at a specified confidence level (probability of correct classification). Rules for ORDER = 1 - contains 3 rule(s) for database A

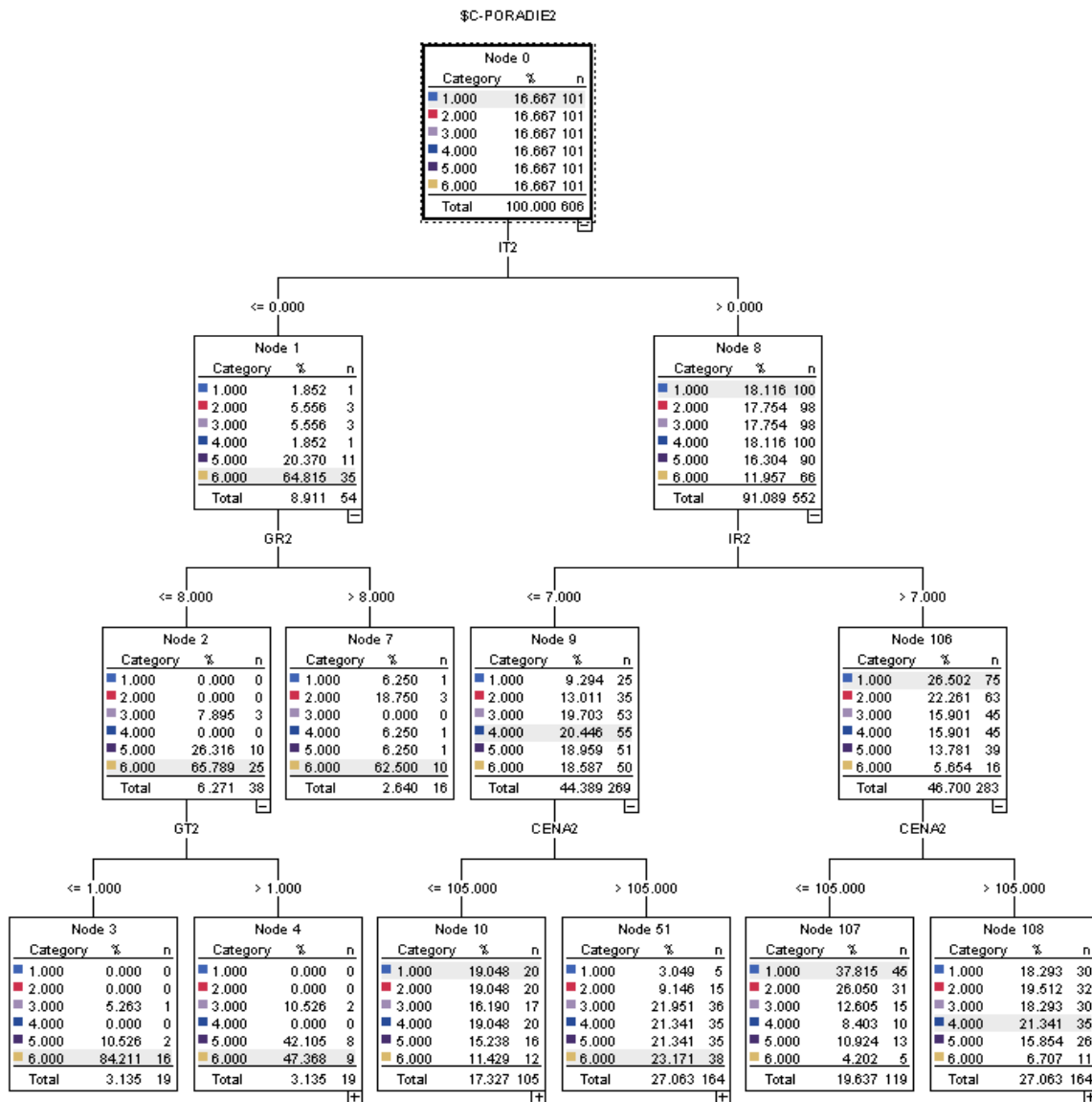
Table 3. Rules for order – database A

RULE NUMBER	RULE CONDITIONS	
Rule 1 for 1.0 (4; 0,667)	if PRICE = 110.0 and GR > 7 and IR > 9 and IT = 2.0	Then Order = 1
Rule 2 for 1.0 (80; 0,439)	if PRICE = 100.0	Then Order = 1
Rule 3 for 1.0 (56; 0,362)	if IR > 9	Then Order = 1

Source: Authors, computation in SPSS

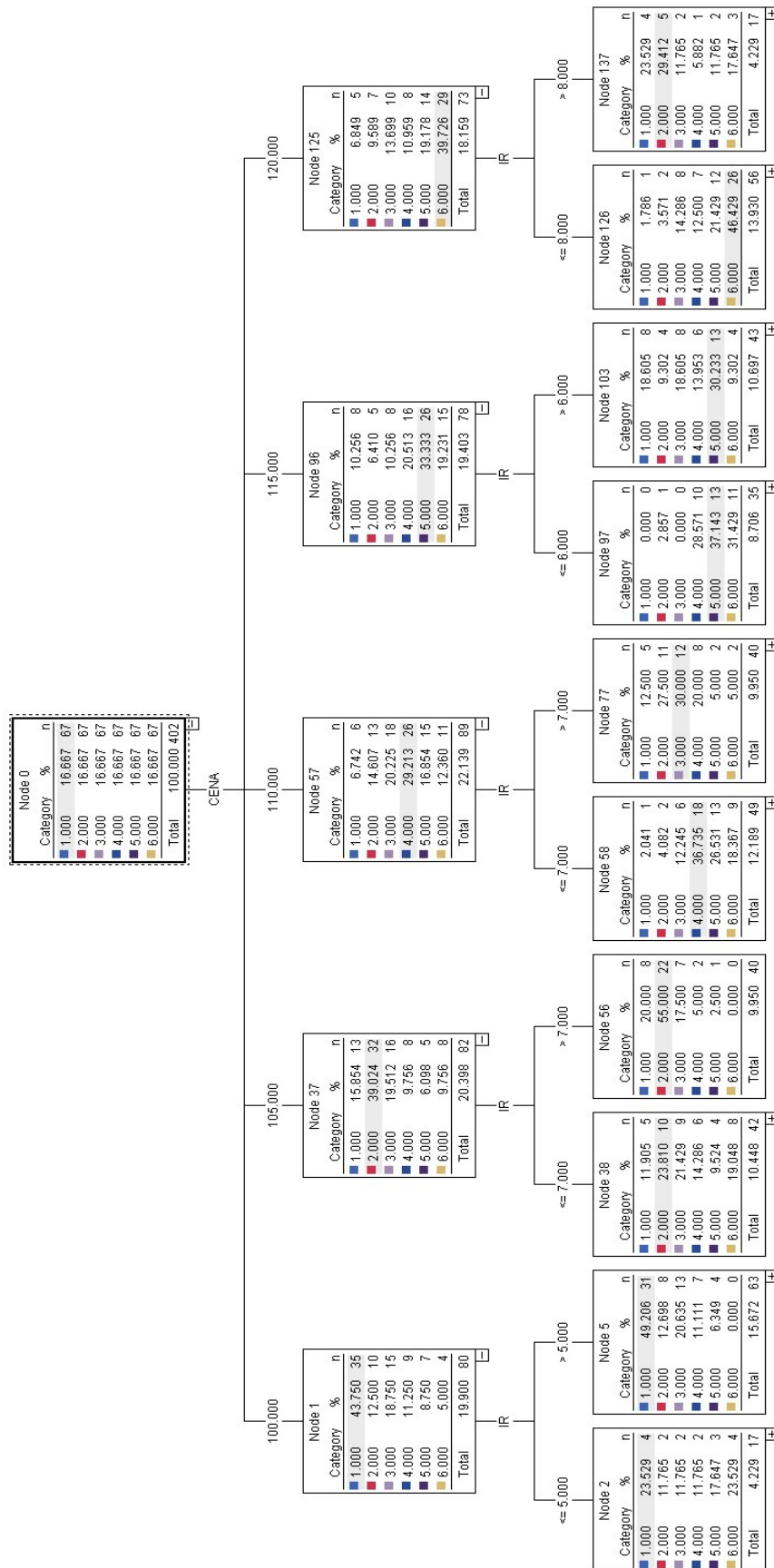
Rule no. 2 shows that 80 sellers ranked 1 were classified regarding their price (100), which was the minimal price in six sellers set. This rule directly indicates that price was in this case the most important trigger for purchase. Remaining two rules include also other expected factors that affected the purchasers' decisions. Rule no. 3 with a frequency of 56 indicates that the second most important factor for triggering a purchase is internal rating (IR) that is higher than 9. Assumption of high significance of internal rating is also supported by the rule no. 1 which has the highest confidence level. In this rule also external rating (GR) and historical transaction evidence was identified as a rule for classification.

Similar analysis using the datamining software SPSS for tree and rule identification in remaining two databases was used. In the next picture (Figure 3), the most significant variables for classification and rules identification in the skilled respondents' database are presented.



Source: Authors, computation in SPSS

Figure 3. Decision tree for database B



Source: Authors, computation in SPSS

Figure 2. Decision tree for database A

From the decision tree an interesting first classification node can be seen. The C5.0 algorithm used the historical transaction evidence as the first classifier. Based on the methodology and experiment settings, sellers with internal historical evidence below 0 (current purchaser never did any contract with current seller) had also the internal rating value equal 0, therefore the tree branch from this node could be considered as explorative (or can serve as a analysis for markets with simple rating types, such as global aggregated values (GT2)). On the second level was external historical transactions evidence and internal rating identified as the classification nodes. Price in this database is at the third tree level.

Rules for ORDER = 1 - contains 7 rule(s) for database B

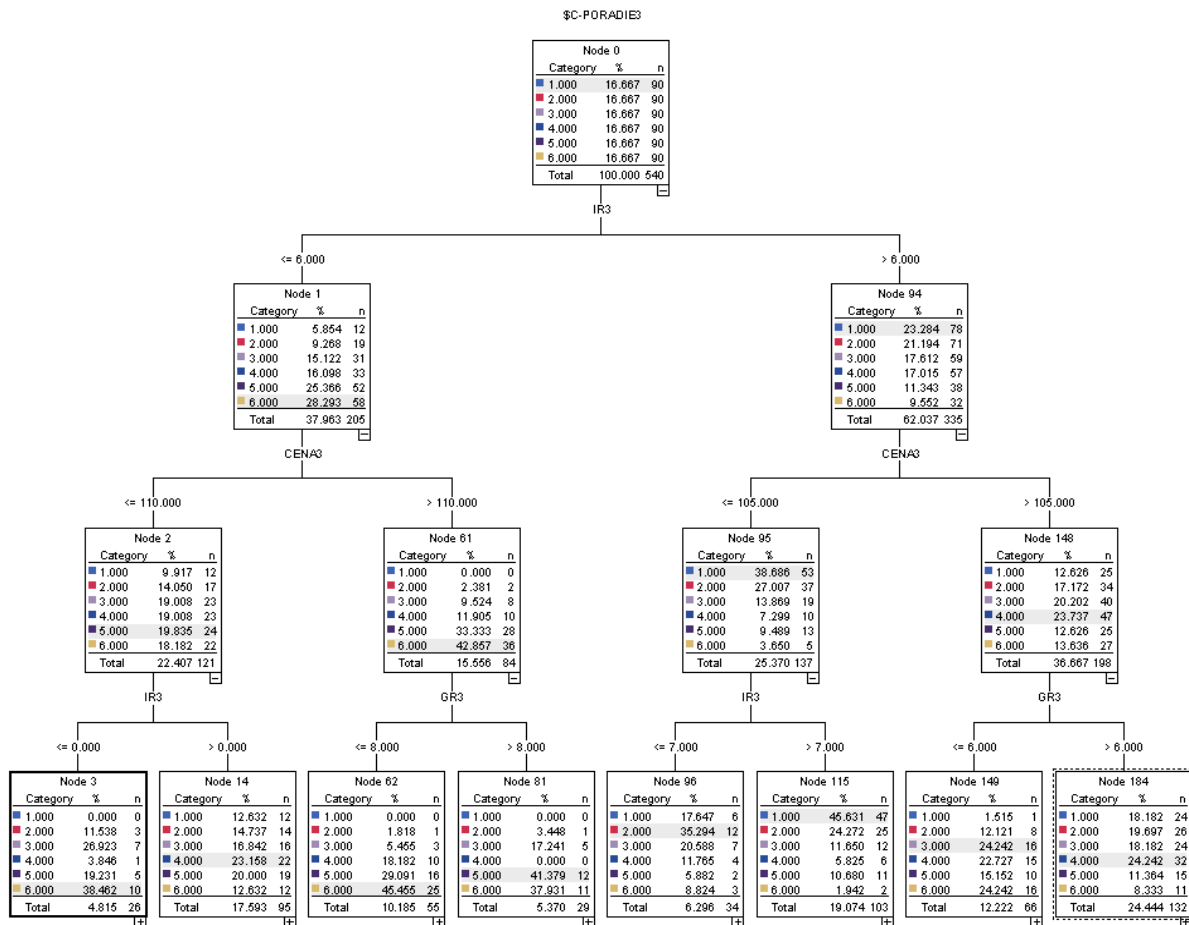
Table 4. Rules for order – database B

RULE NUMBER	RULE CONDITIONS	
Rule 1 for 1.0 (8; 0,6)	if CENA2 <= 100 and GR2 > 7 and GR2 <= 8 and IT2 > 1	Then Order = 1
Rule 2 for 1.0 (13; 0,6)	if CENA2 <= 105 and GR2 > 9 and IR2 <= 7 and IT2 > 1	
Rule 3 for 1.0 (59; 0,443)	if GR2 > 6 and IR2 > 9	
Rule 4 for 1.0 (35; 0,432)	if CENA2 <= 105 and GR2 > 6 and GT2 > 1 and IT2 > 1	
Rule 5 for 1.0 (40; 0,405)	if GT2 <= 1 and IR2 > 9	
Rule 6 for 1.0 (24; 0,385)	if CENA2 > 105 and CENA2 <= 110 and GT2 > 1 and IR2 > 7 and IT2 <= 1	
Rule 7 for 1.0 (552; 0,182)	if IT2 > 0	

Source: Authors, computation in SPSS

All together 7 rules were identified for sellers' to be ordered as no. 1 in procurement process. The highest frequency, but lowest confidence has the rule no.7 that corresponds to the left tree branch as described above. Again the strongest rules for this database (no. 1 and no. 2) are based on minimal prices, but both of these rules include also reputation mechanism values. From all other rules a clear precedence of reputation mechanisms is seen. For a more complex conclusion a detailed analysis of all possible rules should be carried out.

Situation in database for respondents' without skills (database C) is described in the next decision tree (Figure 4). In this case was the same approach of C5.0 model used.



Source: Authors, computation in SPSS

Figure 4. Decision tree for database C

Surprisingly the decision tree with its first node at first level neglects the assumption that unskilled respondents, with no previous experiences would tend to lowest price strategy. Internal rating was identified as the first node, therefore can be considered as the most significant factor. At the second level both branches are split according to PRICE values. Price being the second level node still suggests that lowest price in this case has its significance. External rating is identified at the third level of the tree. Rule set for this respondents' database was generated in the same approach as for the other. In this database 11 rules were identified.

Rules for ORDER = 1 - contains 11 rule(s) for database C

Table 5. Rules for order – database C

RULE NUMBER	RULE CONDITIONS
Rule 1 for 1.0 (7; 0,778)	if CENA3 ≤ 100 and GR3 > 7 and GT3 > 1 and IR3 > 7 and IT3 ≤ 1
Rule 2 for 1.0 (2; 0,75)	if CENA3 ≤ 100 and GR3 > 7 and IR3 > 0 and IR3 ≤ 5 and IT3 ≤ 1
Rule 3 for 1.0 (6; 0,75)	if CENA3 ≤ 100 and GR3 > 6 and IR3 > 5 and IR3 ≤ 6 and IT3 > 1
Rule 4 for 1.0 (10; 0,75)	if CENA3 ≤ 100 and GT3 ≤ 1 and IR3 > 7

Then Order = 1

RULE NUMBER	RULE CONDITIONS
	and IR3 <= 9 and IT3 <= 1
Rule 5 for 1.0 (9; 0,727)	if CENA3 <= 100 and IR3 > 9 and IT3 > 1
Rule 6 for 1.0 (8; 0,7)	if CENA3 <= 105 and GR3 <= 5 and IR3 > 7 and IR3 <= 8
Rule 7 for 1.0 (7; 0,667)	if CENA3 <= 100 and GR3 > 8 and IR3 > 6 and IR3 <= 7
Rule 8 for 1.0 (19; 0,667)	if CENA3 > 100 and CENA3 <= 105 and GR3 > 8 and IR3 > 7
Rule 9 for 1.0 (7; 0,667)	if CENA3 > 105 and GR3 > 9 and IR3 > 6 and IR3 <= 7
Rule 10 for 1.0 (20; 0,591)	if CENA3 > 100 and CENA3 <= 105 and GR3 > 7 and IR3 > 8
Rule 11 for 1.0 (19; 0,476)	if CENA3 > 105 and CENA3 <= 110 and GR3 > 6 and GT3 > 1 and IR3 > 6

Source: Authors, computation in SPSS

The high diversity in respondents' answers could be the reason of high number of identified rules. In all rules for this database some type of rating does play a role. As a conclusion, in this database can be stated that the high diversity in respondents' preferences could result into many different and hard interpretable rules, although the graphical tree showed a clear preference in internal rating. From the rules above can be indirectly deduced a general rule that the highest probability for a seller to be ordered as no. 1 should be his Price between 100 and 110 units, global rating higher than 7 and internal rating higher than 6.

Discussion and conclusion

The role of trust does play a significant role in any business contractation phase. Trust on electronic markets can be supported by several trust building mechanisms from which reputation mechanisms were identified as the most significant. In this research socio-economic aspects of reputation mechanisms based on controlled experiment were analysed. Assumption that different eSkills of three respondents groups can have an impact on their behaviour when performing procurement was tested. Differences in sellers' ordering by these groups showed to be significant. Also differences in price premiums of these groups were identified. Although the descriptive statistics do showed some differences, the statistical test could not prove that. Comparing to research results in Resnick *et al.* (2006) research a 50 % lower average price premium was identified (4.3 %). This could be the result of respondent characteristics, and the construction of the experiment. A more detailed analysis and changes in the experiment could reveal other interesting relations.

The second part of this paper was focused on identification of the most important factors from reputation mechanisms or price using a decision tree and a rule set generation. This analysis supported the assumption that rating as a reputation mechanism does affect the sellers probability for a successful purchase, and that it can also affect the final purchasing price. Both, the decision tree and rule set identified several factors among reputation mechanisms and price in all three databases. These results support the dominant role of reputation mechanisms. From both methods an indirect implication for sellers can be deduced: more than 75% of successful sellers had their price in the lower 25 percentile, global and internal rating better than 6, and had historical transactions between 1 and 10.

Results from this research can be used as a base for reputation mechanisms implementation in public procurement systems and setup of these systems. Reputation mechanisms serve also as a control mechanisms

on specified electronic markets. Other settings, or trust building mechanisms influence on purchasing price or purchase probability can be the topic of authors' next research.

References

- [1] Andrejovská, A., (2013). Meta-analysis combining cluster analysis and multidimensional scaling-categorisation of sings of the European Union countries' insolvency, *Journal of Applied Economic Sciences*, 8(4): 416-425.
- [2] Ba, S., Pavlou, P.A., (2002). Evidence of the Effect of Trust Building Technology in Electronic Markets: Price Premiums and Buyer Behavior, *MIS Quarterly*, 26(3): 243-268. <http://dx.doi.org/10.2307/4132332>
- [3] Bálint, T., Bucko, J., Vejačka, T. (2012). Trust in Enterprise Networking: an Agent-Based Approach, in: *IDIMT-2012: ICT Support for Complex Systems: 20th Interdisciplinary Information Management Talks*: Jindřichův Hradec, Sept. 12-14, 2012, Česká republika - Linz: TraunerVerlag, 2012 pp. 347-354.
- [4] Delina, R. (2009). *Reputation building for electronic marketplaces*, *Ambient Intelligence Perspectives*, 1: 66-72. Available online at: http://books.google.sk/books?id=u8AU_YSRVfUC&printsec=frontcover&dq=Ambient+Intelligence+Perspective
- [5] Delina, R., Dráb, R. (2010). Socio-ekonomické aspekty budovania dôvery na elektronických obchodných platformách, *E +M Ekonomie a management*, 13(4): 110-121.
- [6] Delina, R., Vajda, V., Bednár, P. (2007). *Trusted Operational Scenarios, Deliverable D1.2 of Project IST-FP6-026476 SEAMLESS*, Available online at: <http://mpra.ub.uni-muenchen.de/20243/>
- [7] Dráb, R. (2011). Economical Aspects of Reputation Mechanisms on Electronic Markets, *IDIMT-2011: Interdisciplinarity in complex systems: 19th interdisciplinary information management talks*, Linz: Johannes KeplerUniversität, pp. 329-340.
- [8] Choi, S.Y., Stahl, D.O., Whinston, A.B., (1997), *The Economics of Electronic Commerce*, MacMillan Publishing Company, Upper Saddle River, NJ.
- [9] Eaton, D.H. (2002). *Valuing Information: Evidence from Guitar Auctions on eBay*. Murray, KY, Murray State University: Available online at: <http://campus.murraystate.edu/academic/faculty/david.eaton/workpaper0201.pdf>
- [10] Jarvenpaa, S.L., Tractinsky, N., Vitale, M. (2000). *Consumer Trust in Internet Stores*, in: *Information Technology and Management*, 1(1-2): 45-71.
- [11] Jin, G.Z, Kato A. (2004). *Consumer Frauds and the Misinformed: Evidence from an Online Field Experiment*, University of Maryland. Available online at: <http://www.glue.umd.edu/~ginger/research/ebay-Jin-Kato-Feb04.pdf>
- [12] Kuller, E. (2005). *Trust barriers for the B2B e-market places*. Available online at: <http://www.emarketservices.com/clubs/ems/prod/Trust%20barriers.pdf>
- [13] Lee, M., Turban, E.A. (2001). Trust Model for Consumer Internet Shopping. *International Journal of Electronic Commerce*, 6(1): 75-91.
- [14] Livingston, J. (2002). *How Valuable is a Good Reputation? A Sample Selection Model of Internet Auctions*, University of Maryland, Available online at: <http://www.wam.umd.edu/~kth/reputation1.pdf>, <http://dx.doi.org/10.1162/0034653054638391>
- [15] Mishra, D.P., Heide, J.B., Cort, S.G. (1998). Information Asymmetry and Levels of Agency Relationships, *Journal of Marketing Research*, 35(3): 277-295, <http://dx.doi.org/10.2307/3152028>
- [16] Paralič, J. (2003). *Objavovanie znalostí v databázach*. 1.vyd. Košice: Elfa.
- [17] Pavlou, P.A., Tan, Y., Gefen, D. (2003). The Transitional Role of Institutional Trust in Online Interorganizational Relationships, *Proceedings of the 36th Hawaii International Conference on System Scienced (HICSS'03)*, Big Island, Hawaii, 6.-9. January, 2003. IEEE Computer Society, pp.10. <http://dx.doi.org/10.1109/HICSS.2003.1174574>

- [18] Pavlou, P.A., Dimoka, A. (2006). The Nature and Role of Feedback Text Comments in Online Marketplaces: Implications for Trust Building, Price Premiums, and Seller Differentiation, *Information System Research*, 17(4): 392-414, <http://dx.doi.org/10.1287/isre.1060.0106>
- [19] Resnick, P., Zeckhauser, R., Swanson, J., Lockwood, K. (2006). The value of reputation on eBay: A controlled experiment, *Experimental Economics*, 9(2): 79-101. <http://dx.doi.org/10.1007/s10683-006-4309-2>
- [20] Šoltés, V., Rusnáková, M. (2013). Hedging against a price Drop Using the Inverse Vertical Ratio Put Spread Strategy Formed by Barrier Options, *Inžinerine Ekonomika- Engineering Economics*, 24(1): 18 – 27, <http://dx.doi.org/10.5755/j01.ee.24.1.3505>
- [21] Vajda, V., Sabol, T., Baumann, O., Delina, R., Dráb, R., Hil'ovská, K., Mlynárčik, P. (2009). Identifikácia súčasných a očakávaných potrieb firiem voblasti informačných a komunikačných technológií v regióne východného Slovenska, 1. vyd., Košice : TU, 2009. s. 121.

On The Impact of the Concentration and the Share of Foreign Banks in Banking Assets on Selected Ratios in the Polish Banking Sector

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Abstract:

This paper presents the analysis of yearly data between 2003 and 2012 from the Polish banking sector. The impact of changes in the concentration of the banking industry and the share of foreign banks in banking assets on loan rates, costs and efficiency of the banking sector is analysed.

Keywords: concentration in the banking industry, interest rates, share of foreign banks in banking assets, Poland.

JEL Classification: E43, G21.

1. Introduction

The Polish banking sector is quite young one. Poland has been a member of the European Union since 2004, whereas, before 1989 the country had been under communist regime. As a result, the banking sector [similar to the one in capitalist economies] was developing intensively in 1990s.

At first, many new banks were created. However, they had too little capital. Moreover, the competition from foreign banks was high. As a result, after a short period mergers and takeovers started. Banks' structure became more adequate towards market expectations and benefits from economies of scale took place. Between 1993 and 2004 there were over 43 mergers. In 1993 most of the banking assets were controlled by domestic investors. In 2004 - by the foreign ones (Drachal, 2014a; Kokoszcyński, 2011; Kraciuk, 2006; Pawłowska, 2003; Stępień, 2004).

It is interesting to consider two aspects of banking sector: its concentration and the share of foreign investors. Both aspects have their advantages and disadvantages. Concentration can lead to more efficient use of capital, increase in innovations, ability to diversify capitals, etc. On the other hand, market structure becomes closer to oligopoly. This can result in worsening the consumers' position.

High share of foreign banks in the banking sector can lead to better loan rates, acceleration in the credit action and the intensification of the flow of know-how. On the other hand, it can also increase the risk. Moreover, foreign investors might rather exploit the country than invest in it. It is also worth to mention that, in case of the U.S. and the European Union; during the last ten years it has been observed that the number of banking institutions decreases, whereas the concentration ratios in the banking sectors increase (Świetlik, 2012).

Therefore it seems interesting to consider how changes in the concentration and in the share of foreign banks in banking sectors affect selected factors on the Polish market (Drachal, 2014b). Especially, that these topics are currently being discussed and there is no common opinion. Some other arguments are given, for example, by Piotrowski (2012) and Bartol and Rapkiewicz (2013).

2. Literature review

The literature connected with a topic such as consolidation is wide, especially in case of the U.S. market. The literature connected with the presence of foreign banks on the domestic market is also wide. It can be concluded that concentration of the banking sector influences: costs, banking sector efficiency, credit terms, interest rates, etc. On the other hand, the presence of foreign banks on the domestic market influences mainly loan rates and competitiveness of the sector.

For example, Micek (2002) states that the main benefits, which banks gain from consolidation processes are: gain in efficiency, reduction of costs, access to new markets, increase their share on the current market, better access to the information and competitive advantage, but Ferreira (2013) states that the increase in the concentration hinders the competition amongst financial institutions. As a result, the efficiency of the banking sector rather decreases in such a case. Moreover, the position of customers can worsen, especially if negotiations are considered. However, Allen *et al.* (2012) state that there is a very small impact on average interest rates. Garnaise and Moskowitz (2004) state that high concentration can worsen credit terms offered by banks.

For example, Kozak (2008) noticed that the increase in the concentration can result in the higher spread between offered rates and a reference rate. Berger and Hannan (1989) state that high concentration can result in smaller deposit rates, when compared with a reference rate. Similar conclusions are stated by Hannan and Prager (1998) and Rhoades (1996).

On the other hand, Erel (2011) states that high concentration increases the efficiency of banks, because it allows them to offer relatively smaller rates. Moreover, González and González (2008) state that higher concentration can result in easier access to the long-term loans. Nevertheless, Sørensen and Lichtenberger (2007) state that there is a weak evidence that small concentration results in low mortgage rates. It would be interesting to analyse the mortgage rate in this context for Poland (Belej, 2006; Drachal, 2014c).

Levine (2004) strongly supports the positive role of foreign banks on domestic market. In his opinion, lack of their presence can lead to the increase in loan rates. Moreover, restrictions on domestic banks do not have such consequences. Similarly, Berger and Hannan (1989) and Santillán Salgado (2011) state that state-owned banks have strict credit policies, whereas foreign banks tend to offer accessible loans and competitive prices.

Currently, CR5 (assets of five biggest banks divided by total banking assets) is c.a. 44% in Poland. It is one of the smallest concentration ratios in the European Union. It is also the smallest ratio amongst new (after Fifth Enlargement, in 2004) members of the European Union (ECB, 2013). Concentration ratios seem to be at a quite stable level since 2008 (KNF, 2013).

Generally, the whole banking sector is profitable, despite the recent crisis. Also the accession to the European Union had a positive effect on the banking sector (Piocha, Radlińska, 2010).

On the other hand, the share of foreign banks in the banking assets in Poland is currently higher than the average for the European Union. It was 65% in 2011, whereas the average in the European Union was 46%. However, higher shares are found only in Luxembourg and Finland, if old members of the European Union are considered. Moreover, higher ratios are found in the Baltic countries, which have been severely hit by the recent financial crisis (MSP, 2012).

3. Research premises and methodology

This research is based on simple linear regression models. These models are constructed, evaluated, and briefly diagnosed. They might serve as a proposition for further researches. If not stated otherwise, 5% significance level is assumed. A linear regression was used also, for exemplifying by Kozak (2008) is a quite similar problem for the U.S. market.

Concentration ratio, the share of foreign banks in banking assets and their first lags were taken as independent variables. First lags are included in the models, because it seems reasonable to assume that changes in independent variables can need one time period to produce the impact on the dependent variables. More lags are not included, because time series are short. Moreover, some other variables can make such significant effects that they would distort the models. Then, stepwise regression with backward elimination was evaluated [Montgomery *et al.*, 2012].

The aim of such a method is to find whether the included variables are statistically significant in particular models, describing evolution of selected dependent variables (such as efficiency of banking sector, costs, rates, etc.). If they are significant, then it is asked how they influence the dependent variables (generally is the effect positive or negative). Table 1 presents the proposed variables chosen to measure some processes. Table 1 also presents abbreviations used further in the text. Table 2 presents the sources of data used in the models.

The reference rate is the rate fixed by the Monetary Policy Council. Such a rate was chosen as the most universal and fundamental benchmark for Polish market. Also 52-week treasury bills were taken into consideration as risk-free instruments. Lastly, WIBOR 1Y (Warsaw Interbank Offered Rate) for the period of one year, was considered. It is the interest rate that the average leading bank in Poland would be charged, if borrowing from other banks. Also, most loan rates in Poland are linked with WIBOR rates. (Actually, there are 9 various WIBOR rates for different time periods, but due to the simplicity only WIBOR 1Y was taken into the analysis.)

Table 1. Description of Variables

ABB	DEFINITION	WHAT IT MEASURES
CR	▪ assets of 5 biggest banks / total banking assets	▪ concentration
F	▪ share of foreign banks in banking assets	▪ as in definition
MA1	▪ difference between average loan rate and the reference rate	▪ level of loan rates and competitiveness
MA2	▪ difference between average loan rate and the profitability of 52-week treasury bills	▪ level of loan rates and competitiveness
MA3	▪ difference between average loan rate and WIBOR 1Y	▪ level of loan rates and competitiveness
MH1	▪ difference between average rate for loan for household and the reference rate	▪ level of loan rates and competitiveness
MH2	▪ difference between average rate for loan for household and the profitability of 52-week treasury bills	▪ level of loan rates and competitiveness
MH3	▪ difference between average rate for loan for household and WIBOR 1Y	▪ level of loan rates and competitiveness
MC1	▪ difference between average rate for consumption loan and the reference rate	▪ level of loan rates and competitiveness
MC2	▪ difference between average rate for loan for consumption loan and the profitability of 52-week treasury bills	▪ level of loan rates and competitiveness
MC3	▪ difference between average rate for consumption loan and WIBOR 1Y	▪ level of loan rates and competitiveness
MM1	▪ difference between average mortgage rate and the reference rate	▪ level of loan rates and competitiveness
MM2	▪ difference between average mortgage loan and the profitability of 52-week treasury bills	▪ level of loan rates and competitiveness
MM3	▪ difference between average mortgage rate and WIBOR 1Y	▪ level of loan rates and competitiveness
S	▪ difference between average loan rate and deposit rate	▪ credit terms
C1	▪ personnel expenses / number of employed *10 ⁻⁵	▪ costs
C2	▪ costs of banking activity / number of branches * 10 ⁻⁵	▪ costs
E1	▪ number of employed / number of branches	▪ efficiency
E2	▪ number of employed / number of banks	▪ efficiency
E3	▪ net income from banking activity / number of employed	▪ efficiency
E4	▪ net income from banking activity / number of branches	▪ efficiency
E5	▪ costs / revenues	▪ efficiency
ROE	▪ return on equity	▪ profitability
ROA	▪ return on assets	▪ profitability

Source: own elaboration

Table 2. Source of Data

DATA	SOURCE
assets of 5 biggest banks / total banking assets	KNF [2013]
share of foreign banks in banking assets	KNF [2013]
reference rate	NBP [2013a]
profitability of 52-week treasury bills	Bankier.pl [2013]
WIBOR 1Y	Money.pl [2013]
average loan rate	NBP [2013b]
average rate for loan for household	NBP [2013b]
average rate for consumption loan	NBP [2013b]
average mortgage rate	NBP [2013b]
personnel expenses	KNF [2013]
number of employed	KNF [2013]
costs of banking activity	KNF [2013]
number of branches	KNF [2013]
number of banks	KNF [2013]
net income from banking activity	KNF [2013]
return on equity	GUS [2013]
return on assets	GUS [2013]

Source: own elaboration

All loans included in the statistics are assumed to be the new ones. The new terms are expected to be directly influenced by current market situation, whereas old loans rates can remain unaffected by market changes, for example due to some terms and conditions. Yearly data from the period between 2003 and 2012 are used. Particular values of variables are taken from December or last day of a particular year. If such data were unavailable, then the closest possible period is taken. The currency used is PLN. In case of mortgages loans in PLN were considered. However, it should be mentioned that also mortgages in foreign currencies (e.g. EUR and CHF) were significantly present during the analyzed period in Poland. Indeed, major part of mortgage loans is those in CHF. Moreover, there are only 2 mortgage banks in Poland, i.e. PEKAO and mBank. Since April 2015 there will also be a third one (Adamczyk, 2014; Głuszak, 2010; Karwowska, 2014; Uryniuk, 2014).

The obtained models are tested [Adkins, 2013], whether residuals have normal distribution (Jarque-Bera test), and whether the specification is correct (RESET test). Also they were tested for heteroscedasticity (Breusch-Pagan test) and autocorrelation of residuals up to 1st order (Breusch-Godfrey test).

4. Analysis and results

In the below Tables stars denote significance level of a statistical significance of a particular coefficient. One star denotes 10% significance level. Two stars denote 5% significance level. Three stars denote 1% significance level. If there is no star, it means that at 10% significance level the corresponding coefficient can be assumed equal to 0.

Table 3 - Regression estimates for MA

	MA1	MA2	MA3
const	-0.0919329	-0.0428192	-0.0446362
CR_1	-0.271428**	-0.175834*	-0.200242
F	0.391103***	0.24594**	0.26291*
R-squared	0.780488	0.592030	0.485327

Source: own elaboration in GRETL

The diagnostic of all three models, presented in Table 3, confirms that they have the desired properties. The best model is the one when benchmark rate is the reference rate. The numerical values of coefficients in all models are similar. R-squared is quite high, despite the fact that just two independent variables were included.

MA2 and MA3 models are not significant overall. It can be concluded that the presence of foreign banks results in the increase of average loan rate. However, increase in the concentration results in lower rates in the next period.

Table 4 - Regression estimates for MH

	MH1	MH2	MH3
const	-0.0665132	-0.0173995	-0.0192165
CR_1	-0.256809*	-0.161215	-0.185623
F	0.379512**	0.234349	0.251319
R-squared	0.635063	0.362058	0.344974

Source: own elaboration in GRETL

The properties of models from Table 4 are similar to these from Table 3. The conclusion is also similar.

Table 5. Regression Estimates for MC

	MC1	MC2	MC3
const	0.289569*	0.345523**	0.331906*
CR	-0.268348	-0.225964	-0.214945
F	-0.0927818	-0.211357	-0.200923
R-squared	0.343542	0.382706	0.281941

Source: own elaboration in GRETL

The diagnostic results of models presented in Table 5 are also good. However, statistical significance of coefficients is poor. In these models, CR is not lagged. This seems reasonable, because consumption loans are short-term ones, so their rates should react very quickly to any changes. On the other hand, sign of the coefficient for F is negative. Nevertheless, none of the models are statistically significant overall.

Table 6. Regression Estimates for MM

	MM1	MM2	MM3
const	-0.0330871	0.0160267	0.0206953
CR_1	-0.182504**	-0.0869105	-0.081101
F	0.212835**	0.0676718	0.0535899
R-squared	0.719871	0.259917	0.142618

Source: own elaboration in GRETL

Models presented in Table 6 are similar to the ones presented in Table 3. But MM1 model has bad specification.

Table 7. Regression Estimates for S

	S
const	-0.0525744
CR_1	-0.15677
F	0.257507*
R-squared	0.493978

Source: own elaboration in GRETL

The model for S, presented in Table 7, is similar to the ones from Table 3. Unfortunately, it is not statistically significant overall.

Table 8. Regression Estimates for C1 and C2

	C1	C2
const	0.270034***	5.40338***
CR_1	-0.282419***	-5.31209***
F_1	-0.0935661*	-1.8699*
R-squared	0.950091	0.928695

Source: own elaboration in GRETL

The diagnostic of all models from Table 8 confirms that they have the desired properties. They are both statistically significant overall. Both, concentration and share of foreign banks in banking assets, result in cost reduction (understood as decrease of cost per branch and per employee). Changes in independent variables need one year to influence the dependent variables.

Table 9. Regression Estimates for ROE and ROA

	ROE		ROA
const	0.0866739	const	0.035049
F	1.23010	CR_1	0.0600771*
F_1	-1.115	F_1	-0.0731974
R-squared	0.356609	R-squared	0.538489

Source: own elaboration in GRETL

Model for ROE (in Table 9) consist solely of variable describing share of foreign banks in banking assets and its first lag. Whereas model for ROA (in Table 9) consists in fact that both variables describe concentration and share of foreign banks. Nevertheless, both models are not statistically significant overall. Moreover, ROA model has bad specification. Other diagnostic results for both models are good.

Table 10 - Regression Estimates for E1 and E2

	E1		E2
const	9.41198*	const	414.051***
CR	-9.20279	CR_1	-651.973***
CR_1	15.3046	F	225.166**
R-squared	0.327726	R-squared	0.942643

Source: own elaboration in GRETL

Table 11- Regression Estimates for E3, E4 and E5

	E3	E4	E5
const	1.32731***	15.4777***	0.0152111
CR_1	-1.57215***	-17.2156***	0.489045***
F_1	-0.483342	-6.16198	0.140199
R-squared	0.916968	0.912168	0.920497

Source: own elaboration in GRETL

The model E1 (in Table 10) is not significant overall. The other models (in Tables 10 and 11) are significant overall. Their diagnostic results are good. Only the model E5 has bad specification. It can be concluded that the increase in the concentration results in the decrease of the average employment in bank, but also the decrease in the net income from banking activity per employee and per branch. Moreover, it increases efficiency ratio. On the other hand, increase in share of foreign banks in banking assets decreases net income from banking activity per employee and per branch. But it increases efficiency ratio and the average number of employees per bank.

The constructed models have lags included. Therefore one may question validity of the simple regression methodology instead of the distributed lag model methodology. First of all, ordinary least squares is applicable to a distributed lag model in some cases. Secondly, in all models, except E1 and ROE, there is only one lag for particular variable or this variable itself. Whereas models E1 and ROE are not significant overall, so their analysis can be omitted. As a result, the constructed models can be evaluated by simple regression techniques, indeed.

Discussion and conclusion

It has been found that if the reference rate is assumed to be the benchmark rate, then the increase in the concentration results in lower average loan rates in the next period. On the other hand, the increase in the share of foreign banks in banking sector results in quick increase in average loan rates. Taking profitability of 52-week treasury bills or WIBOR 1Y as a benchmark rate leads to statistically not significant models. But if one considers

particular types of loans, for example: rates for loans for households or consumption loans, then it seems that these rates are highly influenced by factors that are not discussed in this paper. Finally, it has been found that increase in the concentration does not worsen consumers' situation, but increase in the share of foreign banks in banking assets does.

The spread between average loan rate and deposit rate cannot be modelled solely by the considered independent variables. Therefore it cannot be concluded whether the concentration and the share of foreign banks in banking assets have positive or negative impacts on credit terms (understood as financial attractiveness of loans in comparison with deposits).

The concentration and the share of foreign banks in banking assets have very positive impact on cost reduction. However, increase in concentration allows banks to reduce their costs more than the presence of foreign banks. This might be due to the fact that current concentration is low, so the benefits from its increase are not exploited yet. On the other hand, the flow of know-how from foreign banks has been present on the Polish market for over 20 years. So, foreign banks do not bring to domestic banks anything uniquely new.

The models for profitability of banks are statistically not significant overall. Therefore they can not be used to describe the impact of the concentration and the share of foreign banks in banking assets. Such a situation might be due to the fact that recent financial crisis has heavily influenced profitability of banks. It can be the major factor influencing their profitability.

The increase in the concentration does not lead to higher efficiency of banks. Although, it allows reducing the average employment, it also results in smaller net income from banking activity generated by one employee and in higher efficiency ratio.

Similarly, higher share of foreign banks results in smaller net income from banking activity per employee and per branch. It also increases efficiency ratio and the average employment. As a result, both concentration and share of foreign banks in banking assets do not increase banks' efficiency.

References

- [1] Adamczyk, S., 2014. Społeczna odpowiedzialność sektora bankowego z perspektywy kredytów w CHF udzielanych w latach 2004-2008. *Zeszyty Naukowe Wyższej Szkoły Bankowej w Poznaniu*, 54: 183-210.
- [2] Adkins, L.C 2013. *Using gretl for Principles of Econometrics*. Oklahoma State University.
- [3] Allen, J., Clark, R., Houde, J.-F. 2012. Price Competition and Concentration in Search and Negotiation Markets: Evidence from Mortgage Lending. *Bank of Canada Working Paper*, 2012-4.
- [4] Bankier.pl, 2013. *Śr. rent. 52-tyg. bonów skarbowych (Polska)*.
- [5] Bartol, M., Rapkiewicz, M. 2013. *Skutki "repolonizacji" sektora bankowego*. Centrum Analiz Fundacji Republikańskiej.
- [6] Belej, M. 2006. Zagadnienie ryzyka inwestowania w nieruchomości. *Wiadomości Projektanta Budownictwa*, 12: 24-28.
- [7] Berger, A.N., Hannan, T.H. 1989. The price-concentration relationship in banking. *The Review of Economics and Statistics*, 71: 291-299.
- [8] Drachal, K. 2014a. The banking sector in Poland. *Financne Trhy*, 100, ID 2215.
- [9] Drachal, K. 2014b. Concentration of banking sector and loan markups in short term: an example from Poland. *Financial Assets and Investing*, 5: 26-44.
- [10] Drachal, K. 2014c. Oprocentowanie kredytów na nieruchomości mieszkaniowe na tle innych stóp procentowych. *Świat Nieruchomości*, 89: 55-60.
- [11] Erel, I. 2011. The Effect of Bank Mergers on Loan Prices: Evidence from the United States. *Review of Financial Studies*, 24, pp. 1068-1101. Ferreira, C., [2013], Bank market concentration and bank efficiency in the European Union: a panel Granger causality approach. *International Economics and Economic Policy*, 10: 365-391.
- [12] Garmaise, M.J., Moskowitz, T.J. 2004. Bank mergers and crime: The real and social effect of credit market competition. *NBER Working Paper*, 11006.

- [13] Głuszak, M. 2010. Cechy gospodarstw domowych a sposoby zaspokajania potrzeb mieszkaniowych w Polsce. *Zeszyty Naukowe, Uniwersytet Ekonomiczny w Krakowie*, 822: 31-46.
- [14] González, V.M., González, F., 2008. Influence of bank concentration and institutions on capital structure: New international evidence. *Journal of Corporate Finance*, 14: 363-375.
- [15] Hannan, T.H., Prager, R.A.1998. Do substantial horizontal mergers generate significant price effects? Evidence from the banking industry. *Journal of Industrial Economics*, 46: 433-452.
- [16] Karwowska, M. 2014. Czynniki wpływające na atrakcyjność kredytu hipotecznego – analiza empiryczna. *Journal of Finance and Financial Law*, 2: 38-54.
- [17] Kokoszcyński, R. 2001. Structural changes in the Polish banking industry - three dimensions of consolidation processes in an emerging economy. *BIS Papers 4 - The banking industry in the emerging market economies: competition, consolidation and systemic stability*, pp. 118-122.
- [18] Kozak, S. 2008. Wpływ konsolidacji i koncentracji sektora bankowego na poziom cen w bankach. Przykład Stanów Zjednoczonych. *Ekonomia*, 21: 120-138.
- [19] Kraciuk, J. 2006. Procesy konsolidacji w polskim sektorze bankowym. *Problemy Rolnictwa Światowego*, 15: 282-292.
- [20] Levine, R. 2004. Denying Foreign Bank Entry: Implications for Bank Interest Margins. In: (eds.) Ahumada, L.A., Fuentes, J.R., *Central Banking, Analysis, and Economic Policies*, 7: 271-292.
- [21] Micek, M. 2002. Teoretyczne podstawy konsolidacji w sektorze bankowym. *Bank i Kredyt*, 33: 40-46.
- [22] Montgomery, D.C., Peck, E.A., Geoffrey Vining, G. 2012. *Introduction to Linear Regression Analysis*. John Wiley & Sons, Inc.
- [23] Pawłowska, M., 2003. Wpływ zmian w strukturze polskiego sektora bankowego na jego efektywność w latach 1997-2002 (podejście nieparametryczne). *Bank i Kredyt*, 11(12): 51-65.
- [24] Piocha, S., Radlińska, K. 2010. Uwagi na temat kryzysu gospodarczego i sektora bankowego w Polsce. *Zeszyty Naukowe Polityki Europejskiej, Finanse i Marketing*, 53: 238-251.
- [25] Piotrowski, M. 2012. Repolonizacja polskich banków. Czy warto i jak to zrobić?, http://wyborcza.biz/biznes/1,100896,12618785,Repolonizacja_polskich_bankow_Czy_warto_i_jak_to.html
- [26] Rhoades, S.A. 1996. Competition and bank mergers: directions for analysis from available evidence. *Antitrust Bulletin*, 41: 339-364.
- [27] Santillán Salgado, R.J. 2011. Banking Concentration in the European Union during the Last Fifteen Years. *Panaeconomicus*, 58: 245-266.
- [28] Sørensen, C.K., Lichtenberger, J.-D. 2009. Mortgage Interest Rate Dispersion in the Euro Area. *European Central Bank Working Papers*, 733.
- [29] Stępień, K. 2004. *Konsolidacja a efektywność banków w Polsce*. CeDeWu.
- [30] Świetlik, J. 2012. Fuzje i przejęcia w sektorze bankowym w Europie (UE-25) jako czynnik wpływający na finansowanie przedsiębiorstw w ujęciu makro. *Zeszyty Naukowe Kolegium Gospodarki Światowej*, 33: 92-115.
- [31] Uryniuk, J. 2014. Szykuje się wysyp banków hipotecyjnych na polskim rynku. <http://forsal.pl/artykuly/817770,szykuje-sie-wysyp-bankow-hipotecyjnych-na-polskim-ryнку.html>
- *** <http://www.bankier.pl/inwestowanie/notowania/macro/profil.html?id=74>
- *** ECB, 2013. *Structural Financial Indicators*. <http://sdw.ecb.europa.eu>
- *** GUS, 2013. *Roczne wskaźniki makroekonomiczne*.
- *** http://www.stat.gov.pl/gus/wskazniki_makroekon_PLK_HTML.htm
- *** KNF. 2013. *Sektor bankowy*.

- *** http://www.knf.gov.pl/opracowania/sektor_bankowy/index.html
- *** Money.pl. 2013. Archiwum WIBOR. <http://www.money.pl/pieniadze/depozyty/zlotowearch>
- *** MSP. 2012. *Kondycja oraz perspektywy rozwoju polskiego sektora bankowego w 2012 roku na tle Europy.* <http://inwestor.msp.gov.pl/si/polska-gospodarka/wiadomosci-gospodarcze/20713,Kondycjaoraz-perspektywy-rozwoju-polskiego-sektora-bankowego-w-2012-roku-na-tle.html>
- *** NBP, 2013a. *Podstawowe stopy procentowe NBP w latach 1998 - 2013.* http://www.nbp.pl/home.aspx?f=/dzienne/stopy_archiwum.htm
- *** NBP, 2013b. *Statystyka stóp procentowych.*
- *** http://www.nbp.pl/home.aspx?f=/statystyka/pieniezna_i_bankowa/oprocentowanie.html

Role of Wholesale Market in Ensuring Russian Food Safety under Conditions of Innovative Economy

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Abstract:

The article considers the role of wholesale market in ensuring Russian food safety. The meaning and components of wholesaling are analyzed. The necessity of further development of wholesaling is stipulated. Foreign experience of wholesale companies' operation is analyzed. New approaches to the development of the wholesaling branch of the Russian agricultural complex are proposed. Recommendations on implementing the wholesaling system in the activity of domestic entrepreneurship are given.

Keywords: wholesaling, food safety, innovative economy, infrastructure of commodity market.

JEL Classification: O30, O12.

1. Introduction

Under the conditions of external environment, the role of ensuring food safety of the country and protection of the internal market of goods and services from foreign manufacturers' unfair competition increases. One of the important factors that influence the maintenance of the Russian food safety is the availability of a far-reaching distribution network that provides continuous supply of products to people and raw materials for processing industry. The distribution network includes wholesaling as a basic branch. In the period of innovational development of the Russian economy the dependence of wholesaling increases as the activity of agricultural and processing companies that have an innovational component particularly need timely and high quality sale of products and supply of raw materials required for further production process (Sekerin V.D., Avramenko S.A., Veselovsky M.Y., Aleksakhina V.G., 2014). Besides, the development of the wholesaling branch contributes to the growth and development of retailing and increase in people's prosperity. Due to it, it is necessary to develop new measures contributing to strengthening the Russian food safety and development of domestic wholesaling. The role of wholesaling in ensuring food safety under conditions of innovative economy is defined by its place in the system of distribution. Herewith, it is necessary to take into account that any wholesale intermediary entering market relations can act both as a seller and as a buyer of ready products. It distinguishes them from end consumers and direct manufacturers of goods as well as defines the specificity of their marketing strategy that aims, on the one hand, to optimize purchases and, on the other hand, to organize sales. In the first case, while acquiring goods to earn profit in the process of re-selling, the wholesale buyer tries to purchase goods in places where the cheaper products are manufactured and in such a manner contributes to the extension of

specialization and concentration of production in the most favorable natural and economic zones and decrease in operating costs per unit of product. In the second case, having steady relations with retailers, specialized warehousing and transportation infrastructure, the wholesale company can inform manufacturers about consumers' demands and in such a manner influence the volumes, range and quality of the manufactured products. Herewith, giving assurances about selling the manufactured goods, the wholesale intermediary can considerably improve economic position of agricultural manufacturers.

2. Methodology

This research is based on the works of Russian and foreign researchers specializing in this area of science. In order to achieve the goals of this work, such methods as comparative, structural and functional, and abstract-logical analysis, statistic processing of empiric data forecasting were used. Specific facts were analyzed, grouped and systemized. Such theoretic methods as abstracting, deduction and formalization were applied for formalizing and generalizing the results of the research.

Regularities of the activity of entrepreneurship structures under conditions of market economy are described in many works of foreign researchers. It is necessary to mention the works of Kotler Ph., Cooper R., Rothwell R., Rosenberg N., Samuelson P., Freeman C. *et al.*

The problems of ensuring food safety and development of the Russian wholesaling market are also touched upon in the works of such Russian researches as Alferiev V. P., Goremykin V. A., Klukach V. A., Serkov A. F., Ushachev, I. G. These researches greatly contributed to the development of the system ensuring the Russian food safety under the conditions of market economy. Along with this, taking into account the current complicated situation, further transformations in this area are required. It is necessary to solve a number of problems that restrict the development of commodity market and wholesaling that has its negative consequences.

3. Results

Under the conditions of market economy the role and meaning of wholesaling increases (Kotler Ph., 2007). It is related to the fact that wholesaling companies provide manufacturers of agricultural products, raw materials and food, and retailing companies with services on transporting, warehousing of products, stimulating their selling with marketable and financial credit resources, informational and consulting assistance, and decrease the risk of their activity on the commodity market by that. Finally, it provides the efficiency of the trading process, decreases combined costs of the circulation, fastens the process of distribution, eliminates commodity shortage and consequently makes the products cost lower and increases its competitiveness on the commodity market.

Subjects of wholesaling agricultural products, raw materials and food include separate companies (organizations) that acquire and (or) store goods in large lots and re-sell them to retailers, other trading organizations and (or) consuming organizations. They include elevators and granaries, horticultural storage bases, refrigerators, wholesaling food economies, warehouses, trading houses, distribution centers, and large retail chains. They act as trading companies and perform the whole complex of purchasing and selling operations. The proprietary right for commodities is transferred to them (Babkov M.A., Bozhenok S.Ya., Erofeeva M.A. *et al.*, 2006). In addition, various agencies, broker's and dealer's agencies, independent brokers and agents that do not purchase commodities but provide services on selling them to or acquiring by sellers and buyers and receive commissions for this are also involved in wholesaling.

Direct manufacturers of products (agribusiness holding companies, large agro-industrial combines, trading cooperatives, processing companies, etc.) that have their own storage base and establish their trading companies and trading houses also participate in wholesaling.

Structures providing wholesaling - commodity markets, wholesale food markets, fairs, sales - contribute to establishing economic relations, concluding and executing agreements on wholesaling supplies (purchases) and making transactions. They are a place where sellers and buyers are concentrated, the demand for various types of products is revealed, and the level of prices for them is defined. Efficient functioning of every separate participant of wholesaling is possible subject to the availability of the whole block of servicing structures that provide them with forwarding, warehousing, informational and marketing, insuring, financial and credit, and other services.

A considerable part of wholesaling subjects is represented by storage objects. It defines its great role in establishing, storing and managing commodity stocks of agricultural products, raw materials and food. Since commodity stocks under the conditions of non-stability of agricultural production related to its high dependence on weather conditions are a basis for steady operation of processing companies, wholesaling can be regarded as

a strategic area of the commodity market. It determines the legality and responsibility of the state to influence the processes that take place in it. This happens in all developed market economies.

Trading plays an important role in the spatial redistribution of commodities (Dashkov L.P., Pambukhchiznts V.K., 2008). It is of great importance for Russia due to the large territory of the country, various specializations of its specific regions, terms and conditions of import and export or transit of commodity flows of agricultural products, raw materials and food across the territory of the region. High quality and balanced fulfillment of forwarding functions determines general duration of distribution from manufacture sites to receivers, integrity of the quantity and quality of products on the way, transaction expenses.

It is necessary to note that wholesaling plays an important role in forming the objective level of market prices for specific types of agricultural products, raw materials and food, providing publicity and insuring sellers and buyers from their variation. In the whole world these functions are fulfilled via commodity markets, wholesale food markets and sales. Prices determined by them serve as a guidemark for other channels of distributing agricultural products and food. Using commodity markets and wholesale food markets, the state can regulate the level of market prices for specific types of products by performing intervention operations, establish more favorable terms and conditions for selling domestic products, and provide equal entry of direct products manufacturers to the wholesale market.

Under the conditions of fierce competition, the role and meaning of innovational forms and methods of wholesaling development increases (Lyasnikov N.V., Dudin M.N., Sekerin V.D., Veselovsky M.Y., Aleksakhina V.G., 2014).

Trying to extend its market share or area of its activity, enterprises started investing their capital in production, creating large trading, trading and production, trading and financial industrial groups, holdings and vertically-integrated organizations that work according to the completed "production-processing-trading" technological cycle.

Such organizations establish large processing companies, trading companies, etc. Herewith, they are not always related to the agricultural sector. In this case wholesaling firms act as investors that virtually participate in the process of recovery of the agricultural production. However, this process can be deemed positive only subject to establishing mutually beneficial relations with agricultural manufacturers on issues related to prices and titles to the land.

The economic essence of wholesaling agricultural products, raw materials and food can be defined as a transfer of agricultural products from one production stage to another one for consumption. As one of the basic forms of economic relations it aims to develop the commodity market and meet the demand of people for goods and services (Magomedov A.N.D., Belan A.I., Bekhchanova O.V., 2012).

At the present stage economic relations between the participants of the commodity market intend to improve reciprocal payments between the distribution participants for the purpose of reciprocal compensation of expenses for the manufactured and sold products as well as receiving the required profits that would provide stable development of the agricultural production.

In any market system meeting the demand is a prerequisite for preventing crisis situations. That's why forecasting the demand has an important meaning for forming efficient economic relations on the commodity market. A lot of economists characterize the demand as an economic category peculiar of commodity economy and occurring in the area of commodity exchange and trading.

The formation of market channels of distribution and regulation of economic relations in Russia showed that the market could not solve the tasks related to the development of the market of agricultural products and ensuring the food safety of the country on its own and without the state assistance (Nuraliev, S.U., 2012).

The most important functions and tasks of the state on forming and regulating economic relations under the market conditions include the following:

- Full meeting of the people's demands for high quality food, providing a large range of products;
- Creating terms and conditions for bringing the manufactured products to the consumer with the minimum expenses;
- Providing terms and conditions for compensating manufacturers for expenditures related to manufacturing agricultural products, raw materials and food, and
- Stimulating the development of production, increasing the quality and competitiveness of the products on the internal market.

These functions are fulfilled through economic relations between all phases from products production to their consumption where wholesaling is a component of the distribution system from producing agricultural

products, raw materials and food to bringing them to the end consumer. Unfortunately, in the process of fulfilling these functions, economic relations between the participants of the agricultural commodity market and wholesaling and retailing companies in the agrifood complex are formed spontaneously, without taking into account interests of domestic manufacturers.

At the present stage supplying products through a wholesaling intermediary branch in the form of a logistic distribution center is the most efficient. In this case contractual relationships are formed on the basis of e-mail requests received by dispatching departments of these structures from retailing companies in accordance with the agreements concluded before. Based on these requests, dispatching departments of wholesaling companies complete the product line and define the priority of delivering products to the retail trade network. This wholesaling system is the most efficient one. It contributes to the maximum decrease in expenses in the distribution system and increase in the products competitiveness on the internal market.

Contemporary innovational technologies based on logistics and allowing to considerably expanding the distribution processes play an important role in the increase in the competitiveness (Berkhout, G., Van Der Duin, P., 2007). Such systems allow us to make economic relations between the market participants more open and clear, create favorable competitive environment, increase the efficiency of the work of supply and marketing services, and decrease expenditures for supply and marketing operations (Sandu I.S., Ryzhenkova N.E., Veselovsky M.Y., Solovyov A.Y., 2014).

Marketing approach is a basis of efficient functioning of economic relations on the commodity market. A potential exporter or wholesale buyer must exactly know the needs, propensities and preferences of consumers, the conditions and perspectives of the market where he is going to supply products. It is necessary to research, estimate and forecast macroeconomic and microeconomic factors for this.

The most important task in the development of economic relations is the increase in the competitiveness of products (Wheelwright S.C., Clark K.B., 1992). Herewith, a special emphasis is laid on the requirements related to the exclusion of unfair competition and abuse of a dominant position on the market. In order to strengthen positions under the conditions of fierce competition, it is necessary to study possibilities of competitive firms, their economic position and peculiarities of manufacturing activity, applied technologies and methods of marketing research. For this, it is necessary to have efficient marketing and distribution policy both in the area of products manufacture and in selling based on the analysis of the people's consumer demand.

In the majority of developed economies, economic relations between the participants of the market of agricultural products and subjects of wholesaling and retailing are regulated by the state. The formation of such relations is a prerequisite for ensuring food safety of the country and maintaining stability in the society.

Peculiarities of forming commodity relations between participants of the market are stipulated by the liberalization of economic relations and increasing of the influence of transnational corporations for the purpose of monopolizing the market and squeezing competitors. Under the conditions of globalization and increase in the influence of transnational capital on the world market, market mechanisms of self-regulation cannot protect manufacturers' interests and withstand these processes without efficient agricultural policy of the state.

Today the Russian market is the least protected from unfair competitiveness on the part of large foreign trading companies. It is characterized by a non-developed infrastructure, non-availability of efficiently functioning market institutes on forming and regulating economic relations.

The situation in this area changed a little at the end of 2014 – the beginning of 2015. After imposing trade sanctions by the USA, EU countries and other developed countries on Russian companies, retaliatory sanctions were introduced by Russia. First of all, these retaliatory sanctions restricted, and as far as some types of products were concerned, fully banned the import of these products to the territory of the Russian Federation. As a whole, retaliatory sanctions had a positive effect on the development of domestic agriculture and processing industries.

According to the data of the Russian Federal Customs Service (<http://www.customs.ru/index.php?option.-2015>), physically the import of food in January-March 2015 as compared to January-March 2014 decreased by 25.3%, including fresh and frozen meat – by 8.0%, milk – by 19.1%, butter – by 33%, cheese and curds – by 13.00%. Herewith, the export of Russian food and raw materials for its production considerably increased. In January-March 2015 the share of export of food and raw materials for its production in the trading structure of export was 8.3% (in January - March 2015 it was 6.6%). Physical volumes of pork export increased 8.4 times, wheat - 7.2 times, milk and cream - 17.1 times, and sunflower oil by 13.7%.

According to the data of the Federal State Statistics Service (http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/ - 2015), the growth of production volumes is observed in the agro industrial complex. So, for the first quarter of 2015 as compared to the relevant period of 2014, the index of

manufacturing cattle and poultry for slaughter was 106.3, milk – 101.2, eggs – 101.3. The volume of import replacement also increased. It increased from 80% to 90%. This growth was achieved in spite of the fall of the overall production as a whole for the industry and other leading branches of the national economy of the Russian Federation.

In some way the growth of the overall agricultural production restrains a considerable increase in prices for food that is observed in retailing. To a large extent this growth is stipulated by sharp reduction of foreign food import and increase in transfer prices by suppliers of import products caused by the considerable devaluation of the ruble. However, the growth of prices for food gradually slows down. It is stipulated by the decrease in shortage of products supply and increase in the import replacement.

The extension of demand for food is known to have specific limits related to physiologic boundaries of its consumption. To the extent of approaching its saturation boundary, the growth of demand slows down in relation to the growth of people's profits. In this case, in order to provide the demand and supply balance, it is necessary to increase the level and efficiency of the commodity market. Herewith, the decrease in people's profits also leads to the reduction of expenses for food. That's why the demand for food can be extended by increasing profits and level of people's life or by differentiating people's profits and introducing a progressive scale of profits taxation (Samuelson P., 2010).

In developed countries the demand for food is not elastic in relation to the level of people's profits. The peculiarity of the commodity market in these countries is explained by a high level of people's profits and saturated demand. In this case price demand non-elasticity makes it difficult for the price mechanism to function, and be regulated; it does not allow us to extend the demand due to the decrease in price (Taranukha Yu.V., 2013).

In Russia price demand is elastic in relation to such goods as meat and meat products, fish and fish products, fruits and vegetables. Low level of these products provision stipulates a considerable dependence of the demand for meat products on price changes. However, we cannot say the same about cereal products and potatoes. In spite of the increase in real prices for bread, the volume of its consumption remains almost at the same level as it is related to the necessity of its everyday consumption. If we regard the price demand elasticity for food in general and specific products, it will be the most considerable for meat, fish, fruits and vegetables where the level of consumption is the lowest.

The competitiveness of agricultural products, raw materials and food, and the competitiveness of the company in the area of manufacture and distribution of products of the agricultural complex directly depend on the efficiency of manufacture and selling of the manufactured products (Ushachev I.G., Klukach V.A., Magomedov A.-N.D., 2006). Herewith, the competitiveness of the products depends not only on opportunities of goods producers to produce competitive products but also to profitably sell them on the basis of efficient interrelation with wholesaling and retailing companies.

The most important condition of the agrifood market development is the maximum use of competitive strengths of the branch in order to decrease the expenditures in the area of manufacture, processing, storage, and selling of finished products (Ushachev I.G., 2005). The basic factors that define the competitiveness of products on the commodity market include the level and efficiency of products manufacture and selling as well as the ability of the branch company to adapt to the conditions of the market.

The generalizing indicator of the products competitiveness is the ability of the company to produce goods and services that meet the people's demand, comply with the market requirements, and whose selling provides economic development of the branch under the conditions of free competitiveness (Kline, S J., Rosenberg, N., 1986). For this, it is necessary not only to produce high quality goods but also to sell them profitably, as well as to constantly increase and improve technical level of manufacture and distribution of food.

The contemporary stage of economic development is characterized by the establishment of large unions and companies that hold serious positions in various branches of economy. Monopole structures mainly function in wholesaling and branches related to raw resources. It requires an efficient mechanism of state regulation in these branches.

Considering the principle regularities of the commodity market development, it is necessary to note that they have their own characteristic peculiarities in a number of countries. These peculiarities are based on the improvement of the mechanism of organizing the interrelation of manufacturers of agricultural products with wholesaling and retailing companies.

The American model of developing and regulating economic relations on the commodity market is based on the close interrelation of the state and business. The state establishes the game rules for participants of the

market and watches all participants to comply with these rules (Rothwell R, 1994). It supports the development of the entrepreneurship activity with the aid of legal and regulatory framework of economic relations. Using these basic measures to form and regulate economic relations on the internal and external markets, based on close interrelation of the state and business, and focusing on the manufacture of competitive products, the American agriculture is characterized by the commodity market abundance and considerable export potential (Rothwell, R., Freeman, C., Horsley, A., Jervis, V.T.P., Robertson, A.B., Townsend J., 1993).

The European model of developing and regulating economic relations on the agrifood market differs from the American model by a heavier state regulation and active role of the state in the formation and regulation of economic relations with the aid of various mechanisms and social programs. A socially oriented model with the active regulating role of the state in the economy is firmed up and applied in the majority of EU countries.

The Japanese model of establishing and regulating economic relations on the commodity market is based on partnership relations between the state and business. The state defines national priorities and pursues the policy of supporting private economy, attracts business as an expert while forming the state policy of development and regulation of the commodity market.

The Chinese model is based on intensive export-oriented policy of economic development, revealing and state support for competitive branches of the economy and zones of producing competitive types of goods and services. The most important peculiarity of the Chinese economic policy is the formation of conditions for the development of people's community relief. Such policy contributed to fast growth of the volumes of food manufacture, updating of basic assets and technological equipment, increase in the level of people's life, extension of the demand for food and decrease in specific charges for their consumption.

The manufacture of competitive products for selling on the internal and external markets must be a priority direction of the state economic policy (Troshin A.S., Sandu I.S., Kupriyanov S.V., Stryabkova E.A., 2014).

While transferring from the economic model with a high level of state regulation to the model with predominantly market regulators, the infrastructure of the commodity market, processes related to its modernization and formation of new economic relations between the market participants undergo relevant changes.

The most important principles of development and improvement of the commodity market infrastructure include the minimization of expenses in the system of distribution, provision of terms and conditions to improve the competitiveness of domestic food, simplification of terms and conditions of goods supply and selling, acceleration of commodity circulation and maintaining the products quality. These principles are implemented on the basis of analyzing the information about the situation on the commodity market, level and degree of development of the food wholesaling system.

The level of the development of the infrastructure of the commodity market and, first of all, wholesaling objects in the developed countries is much higher than that in Russia. It contributes to their ability to bring products to the consumer with fewer expenses and increase the competitiveness of their goods on the internal and external markets. That's why the development of the commodity market infrastructure is a prerequisite of the increase in the products competitiveness both on the internal and international markets.

While forming and developing the market infrastructure on the commodity market at the current stage, basic approaches assume:

- Support for modern information provision systems including the development of food selling online system;
- Development and improvement of regulatory documents governing the activity of participants of the system of distribution on the commodity market;
- Provision of interaction of domestic producers with wholesaling companies in order to decrease expenses in the system of sales and increase the competitiveness of the domestic agro industrial complex;
- Wide use of logistic systems to minimize expenses for forming and using commodity funds,
- Support for fair and exhibition activity that allows to more completely use current production assets for promoting new types of products on the internal and external markets;
- Development of marketing activity of manufacturers and processing companies aiming to extend the production volumes and products sales.

The most important criteria of efficient functioning of the market infrastructure is the decrease in the level of expenses in the system of distribution, provision of optimal terms and conditions for the increase in the competitiveness of the domestic manufacturer.

Wholesaling as the most important element of the commodity market infrastructure requires constant development and improvement taking into account the requirements of the current stage of economic development, and implementation of new innovational and informational technologies (Cooper, R., 2001).

As the world experience shows, wholesaling commodity markets and food distributional centers are the most important chain in this system. They contribute to the prevention of adulterate goods entering the retailing market, increase in the products quality and meeting the real demand of people. They also provide terms and conditions for the development of competition and prices stabilization.

The basic tasks of efficient functioning of the commodity market infrastructure are the following:

- Minimization of expenses based on the formation of rational system of food distribution;
- Extension of product lines taking into account researching and forecasting of the people's demand and specific segments of the market;
- Providing all participants of the market with access to information about the environment of the commodity market based on marketing research;
- Improvement of economic relations between all participants of the market based on the conclusion of mutually beneficial agreements;
- Creation of an efficient mechanism of purchases and supplies of products for federal, regional and municipal needs;
- Providing optimal terms and conditions for warehousing, storage and transportation of goods;
- Solving problems related to the return of low quality goods and prevention of providing the consumer with such products;
- Organization of subgrading range groups of goods taking into account the peculiarities of food production and consumption, and
- Maintenance of the sold products quality, and increase in its competitiveness on the internal market.

4. Discussion

Creation of mechanisms that provide the development of commodity market infrastructure and formation of the required organizational and economic conditions for efficient competitiveness on the commodity market must be one of the priority areas of the state policy. The basic factors that restrain the formation and development of the commodity market infrastructure still include the lack of the state support for this area, imperfection of regulatory and legal framework, and non-availability of the unified state policy and approaches on the federal and regional levels.

Today a lot of wholesaling companies often reduce their activity basically to the growth in volumes of products sales and do not perform any work on improving services and maintaining the quality of products. Some wholesaling organizations sell products via other intermediary structures that cause additional expenses and charges in the system of distribution. Especially important functions of wholesaling companies include the formation of optimal range of goods that must meet the demands of all categories of people with various levels of profits. Herewith, it is necessary to take into account basic factors related to the peculiarities of food production and consumption.

Under the conditions of crisis, the role of wholesaling as an important branch uniting the production of domestic food and its consumption increases, since the development of wholesaling contributes to the growth of the production volume, decrease in ultimate prices and improvement of people servicing.

Conclusion

Wholesaling and its subjects hold a specific place in the system of distribution on the commodity market of the country. They act as a linking branch between products manufacturers and consumers, define the relations between them, and play an important role in maintaining steadiness and efficiency of the country's commodity market functioning, as a whole.

The formation of efficient commodity distribution infrastructure must be a priority area of the agrifood market development and a necessary condition for ensuring food safety of the country under the conditions of globalization. Under contemporary conditions it is important to approximate the wholesaling branch to the production one that will provide the integrity and high quality of the products as well as will allow the producer of agricultural products to sell its products at higher prices that will contribute to the profitability of agricultural production.

The formation of today's market infrastructure is stipulated by the necessity to develop the agrifood market on the basis of close interrelation between agricultural manufacturers and wholesaling and retailing companies for providing continuous supply of people with domestically produced food.

References

- [1] Babkov, M.A., Bozhenok, S.Ya., Magomedov, A-N.D., et al. 2006. *Multi-authored monograph. Recommendations on Developing the System of Wholesaling Agricultural Products, Raw Materials and Primary Goods* (Endorsed by Doctor of Economics, Academician of the Russian Academy of Agricultural Sciences Ushachev, I.G., pp. 105). Moscow: All-Russian Scientific and Research Institute of Agricultural Economics of the Russian Academy of Agricultural Sciences.
- [2] Berkhout, G., Van Der Duin, P. 2007. New Ways of Innovation: an Application of the Cyclic Innovation Model to the Mobile Telecom Industry. *International Journal of Technology Management*, 40(4): 294-309.
- [3] Cooper, R.G. 2001. *Winning at New Products. Accelerating the process from Idea to Launch* (pp. 370). Cambridge (MA): Perseus Publishing.
- [4] Dashkov, L.P., Pambukhchians, V.K. (2008). *Organization, technology and design of trading companies: textbook for University students* (8th EDITION, amended, pp. 508). Moscow: "Dashkov and Co." Publishing and Trading Corporation.
- [6] Kline, S.J., Rosenberg, N. 1986. *An Overview of Innovation. The positive Sum Strategy: Harnessing Technology for Economic Growth* (Landau, R., & Rosenberg, N., Eds., pp. 640). Washington: National Academy Press.
- [7] Kotler, Ph. 2007. *Basics of Marketing. Short Course*. (Translated from English, pp. 656). Moscow: "Williams" Publishing House.
- [8] Lyasnikov, N.V., Dudin, M.N., Sekerin, V.D., Veselovsky, M.Y., Aleksakhina, V.G. 2014. The National Innovation System: the Conditions of its Making and Factors in its Development. *Life Science Journal*, 11(8): 535-538.
- [9] Magomedov, A-N.D., Belan, A.I., Bekhchanova, O.V. et al. 2012. *Scientific Basis of Developing Infrastructure of Distribution Network of Agrifood Market* (pp. 147). Moscow: Publishing House of IE Nasiriddinov V.V.
- [10] Nuraliev, S.U. 2012. Commodity Market and Mechanism of its Regulation. *Economy of Agricultural and Processing Companies*, 5: 24-26.
- [13] Rothwell, R. 1994. Towards the Fifth-generation Innovation Process. *International Marketing Review*, 11(1): 7-31.
- [14] Rothwell, R., Freeman, C., Horsley, A., Jervis, V.T.P., Robertson, A.B., Townsend, J. 1993. SAPPHO updated – project SAPPHO PHASE II. *Research Policy-Elsevier*, 22(2), 110.
- [15] Samuelson, P., Nordhaus, W.D. 2010. *Economics* (Translated from English, 18th Edition). Moscow: Willieme.
- [16] Sandu, I.S., Ryzhenkova, N.E., Veselovsky, M.Y., & Solovyov, A.Y. 2014. Economic Aspects of Innovation-oriented Market Economy Formation. *Life Science Journal*, 11(12): 242-244.
- [17] Sekerin, V.D., Avramenko, S.A., Veselovsky, M.Y., & Aleksakhina, V.G. 2014. B2G Market: The Essence and Statistical Analysis. *World Applied Sciences Journal*, 31(6): 1104-1108.
- [18] Taranukha, Yu. V. 2013. *Microeconomics: manual* (Endorsed by Doctor of Economics, Professor A.V. Sidorovich). Moscow: "Delo i Servis" Publishing House.
- [19] Troshin, A.S., Sandu, I.S., Kupriyanov, S.V., Stryabkova, E.A., Saldanha, H.F.D. 2014. Role and Place of Economic Mechanism in Modern Conditions. *Life Science Journal*, 11(10): 487-490.

- [20] Ushachev, I.G., Klukach, V.A., & Magomedov, A–N.D. 2006. Recommendations on Developing Agrifood Market Infrastructure (pp. 67). Moscow: All-Russian Scientific and Research Institute of Agricultural Economics of the Russian Academy of Agricultural Sciences.
- [21] Wheelwright, S.C., Clark, K.B. 1992. *Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency and Quality* (pp. 392). New York: The Free Press.
- *** *Development of Commodity Market Infrastructure 2005*, Endorsed by Doctor of Economics, Academician of the Russian Academy of Agricultural Sciences Ushachev, I.G., pp. 160). Moscow: “Prometey” State Non-financial Organization, 2005. - 160 p.
- *** Official website of the Federal State Statistics Service. *Animal Production and Cattle Stock in All Types of Households for January – March, 2015*. Bulletin. Retrieved from: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/
- *** Official website of the Russian Federal Customs Service. *Customs Statistics of External Commerce. Interpretation of Tables* (Russian export/import of the most important goods for January - March, 2015). Retrieved from: <http://www.customs.ru/index.php?option>

Modern Russian Practice of Investing in Human Capital Assets

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Abstract:

The article analyzes issues related to forming human capital assets. It is established that human capital assets are a strategic resource of both a specific organization and a country, in general. This article gives the definition, characteristics and evolution of the "human capital assets" category. The article determines that in spite of the multistructurality of the agricultural sector of our country, the consumer cooperation system continues holding a special place in it. Basic areas of investing in human capital assets are determined. The topicality of research these problematic for enterprises of the agricultural sector under the current conditions is stipulated. It is determined that to a large extent the efficiency of agricultural organizations and consumer cooperation functioning depends on investing in human capital assets. This article reveals the current state of staff training and shows the system of education of staff for agricultural sector. Methodological basis included dialectical methods of research: analysis, forecasting, and synthesis.

Keywords: human capital assets, investing in human capital assets, areas of investing in human capital assets, system of education, agricultural sector, consumer cooperation system.

JEL Classification: O15, M 50.

1. Introduction

Investing in human capital assets is an essential element for developing an efficient management model. Management theorists have been studying this issue in details during seventy years. It has resulted in the human capital assets theory generally accepted in the world practice. The main mechanism of its implementation is a large-scale investment policy. This theory concept has found its use in various areas of social and economic activity while fundamental provisions are taken into account and implemented both by heads of commercial structures and representatives of various state bodies of all levels of governance. The compliance with basic principles of this theory allows updating the company staff's skills and knowledge, enhancing its intellectual potential, and consequently improving the quality of people's life.

It is impossible to imagine transformation processes including contemporary organizations without the development of human resources. Directions and efficiency of reforms implemented in Russia including in the agricultural sector depend on the development of an efficient model of human capital assets management.

2. Methodology

The methodological basis for the researches whose results are stated herein includes economic analysis based on the universal dialectical method of cognition.

Dialectics comes from the fact that the phenomena under study are taken in their interrelation and interdependence, movement, changing and development. Herewith, the development is understood as a clash of opposing views that reflects objective laws of the reality itself. The following basic features show the main principles of the economic analysis method:

- the necessity of constant comparisons is one of the characteristic features of the economic analysis method;
- the necessity to study internal contradictions, positive and negative points of every phenomenon and process;
- business activity of organizations must be studied taking into account all interrelations. No phenomenon can be correctly understood if it is regarded in isolation and without any reference to others;

- economic analysis can infer cause-and-effect relationships and give them qualitative characteristics, i.e. it measures the impact of factors on the activity results;
- every process, every economic phenomenon must be regarded as a system, combination of many interconnected elements. It causes the necessity to systematically approach studying the analysis objects that is one more of its characteristic features;
- an important methodologic feature of the analysis includes the development and the use of the system of indicators required for a comprehensive, systematic research of cause-and-effect relationships of economic phenomena and processes in the company business activity.

Thus, the economic analysis method is a dialectical approach, ways and methods of studying, measuring and generalizing the impact of numerous factors on the results of the activity of organization as an economic system.

3. Results

It is generally accepted that human capital assets are a strategic resource of any economic system. In this regard, approaches to defining the notion of human capital assets underwent considerable transformations in the process of social relations evolution and production factors changing. The human capital assets theory was generated and established at the end of the XIX century. Hitherto the person with the complex of knowledge and skills was regarded as a resource that was subject to layoff. The whole complex of skills, abilities, physical and intellectual potential that was peculiar of the person was called labor force. It is known that the maximization of profit of the establishment willing to receive a profit can be achieved through two basic ways: an increase in the profit by reorganization or innovational policy, changing the production technology or providing services and taking another measures; a decrease in expenses where staff is the main point to be reduced. In this regard, first of all, successful activity of an enterprise is based on the consideration of the human capital assets as one of the key values in the management of contemporary organization. In this case staff becomes an object of social investments. The latter have "a social but not individual or corporate nature" and "contribute to the formation of the structure of intracorporate or external relations" (Lomovtseva, O.A., Soboleva S.Yu., 2009).

William Petty is one of the first who researched the issue of labor force. He offered another approach to its perception. He stated that human capital assets were "living acting forces of the person" (Troshin A.V., 2010). Afterwards in his fundamental work Adam Smith wrote that "the increase in the efficiency of useful labor depends, above all, on the increase in the employee's knack and skills, and then on improving machines and tools he works with (Troshin A.V., 2010). So, at the first stage of the human capital assets theory the researchers regard the person as an employee and estimate his physical potential only. The researchers of the next period strived for increasing the person's production capacity by inventing new methods of work and simplifying tools. It resulted in the productivity increase. Later the attitude to the person as a resource that has physical abilities only started changing.

In the process of this theory development Carl Marx defined the labor force as "a combination of physical and mental capacities possessed" by "a living personality and used by him every time he produces user values" (Zaitseva A.N., Rakhimova L.R., 2010).

Thus, initially the person was perceived as a physical capital. However, with the course of time researches got interested in another component of this "resource" that in future had a considerable impact on the researches deepening.

Fundamentally another attitude to people started being formed in the 50-60s of the XX century when structural changes in the society served as a key factor. They included scientific and technical revolution that led to acute need in highly-qualified personnel.

The founders of the human capital assets concept were American economists, representatives of the "Chicago school" and Nobel laureates in economics T. Schultz and G. Becker. In his works "Capital Formation by Education" and "Investment in Human Capital", T. Schultz noted as follows: "education is one of the forms of capital; it is called human because this form becomes a part of the person, and it is a capital because it is a source of future accomplishments or future earnings, or both" (Troshin A.V., 2010).

So, the concept of human capital assets underwent considerable evolution in the history of the scientific thought. For example, in particular its basic postulates were formed within the neoclassical direction. Herewith, the development of human capital assets in the management and economic activity of the enterprise is not regarded as a goal in and of itself. It is one of the required tools for achieving the competitiveness by the enterprise. Relevant investments are required for this. According to contemporary classics of the economics

theory C. McConnel and S. Brue, investments in human capital assets assume "any actions that improve the qualification and abilities, and employees' workforce productivity thereby" (McConnel C.R., Brue S.L., 1992).

In the second part of the XX century the notion of the human capital assets was formed, methods of its improvement where investment had become the main mechanism were defined. Various researchers were involved in further developments of this theory and aimed to systemize this process.

Directions of investments in human capital assets include health, education, and culture (Vorotilova, O.A., 2014).

Investments in the health capital are a basis of the human capital, in general, as they prolong the employable period of the person's life, and thus, slow down the physical depreciation of the human capital assets. The health of the society is not only a factor of the state economic development but also the one of national safety (Doroshenko Yu.A., 2012).

Investments in the education capital form qualified and more productive labor forces. Special literature regards the problem of moral ageing of the accrued academic potential and necessity of investments in re-education and further training (Doroshenko Yu.A., 2012).

Investments in the culture capital have, above all, social effect. They increase the person's inclination to communications, create background for more successful professional preparation, and contribute to the transfer of the cultural possessions of the society from generation to generation. Along with this, it is certainly possible to implement commercially efficient projects in the area of culture (Vorotilova, O.A., 2014).

Under contemporary conditions of the Russian economy modernization, investments in human capital assets are regarded as one of the priority directions in the state and society activity. In this case it is traditionally implemented on two institutional levels – macro and micro levels. On the macro level it includes the implementation of state national priorities, first of all, in relation to financing education, medicine, culture, fundamental researches and other expenditures provided by state institutions. This type of expenditures naturally assumes diversified activity of the state and civil society in social and economic areas. For example, in the area of education it goes about the increase in the scientific and research activity of higher and professional educational establishments. As for public health services, they include expenditures for health services, an increase in the availability of high quality medical aid, state regulation of prices for necessary and the most important pharmaceuticals, etc. In addition, if we generally speak about investments in human capital assets within the national economy, it certainly goes about system transformations in such issues as organization of the competitive environment, development of social areas of economy, development of competitive labor force market, and improvement of the quality of social environment and life of citizens who live on the territory of specific region.

As for investments in human capital assets on the micro level, this is the level of a certain enterprise. Here expenditures are focused on the social policy of the company. They aim to train and improve the employees' qualification, pay for medical services, including payment of sick lists in case of the employee's incapacity to work, expenditures for labor protection and safety at the workplace and other social services. Along with this, the results of benefit from investments in human capital assets are always important. They comprise general economic growth for the state and society, and an increase in the workforce productivity and production capacity including their investment value and attractiveness for business structures. For example, according to the sociologic research that studied the aggregate human capital assets and was conducted at enterprises of the Volgograd region and Volgograd, "... more than half of the respondents have financial resources for increasing human capital assets especially in the area of knowledge capital. The most actual factors of investments in human capital assets among employees include employment term, experience of occupying this position – 38.1%, higher education - 24%, personal features – 21.7%, acquaintanceship – 11.6%, certain achievement in this activity – 9.5%, and further training – 71.4%" (Vasilenko, I.V., 2011). Thus, investing funds in human capital assets is a purposeful activity institutionalized by the state, on the one hand, and the business community and directly by the company employee, on the other hand.

4. Discussion

The problem of accumulation and accrual of human capital assets is urgent for modern Russian enterprises as well as for Western countries. This issue is especially urgent for enterprises of the agricultural sector.

In our country the issues related to training specialists always played a key role for social and economic and political development of the state. The world practice also proved that investments in human capital assets have the greatest effect as employees' knowledge and competence level are the basis for the development of

any enterprise and the country as a whole. As it is known, in the past decade the agricultural sector of our country has achieved major success. To our mind, for the problem related to the deficiency of highly skilled employees, they would have been even more remarkable. Unfortunately, we have to state that agriculture is practically the only area where the share of staff with professional education has considerably reduced in the past decade. It is not a secret that only 20% of agricultural graduates start working after graduating from the higher educational establishment or college. The majority of them stay in the city and get employed with a different specialization. Under the conditions of low salary and education commercialization, a lot of village school leavers or already employed specialists cannot afford to continue their education and get, for example, higher education. We also have to state that there is "... also a layoff of specialists with higher education (59%), professional education (39%); there is even the reduction in the share of the most experienced managers and specialists aged 30-55 (4-5%)" (Gerasimova, N.V., 2011). At the same time it is the educational level of managers and specialists that creates the staff potential required for the development of agricultural production. The future of stable development of agro-industrial complex "... will be determined by people, their qualification, skills, labor motivation, and culture. That's why educating and re-educating, further training, and forming staff become fundamentally important for all areas of the complex" (Inshakov, O. V., 1995). Consequently, the situation with staff in the agricultural sector remains rather complicated, and to a large extent it touches upon many agricultural regions of our country. This occurs in spite of the fact that today, as a whole, 59 agricultural higher educational establishments and 25 establishments of additional professional education function in the country. Staff with higher professional education is trained in 122 specialties and 70 directions of bachelor and master courses. Staff with secondary professional education is trained at 26 higher educational establishments in 51 specialties. 429.2 thousand students (including 197.8 thousand full-time students) study according to programs of higher professional education. Besides, there are 9.5 thousand postgraduates and postdoctoral students. 25.6 thousand people study according to programs of secondary professional education (Official website of the Ministry of Agriculture of the Russian Federation, 2015). Education is carried out both according to directions that are traditional for agriculture and modern specialties: zootechnics, mechanization, agronomy, economic specialties, marketing services, informational technologies, etc. Herewith, about 87% of the total number of students of agricultural higher educational establishments studies strictly according to agricultural specialties. Besides, over the past ten years 22 training colleges, 41 Institutes for Continuing Education and 1 Scientific Research Institute were attached to agricultural higher educational establishments (Official website of the Ministry of Agriculture of the Russian Federation, 2015).

We think the reasons of negative tendencies of decreasing educational level of employees working in the agricultural sector are rather diversified. They include unequal allocation of productive forces on village territories, low investment attractiveness of rural settlements, insufficient quality of work force, competitive weakness of rural staff on the urban market, underdevelopment of the labor market and housing in villages, reduction of support measures by state authorities, and efferent processes in the structure of managing agriculture as an integral system, etc. Taking into account the above stated, we find it possible to offer the following measures on overcoming negative tendencies. It is necessary to recover the mechanism of training staff for the agricultural sector on the basis of the educational scheme that is traditional for our country – "science – education – production" – that was successfully applied in the Soviet period. For example, in 2008 168 teachers of Russian higher educational establishments on consumer cooperation were trained by efforts of teachers of the Volgograd State Agricultural University, and specialists of the "Sodruzhestvo" Volgograd Regional Consumer Agricultural Credit Cooperative (VRCAC). In November 2014 the "Managing Comprehensive Development of Rural Territories" program on training village heads was developed and implemented. Managers of 25 rural settlements from the Uryupinsk District were trained according to it (20). Besides, the basic structure in relation to training staff for the cooperation in our region is the Volgograd Institute of Cooperation (a branch) of the Russian University of Cooperation (Russian University of Cooperation. Volgograd Branch, 2015). The Institute trains specialists both for the consumer cooperation system and other areas of the national economy of the region. The creation of a multilevel system of agricultural education, the integration of agricultural higher educational establishments with agricultural colleges and other secondary professional establishments, in particular, is one more measure to solve the problem of training staff and increasing the educational level of employees of agricultural business. Some regions have been already successfully implementing such practice. For example, the Altai State Agricultural University, the Belgorod State Agricultural University named after V.Ya. Gorin, the Bryansk State Agricultural Academy, etc.

The application of new informational and communication technologies in agricultural education is a measure to overcome the problem on providing staff for the agricultural sector. Above all, it goes about the development of remote technologies. The application of remote technologies will allow not only to solve the issue related to training highly-qualified staff without discontinuing rural life style, but also to improve additional education and further training of working specialists. Under today's conditions the development of "agricultural education with the application of remote technologies must aim to solve the following tasks: to increase physical availability of the educational establishment for rural school-leavers who want to continue their education, to decrease financial load for the students who have chosen the remote form of education, and to provide students with professional competences that can be used under conditions of the social environment, etc." (Nardin, D.S., 2012).

The problem of training qualified specialists is also actual for the system of consumer cooperation. It is not a secret that modern Russia cooperation survives only due to so called "old staff", while the youth hardly decides to work for cooperative organizations. Along with this, "in villages the cooperation is a rather intensive social and economic phenomena with an explicit civil content" (Obyedkova, L.V., 2011). In this regard, it is necessary to note that consumer cooperation is a peculiar rational form of the population self-organization as it naturally combines personal, individual and corporate opportunities.

Cooperative activity of citizens based on cooperative property contributes to their economic self-government and independence from state structures, realization of their solid citizenship. The importance of consumer cooperation for the Russian agricultural sector lies in the fact that "they allow to overcome negative consequences in terms of determining purchasing prices by large agricultural enterprises, to decrease transportation expenses and to generally contribute to the development of manufacturers of agricultural products themselves" (Opeykina, T.V., 2014). That's why we think it is quite natural that personal small-holdings, peasant farm enterprises and small and medium-sized plants continue being basic subjects of consumer cooperation. For example, at the present time there are "more than 2 bn. personal small-holdings, about 300 thousand peasant farm enterprises, and 40 thousand small and medium-sized plants" (Tkach, A., 2014).

Along with this, it is necessary to note that in our country the consumer cooperation is one of few systems that managed to maintain not only its business activity but also a system of specialists training – system of education - in the difficult period of transferring to a new socio-political and socio-economic mechanism of the government. Today it consists of the Russian University of Cooperation (RUC), an autonomous non-commercial organization of higher professional education of the Central Union of Consumer Cooperatives of the Russian Federation with the center in Moscow and 21 branches in Russian regions. In addition, the system of cooperative education includes "Siberian University of Consumer Cooperation", a non-governmental educational establishment of higher professional education of the Central Union of Consumer Cooperatives of the Russian Federation with the center in Novosibirsk and 7 branches in such cities as Chita, Ulan-Ude, Omsk, Vladivostok, Kyzyl, Tyumen, Yakutsk, and 52 secondary special educational establishments with 25 branches around the country. In total, more than 100 thousand persons study in consumer cooperation establishments (Official website of Central Union of Consumer Cooperatives of the Russian Federation, 2015). Cooperative higher educational establishments continue practicing permanent education system: pre-university tutorial, secondary professional education, higher professional education, training academic staff at graduate and doctoral training centers, additional professional education, managers', employees' and specialists' further training. The Interuniversity Academic Board of the Central Union of Consumer Cooperatives has been functioning since 1997. It consists of researchers from higher educational establishments, chiefs of Central Union of Consumer Cooperatives and regional unions of consumer societies (Management Bodies of Central Union of Consumer Cooperatives, 2015). The main task of its establishment is to coordinate scientific and applied researches on priority directions of the activity performed by consumer cooperation enterprises. In our opinion, the formation of such a large educational center was the logic continuance of the policy successively pursued by the Central Union of Consumer Cooperatives in relation to reforming the cooperative education system in recent years. Herewith, the aim of the continued reforming is also to, firstly, meet the needs of all consumer cooperation areas in highly-qualified specialists, and secondly, maintain inextricable connection of theoretic knowledge with the production and social activity of cooperative structures.

Today's cooperation not only strengthens the aspiration of rural manufacturers to protect their own interests but also contributes to their self-organization, since it allows them not to be excluded from the participation in all transformations that take place in socio-economic life of the society and the country. This statement is also appropriate, because, as we think, consumer cooperation is a product of self-regulating organization of civil society.

In the contemporary social medium the civil society performs a number of important functions. First of all, it is self-governance, i.e. the availability of a relevant mechanism based on direct and inverse relationships and allowing withstanding the external impact of the state as well as contributing to balancing interests of certain citizens and norms of the law that reflects the society's interests. Secondly, it is social integration. This is an ability to self-organize that is not related to hereditary privileges, territory and ethnic affiliation covering the subject of civil society, social institutes and other structural formations. The third function includes self-development. This is the creation of social conditions for self-realization of social groups where a relatively free and developed personality is associated in. Consequently, the system of consumer cooperation comprises its basic features and characteristics, but it does not come down to them. The importance of considering consumer cooperation in the structure of the civil society is not a strictly national Russian problem. It is also an international problem.

Theory and practice of cooperation give an opportunity to single out specific features of consumer cooperation that identify it as a unique socio-economic system. Consumer cooperation is simultaneously a volunteering union of people or organizations that have common socio-economic interest and corporate formation of members maintaining their self-governance. It operates on the profit-free basis in order to meet economic and social needs of its members. One more specific feature includes the fact that a cooperative enterprise entirely belongs to the cooperation members and is controlled by them. According to its character, the system of cooperative management is democratic. At the same time consumer cooperation can also be regarded as a social organization that is a voluntary democratic union that aims to meet economic, social and cultural needs and was established for its members' (manufacturers' and consumers') self-help and self-protection.

Herewith, it is impossible to imagine the development of cooperative structures without serious support from the federal center and regional authorities. Historically it is the state that sanctioned the becoming of cooperative sector in our country. This tradition continues being maintained at the present time. In other words, legal regulation is a rather important issue for small business in agriculture (Kulikov, I. 2013).

Today it is possible to speak about several forms of state support: legal, financial and economic, and organizational. Legal support includes the formation of regulatory and legal framework on federal and regional levels, availability of state programs that aim to develop various types of cooperation, legal initiative of the Central Union of Consumer Cooperatives of the Russian Federation, etc. Financial and economic support includes such measures as compensation costs, provision of concessional loans, debts optimization, preferential price formation, etc. Organizational support, above all, aims to create favorable conditions for cooperation of all types as well as to provide procedural guidelines while establishing a cooperative, to form the infrastructure of cooperative activity in agriculture, etc. Legal support for consumer cooperation has already got positive results, including those related to the development of educational level of employees working in the agricultural area, etc. For example, according to the results of polling among graduates of the Volgograd State Agricultural University, 59% of the respondents have already taken their decisions as for their future job. 40% of them plan to work in the agro-industrial complex, and 75% will work within their specialty in the rural area (Official website of "Volgograd State Agricultural University" Federal State-Funded Educational Institution of Higher Vocational Education, 2015). It is the first time for the last decade when the state support of the village increased several times, and the implementation of a new agreed federal target program of stable development of rural territories for 2014-2017 and for the period until 2020 opens even wider horizons for those who work in rural area. The above actions have already contributed to the development of various forms of cooperative structures in the villages. So, "all types of agricultural consumer cooperatives including agricultural credit cooperatives became widely spread" (Fomicheva, K.A., 2014).

In this regard it is necessary to denote two important principles of state support cooperation, as a whole, and consumer cooperation, in particular. The first principle assumes that state support is provided only for those cooperatives that invest funds in the development of proper and shareholders' resources. Herewith, they do not expect the state to do it instead of them. This is the essence of private and state partnership. The second principle lies in the fact that the state will not support any organization that includes the word 'cooperation' in its name. But it will support the ones that can prove their usefulness for their own members.

Conclusion

To sum it up, we would like to emphasize that investing in human capital assets is regarded as one of the crucial processes in forming the contemporary history of the Russian economy, and the human capital assets are one of its strategic resources. However, even with the current rates of investing in human capital assets, the necessity in their permanent development is maintained both for the cooperative sector and agriculture, in the

whole. That's why we think that overcoming difficulties while training staff depends on a number of circumstances. However, for the most part they are not related to solving the whole complex of problems on social and economic arrangement of rural areas and, first of all, measures of state support on forming the staff policy.

References

- [1] Doroshenko, Yu.A. (2007). *Human Capital Assets as a Priority Object for Investments*. Retrieved 29.11.2012 from: <http://www.creativeconomy.ru/articles/12017/>
 - [2] Fomicheva, K.A. (2014). Formation and Functioning of Agricultural Consumer Cooperation. *Economy of Agricultural and Processing Companies*, 2: 38-39.
 - [3] Gerasimova, N.V. (2011). Highly Qualified Personnel to Innovational Agriculture. *Economy of Agriculture*, 2: 34-45.
 - [4] Inshakov, O.V. (1995). *Mechanism of Social and Market Transformation and Stable Development of Russian Agro-Industrial Complex* (pp. 450). Volgograd: Publishing House of the Volgograd State University.
 - [5] Kulikov, I. (2013). Problems and Directions of Development Small Business in Russian Agriculture. *Agro-Industrial Complex: Management*, 2: 3-8.
 - [6] Lomovtseva, O.A., & Soboleva S.Yu. (2009). Methodological Aspects of Defining the Essence and Efficiency of Social Investments. *Belgorod State University Scientific Bulletin*, 9: 213-218.
 - [7] McConnel, C.R., Brue, S.L. (1992). *Economics: Principles, Problems, and Policies*, Volume 2, pp. 400 Moscow: Business.
 - [8] Nardin, D.S., Nardina, S.A. (2012). Perspectives of Agricultural Education Development using Remote Technologies. *Young Scientist*, 12: 497-499.
 - [9] Obyedkova, L.V. (2011). Development of Russian Agricultural Cooperation. *Belgorod State University Scientific Bulletin. History. Politology. Economics. Computer Science Series*, 7(102), 18/1, 34-40.
 - [10] Obyedkova, L.V., Opeikina, T.V. (2014). Role and Value of Consumer Cooperation in Development of Contemporary Russian Society. *Bulletin of the Eurasian Academy of Administrative Sciences*, 1: 84-93.
 - [11] Tkach, A. (2014). Cooperation in Russian Agro-Industrial Complex. *Agro-Industrial Complex: Economy, Management*, 3: 30-36.
 - [12] Troshin, A.V. (2010). Human Capital Assets as a Factor of Developing Russian Innovational Economy. *Bulletin of the Volgograd State Technical University online academic periodical*. Retrieved 31.03.2013 from <http://econ.vsu.ru/downloads/pub/seconomic/9/Troshin.pdf>
 - [13] Vasilenko, I.V. (2011). Knowledge Capital in Human Capital Assets in the Contemporary Russia (through the Example of Volgograd and the Volgograd Region) (500 p.). "Innovational Development of Human Capital Assets" November 18-19, 2011: *Proceedings of the All-Russian Research-to-Practice Conference*. Volgograd: Publishing House of the Humanitarian Education Department of the Higher Professional Education of the Volgograd State Service Academy.
 - [14] Vorotilova, O.A. (2014). Directing Investments in Development of Human Capital Assets. *Economy and Contemporary Management: Theory and Practice*, Novosibirsk, NP "SibAK", 10: 77-84.
 - [15] Zaitseva, A.N., Rachimova, L.R. (2010). Formation and Development of Human Capital Assets Theory in Western Economic Thought. *Tyumen State University Bulletin online scientific periodical*. Retrieved 02.04.2013 from: <http://www.utmn.ru/docs/3323.pdf>
- *** *Central Union of Consumer Cooperatives in Figures*. Official website of the Central Union of Consumer Cooperatives of the Russian Federation. Retrieved 25.02.2015 from <http://www.rus.coop/about/figures>
- *** *Management Bodies of Central Union of Consumer Cooperatives*. Retrieved 24.01.2015 from: studopedia.org/2-60711.html/
- *** *Optimization of Agricultural Education System*. Official website of the Ministry of Agriculture of the Russian Federation. Retrieved 23.01.2015 from: <http://www.mcx.ru/news/news/show/8242.355.htm>

- *** Recruitment Fair. Official website of Volgograd State Agricultural University Federal State-Funded Educational Institution of Higher Vocational Education. Retrieved 24.01.2015 from: <http://www.volgau.com>
- *** *Russian University of Cooperation. Volgograd Branch. Official website.* Retrieved 24.01.2015 from: <http://volgograd.ruc.su>

Central Bank Interventions and Foreign Exchange Rate Volatility in India: Before and After the 2008 Global Financial Crisis

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Abstract

The study empirically investigates the dynamic inter-relationship between central bank interventions and volatility of the Indian rupee – US dollar exchange rate during before and after the 2008 global financial crisis. It also examines the factors influencing the volatility of exchange rate by employing GJR GARCH framework. For analysis, the study has divided data into two periods: pre-crisis (from April 01, 2002 to January, 30 2008) and post-crisis (from February 01, 2008 to March 30, 2012). The following data was used by the study: monthly data on Indian rupee - US dollar bilateral exchange rate, net FII inflows, net dollar purchases and sales of RBI and inflation differentials between USA and India. The empirical results show that RBI interventions are effective in reducing the volatility of the Indian rupee – US dollar exchange rate during the pre-crisis period. However, RBI interventions seem to increase exchange rate volatility during post crisis. Finally the results suggest that higher FII inflows caused the Indian rupee to appreciate vis-a-vis the US dollar but this appreciation was accompanied by an increased volatility in the exchange rate.

Keywords: RBI, intervention, volatility, financial crisis, GJR GARCH.

JEL Classification: G15, G150

1. Introduction

The government of India introduced financial sector reforms in 1991. After reforms, India initiated the process of integration of its financial markets with global financial markets by permitting foreign institutional investors (FIIs) to invest in Indian capital market and allowing domestic companies to raise capital from abroad. The foreign currencies' inflows and outflows affected the rupee exchange value vis-à-vis the foreign currencies. The financial sector reforms also encouraged more export/import of goods and services contributing to foreign currency inflows/outflows which leads to increases in volatility of foreign exchange market in India.

In recent times, volatility in Indian foreign exchange market has increased due to global financial crisis which was originated in USA, 2008. This increased volatility has an adverse impact on the balance of payments, FDI flows and FII flows affecting the economic growth of the country. In order to reduce the adverse impact of the volatility in exchange rate, the RBI intervened in the Forex market. The intended objectives of RBI's participation in the forex market are stabilization of the exchange rate and building of foreign exchange reserves.

The monetary authorities in emerging economics such as India are concerned about the impact of central bank interventions on exchange rate volatility. There are many studies which have examined this issue. Some studies found that RBI intervention in foreign exchange market is effective in controlling volatility of exchange rate (Ranadive and Burange (2014), Behra (2005) and Domaç and Alfonso Mendoza (2004)). Behra (2005) investigated the impact of RBI interventions on volatility exchange rate by applying GARCH model. The study found that the volatility of the exchange rate reduced after RBI interventions. Domaç and Alfonso Mendoza (2004) find evidences that central bank interventions have reduced volatility in the foreign exchange market in Mexico and Turkey. However, other studies found that central bank interventions have increased the volatility of exchange rate and some studies found that central bank intervention does not have any impact on the volatility of exchange rate (Vadivel and Ramachandran (2013), Hassene Ben, Houssein Rachdi and Sami Mensi (2011), Ken Miyajima and Carlos Montoro (2013)). Therefore, it is important to study the effect of central bank interventions on volatility in the Indian foreign exchange market.

The main objective of the study is to investigate the empirical relationship between the RBI interventions and exchange rate volatility. The study also investigates the influence of other factors on exchange rate volatility, namely demand and supply of currencies, interest rate differentials, inflation differentials and balance of payments position.

2. Theoretical and empirical evidences

The RBI intervention implies buying or selling of foreign currency in foreign exchange market in order to stabilize the exchange rate and reduce its volatility. There are two main channels which RBI may intervene in foreign exchange market - sterilized interventions and non-sterilized interventions.

The channels through which a non-sterilized intervention in the foreign market may influence the exchange rate are well known in the economic literature. A purchase or sale of foreign currency by the RBI may depreciate or appreciate the domestic currency and correspondingly cause a decrease or an increase in the money supply in the economy. Sterilized intervention, on the other hand, might influence the exchange rate not through changes in money supply, but through two main channels: portfolio balance channel and the signaling channel. The portfolio balance channel assumes that investors diversify their portfolio based on interest differential. Rogoff (1984) found that channels of portfolio balance approach could have large impact on exchange market. However, others studies do not find evidence of much impact of this channel and suggest it to be weak (Evans and Lyons (2001) and Ghosh (1992)).

The signaling channel refers to the signals may sent by the RBI to the market. RBI directly intervenes in foreign exchange market to indicate intended changes in monetary policy, the resulting appreciation of the exchange rate can be described as the signaling channel fundamentals. The impact of intervention through the signaling channel has often been found more effective than through the portfolio balance channel (Dominguez and Frankel (1993a)).

Sahadevan (1999) used Granger causality test to show that central bank interventions do not have any significant causal relationship with the monetary variable and the exchange rate. The study concludes that the intervention did not have stabilizing effect on exchange rate. Behra, Narasimhan and Murthy (2005) use the GARCH model and monthly data of exchange rate return, FII trades and net purchase of the dollar by RBI from 1995 to 2005 to demonstrate that the interventions of the central bank are effective in reducing volatility in the Indian foreign exchange market.

Vadivel and Ramachandran (2013) used GARCH and APARCH models and the weekly exchange rate data for the period from December 1996 to April 2013 to conclude that RBI interventions have not been successful in containing volatility in the exchange rate. Takeshi (2012) examines the causal relationship between central bank intervention and exchange returns in India by using EGARCH framework for the period of December 1997 to December 2011. His results conclude that the Indian central bank interventions have served as a useful instrument in reducing exchange rate volatility.

Dominguez (1998) empirically analyses the effects of US, German and Japanese monetary and intervention policies on dollar-mark and dollar-yen exchange rate volatility using data from 1977-78 to 1994-95. The study shows that interventions were generally found to increase volatility. Finally result suggests that intervention had effects on volatility that are situation-specific and that central bank exchange rate policy did increase volatility.

The above studies have mixed conclusions. Also these studies have not analyzed the interrelationship between central bank interventions and volatility of exchange rate during before and after the 2008 global financial crisis. Therefore, the study re-investigates the dynamic interrelationship between central bank interventions and volatility of foreign exchange market in India.

3. Data and methodology

3.1 Data description

Data for the present study has been obtained from the Reserve Bank of India (RBI) website. The monthly data on nominal exchange rate (Dollar-Rupee), FII flows, US - India inflation differentials are taken from April 2002 to March 2012. The study covers two periods: pre-crisis (from April 01, 2002 to January 30, 2008) and post-crisis (from February 01, 2008 to March 30, 2012) in order to investigate the effect of RBI interventions on volatility in the Indian foreign exchange market.

The exchange rate is influenced by not only by central bank interventions, but also by other macroeconomic variables such as FII flows and inflation differentials. The foreign institutional investors play a

dominant role in the Indian stock market and inflows of FII have increased the volatility in the exchange rate. The following table shows the RBI purchases/sales of U.S dollar over the years.

Table 1: RBI's Purchases/Sales of U.S Dollar (Units in Million)

Year	Purchase	Sale	Net	Outstanding Net Forward Sales/ Purchase
1997-08	15.1	11.2	3.9	-1.8
1998-99	28.7	26.9	1.8	-0.8
1999-00	24.1	20.8	3.3	-0.7
2000-01	28.2	25.8	2.4	-1.3
2001-02	22.8	15.8	7	-0.4
2002-03	30.6	14.9	15.7	2.4
2003-04	55.4	24.9	30.5	1.1
2004-05	31.4	10.6	20.8	0
2005-06	15.2	7.1	8.1	0
2006-07	26.8	0	26.8	0
2007-08	79.7	1.5	78.2	14.7
2008-09	26.6	61.5	-34.9	2

Source: Reserve Bank of India website

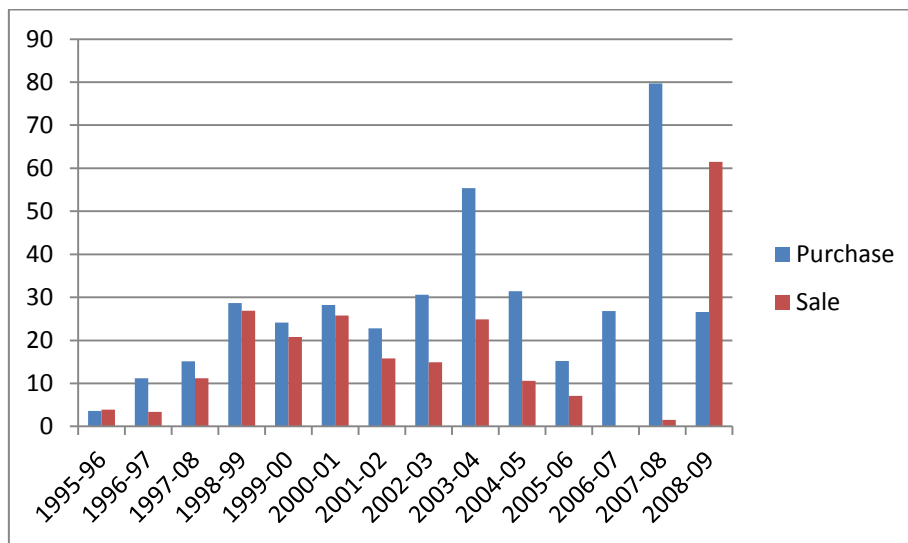


Figure 1: RBI's Purchases/Sales of U.S Dollar (Units in Million)

3.2 Methodology

The study conducted unit root tests to check the stationarity of series by employing Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) models. To investigate the impact of RBI interventions on exchange rate volatility, GJR GARCH model is used. In the simple GARCH model, bad and good news have the same effects on conditional volatility. However, the GJR GARCH model (1993) allowed for good and bad news to have different effects on volatility. In the model, the asymmetric response of conditional volatility to information is captured by including, along with the standard GARCH variables, squared values of ε_{t-1} when ε_{t-1}^2 is positive. The following GJR GARCH specification is estimated.

$$h_t = \alpha_0 + \sum_{j=1}^q \alpha_j \varepsilon_{t-1}^2 + \sum_{i=1}^p \beta_i h_{t-1} + \sum_{k=1}^r \gamma_k I_{t-1} \varepsilon_{t-1}^2 \quad (1)$$

where, $I_{t-1} = 1$ if $\varepsilon_{t-1} < 0$, 0 otherwise.

The study also examined two GJR GARCH models, one for pre-crisis period and the other for post-crisis period to check how estimation of the GARCH coefficient changes from one period to another. In order to investigate the effect of RBI intervention on volatility of exchange rate, the study introduces intervention variable in conditional mean and variance equations. The modified GJR GARCH model is specified as,

$$R_t = \beta_0 + \beta_1 R_{t-1} + \gamma_1 I_n + u_t \quad (2)$$

$$h_t = \alpha_0 + \sum_{j=1}^q \alpha_j \varepsilon_{t-j}^2 + \sum_{i=1}^p \beta_i h_{t-i} + \sum_{k=1}^r \gamma_k I_{t-k} \varepsilon_{t-k}^2 + \lambda_1 I_n \quad (3)$$

Where I_n is RBI intervention variable. RBI intervenes to purchase and sell foreign currency to influence the exchange rate. If the coefficient of intervention in the mean equation is positive and significant it indicates that the RBI intervention positively impacts exchange rate returns. If coefficient is negative and significant, it indicates that RBI intervention negatively impacts exchange rate returns.

The study associates intervention variable in variance equation to examine the effect of RBI intervention on exchange rate volatility. If coefficient of intervention is positive and significant it implies that the intervention increases the volatility of the exchange rate.

The study used GJR GARCH model to investigate the factors determining exchange rate for the pre-crisis and the post crisis periods. For this purpose, the study introduces the 'foreign institutional investment' variable and the 'inflation differential between USA and India' variable in the mean and variance equations. The modified GJR GARCH model is specified as:

$$R_t = \beta_0 + \beta_1 R_{t-1} + \gamma_1 FII_{t-1} + \gamma_2 Indif_{t-1} + u_t \quad (4)$$

$$h_t = \alpha_0 + \sum_{j=1}^q \alpha_j \varepsilon_{t-j}^2 + \sum_{i=1}^p \beta_i h_{t-i} + \sum_{k=1}^r \gamma_k I_{t-k} \varepsilon_{t-k}^2 + \lambda_1 FII_{t-1} + \phi Indif_{t-1} \quad (5)$$

If the coefficient of FII is positive and significant, it implies that volatility of exchange rate increases with increase in FII flows. If the coefficient of FII is negative and significant, it implies that volatility of exchange rate decreases with increase in FII flows.

4. Results and discussion

The results of the ADF and PP tests are given in Table 2 and 3 for all the series for both the pre and post global financial crisis periods. The results of ADF shows that the log series of exchange rate (US dollar- Rupee) are found to be non-stationary in level form, since null hypothesis is accepted. However, log series of exchange rate are stationary in first difference. In case of net purchase and sell of dollar, inflation differential and foreign institutional investment are non-stationary in level form, but are stationary in first difference both pre and post global financial crisis. Similar results observed in the PP test results are given in same tables.

Table 2: Results of Unit Root Statistics: Pre Crisis

Name of the Variable	ADF in level	ADF in First Differences	PP in level	PP in First Differences
Exchange rate of rupee-US-Dollar)	-0.230 (0.258)	-19.712* (0.0120)	-0.4890 (0.432)	-19.988* (0.0000)
Net Purchase and Sell of Dollar	-0.1567 (0.489)	-47.890* (0.0000)	-0.670 (0.476)	-47.865* (0.0000)
Inflation Differential (US-India)	-0.567 (0.356)	-58.380* (0.0000)	-0.3896 (0.2674)	-58.540* (0.0000)
FII	-3.568* (0.259)	-16.370* (0.0000)	-2.965* (0.670)	-16.785* (0.0000)

Note: ** Indicates 1% and 5% significance level

Table 3: Results of unit root statistics: post crisis

Name of the Variable	ADF in level	ADF in First Differences	PP in level	PP in First Differences
Exchange rate of rupee-Dollar	-0.363 (0.2891)	-28.5810* (0.000)	-0.2801 (0.3891)	-28.671* (0.0000)
Net Purchase and Sell of dollar	-0.2451 (0.491)	-51.380* (0.0000)	-0.119 (0.589)	-51.712* (0.0000)
Inflation differential (US-India)	-0.451 (0.3901)	-22.371* (0.0000)	-0.427 (0.2561)	-22.891* (0.0000)
FII	-0.1782* (0.2590)	-12.421* (0.0000)	-0.2891 (0.5190)	-12.589* (0.0000)

Note: *&* Indicates 1% and 5% significance level

The Table 4 provides descriptive statistics for all the series both pre and post global financial crisis. To test ARCH effect in present data, Ljung-Box Q test is employed. The LB Q test shows presence of time varying heteroscedasticity in the data during pre and post crisis. The LM test confirms the presence of ARCH effects in returns on exchange rate. There is evidence for time-varying volatility in returns on exchange rates both pre and post global financial crisis.

Table 4: Summary of Descriptive Statistics: Pre and Post Crisis

Name of Variables	Mean	S.D	Skewness	Kurtosis	LB-Q TEST
Exchange Rate(US-Dollar)	0.000234	-0.2670	-0.0045	11.375	18.456 (0.213)
Net Purchase and sell of Dollar	-0.0E406	-0.0231	0.7431	9.432	23.456* (0.0134)
Inflation differential (US-India)	-0.00038	-0.0456	0.0039	14.439	45.5021* (0.000)
FII	0.9310	0.4322	0.4710	8.329	17.530* (0.0346)
Summary of Descriptive Statistics: Post Crisis					
Exchange Rate(US-Dollar)	0.00781	0.0491	-0.3461	15.730	27.9871* (0.0028)
Net Purchase and sell of Dollar	-0.00371	-0.4193	3.349	22.301	35.229* (0.0000)
Inflation differential (US-India)	-0.03189	-0.3491	7.901	12.420	21.521* (0.000)
FII	0.4519	2.901	6.3210	18.309	34.670* (0.000)

Note: *&* Indicates 1% and 5% significance level

The variances of returns on exchange rate are negative in pre-crisis but positive in post crisis implying increase in volatility in exchange rate during the study period (refer Figure 2). The variance of FII flows is positive both pre and post crisis implying FII flows increase the volatility of the exchange rate (Indian rupee-US-Dollar).

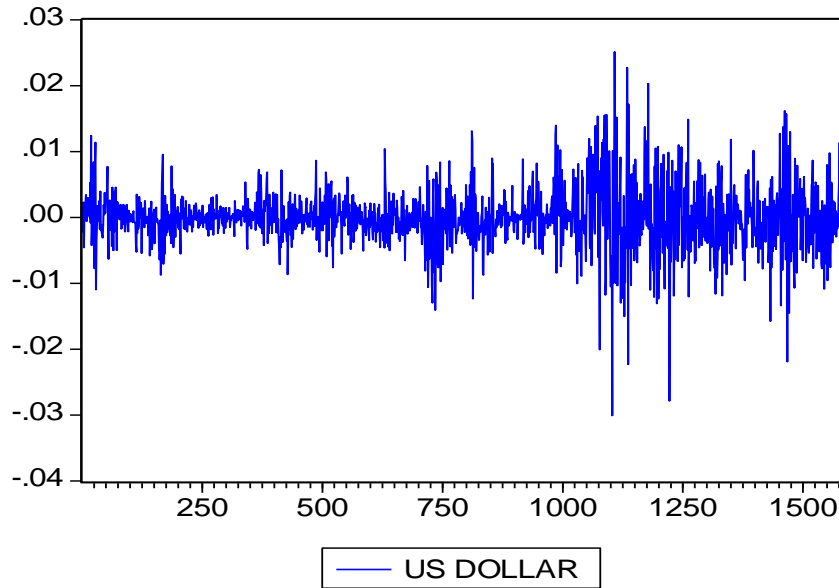


Figure 2: Exchange Returns on USD-INR

The variance of net purchase and sale of U.S dollar is negative pre-crisis but positive post crisis. The value of kurtosis is found to be more than three for all series both pre and post global financial crisis. It implies that all series follow non-normal distribution. The coefficient of skewness is positive for most of series except in the case of returns on exchange rate. It indicates that frequency distribution of the series is positively skewed or tails to the right.

In order to investigate whether exchange returns follow asymmetric behavior or not, GJR GARCH Model is employed. The results of GJR GARCH model are presented in Table 5. The coefficient of ARCH is positive and significant which implies that past news impacts current volatility. Further, the coefficient of GARCH is positive and significant which shows that volatility clustering is present in exchange rate returns. The asymmetric effect captured by λ_1 is positive and significant which implies the presence of asymmetric effect in the volatility of returns on exchange rate. It shows that bad news tend to cause volatility than positive news.

Table 5: Results of GJR GARCH Model with Returns on Exchange Rate

Mean Equation			
Parameters	Coefficients	Z-statistic	p-value
β_0	0.05320	0.2305	0.2510
β_1	3.5221	4.6201*	0.0000
Variance Equation			
α_0	0.3567	1.9340**	0.0480
α_1	0.6210	3.7801*	0.0000
β_1	0.3801	5.450*	0.0000
λ_1 (Asymmetric effect)	0.0459	4.8901*	0.0000
Residual diagnostics	Test statistic	P. value	
L B-Q(16)	3.890	0.3890	
LB ² -Q(16)	7.8901	0.3569	
LM- (10)	15.7601	0.01280	
F- Test	0.7890	0.2570	

Note: *&* Indicates 1% and 5% significance level

To investigate the effect of RBI interventions on volatility of exchange rate, the study introduces intervention variable (Net purchase and sale of dollar) in mean and variance equations in GJR GARCH model. Table 6 provides result of GJR GARCH model for the pre-crisis period. The coefficient of intervention in the variance equation is found to be negative and significant. This shows that RBI interventions are effective in reducing the volatility of the rupee – dollar exchange rates.

Table 6: Parameter Estimates of the GARCH (1,1) Model: Pre Crisis

Mean Equation			
Parameters	Coefficients	Z-statistic	p-value
β_0	0.0034	2.0117*	0.4310
β_1	2.510	3.821*	0.0000
γ_1 (Net purchase and sell of dollar)	0.0073	2.4301*	0.0020
Variance Equation			
α_0	0.00490	1.310**	0.2321
α_1	0.21345	2.439*	0.0200
β_1	0.7901	6.891*	0.0000
λ_1	0.04786	3.540*	0.0000
γ_1 (Net purchase and sell of dollar)	-0.00297	2.772*	0.0000
Residual diagnostics	Test statistic	P. value	
L B-Q(16)	5.670	0.5710	
LB ² -Q(16)	3.4569	0.4780	
LM- (10)	19.3470	0.3820	
F- Test	0.4801	0.8240	

Note: *&* Indicates 1% and 5% significance level

The results of GJR GARCH model is given in Table 7 for the post-crisis period. The coefficient of intervention is negative (-0.679) and highly significant in the mean equation. It indicates that one crore rupee worth net purchase of dollar by RBI, exchange rate returns will decline by 0.679 percent. The coefficient of intervention in the variance equation is positive and highly significant. It indicates that RBI intervention leads to increase in the volatility of the exchange rate. Thus, RBI intervention is not supportive in reducing the volatility in the Indian foreign exchange market. This is due to the possibility that higher volatility of exchange rate might be influenced by internal as well as external factors. The final result suggests RBI may choose an alternative intervention to reduce volatility rather than non-sterilized intervention.

Table 7: Parameter Estimates of the GARCH (1,1) Model: Post Crisis

Mean Equation			
Parameters	Coefficients	Z-statistic	p-value
β_0	0.0753	1.0370	0.3701
β_1	3.643	5.5301*	0.0000
γ_1 (Net purchase and sell of dollar)	-0.6790	2.4301*	0.0001
Variance Equation			
α_0	0.05430	1.670**	0.0250
α_1	0.6321	4.670*	0.0000
β_1	0.3489	9.785*	0.0000
λ_1	0.3210	2.750*	0.0000
γ_1 (Net purchase and sell of dollar)	0.0750	2.890*	0.0000

Residual diagnostics	Test statistic	P. value
L B-Q(16)	8.780	0.6401
LB ² -Q(16)	2.8040	0.5320
LM- (10)	17.8901	0.25601
F- Test	0.5670	0.6710

Note: *&* Indicates 1% and 5% significance level

To examine factors determining volatility of exchange rate, the study introduces two variables, 'net foreign institutional investment' and 'inflation differential between USA and India' in the GJR GARCH model. The results of the GJR GARCH model are given in Table 8 and 9 for both pre and post crisis periods. The results show that volatility of exchange rates are affected significantly by both inflation differential and FII inflows. The result of GJR GARCH model reveals that inflation differential between India and the US has a negative impact on volatility both period pre and post crisis. FII flows are increase exchange rate volatility during pre and post crisis. These latter two results have important policy implications for controlling volatility in exchange rate returns.

Table 8: Factors Determining Exchange rate with GJR GARCH Model: Pre Crisis

Mean Equation			
Parameters	Coefficients	Z-statistic	p-value
β_0	0.000432	1.640**	0.0351
β_1	3.6790	2.781*	0.0001
$\lambda_1(\text{FII})$	3.456	5.5320*	0.0001
$\lambda_2(\text{Infld-US-India})$	-0.5621	1.8456*	0.0456
Variance Equation			
α_0	0.00340	2.673*	0.0000
α_1	0.4561	6.7210*	0.0000
β_1	0.5423	4.6301*	0.0000
γ_1	0.00462	4.562*	0.0000
$\lambda_1(\text{FII})$	0.00875	1.450**	0.0021
$\lambda_2(\text{Infld US-India})$	-0.0321	4.7643*	0.0000
Residual diagnostics	Test statistic	P. Value	
L B-Q(16)	3.742	0.4379	
LB ² -Q(16)	7.890	0.5701	
LM- (10)	5.780	0.360	
F- Test	0.3670	0.614	

Note: *&* Indicates 1% and 5% significance level

Table 9: Factors Determining Exchange rate with GJR GARCH Model: Post Crisis

Mean Equation			
Parameters	Coefficients	Z-statistic	p-value
β_0	0.0210	1.388**	0.0280
β_1	1.720	2.4190*	0.0001
$\lambda_1(\text{FII})$	0.218	4.3901	0.0001
$\lambda_2(\text{Infld-US-India})$	-0.2317	2.014*	0.0312
Variance Equation			
α_0	0.9101	1.8290*	0.0000
α_1	0.3810	4.671*	0.0000
β_1	0.6217	8.321*	0.0000

γ_1	0.0341	4.670*	0.0000
$\lambda_1(\text{FII})$	0.00341	2.091**	0.0000
$\lambda_2(\text{Inflid US-India})$	-0.0091	3.7801	0.0000
Residual diagnostics	Test statistic	P. Value	
L B-Q(16)	4.549	0.371	
LB ² -Q(16)	8.602	0.673	
LM- (10)	12.678	0.2673	
F- Test	0.5620	0.4290	

Note: *&* Indicates 1% and 5% significance level

Final remarks

The study empirically examines the dynamic inter- relationship between RBI interventions and volatility of exchange rate during pre and post 2008 financial crisis. It also investigates other factors influencing exchange rate of rupee against dollar. The study employs GJR GARCH model to capture asymmetric volatility. The result reveals that RBI intervention is effective in reducing volatility of exchange rate during pre-crisis. However, RBI interventions seem to increase the volatility of exchange rate returns during post crisis. This is due to the possibility that volatility of exchange rate might be influenced by internal and external factors. Thus, RBI interventions are not effective to control the volatility in Indian foreign exchange rate during post financial crisis. Finally, result suggests that high FII flows lead to the appreciation of the rupee which erodes India's competitiveness in the international market. FII flows also increase the volatility in Indian foreign exchange market.

References

- [1] Domaçılker, Alfonso Mendoza, 2004. Is there a room for foreign Exchange rate intervention under an inflation targeting framework, *World Bank Policy Research Working Paper*, No. 3288.
- [2] Dominguez, K.M. 1998. Central bank intervention and exchange rate volatility. *Journal of International Money and Finance* 17(1): 161-190, [http://dx.doi.org/10.1016/S0261-5606\(97\)98055-4](http://dx.doi.org/10.1016/S0261-5606(97)98055-4)
- [3] Dominguez, K.M, J.A Frankel, J.A. 1993a. Does Foreign Exchange Intervention Matter? The Portfolio Effect', *American Economic Review*, 83(5): 1356–1369. (DOI): 10.3386/w3299
- [4] Evans, M.D.D, Lyons, R.K. 2001. Portfolio Balance, Price Impact, and Secret Intervention', *NBER Working Paper*, 835: 1-20, <http://dx.doi.org/10.2139/ssrn.273528>
- [5] Ghosh, A.R. 1992. Is it signaling? Exchange intervention and the dollar-Deutschemark rate', *Journal of International Economics*, 32(3/4): 201–22, [http://dx.doi.org/10.1016/0022-1996\(92\)90017-E](http://dx.doi.org/10.1016/0022-1996(92)90017-E)
- [6] Hassene, Ben, Housseem Rachdi and Sami Mensi. 2011. The Effect of Central Bank Intervention on the Exchange Rate of the Tunisian Dinar in Relation to the European Currency, *Journal of Business Studies Quarterly*, 2(3): 64-74.
- [7] Ken, Miyajima. 2013. Foreign exchange intervention and expectation in emerging economies, Bank for International Settlements, *Working Papers No. 414*: 1-25.
- [8] Rogoff, K. 2014. On the Effects of Sterilized Intervention: An Analysis of Weekly Data, *Journal of Monetary Economics*, 1(84): 133–15.
- [9] Rucha, R. Ranadive and Burange, L.G. 2014. Exchange Rate Volatility and Effectiveness of Intervention in India, WP. No.: UDE 48/03/2014, pp: 1-22.
- [10] Sahadevan, K. 2002. Foreign Exchange Intervention and Future Monetary Policy: Some Empirical Evidence on Signaling Hypothesis. *ICFAI Journal of Applied Finance*, 8(4): 67-78.
- [11] Takeshi. 2012. Central Bank Intervention and Exchange Rate Behavior: Empirical Evidence for India, *Discussion Paper*, 353: 1-22.
- [12] Vadivel, A. and Ramachandran, M. 2013. Does Exchange Rate Intervention Trigger Volatility, *IEG Working Paper*, No. 328, Institute of Economic Growth.

