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Evaluation and Forecasting of Effectiveness of the Use of Region's Development Potential

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Abstract

The purpose of the research is to improve methodological instrumentarium of evaluation and forecast of regional economic growth. The authors develop methodological approach of evaluation of effectiveness of the use of region's development potential and conduct imitation modeling, which allowed building forecast scenarios for achievement of variative limits with the indicator of effectiveness of the use of region's development potential. The offered methodology of evaluation of effectiveness of the use of region's development potential consists not only in the offered scheme of analytical actions, which allow identifying the level of effectiveness, but also allows building the evaluation results into forecast scenarios of regional development of economies for determining the probability of achievement of possible perspectives. This approach allows evaluating general results of work as to rational use of existing possibilities for socio-economic development (with their correction as to existing limitations) and substantiating the necessity for measures for elimination of negative tendencies in development and minimization of inter-regional differences. This opens new possibilities for regulation of socio-economic development of regions, based on perspective analysis. That is, forecasting in this situation becomes not only purpose but means for achievement of the set goals.

Keywords: evaluation, forecasting, potential, effectiveness, region development.

JELClassification: R11, E1.

1. Introduction

Region's development potential is realized in perspective in the form of activization of investment activities and general regional growth, but this realization takes place with certain time lag. This, after evaluation of region's development potential in current period, changes in regional development come later.

Therefore, there arose necessity for determining causal relations between region's development potential and main indicators which characterize regional development: investments into main capital per capita and gross regional product per capita. At that, potential of development is the cause for inflow of investments into region and for growth of gross regional product. As a result, development potential can be viewed as factor attribute, and investment into fixed capital and gross regional product – as resultative attribute. Consequently, it is possible to set the type and parameters of objectively existing dependence and choose the corresponding function.

2. Methodological approach to determining the effectiveness of the use of region's development potential

The conducted research showed interconnection between potential of regional development and coefficients of regional growth, which allows not only determining the type of such dependence but quantitatively evaluating effectiveness of the use of development potential. In order to solve this task, methodological approach to evaluation of effectiveness of the use of region's development potential is offered which is realized according to the following stages:

- calculation of effectiveness indicator is performed by correlation of socio-economic development of region and development potential, which have been normalized on the basis of comparison with the level of the RF (macro-region);

- group of regions as to areas of effectiveness of the use of their development potential (according to coefficient of regional growth);
- evaluation of the range of fluctuations of effectiveness of the use of development potential with the use of methods of imitational modeling;
- evaluation of probability of increase of effectiveness of the use of potential of development of regions of Southern Russia by comparison of the received results of imitation modeling and actual level of effectiveness;
- determination of possibility of realization of strategic scenarios of regional development (optimistic, inertial, and pessimistic).

Evaluation of effectiveness of the use of existing region's development potential is performed on the basis of comparison of indicators which characterize results of activities and used resources.

Its economic sense consists in the following: with investments into region's economy and improvement of socio-economic indicators, i.e., increase of development potential, there should be the increase of activity of investment activities and, correspondingly, growth of socio-economic development of region – under the condition that these resources were used effectively. Effectiveness indicator of the use of potential of region allows evaluating the real effect from its growth.

It is calculated according to the following formula:

$$\mathrm{EDP} = \frac{X_{i_{t+1}} / \overline{X} + T_{x i_t} / \overline{T_x}}{\mathrm{DP}_{i_t} / \overline{DP} + \mathrm{T}_{DP i_{t-1}} / \overline{T}_{DP}}, \quad (1)$$

where E_{DP} – indicator of effectiveness of the use of region's development potential; X_{it+1} – indicator characterizing the level of socio-economic development of *i*-th region in year *t+1*; DP_{it} – region's development potential in year *t*; $\overline{X}$ – average value of indicator characterizing the level of socio-economic development of region (for the RF or macro-region; T_{xit}– rate of growth of indicator characterizing the level of socio-economic development of region in year t; $\overline{T_X}$ – average rate of growth of indicator characterizing the level of socio-economic development of region (for the RF or macro-region); $\overline{DP}$ – average value of development potential; T_{DPt-1} – rate of growth of region's development potential in year t-1; $\overline{T_{DP}}$ – average rate of growth of development potential (for the RF or macro-region). Value of this indicator has to be positive. Besides, the bigger the value of effectiveness indicator, the quicker the regional development and more effective the use of development potential:

$$E_{\mathrm{DP}} \to \max \quad (2)$$

Low values of coefficient of effectiveness of development potential use show economic instability and irrational processes in region's economy. Normative level of this indicator should correspond to the level 0.1 – 0.2. This means that growth of investments (GPP) per capita should constitute at least 10 – 20% of the growth of potential of regions' development.

3. Results of evaluation of effectiveness of the use of development potential by the example of regions of Southern Russia

The received results allow distributing regions of Southern Russia as to effectiveness of the use of development potential (Table 1 - 2). As an example, let us view classification of the studied regions for 2012.

Table 1 – Distribution of regions of Southern Russia as to effectiveness of the use of development potential (on the basis of investments into fixed capital per capita)

Value of current potential of development of region \ Value of coefficient of regional development			Groups of subjects as to value of coefficient of regional development				Number of regions in group
			1	2	3	4	
			0.5-1.0	1.0-1.5	1.5-2.0	more than 2.0	
Groups of subjects as to current potential of development	1	0.5-1.0	CR, RI	RK, RA			4
	2	1.0-1.5	AO	KCR, KBE RNOA			4
	3	1.5-2.0		SK			1
	4	more than 2.0		RO, VO, KK, RD			4
Number of regions in group			3	10	0	0	13

I*, II, III, IV

Note: * Zone I supposes low levels of development potential of regional socio-economic systems with simultaneously low investments into fixed capital; Zone II accumulates regions with low level of development potential; at that, regional rates of investment activities are rather high; Zone III means non-effectiveness of the use of relatively high level of region's development potential, which influences the rates of investment development of territory. Zone IV is the most favorable zone which supposes effective realization of current potential and high rates of investment activities in region. ** CR – Chechen Republic, RI – Republic of Ingushetia, RK – Republic of Kalmykia, RA – Republic of Adygea, AO – Astrakhan Oblast, KCR - Karachay-Cherkess Republic, KBR - Kabardino-Balkar Republic, RNOA - Republic of North Ossetia-Alania, SK – Stavropol Krai, RO – Rostov Oblast, VO – Volgograd Oblast, KK – Krasnodar Krai, RD – Republic of Dagestan

Thus, most of regions (61.5%) belong to the first group of effectiveness of the use of regions' development potential. Such situation is caused by existing obstacle for regional development, caused by domination of current limitations over possibilities which form the potential of regional development. At that, structure of groups for both studies indicators did not change.

Table 2 – Distribution of regions of Southern Russia as to zones of effectiveness of the use of development potential (on the basis of GRP per capita)

Value of current potential of development of region \ Value of coefficient of regional development			Groups of subjects as to value of coefficient of regional development				Number of regions in group
			1	2	3	4	
			0.5-1,0	1.0-1.5	1.5-2.0	more than 2.0	
Groups of subjects as to current potential of	1	0.5-1.0	RI	CR, RK, RA			4
	2	1.0-1.5	AO	KCR, KBR RNOA			4
	3	1.5-2.0		SK			1
	4	more than 2.0		RO, VO, KK, RD			4
Number of regions in group			2	11	0	0	13

I*, II, III, IV

Note: * Zone I supposes low levels of development potential with simultaneously low levels of regional growth. Zone II accumulates regions with low level of potential; at that, regional rates of development are rather high. Zone III means non-effectiveness of the use of relatively high level of region's development potential, which influences the rates of economic development of territory. Zone IV is the most favorable zone which supposes effective realization of current potential for normal development of region's economy; ** CR – Chechen Republic, RI – Republic of Ingushetia, RK – Republic of Kalmykia, RA – Republic of Adygea, AO – Astrakhan Oblast, KCR - Karachay-Cherkess Republic, KBR -

Kabardino-Balkar Republic, RNOA - Republic of North Ossetia-Alania, SK – Stavropol Krai, RO – Rostov Oblast, VO – Volgograd Oblast, KK – Krasnodar Krai, RD – Republic of Dagestan

List of leaders as to average level of effective use of potential of development of regions of Southern Russia is Rostov Oblast, Krasnodar Krai, Volgograd Oblast, and the Republic of Dagestan.

4. Forecasting of indicator of effectiveness of the use of region's development potential

The offered methodology of calculation of effectiveness of the use of region's development potential opens new possibilities for state regulation of regional development, based on perspective analysis. That is, forecasting of regions' development potential becomes not only the purpose but means for achievement of the set goals of strategic development.

For that, it is necessary to study possible variants which could be realized for transfer of regions from one group of effectiveness of the use of development potential into another one. For realization of this provision, the thesis work uses imitation modeling of indicators of regional development according to the Monte-Carlo method.

Preparation and realization of working regional policy require clear and unambiguous determination of criteria of evaluation of potential of regional development and effectiveness of its use in regions, development of methodological methods which is adequate for economic realias, and its consistent use. At that, having determined the range of fluctuations of effectiveness of territories' development potential, it is possible to determine reasons for irrational use of the achieved level of regional development. Evaluation and substantiation of possible variants of fluctuations of effectiveness of the use of development potential will allow determining strategic directions of regional policy and correcting perspective indicators of socio-economic state of region.

Search for limits of change of effectiveness of the use of regional development potential is based on results of previous calculations which allow characterizing extensional indicators as to rate and per capita, which characterized the level of socio-economic development of region and potential of development.

One the basis of these data, we have conducted imitation modeling of effectiveness of the use of regional development potential with the help of the Monte Carlo method on the basis of the model:

$$Y_t = X_{1t+1} / X_{2t}, \quad (3)$$

where Y_t – effectiveness of the use of region's development potential in t-th year; $X_{1\,t+1}$ – level of socio-economic development of regions in $t+1$ year; $X_{2\,t}$ – region's development potential in t-th year.

We have conducted imitation modeling of effectiveness of the use of development potential of regions of Southern Russia in view of significant change of factors, i.e., theoretically supposing tendency for growth or reduction of indicators of the level of socio-economic development of region and regional development potential.

At that, eight possible imitation situations were taken into account:

- simultaneous growth of the level of socio-economic development and potential of region's development;
- simultaneous reduction of the level of socio-economic development and regions' development potential;
- growth of the level of socio-economic development of region and reduction of regions' development potential;
- reduction of the level of socio-economic development and growth of regions' development potential;
- growth of the level of socio-economic development with stable level of regions' development potential;
- reduction of the level of socio-economic development with stable level of regions' development potential;
- growth of potential of regional development with stable level of socio-economic development;
- reduction of potential of regional development with stable level of socio-economic development.

As a result, we received large dispersion of probable values of indicator of effectiveness of the use of development potential of regional socio-economic systems. The most optimal variant of imitation modeling is the first of the supposed situations, i.e., maximal value of the resultative indicator reaches 1.878, and minimal value of the resultative indicator reaches – 1.033, average value – 1.413. Increase of modeled average value shows ascending trend. Besides, despite the increase of the range of values of the level of socio-economic development and potential of regional development, we have received acceptable levels of standard deviation and coefficient of variation – 0.186 and 13.2 %, correspondingly. Values of these characteristics show acceptable homogeneity of totality and low level of dispersion of values of the indicator as to average one, which increases trust to results of imitation modeling.

Conduct of imitation modeling of indicator of effectiveness of the use of regions' development potential allowed concluding that the range of indicators of effectiveness within the studied totality of indicators of socio-

economic development of regions of Southern Russia can vary from 0.429 to 1.878. Taking into account theoretical possibility of growth of effectiveness of the use of regional development potential by means of domination of growth rates of region's economy over growth rates of potential of territories' development, it is possible to speak about growth of the value of final indicator of effectiveness – up to 1.878.

Comparing the results of imitation modeling and actual effectiveness of the use of regions of Southern Russia, it is possible to conclude that there is possibility for most of regions to achieve the determined maximum of the indicator.

Viewing the problem of increase of effectiveness of the use of regional development potential from the point of view of long-term scenarios (inertial, pessimistic, and optimistic), it is possible to compare the modeled regularities with results of the conducted evaluation.

Table 3 – Results of evaluation of possibility of achievement of variative limits of effectiveness of the use of regions' development potential within inertial scenario (as to average level)

Scenario of regional development	Regions of Southern Russia	Achieved level of effectiveness	Required minimum	Average level*	Maximally possible
			1.012	1.262	1.559
Inertial	VO	0.937	not achieved	possible	hardly probable
	RO	1.054	achieved	possible	possible
	KK	1.066	achieved	possible	possible
	CR	0.897	not achieved	hardly probable	hardly probable
	RNOA	1.030	achieved	possible	hardly probable
	KCR	0.975	not achieved	possible	hardly probable
	RK	1.009	not achieved	possible	hardly probable
	KBR	1.012	achieved	possible	hardly probable
	RI	0.956	not achieved	hardly probable	hardly probable
	RD	1.004	not achieved	possible	hardly probable
	AO	1.077	achieved	possible	hardly probable
	SK	0.992	not achieved	possible	hardly probable
	RA	1.018	achieved	possible	hardly probable

Note: * determined on the basis of found maximums in calculation of economic effectiveness of the use of development potential of regional socio-economic systems for 2000-2013; ** CR – Chechen Republic, RI – Republic of Ingushetia, RK – Republic of Kalmykia, RA – Republic of Adygea, AO – Astrakhan Oblast, KCR - Karachay-Cherkess Republic, KBR - Kabardino-Balkar Republic, RNOA - Republic of North Ossetia-Alania, SK – Stavropol Krai, RO – Rostov Oblast, VO – Volgograd Oblast, KK – Krasnodar Krai, RD – Republic of Dagestan

Inertial scenario of regional development is realized in Russia with the highest probability. It is based on the formed trends of spatial development. Its macro-economic background – waning reconstructive growth after crisis decline of 2008-2009 and relatively low rates of growth of the country's economy in new decade due to stabilization of oil prices and slower growth of the global demand for resources.

Against such background, spatial development will most likely have predictable trends, regardless of regional policy conducted by the authorities. Such tendencies in socio-economic development of regions and simultaneous unlikely change of correlation of possibilities and limitations which form potential of development of territories will not lead to significant dynamic fluctuations in the level of effectiveness of the potential use and, of the modeled situations; the fifth variant will be realized under the conditions of inertial scenario (Table 3).

At that, six regions in the studied totality (46.15%), as to criterion of regional development, based on investments into fixed capital and as to GRP per capita, achieved the minimum of effectiveness of the use of territories' development potential, determined in this variant (1.012). This shows excess of the rates of socio-economic development of regions in year *t+1* over rates of potential of development of regional socio-economic systems in year *t*, i.e., in these regions, required minimal level of effectiveness of the use, set in the basis of regional development of potential, is already achieved. The larger is the feedback from the existing potential of regional development, the more probable is the growth of main indicators of socio-economic development of regions in perspective.

That's why vector of effectiveness of the use of development potential of regional socio-economic systems should strive – within inertial scenario – to the level of 1.559.

Pessimistic scenario strengthens tendencies of polarization of regions as to the level of socio-economic development and does not allow realizing the accumulated potential of regional development in full, let alone

increasing this level. The main problem during realization of pessimistic scenario of reduction of the number of perspective areas of growth due to aggravation of institutional conditions and reduction of investments and aggravation of social problems in regions. Within pessimistic scenario of regional development, required minimal level of effectiveness of the use of potential of development of regional socio-economic systems of Southern Russia is achieved by all regions.

Optimistic scenario of regional development is possible in case of significant improvement of institutes (protection of property rights, reduction of corruption, etc.) and growth of economy's openness. Even the low quality of infrastructure is a less serious obstacle on the way to sustainable development of region. In optimistic scenario, spatial polarization of regions' development is preserved. It is unlikely to change this situation into the direction of reduction of the level of regions' differentiation in the near future. Under the existing conditions of regional development, realization of optimistic scenario will lead to increase of speed and quality of general regional development, but regional inequality in near future will preserve and even strengthen. Based on the received data, it is possible to conclude that realization of optimistic scenario of regional development is unlikely, which is caused by insufficient level of achieved potential of development of socio-economic systems of Southern Russia.

Conclusions

Thus, the use of this approach to determination of effectiveness of the use of regions' development potential allows modeling possible variants of realization of situation within the developed scenarios of regional development. At that, the chosen scenario of development of situation of rational use of existing socio-economic advantages of region allows determining critical levels and perspectives for further development (maximums in imitation). This opens new possibilities for regulation of socio-economic development of regions, founding on perspective analysis. That is, modeling in this situation becomes not only the purpose but means for achievement of the set goals.

The offered methodology for evaluation of effectiveness of the use of region's development potential consists not only on the offered scheme of analytical actions which allow identifying the level of effectiveness, but allows building results of evaluation into forecast scenarios of regional development of economies for determination of probability of achievement of possible perspectives. This approach allows evaluating general results of work on rational use of existing possibilities for socio-economic development (with their correction as to existing limitations) and substantiating the necessity for measures for elimination of negative tendencies in development and minimization of inter-regional differences.

References:

[1] Baydakov, A.N. 2004. Forecasting as a management function. *Agrarian science*. 9: 12-14.

[2] Baydakov, A.N. and Nazarenko, A.V. 2014. Forecasting provision of management of agrarian economic systems: fractal approach. *Bulleting of Stavropol APK*. 1(13): 69-75.

[3] Baydakov, A.N. and Nazarenko, A.V. 2012. Fractal approach to management of economic systems. *Polythematic network online scientific journal of Kuban State Agrarian University*. 83: 467-487.

[4] Baydakov, A.N., Nazarenko, A.V. and Korshikova, M.V. 2011. Building forecast scenarios as an effective tool of risk management. *Collection: Agrarian Science – To North Caucasus Federal District 75th Scientific & Practical Conference*. 492-497.

[5] Chernikova, L.I. 2014. Imitation modeling of reproduction process in agriculture, *Economics and Entrepreneurship*. 4-1(45-1): 190-193.

[6] Drannikova, E.A. 2007. Priorities of development of socio-economic potential of region: based on materials of Stavropol Krai: PhD. thesis: 08.00.05 / Drannikov E.A. – Stavropol: North Caucasus STU, 181 p.

[7] Gladilin, A.V., Tsymbalenko, T.T. and Tsymbalenko, S.V. 2008. Correlation modeling of economic processes. Stavropol.

[8] Emelyanov, A.A., Vlasova, E.A. and Duma, R.V. 2002. Imitation modeling of economic processes: study guide, M.: *Finances and Statistics*, 368.

[9] Kostyuchenko, T.N., Sidorova, D.V., Eremenko, N.V. and Chernikova, L.I. 2015. Insurance as a tool for managing risks in agriculture. *Mediterranean Journal of Social Sciences*, 6(5): 220-228.

[10] Nazarenko, A.V., Zaporozhets, D.V., Sergienko, E.G. and Baydakov, A.A. 2014. Cyclic dynamics of structural characteristics of business. *Bulletin of Stavropol APK,* 4(16): 277-283.

[11] Taran, O.L. 2004. Structural factors of sustainable development of regional economy: monograph. Nalchik: Poligrafservis & T.

[12] Tsymbalenko, T.T. and Tsymbalenko, O.S. 2008. Methods of evaluation of investment attractiveness. *Terra Economicus*. 6(2-3): 118-121.

[13] Zaporozhets, D.V. and Babkina, O.N. 2015. Forecasting as a function of innovational business management. Collection: Economic and Informational Aspects of Region's Development: Theory and Practice. International Scientific & Practical Conference. Stavropol State Agrarian University. 110-112.

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The Political Economy of Public Spending on Italian Rail Transport: A European View

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Abstract

The public expenditure on railways is largely unexplored in Europe. This is surprising because the size of government financial support to the industry is remarkable. Filling a dozen years of missing information, this paper rebuilds the total public spending on the Italian railway since 1992 making it comparable. This research complements a significant lack of information of public interest since these data have been published from 1966 until 2001; year of the last data release. From then the extent of public support to the industry has remained indefinite. Our results serve: scholars aimed at comparing such expenses with other countries, policy makers aimed at taking superior data-supported decisions when it comes to budgeting and industry professionals for intelligence purposes. Thus, reducing the long-lasting asymmetric information in this domain - a key threaten to the sector growth. Results of this paper enable a proper comparison of the government spending on railways among different countries such as Italy, France and Great Britain as an exercise.

Keywords: Public expenditure, railways, state aid, public administration, political economy, transport policy, transport economics.

JEL Classification: D78, H25, H50.

1. Introduction

A major policy lesson stemming from the budgetary troubles of many countries within the European Union (EU) is the need to improve expenditure performance, i.e. the reinforced connection between funding decisions, policy priorities and outcomes (Di Foggia and Lazzarotti 2013, Vandierendonck 2014); no exception for railways. From a European perspective the railway sector is (still) significantly reliant on public subsidies, almost as much as its sales revenues. Although since as long ago as 1991 (Directive 91/440/EEC) covered three key areas, among which: restructuring deficits to put railway companies on a viable financial footing and maintain financial sustainability, at present, there are few signs as yet of a confidence-boosting solution to stabilize the sector. Therefore, in today's spending review environment, public expenditure should effectively target sustainable-growth enhancing policies while encouraging budgetary consolidation and limiting distortions of competition (Arrigo and Di Foggia 2013a, 2013b).

In Europe, data on railways funding suffer from some limitations. First, data are missing for some years as a result of missing notifications from European Union member States (MS). Second, the published data do not disaggregate between different support to the network for financing new investments, for renewals and maintenance, for operating expenses and for public service obligations (PSO) that is a common mechanism to ensure that all consumers retain access to public services (Mirabel, Poudou and Roland 2009). This paper is designed to help overcome these problems providing a comprehensive figure of the public expenditure on the Italian railways over 22 years, i.e. between 1992, when the company was transformed from a public entity into a joint-stock company, and 2013 - further updates will be useful and completed in the feature. The reason is over a decade of missing and incomplete information on public expenditure on railways or, eventually, when sporadically available data are issued from heterogeneous sources and for limited periods of time; situation which does not allow an extensive evaluation of such expenditure. This gap is even more evident now since the determinants and magnitude of subsidies to railways have triggered interest among policy-makers, academics, regulatory entities, professionals and European institutions (Arrigo and Di Foggia 2014). This paper gets bogged down in the analysis on Public expenditure on railways and does not cover the funding of the regional and sub-urban railways.

This is due to the difficulties faced in identifying the correct sources for this period of time. While there is utter confidence about either the definition or the quantifiable support to the railway, since the beginning of the

2000s it has not been made a comprehensive quantification of the costs. This condition of non-information is even more serious in view of the sombre fiscal problems that Italy keeps coping with for several decades already; the high-level of the Italian public debt that back in 2014 ranked third in the world, and the notable difficulty in fulfilling the requirements listed in the Maastricht Treaty (EU 2010). In fact, according to the Maastricht treaty the MS must demonstrate sound public finances and meet two criteria: their budget deficit must not exceed 3% and public debt must not exceed 60% of gross domestic product. In Italy, despite these important issues at stake, no public body is in charge to annually monitor and publish the costs related to the railway sector. In the last decade, no studies on the topic have been published, with the exception of our recent works (Arrigo and Di Foggia 2013b). Based on reliable official data results of this paper fill a severe knowledge gap and support (i) policy makers when it comes to allocate public resources, (ii) competition authorities in their market assessment and (ii) scholars aimed at investigates this prominent topic. This paper is organized as follows: in the first section we provide and introduction to the theoretical and empirical research available. After that we describe the research approach and methodology. This is followed by a reconstruction of the public expenditure on railways until it was published. Afterward we present data aimed at filling the mentioned gap, next come the conclusions.

2. Background

With the goal of creating single rail market, early EU legislation laid down the basic principles guiding the improvement of rail efficiency via progressive market opening, establishment of independent railway undertakings and infrastructure managers and separation of accounts between them. Since 2000, these principles have been progressively translated into reality, not least through the adoption of three successive packages of EU legislation (Nash 2010). Nevertheless, results so far have remained modest, partly due to obstacles to market entry, integration of incumbent and information asymmetries due to the lack of complete financial transparency.

No wonder that the European Commission, in its White Paper called “European transport policy for 2010: time to decide”, has declared the development of the European railway system priority for achieving sustainable development in Europe with the goal, among others, of reducing subsidies to railways (Friebel, Ivaldi and Vibes 2010). Previous literature on public economics has often analyzed relationships between the government, the society and the market, recurrently to evaluate the role of public organizations and the impact of public policies on the functioning of modern markets (Affuso, Angeriz and Pollitt 2004). A vast theoretical literature in economics has studied the relationship between ownership and performance with researchers making arguments both for and against state ownership.

The traditional social choice approach states that public intervention is needed in the presence of social goals and/or of market failures (Ponti 2011). This topic has widely been investigated especially since the eighties, for example the choice between public and private provision of goods and services is analyzed and the differential ability of the government to intervene in the production activities of private and public firms highlighted (Sappington and Stiglitz 1987). Historically, European railway operators were organized as a vertical integrated company which modus operandi has recently changed because of spread liberalization processed across Europe (Beria, Quinet, de Rus and Schulz 2012). In fact, among key reasons that have prompted a thorough reform of railway regulation in Europe is the heavy financial burden of railways on public expenditures. It is estimated that railways subsidies are second only to expenses related to agricultural policy.

The rationale for providing public support whether in the form of investment or state aids, is establish in market failures or public service obligations (Arrigo and Di Foggia 2015). These funds are also used to cover substantial investment costs, the private provision of which would not yield sufficient return on investment (Di Pietroantonio and Pelkmans 2004) for operators. Such operators have generally benefitted of government support to carry out their mandate of general interest. Nevertheless because of increasing budgetary constraints and provided that the efficiency of the state-owned enterprises of MS varies widely, there is renewed interest and institutional needs to shed some more light on the financial mechanisms, government expenditure levels and compliance with European rules (specifically those related to state aid). EU fiscal rules have encouraged MS to adopt budgetary constraints taking their expenditure into account (Vandierendonck 2014), thus, a number of questions have been raised by scholars and policy-makers and other stakeholders on the application of the EU rules, notably those on public support to services of economic and general interest (European Commission 2013). This questions base on the fact that article 101, 102 and 106 of the TFEU specifically govern the functioning of the market in an effort to enforce competition. Every MS financially subsidies it is national railway industry but Cipro and Malta because of no rail operators.

The EU is aimed at provide a comparable figure of government support in different sector and a digest of such data is annually presented in the State Aid scoreboard. The State Aid Scoreboard comprises expenditure

made by MS which falls under the scope of Article 107 of the TFEU (EC 2015). Against this background in recent years, a number of empirical studies in the field of comparative political economy have analyzed the development and determinants of government subsidies granted to different sectors of the economy in advanced democracies nevertheless there is a critical gap in the field of public subsidization of railways (Crössmann and Mause 2014).

Similar results are presented in a study aimed at assessing the public budget contributions on the financing of railway undertakings and rail infrastructure managers (NERA 2004). Again, on one hand governments finance railways to provide services beyond those that a commercial firm would offer for example geographic coverage of the network, location of stations or frequency and speed of services (Perkins 2005), but on the other hand the division of labor between the state and the markets in governing the railway sector has a long and controversial history. Firstly, the following question arise: whether and to what extent the railway sector could be governed by open competitive markets or whether it should alternatively be considered as a technical system with a centralized operator controlled by the State (Knieps 2012).

A recent article highlights that railway sector aid has risen significantly in recent years in several countries, and supports the need for further structural reforms in order to ease the burden for taxpayers. It is in this respect that still, much remains to be explored, for example, it would be important to get more and better data about governments' policies or to understand which and in what measure the operators receive public support and for which purposes (Mause and Schreeb 2011) and the accountability that needs a sound revenue management (Di Foggia and Lazzarotti 2014). More in detail other studies have focused on the implication of public expenditure on industrial organization. A long-standing result in industrial organization is the sub-optimality of firms' expenditures because of market failures. The presence of externalities creates a gap between private and social profitability of these activities and therefore firms spend less than is socially optimal (González and Pazó 2008), highlighting that public expenditure aims at reducing this failure.

3. Research approach

Public expenditure on railways sector in Italy can be defined from a conceptual point of view and evaluated from an accounting perspective. First represent the delimitation of the term public expenditure that represents the provision of resources carried out by the State and other public entities in order to produce goods and services necessary to meet the public needs and the achievement of other specific objectives pursued by them.

Second are the domains of expenditure related to the railway sector that is defined by public finance documents, primarily according to the Statement of Accounts of the Ministry of Economy and Finance (MEF). Moreover, coexist the yearly reports since 1966 regarding the income reported by the National Account for Infrastructure and Transportation (CNIT), the yearly reports regarding the transfers of public resources to the incumbent, the annual reports of the Court of Auditors, and specific sources identified in the EU rules applied to the industry.

Third, the values regarding the cash flows appear in various sections of the state budget or of the public administration entities with responsibilities in this domain. In the case of the state budget, the information is included in the Statement of Account provided by the MEF. All that said the most appropriate approach to deal with our questions is a combination of sources from both industry accounting and corporate documents and Government statistics. More in details, case study research is the most appropriate procedure to get high accuracy. There are five public sources useful in the process of evaluating the level of public expenditure on railways: The State budget, the CNIT, the European scoreboard on state aid, incumbent budgets and annual reports of the Court of Auditors. The contextual usage of these sources of information guaranteed data triangulation, i.e. the practice of using multiple sources of data or multiple approaches to analyzing data.

Finally, it is worth noting that in this paper we provide both current and real series for comparison purposes. Data reported in current prices for each year are in the value of the currency for that particular year. Constant series show the data for each year in the value of a particular base year, *i.e.* 2014. If current values are influenced by the effect of inflation, constant series (i.e. real terms) allow measure the true growth of a series. In this paper, we obtain real terms using the coefficients of revaluation published by the national statistics institute (ISTAT).

Finally, it is worth noting that in the light of the current budgetary constraints and the struggling of many MS in complying with Maastricht treaty's parameters, our research is aimed at helping stakeholders to answer some questions, for example: whether and to what extend shall the government expenditure on railways be reconsidered.

4. The available information

We begin this section highlighting that public expenditure shall be analyzed in in the light of the policy it is supposed to fund and the end-user it is meant to serve ultimately. Consequently, two approaches exist: a strategic one and a tactical one. The strategic dimension is aimed at questioning the relevance of public funding for a specific policy objective, the depth of the involvement of public authorities and consequently the relevant public level/body in charge, while the tactical dimension is aimed at analyzing the efficiency of money spent by optimizing the relationship between expenditure level and impact (Vandierendonck 2014).

Focusing on the strategic dimension, we outline the official sources related to the amount of public expenditure directed to the railway sector in Italy. Until 2001 there are many similarities between the Italian case and other major European countries such as Great Britain and France, see Annex 1 for an example of the level of detail in Italy, for an overview of the French situation and Annex 3 for the British one. Starting from 2002, this important source of information starts to lack its comprehensive features, and as the responsibilities on regional rail are moved to the regions, the budget values are referring only to the costs covered by the State, without including those assigned to the regions. Though, the amount of public expenditure on railways can be easily reconstructed based on the available data regarding the payments made by the state for different categories of expenditure, which are annually published by the Ministry of Infrastructure and Transport (MIT) as Table 1 summarizes.

Table 1 - Public expenditure on the national railway system in Italy from 1992 to 2001 (payments)

YEAR	Operating grant	Capital grant	Total	Operating grant	Capital grant	TOTAL
	Billions of EUR (current)			Billions of EUR (real terms)		
1992	3.25	2.06	5.31	5.45	3.46	8.91
1993	6.15	2.79	8.94	9.92	4.49	14.41
1994	5.27	2.59	7.86	8.17	4.02	12.19
1995	5.42	1.89	7.31	7.99	2.78	10.76
1996	5.08	4.79	9.87	7.20	6.79	13.99
1997	5.44	6.13	11.56	7.57	8.53	16.09
1998	6.58	9.85	16.43	9.00	13.47	22.47
1999	5.17	6.64	11.81	6.97	8.94	15.91
2000	6.11	5.64	11.75	8.02	7.41	15.42
2001	5.89	7.44	13.34	7.54	9.52	17.06
TOTAL	54.36	49.81	104.17	77.81	69.41	147.21
AVERAGE	5.44	4.98	10.42	7.78	6.94	14.72

Source: National Account for Infrastructure and Transport (MIT, 1993)

It emerges that the total public expenditure in the decade totals €104.2bn in current prices or €147.2bn in real terms. Taking into consideration the limitation coming from the fact that these values depend on the cash payments and therefore are subject to fluctuations often caused by the need for public finances, it is appropriate to examine the previous data separately, based on the type of spending and the category of recipient. At the same time, within the category of the payments for the Italian railway incumbent (FS), a distinction should be done between the cause and the specific aim pursued. A first important distinction is between:

- Payments that finance the operating costs during the specific year (such as for PSO and contributions for the infrastructure);
- Contributions to finance capital investments;
- Transfers financing previously generated burdens of operating activities.

There are important distinctions between the three categories. Table 2 includes the data of public expenditure on the railways sector as source of income mentioned in the budget for transportation, already included in aggregate form in the Table 1. However, the data is classified according to the purpose, as stated in the header of each chapter of the state budget, instead of classification regarding the typology. The details of the budget for Transportation do not take into account the changes regarding these expenses, which occurred as a result of past debt, established by the Budget Law for the year 1997. In fact, until 1996 the State transferred annually to FS funds needed to support both the interest payments for repayment of the maturing debt.

Table 2 - Public expenditure on the railways sector (Billions EUR)

Current	A	B	A+B	C	D	C+D	E	F	G	G+G	H	Total
1992	0.93	0.58	1.51		0.03	0.03	1.54	2.32	1.45	3.77	0.96	6.26
1993	3.65	0.97	4.62		0.22	0.22	4.84	2.5	1.6	4.1	0.83	9.76
1994	1.32	1.89	3.2		0.43	0.43	3.64	2.06	2.15	4.22	0.93	8.78
1995	1.42	1.59	3.01	0.77		0.77	3.78	2.41	1.07	3.48	0.79	8.05
1996	1.45	1.97	3.42	1.52	0.51	2.03	5.44	1.66	2.67	4.33	0.78	10.55
1997				2.63		2.63	2.63	1.87	3.43	5.3	3.56	11.50
1998	2.74		2.74	4.13	0.07	4.2	6.94	1.26	5.58	6.84	2.58	16.36
1999	2.29		2.29	3.82	0.02	3.84	6.13	0.82	2.73	3.55	2.07	11.75
2000	2.94		2.94	3.18		3.18	6.12	0.64	2.46	3.1	2.47	11.68
2001	1.34	1.32	2.66	1.34	1.34	2.68	5.35	1.34	3.83	5.17	2.58	13.10
REAL TERMS												
1992	1.55	0.98	2.53		0.05	0.05	2.58	3.9	2.43	6.32	1.6	10.51
1993	5.89	1.56	7.45		0.35	0.35	7.8	4.03	2.57	6.6	1.33	15.73
1994	2.04	2.93	4.97		0.67	0.67	5.64	3.2	3.34	6.54	1.44	13.62
1995	2.10	2.34	4.44	1.13		1.13	5.57	3.55	1.58	5.12	1.16	11.85
1996	2.05	2.79	4.84	2.15	0.73	2.87	7.71	2.36	3.78	6.14	1.10	14.95
1997			0.00	3.67		3.67	3.67	2.6	4.77	7.38	4.96	16.00
1998	3.75		3.75	5.65	0.10	5.75	9.49	1.72	7.64	9.36	3.53	22.38
1999	3.08		3.08	5.15	0.03	5.18	8.26	1.1	3.68	4.78	2.78	15.82
2000	3.86		3.86	4.17		4.17	8.03	0.84	3.23	4.07	3.24	15.34
2001	1.72	1.69	3.41	1.72	1.72	3.43	6.84	1.72	4.9	6.61	3.3	16.75

Source: National Account for Infrastructure and Transport (MIT, 1993). Note: A: PSO, B: Infrastructure management, C: Capital injections, D: Other capital grant contributions, E: Management and investments, F: Service on debt, G: Share capital debt, H: Contributions on pension fund

It is worth noting that Table 2 shows the State contribution for covering the deficit of the pension fund for the FS employees, administered directly by the incumbent until 2000, and successively by the national security and welfare institute (INPS). However, the CNIT considers these items only since 1997.

The total amount for this purpose during the period amounted to €17.5bn, a value that brings the total public expenditure on railways to €107.8bn in current prices. After 2001 the total public expenditure on the railways sector was no longer officially calculated – in this regard it is important to highlight that unlike in the area of industrial subsidies, there is no clear downward trend of railway support throughout Europe since the early eighties (Mause and Schreeb 2011). In order to reconstruct it accurately, maintaining the methodology used until 2001 for the budget of MIT, one should look for every year into the budget of the MEF, together with those for the individual regional administrations. This procedure is complex, since data have not been published or made available through individual statements except in the most recent years.

Consequently, it is necessary to use more comprehensive public sources. A suitable procedure is to check the previous spending of the Italian Regions for local rail transport is through looking into their budget. This shall be done at the level of their revenue as reflected in the budgets of the FS, with the caveat that it is preferable to refer to the financial statements rather than to the consolidated budgets of the incumbent. The same balance can be referenced in relation to fees for public service contracts awarded by the State. An even easier way is by using directly the annual reports of the Court of Auditors. Both sources, FS budgets and reports of the Court of Auditors, however, do not allow full coverage of the Italian public expenditure according to the EU rules in the railway sector but only that part that takes the form of transfers of financial resources, whether as remuneration for services rendered or contributions to support investment. That said there is about two categories: public expenditure from FS debt management through the two measures contained in the budget laws for 1997 and for 2007 and the state contribution to the deficit of the pension fund of workers of FS, managed by INPS.

For these sources, there is no alternative option than to report them through the balance sheet items included in the annual financial statement of the MEF. Since the distinction between the two categories is important, it was considered preferable to evaluate them automatically, compensating the lack of publicly available data on public expenditure on the national railway system since 1992. The next section is devoted to the complete reconstruction of public expenditure.

5. Filling the gap and comparing

In this section, we evaluate the amount of total public expenditure on railways since 1992 until 2013. This exercise aims to update and complete public data available up to 2001, previously analyzed. Firstly, one should therefore begin by introducing the PSO and network management since the charges for operating expenses paid from State to FS currently fall into the category of contributions to support the operating of the network and fees related to transport services, for PSO.

As anticipated, railway sector is currently undergoing a significant change process with regulatory reforms. These reforms are aimed at allowing greater competition moving the industry away from monopoly toward more open market. However, with free entry and exit, unprofitable markets tend to lose service. As a result, governments often include in regulatory reforms programs to ensure that all consumers retain access to public services. A common mechanism is to prescribe a public service obligation to one firm, the public service provider, and to financially compensate the service provider (Mirabel *et al.* 2009). Operating grants to the infrastructure have always been defined periodically, for a multi-year period, by the program contract between the State and the incumbent. Transfers for service obligations have also been paid by the central government until 2000, while since 2001 by the regions exception made for special services for specific regions.

These sources are classified as public expenditure, and, as a result, the only possible uncertainty about their quantification is whether it is appropriate to consider them in terms of the amount allocated in the public budget for competence or just as cash payments. More problems arise when considering sources not related to those specifically provided for by the European rules, such as the entries for the use of restructuring funds, set up by special laws aimed to facilitate the process of restructuring following the transformation in a joint stock company. Those aspects have in common the advantage to compensate the income statement sources regarding the cost, and hence to improve the operating results, and can be considered forms of public support, of the legislative kind with implications over the budget. However, they are also classified as public expenditure only on condition of being financially fuelled by transfers through the public finance sector.

This condition must be established for each category, being immediately and undoubtedly deduced from the category used to classify the specific source. The first of these funds is established following the provisions of the law 538/1993, allowing FS to reduce the impact of the income statement following the significant depreciation of the infrastructure. The text of the law does not suggest that the fund is fed through transfers of public money, but rather the opposite emerges from reading the notes to the financial statements of FS in 1993: fund for maintenance of the network efficiency. It is a fund with contributions from the state aimed at sustaining the costs of maintenance and depreciation of the infrastructure. The reports of the Court of Auditors on the budget qualify FS also to use this fund as part of state transfers, adding it to the other sources previously analyzed. For these reasons, this paper considers the values relating to it as public expenditure. The Law 448/1998 established the second fund with a purpose similar to the previous one and in this case, we found no evidence that has been fed with public transfers. The amounts related to its use are not considered public expenditure in this paper. The last case concerns the "Industrial Restructuring", which was also established in 1993 and used over the years to support early retirement costs of redundant staff, always based on the 1993 financial statements of FS, funds directed according to the terms set in the contract program. As a result, the use of this fund is considered public expenditure.

Table 3 - Fees and contributions (operating grants) from 1992 to 2013 (Billions EUR)

Year	Operating grants to the infrastructure	Transfers for PSO and fees			Usage of fund for pre-retirement	Other operating grants	Total operating grants
		From central State	From Regions	TOTAL			
1992	1.81	2.22		2.22		0.03	4.06
1993	2.52	1.22		1.22	1.05	0.00	4.79
1994	2.52	1.32		1.32	0.09	0.44	4.37
1995	2.44	1.43		1.43	0.47	0.10	4.44
1996	2.52	1.45		1.45	0.09	0.00	4.07
1997	0.39	1.44		1.44	0.10	0.01	1.93
1998	1.69	1.51		1.51	0.02	0.01	3.23
1999	1.43	1.51		1.51	0.10	0.02	3.06
2000	1.45	1.61		1.61	0.09	0.12	3.28
2001	1.48	0.53	1.27	1.80		0.07	3.34
2002	1.45	0.48	1.27	1.76		0.03	3.24

Year	Operating grants	Transfers for PSO and fees			Usage of	Other	Total
2003	0.38	0.48	1.30	1.78		0.02	2.18
2004	1.30	0.48	1.31	1.79	0.04	0.02	3.16
2005	1.29	0.48	1.33	1.81	0.10	0.06	3.25
2006	0.90	0.37	1.35	1.72	0.07	0.07	2.75
2007	1.15	0.57	1.64	2.20		0.04	3.40
2008	1.04	0.60	1.71	2.31		0.12	3.48
2009	0.85	0.53	1.85	2.39			3.24
2010	0.98	0.54	1.55	2.09			3.07
2011	0.98	0.54	1.51	2.05			3.03
2012	1.11	0.51	1.51	2.02			3.13
2013	1.05	0.49	1.53	2.02			3.07
TOTAL 1992-2013							73.56
AVERAGE							3.34

Source: Court of Auditors (1996-2013) and FS (1992-1995)

Once clarified the cases related to the use of capital funds, the values for each source are summarized by type, at current value, in the Table 3. As it can be observed, the fees for the provision of transport services and network management for the 22 years in question, together with minor amounts of contribution to income reached €73.6bn in current prices.

The total value corresponds to a yearly average of over €3.3bn, which shows significant differences, if analyzed for distinct sub-periods. For example, in the first four years of the transformation in joint stock company, the period 1992-95, there was an annual public contribution of an average of €4.4bn, while in the last four-years period, 2010-2013, the average annual contribution is reduced to just under €3.1bn (-30%) in nominal terms and therefore more marked in real terms. As can be observed in Table 4, in real terms, the total public expenditure in the current account for the railway transport services and non-market services for network management, together with some minor contributions, were as high as €94.8bn, with an amount of €4.3bn on average for every year. Much larger than the nominal drop is the decline in real terms between the amount at beginning of the period considered and that in the most recent years.

Table 4 - Contributions and operating grants (billions EUR, real terms)

Year	Infrastructure management	Transport services	Other contributions	Total
1992	3.04	3.73	0.05	6.82
1993	4.05	1.96	1.70	7.72
1994	3.91	2.05	0.81	6.78
1995	3.59	2.11	0.84	6.53
1996	3.58	2.06	0.13	5.77
1997	0.54	2.00	0.15	2.69
1998	2.31	2.07	0.03	4.41
1999	1.93	2.04	0.16	4.12
2000	1.90	2.12	0.28	4.30
2001	1.89	2.30	0.08	4.28
2002	1.81	2.19	0.04	4.04
2003	0.47	2.17	0.03	2.66
2004	1.56	2.14	0.07	3.77
2005	1.52	2.13	0.18	3.82
2006	1.04	1.98	0.16	3.17
2007	1.31	2.50	0.05	3.85
2008	1.14	2.54	0.14	3.81
2009	0.93	2.60		3.52
2010	1.05	2.24		3.29
2011	1.02	2.14		3.16
2012	1.13	2.05		3.17
2013	1.05	2.03		3.08
TOTAL				94.77
AVERAGE				4.31

Source: Court of Auditors (1996-2013) and FS (1992-1995)

It is necessary to remember that the overall figure we calculated as €73.6bn does not cover all disbursements in current account made by the public sector to the national railways. Therefore, they are not considered here included into the category of public transfers to FS made in the period 1992-96 compared to the interest on the loans purchased as a result of regulatory authorization by the law, with guarantee of reimbursement and as state expense. At this point, it is appropriate to review the investments.

The State has provided the incumbent with resources to support investment, as agreed in the program contracts set up over time in different ways. Before the transformation into a joint company in 1992 and then again for the five years between 1992-96 the type of support used was authorized to FS, granted according to the law to contract loans guaranteed by the State with interest rates borne by public finance. From 1997 to 2005, the government funded investments primarily through contributions to the share capital of the company FS, subscribed by the sole shareholder, the Treasury. From 2006 onwards, the State has financed investments by providing direct contributions in investment account. This modality, as in the previous case, differs from the first to the fact that the burden to public finance one-off occurs simultaneously with the realization of the investment projects and not diminished during the period of the loan repayment. A second difference is that the burden of interest rate resulting from the financing of the debt of these two modes of investment support appears exclusively in the state budget and we do not find evidence, unlike in the first care, in the balance sheet of FS. A digest of what above mentioned is presented in Table 5 that quantifies the public support for the FS investments, as agreed in the program contracts.

Table 5 - Public support to investments (Billions EUR)

Year	Injections in capital	Contributions for plants	Other contributions	Total capital grants
1992			0.04	0.04
1993			0.27	0.27
1994	0.85		0.06	0.91
1995	0.77		0.11	0.88
1996	1.52		0.42	1.94
1997	2.63			2.63
1998	4.13			4.13
1999	3.82			3.82
2000	3.18			3.18
2001	3.62			3.62
2002	4.08			4.08
2003	3.93		0.12	4.05
2004	2.67		0.35	3.01
2005	3.01		0.53	3.54
2006		4.48	0.42	4.89
2007		5.96	0.38	6.34
2008		3.02	0.43	3.44
2009		4.77	0.43	5.20
2010		2.20	0.13	2.33
2011		3.08	0.09	3.17
2012		4.05	0.26	4.31
2013		3.94	0.24	4.18
TOTAL				69.97

Source: Court of Auditors (1996-2013) and FS (1992-1995)

To come to the substance of the issue, the remaining sections summarize the whole providing reliable, objective data in addition to some implications. Summing up the public support for FS investments with payments for the provision of transport services and management of the network, the total public expenditure is in amounts to € 143.5bn in current value over the analysed period. Table 6 comprehensively tabulates the total support including both operating and capital grants.

Table 6 - Total transfers to the FS group from 1992 to 2013

Year	Total operating grants	Total capital grants	Transfers to FS	Total operating grants	Total capital grants	Transfers to FS
	Billions of EUR (current)			Billions of EUR (real terms)		
1992	4.06	0.04	4.10	6.82	0.06	6.88
1993	4.79	0.27	5.06	7.72	0.44	8.16
1994	4.37	0.91	5.28	6.78	1.41	8.19
1995	4.44	0.88	5.32	6.53	1.29	7.83
1996	4.07	1.94	6.00	5.77	2.74	8.51
1997	1.93	2.63	4.57	2.69	3.67	6.35
1998	3.23	4.13	7.36	4.41	5.65	10.06
1999	3.06	3.82	6.88	4.12	5.15	9.27
2000	3.28	3.18	6.46	4.30	4.17	8.48
2001	3.34	3.62	6.96	4.28	4.62	8.90
2002	3.24	4.08	7.32	4.04	5.09	9.13
2003	2.18	4.05	6.23	2.66	4.93	7.59
2004	3.16	3.01	6.17	3.77	3.60	7.37
2005	3.25	3.54	6.79	3.82	4.16	7.98
2006	2.75	4.89	7.65	3.17	5.64	8.81
2007	3.40	6.34	9.75	3.85	7.18	11.03
2008	3.48	3.44	6.92	3.81	3.78	7.59
2009	3.24	5.20	8.44	3.52	5.67	9.19
2010	3.07	2.33	5.40	3.29	2.50	5.79
2011	3.03	3.17	6.20	3.16	3.31	6.47
2012	3.13	4.31	7.44	3.17	4.37	7.54
2013	3.07	4.18	7.26	3.08	4.19	7.27
TOTAL	73.56	69.97	143.53	94.77	83.61	178.38
AVERAGE	3.34	3.18	6.52	4.31	3.80	8.11

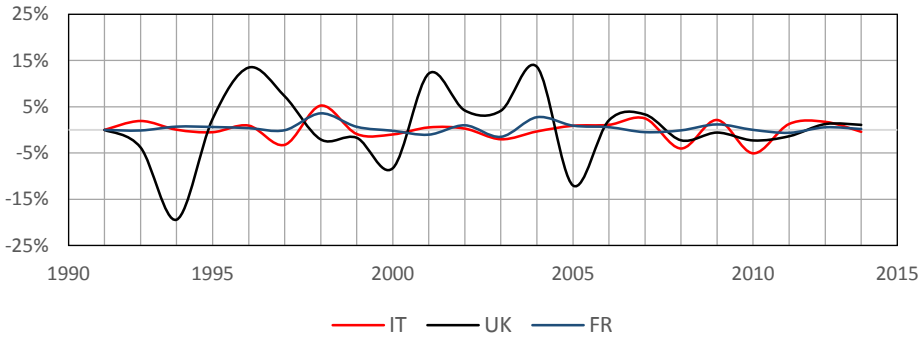
Source: own elaboration and Court of Auditors (1996-2013) and FS (1992-1995)

An important feature of the results presented here is that these data are homogeneous and therefore can be compared directly with other countries as shown in Table 7 also in terms of percentage change over time as reported in Figure 1.

Table 7 - Public expenditure on railways (Millions EUR)

YEAR	IT	UK	FR
1992	6.879	3.355	4.528
1993	8.157	2.467	4.482
1994	8.188	0.542	4.756
1995	7.827	0.63	5.016
1996	8.508	1.501	5.183
1997	6.354	2.554	5.153
1998	10.064	2.173	6.998
1999	9.27	1.906	7.425
2000	8.475	1.02	7.302
2001	8.9	2.372	6.664
2002	9.129	3.285	7.273
2003	7.59	4.594	6.369
2004	7.371	14.511	8.102
2005	7.982	4.594	8.8
2006	8.809	5.477	9.279
2007	11.033	7.298	8.877
2008	7.589	5.973	8.8
2009	9.188	5.681	9.801
2010	5.789	4.666	9.805
2011	6.469	4.157	9.256
2012	7.54	4.616	9.742
2013	7.27	5.06	9.908

Source: based on Table 6, Annex 2 and Annex 3



Source: own elaboration

Figure 1 - Public expenditure annual change

Also our results allow for further implications. Besides bridging the data gap, by combining our data with industrial output and information such as the length of the network, the length of the track and the passengers transported, one can do benchmarking exercises, in fact it is widely known that normalizing is required when comparing data for benchmarking purposes. Industrial data and characteristics shall be used to create an indicator of the size of the different national rail sectors i.e. an index of the size of the rail sector *isr*.

The index corresponds to the simple average of the relative indices calculated for each country e.g. (as said network and tracks length, passengers/km). Subsequently by setting a country's public support to 100 it is possible to have other countries compared. Finally, it is possible to estimate the public support *ps* that would be granted in country$_{(j)}$ adopting country$_{(i)}$ criteria, obtained as a ratio between support granted in that country and the specific SISR.

$$\frac{ps_{j,i}}{isr_j} = \frac{ps_i}{isr_i} \tag{1}$$

With straightforward manipulations of equation (1) it is possible to derive the theoretical subsidy PS as described in the equation (2).

$$ps_{j,i} = ps_i \left(\frac{isr_j}{isr_i}\right) \tag{2}$$

The theoretical subsidies expected in the country$_{(j)}$ with the criteria of the country$_{(i)}$ stem from the actual subsidies granted in country$_{(i)}$ *times* the ratio between the *isr* of country$_{(i)}$ and that of country$_{(i)}$. These exercise help identifying any discrepancies of which stakeholders (especially policy makers and competition authorities) were unaware so that they could understand the source of any problems that may occur from a comparative perspective.

Concluding remarks

Governments face a number of choices in determining the level of public support they provide for railways, they are more and more facing budgeting constraints and EU rules compliance requirements, so, sound budgeting requires efficiency in expenditure allocation.

In turn, to allocate expenditure properly, decision takers need precise information and this is the reason why this paper traces the sources of total public expenditure on railways since 1992, the year when the Italian rail company turned into a joint stock company; at the time of this writing this is the unique complete reference. Actually the research supplements a significant lack of information of public interest due to the fact that the total public expenditure on railways has been annually calculated and published in the CNIT from 1966 only until 2001; as a consequence, the total amount of the expenditure from then on has been unknown.

This work also updates the results of our previous analysis (Arrigo and Di Foggia 2013b) and put the basis for an international comparison which is a prominent need Europe wide. Therefore, a first suggestion for further research emerges i.e. modeling and encompassing regional financing mechanisms as well as the amount in order to see clear, comparable and non-discriminatory tenders for rail transport in Europe. This is a key element since Europe is at last beginning to glimpse that single railway market, but which has still not been achieved. In this regard this paper has policy implications too since in most EU member States, public payments have

increased substantially, while the growth in traffic has been more moderate (Di Foggia and Arrigo 2015). Substantial public sector investment, particularly in the newer EU members where subsidy payments more than doubled in six years, has not in itself secured equivalent increases in rail demand. This is partly due to an inability to curb operational inefficiencies caused by a lack of appropriate competitive incentives. Yet in some countries, public expenditure is awarded directly without competitive tender and this leads to a second field for future research i.e. measurement of efficiency gains that are necessary to create sustainable growth and for the benefit of the public purse.

References

[1] Affuso, L., Angeriz, A. and Pollitt, M. (2004). *The Impact of Privatisation on the Efficiency of Train Operation in Britain* (No. 28). London: Centre for Globalization Research - Queen Mary University.

[2] Arrigo, U. and Di Foggia, G. (2013). Assessing the Railways Subsidy in Selected European Countries: Insights from the Italian Case. *European Journal of Business and Economics*, *8*(4): 1–9. DOI:10.12955/ejbe.v8i4.420

[3] Arrigo, U., Di Foggia, G. (2013). Schemes and Levels of State aid to Rail Industry in Europe: Evidences from a Cross-Country Comparison. *European Journal of Business and Economics*, *8*(3): 14–20. DOI: ejbe.v8i3.410

[4] Arrigo, U. and Di Foggia, G. (2014). Policy-Oriented Insights to Enhance Effectiveness and Efficiency of Public Spending: Comparing the Determinants of Subsidies to Railways in key European Countries. *International Journal of Managerial Studies and Research*, *2*(11): 23–35.

[5] Arrigo, U., Di Foggia, G. (2015). The scope of public organisations with productive functions: insights from the inefficiency of Italian local public transport. *European Journal of Government and Economics*, *4*(2): 134–154.

[6] Beria, P., Quinet, E., de Rus, G. and Schulz, C. (2012). A comparison of rail liberalisation levels across four European countries. *Research in Transportation Economics*, *36*(1): 110–120. DOI:10.1016/j.retrec. 2012.03.014

[7] Crössmann, K. and Mause, K. (2014). Rail subsidisation in the European Union: An issue beyond left and right? *Comparative European Politics*, 1–22. DOI:10.1057/cep.2014.2

[8] Di Foggia, G. and Arrigo, U. (2015). Network industries economics: a comparison of rail Infrastructures output in key European countries. *Journal of Applied Economic Sciences*, *10*(6): 863–876.

[9] Di Foggia, G. and Lazzarotti, V. (2013). Business Implications of Local Development Policies: the Case of Dubai and the Travel Industry. *Theoretical and Empirical Research in Urban Management*, *8*(1): 5–18.

[10] Di Foggia, G. and Lazzarotti, V. (2014). Assessing the link between revenue management and performance: insights from the Italian tourism industry. *Measuring Business Excellence*, *18*(1): 55–65. DOI: http://dx.doi.org/10.1108/MBE-11-2013-0059

[11] Di Pietroantonio, L. and Pelkmans, J. (2004). The economics of EU railway reform. *Journal of Network Industries, 5*(3-4): 295–396. Retrieved from http://heinonline.org/HOL/Page?handle=hein.journals/netwin5&id=295&collection =journals&index

[12] Friebel, G., Ivaldi, M. and Vibes, C. (2010). Railway (De) Regulation: A European Efficiency Comparison. *Economica*, *77*: 77–91. DOI:10.1111/j.1468-0335.2008.00739.x

[13] González, X. and Pazó, C. (2008). Do public subsidies stimulate private R&D spending? *Research Policy*, *37*(3): 371–389. DOI:10.1016/j.respol.2007.10.009

[14] Keep, M. (2014). *Railways: Government support and public expenditure* (No. SN00617). *Commons Briefing papers*. London: House of Commons. Retrieved from http://researchbriefings.files.parliament.uk/documents/SN00617/SN00617.pdf

[15] Knieps, G. (2012). Competition and the railroads: A European perspective (No. 142). Freiburg: Institut für Verkehrswissenschaft und Regionalpolitik.

[16] Mause, K. and Schreeb, K. (2011). On the Political Economy of Railway Subsidies : Evidence from Western

Europe, 1994-2008, *49*.

[17] Mirabel, F., Poudou, J.C. and Roland, M. (2009). Universal service obligations: The role of subsidization schemes. *Information Economics and Policy*, *21*(1): 1–9. DOI:10.1016/j.infoecopol.2008.07.003

[18] Nash, C. (2010). Research in Transportation Economics European rail reform and passenger services – the next steps. *Research in Transportation Economics*, *29*(1): 204–211. DOI:10.1016/j.retrec.2010.07.025

[19] Perkins, S. (2005). The role of government in European railway investment and funding. In *China Railway Investment and Financing Reform Forum* (pp. 1–33). ECMT. Retrieved from http://international transportforum. org/IntOrg/ecmt/railways/pdf/SPbeijing05.pdf.

[20] Ponti, M. (2011). Competition, regulation and public service obligations. In A. de Palma, R. Lindsey, E. Quinet, & R. Vickerman (Eds.), *A handbook of transport economics* (p. 928). Cheltenham Glos GL50 2JA UK: Edward Elgar Publishing. DOI:10.4337/9780857930873.00038

[21] Sappington, D. E. M. and Stiglitz, J. E. (1987). Privatization, information and incentives. *Journal of Policy Analysis and Management*, *6*(4): 567–585. DOI: 10.2307/3323510

[22] Vandierendonck, C. (2014). Public Spending Reviews: design, conduct, implementation. European Economy. Brussels. DOI: 10.2765/70397

*** CGDD. (1993). *Les comptes des transports [Transport accounts]*. Paris: Commissariat général au développement durable. Retrieved from http://www.statistiques.developpement-durable.gouv.fr/donnees-densemble/1924/874/ ensemble-comptes-transports.html

*** EC. (2015). State Aid Scoreboard 2014. *State Aid Scoreboard*. Retrieved January 2, 2016, from http://ec.europa.eu/ competition/state_aid/scoreboard/index_en.html

*** EU. Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union (2010).Bruxelles. DOI:10.3000/17252423.C_2010.083.eng

*** European Commission. Guide to the application of the European Union rules on state aid, public procurement and the internal market to services of general economic interest, and in particular to social services of general interest EN (2013). Brussels: European Commission.

*** MIT. (1993). *Conto Nazionale delle Infrastrutture e dei Trasporti, anni: 1992-2002 [National Transport Account, years: 1992-2002]*. Rome: Istituto Poligrafico e Zecca dello Stato S.p.A.

*** NERA. (2004). *Study of the Financing of and Public Budget Contribution to Railways: A Final Report for European Commission DG TREN*. London, UK: NERA - National Economic Research Associates.

ANNEXES

Annex 1 - Detailed direct expenses and contributions borne by the State for Transport: 2001 (Billions of EUR)

Reference			Operating			Capital			TOTAL
Sector	Ministry	Purpose	Direct	Contribute	Total	Direct	Contribute	Total	
TOTAL			1,0279	8,5284	9,5563	259,0020	13,0901	13,3491	22,9054
Tot. Section 1			0,5474	8,5101	9,0575	232,8820	13,0596	13,2924	22,3500
		Tot division 1	0,0007	6,5241	6,5247		8,0070	8,0070	14,5317
FS	MIT	Network upgrading and station re-design					0,0005	0,0005	0,0005
	MEF	Burden for service on FS debt up December 31 1995	0,0006	0,0000	0,0006				0,0006
		Support to pension fund deficit to FS personnel		2,5823	0,5823				2,5823
		Payment to public and program service		1,3411	1,3411				1,3411
		Payment to FS for obligations and operation of the infrastructure		1,3227	1,3227				1,3226
		Share of public for service on debt of Municipalities that build new sub-urban trains capacity		0,0662	66,1740				66,1740
		Interests for mortgage of FS		0,5813	0,5813				581,2780
		Public injection in FS social capital for infrastructure development					3,6152	3,6152	3,6152
		Capital shares included in the mortgage amortisation of FS					3,8276	3,8276	3,8276
Total FS			0,0006	5,8934	5,8930		7,4436	0,7436	13,3376

Annex 2 - Public transfer in France (million EUR)

YEAR	Public transfer to SNCF			Public transfer to RFF			
	Operating grants	Capital grants	Total	Operating grants	Capital grants	Total	Total
1992			4.528				4.528
1993			4.482				4.482
1994			4.756				4.756
1995			5.016				5.016
1996			5.183				5.183
1997			5.153				5.153
1998	2.607	1.052	3.354	1.799	1.844	3.644	6.998
1999	2.648	976	3.583	1.646	2.196	3.842	7.425
2000	2.648	919	3.567	1.631	2.104	3.735	7.302
2001	2.604	1.040	3.644	1.606	1.414	3.020	6.664
2002	2.827	1.275	4.102	1.406	1.765	3.171	7.273
2003	2.901	1.282	4.183	1.385	800	2.186	6.369
2004	3.251	1.249	4.500	1.765	1.837	3.602	8.102
2005	3.404	1.662	5.066	1.938	1.796	3.734	8.800
2006	3.527	1.979	5.506	1.949	1.824	3.773	9.279
2007	3.710	1.459	5.169	1.813	1.895	3.708	8.877
2008	3.960	1.348	5.308	1.463	2.029	3.492	8.800
2009	4.141	1.132	5.273	2.326	2.202	4.528	9.801
2010	4.260	0..915	5.175	2.400	2.230	4.630	9.805
2011	4.712	0.547	5.259	2.289	1.707	3.997	9.256
2012	4.940	0.689	5.629	2.190	1.923	4.113	9.742
2013	4.925	0.919	5.844	2.052	2.012	4.064	9.908

Source: (CGDD, 1993)

Annex 3 - Government support to British rail industry (million Pounds)

Year	Central government grants	PTE grants	Direct rail support	Other elements of government support	TOTAL
1991-92	1.421	0.189		0.888	3.355
1992-93	1.845	0.165		1.345	2.467
1993-94	1.404	0.252		0.811	0.542
1994-95	2.718	0.518		-0.695	630
1995-96	2.501	0.529		-2.401	1.501
1996-97	2.572	0.414		-1.484	2.554
1997-98	1.996	0.524		0.035	2.173
1998-99	1.639	0.462		0.073	1.906
1999-00	1.385	0.419		0.101	1.020
2000-01	1.131	0.378		0.112	2.372
2001-02	0950	0.397	0.889	0.136	3.285
2002-03	1.187	0.388	1.480	0.032	4.594
2003-04	1.092	0.516	2.080	0.223	14.511
2004-05	1064	0.471	2.872	0.187	4.594
2005-06	1.046	0.395	4.007	0.029	5.477
2006-07	1.685	0.362	5.163	0.088	7.298
2007-08	1.267	0.350	4.145	0.211	5.973
2008-09	0.260	0.348	4.082	0.391	5.681
2009-10	0.481	0.338	3.807	0.041	4.666
2010-11	0.053	0.215	3.625	0.350	4.157
2011-12	-0.133	0.218	3.811	0.721	4.616
2012-13	-0.420	0..164	3.780	1.536	5.060

Source: House of Commons Briefing papers (Keep, 2014). Real terms in 2012/2013 prices

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An Investigation of Spatial Contiguity for Provinces in Turkey Using Nomenclature of Territorial Units for Statistics Level 3 Data

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Abstract

Using NUTS Level 3 data, this study examines whether provinces in Turkey exhibit spatial contiguity. Output-oriented BCC and CCR model forms of PCA and DEA were used in the data preparation phase. While a total of 72 models were obtained using findings resulting from PCA, CCR and BCC, those models having econometric complications and models not exhibiting spatial autocorrelation based on Moran's I test, were excluded. For the remaining 13 models, SAR and SEM estimates were performed, and component-based spatial contiguities were determined for the provinces. The contiguities were confirmed visually through spatial mapping.

Keywords: spatial econometrics, spatial autoregressive (SAR), spatial error model (SEM).

JEL Classification: B23, C21, R58.

1. Introduction

Acknowledging that regions and countries possess dissimilar characteristicswhile failing to pay attention to the mutual interaction among regions, and notably, disregarding the effects of localities in analyses based on spatial experiments, may lead to biased forecasts and inconsistent results being obtained from the models used in the aforementioned analyses.Spatial econometrics is a sub branch of econometrics comprised of econometric methods involving spatial effects existing in cross-sectional and panel data. Spatial analysis includes using data in getting to information, as well as applying analytical methods to spatial geographical data. Spatial analysis has three components: mapping and geographical projection, research-based spatial data analysis, and spatial modelling. Spatial modelling necessitates the use of econometrics and is performed using regression analysis (Sağbaş and Kaya 2009).

Spatial regression models exploit the structure of complex dependencies among the observations corresponding to countries, regions, provinces, etc. Therefore, parameter forecasts include the rich informational relationships that exist among observations and regions.

A change in a single observation (region) associated with an explanatory variable directly affects the region itself (direct effect) and indirectly affects (indirect effect) all other potential regions. As a matter of fact, the ability of spatial regression models to capture such effects represents one significant aspect of spatial econometric models. The value of spatial econometrics lies in its ability to accommodate the modelling strategies that define multi-regional interactions. However, such rich information increases the task of interpreting the obtained forecasts (Le Sage and Pace 2009).

This study is founded on two elemental goals. The first goal is to provide a detailed literature survey of other studies in the field of spatial econometrics. The second goal is to establish an original treatise which complements results from the limited number of spatial econometric implementations carried out in Turkey with principal component analysis and data envelopment analysis.

The data used in the analyses has been obtained from the Turkish Statistical Institute and The Bank Association of Turkey.Shapefile data has been used in the mapping of spatial econometric models, and the aforementioned data has been sourced from the Spatial Data Technologies department at the Tübitak Bilgem Research Institute of Software Development.

2. Literature review

Sergio J. Rey and Brett D. Montouri (1998), "US Regional Income Convergence: A Spatial Econometric Perspective": The study tackles anew the question of U.S. regional economic income convergence from a spatial econometric perspective. Recently developed methods of exploratory spatial data analysis provide new insights on the geographical dynamics of U.S. regional income growth patterns over the 1929-1994 period.Strong patterns of both global and local spatial autocorrelation are found throughout the study period, and the magnitude of global

spatial autocorrelation is also found to exhibit strong temporal co-movement with regional income dispersion.

Julie Le Gallo and Cem Ertur (2000), "Exploratory Spatial Data Analysis of the Distribution of Regional Per Capita GDP in Europe, 1980 - 1995": The objective of the study is to explore the space-time dynamics of European regional per capita GDP. Recently developed methods of exploratory spatial data analysis have been used in achieving the stated objective. Samples from the European regions over the 1980–1995 period provide clear evidence of global and local spatial autocorrelation in the distribution of regional per capita GDP.The study reveals significant positive global and spatial autocorrelation persisting throughout the entire period. As well, the study demonstrates the persistence of HH (High-High) and LL (Low-Low) types of clustering for regional per capita GDP, confirming the North-South polarization of European regions.

J. Paul Elhorst (2011), "Spatial Panel Models": The article provides a survey of existing literature on spatial panel data models. Both static and dynamic models have been considered. The article also demonstrates that spatial econometric models which include lags of the dependent and independent variables in both space and time provide a useful tool to quantify the magnitude of direct and indirect effects, both in the short and long terms. To illustrate these models and their effects estimates, a demand model for cigarettes is estimated based on panel data from 46 US states over the period from 1963 to 1992. Spatial econometrics is concerned with the effects of interactions among geographical units. Spatial econometric models may be used to explain the behavior of economic units that are non-geographical; however, such research is currently only in its infancy.

Ferhan Gezici and Geoffrey J.D. Hewings (2003), "Spatial Analysis of Regional Inequalities in Turkey": In this paper, the authors examine the regional inequalities in Turkey not only at the inter-provincial level but for three different regional definitions as well. The motivation draws on the earlier (2001) findings of the authors that raised questions about inequalities not only between regions (inter-regional) but inequalities within each region. Hence, one contribution of this paper is to test the effects of aggregation and scale on the identification of regional inequalities using accepted methods of spatial analysis. The results indicate that overall inequalities are decreasing, and yet, spatial dependence is becoming more dominant.The Theil index indicates that, for all spatial partitions from 1980 to 1997, intra-regional inequalities are declining, while interregional inequalities in Turkey are increasing. This result is in line with the world with the exception of the US.

James J. Biles (2003), "Using Spatial Econometric Techniques to Estimate Spatial Multipliers: An Assessment of Regional Economic Policy in Yucatán, Mexico": The study posits that while the traditional economic base model remains a useful tool for regional analysis, in a multi-region context it fails to account for feedback effects. In addition, since the model is typically applied to individual regions, formal assessment of variation in the magnitude of regional multipliers is rarely considered. These shortcomings may be addressed by using spatial econometric techniques to model the economic base relationship stochastically. The study incorporates spatial effects into the traditional economic base model and finds empirical evidence that economic activity in Yucatán, Mexico generates indirect impacts not only locally, but among other locations that are linked economically.

Altan Aldan (2005), "Convergence across Provinces of Turkey: A Spatial Analysis": The goal of this dissertation thesis is to analyze regional disparities in Turkey and to test the hypothesis of convergence across provinces in Turkey. The study, covering the 1987-2001 period, also attempts to analyze the spatial spillovers of the provinces in the growth process. Two alternative methodologies are used in the analyses. First, the methodology of β-convergence based on cross-sectional regressions is used and the effects of spatial dependence are analyzed using spatial econometric techniques. Second, Markov chain analysis is used and spatial dependence is integrated using spatial Markov chains.

Mert Çubukçu (2005), "Ekonometrik Modellerde Coğrafi Bilgi Sistemleri ile Yeni Açılımlar": In the study, data from 41 telephone companies operating within the state of New York, USA for the year 1980 has been used to model a total cost function. Geographical data for the analyzed region has been integreated into the model in the form of variables, through the use of a GIS. It was shown that the aforementioned variables provided a better description of the data used. The results obtained indicated that telephone service costs are determined by input costs, technological capability and product quantity, in line with conventional econometric models.GIS use revealed that, in addition to the preceding, attributes of the service area such as (1) soil structure, (2) gradients, (3) environmental quality, (4) size of service area, (5) street layout, and (6) population density and land use, are also effective.

K. Batu Tunay and A. Murat Silgapar (2007) "Regional Inflation Convergence Analysis in Turkey with Dynamic Space-Time Panel Data Models": The goal of this study is to analyze the phenomenon of inflation convergence across geographical regions in Turkey. An additional objective is to estimate the rate of inflation convergence and the significance of the effects of dispersion and spillover among regions. As econometrics

models, the study uses panel unit root tests and dynamic space-time panel data models. Panel unit root tests were used to determine cross-sectional and spatial dependency. The findings point out the existence of a serious inflation convergence phenomenon and a rather rapid convergence process among different geographical regions, whereas the dispersion and spillover effects seem robust and depend on data from the current and past periods. Consequently, the study finds that in political decision making processes, monetary authorities must be sensitive to and careful of the vulnerabilities that may arise from inflation convergence and dispersion.

M. Ensar Yeşilyurt (2007) "Spatial Relationships Based on Sectoral Efficiency in Manufacturing Industry: Turkey Case": The study aims to determine, with the help of spatial models, the existence and nature of sectoral externality. As such models are generally employed for spatial analyses, the study presents a divergent approach.Based on the stated goal, an analysis for sectoral effectiveness in the Turkish manufacturing industry was conducted.Aside from the effects from descriptive variables, the levels of effectiveness obtained were examined for impact from sectoral contiguity.For weightings related to sectoral contiguity, forward and backward correlation coefficients for the sectors have been employed. For sectoral contiguity, the SEM and SAR spatial models have been used.

A. Özlem Önder, Metin Karadağ and Ertuğrul Deliktaş (2007), "The Effects of Public Capital on Regional Convergence in Turkey": In this working paper, the authors attempt to explore the dynamic effects of public capital on output per capita in terms of convergence in the Turkish regions. A conditional convergence model based on per capita GDP and public capital is estimated using the panel data set of regions in Turkey at NUTS-1 level for the time period of 1980-2001. The spatial effects are also investigated. The results show that there exists conditional convergence. The results also reveal that in some of the models public capital has a positive and significant effect on output per capita.

Ayşe Kaya (2008), "Net Financial Convergence per Regions in Turkey": The goal of this dissertation thesis it to investigate the collective effects of government spending and taxation policies at the provincial level in Turkey. In other words, the determinants of regional net financial convergence were investigated.In the regression analyses conducted on the determinants for income and expense coverage ratio (IECR), the dependent variable in the study, statistically significant results were obtained for a majority of the variables accepted as determinants, in line with expectations. Data from 78 provinces spanning various years were examined using horizontal cross-sectional data analysis and it was discovered that variables relating to socioeconomic data were significant in determining IECR.It was observed that in most of the 81 provinces in Turkey, revenues fell short of expenditures for the years 1990 through 2003. Only 13 provinces out of the total 81 (Kocaeli, İstanbul, Bursa, İzmir, Zonguldak, Tekirdağ, İçel, Ankara, Hatay, Yalova, Muğla, Kırklareli and Manisa) had a corresponding ratio of greater than zero. It is also observed that the majority of the aforementioned 13 provinces are located in the Marmara and Aegean regions. In the remainder of the provinces, the revenues fell far short of expenditures. Therefore, the contributionsof these provinces to the central government are less than the contributions they receive from the central government.The provinces that do contribute to the national economy of Turkey are located in the Marmara, Aegean and Central Anatolia regions. The provinces with deficits in tax revenues are located in Eastern and Southeastern Anatolia regions.

M. Ensar Yeşilyurt (2008) "Spatial Contiguity Relations in the Manufacturing Industry in Turkey": One approach to achieve regional development involves selecting certain centers to manage the improvement of other less-developed zones. Such a strategy has also been implemented in Turkey. Using spatial models, this study examines whether the aforementioned developmental strategy has been successful in Turkey. The data set is comprised of provincial data series for the period from 1993 to 2001. A total of eight forms relating to SAR and SEM models were analyzed, and it was decided to opt for the fixed-effect SAR model with time periods. Upon evaluating the entire set of findings, it was found that developmental planning using the creation of centers of attraction to incite regional development was applicable to the composition of Turkey.

Guangqing Chi and Jun Zhu (2008), "Spatial Regression Models for Demographic Analysis": The goal of the authors is to review the spatial regression models for demographic data analysis used for geographical purposes, as well as the related statistical techniques. They have tested their hypothesis on population change in the 1990s at the minor civil division level in the state of Wisconsin. Focusing on the use of spatial regression models, they provide a practical guide to spatial demographical analysis.

Berk Şener (2009), "Employment Growth in a Cross-Section of Turkish Districts: A Spatial Analysis": The goal of the dissertation thesis is to contribute to the existing literature by exploring the relationship between human capital and employment growth in districts in Turkey between 1990 and 2000 using spatial econometric analysis. The dynamics of employment growth in 894 districts in Turkey were analyzed for the aforementioned time period. Using a model proposed by Rivera-Batiz (1998) and revised by Simon (1998), the relationship

between human capital and employment growth was tested using variables for population, share of production, regional puppets and distance to provincial centers. As least squares estimates are biased and exhibit inconsistencies due to spatial dependencies between dependent variables, likelihood methods were employed instead.

Jülide Yıldırım (2009), "Regional Policy and Economic Convergence in Turkey: A Spatial Data Analysis": The goal of the paper is the experimental evaluation, using province-level data, of the regional policies of administrations on economic convergence in Turkey for the period from 1990 and 2001. Both conventional beta convergence analyses, which considers spatial dimension, as well as geographically weighted regression analysis, has been used to explore the convergence characteristics of provinces in Turkey. Empirical results of the spatial lag model indicate convergence at the national level. To test the empirical results of conventional beta convergence analysis, geographically weighted regression analysis has been performed. Significant variance was observed in the convergence rates of the provinces, along with structural instabilities.

Özlem Deniz Başar (2009), "Spatial Regression Analysis": The goal of this dissertation thesis is to devise spatial weight functions to build spatial weight matrices which in turn will be used in spatial regression analysis. Towards this goal, the geographical coordinates, along with other attributes of localities investigated, have been included in the study, and spatial models have been generated using the spatial matrices that were created.

Luc Anselin (2010), "Thirty Years of Spatial Econometrics": In this paper, the author gives a personal view on developments of the field of spatial econometrics for the past 30 years. The article argues that econometrics has moved from the margins to the mainstream of applied econometrics and social science methodology, and describes the said evolution.

Fatma Zeren (2010), "Spatial Interaction Analysis": The paper aims to explain the spatial econometric models and analyzes such models using the maximum likelihood method. In addition to specification tests for spatial models, the process of selecting the best model which represents the data in question is explained. In this context, the land used in Turkey for vegetable farming in the year 2006 is considered as data. In the model devised, effects of contiguity on vegetable farming are explored. Empirical evidence indicates that there is positive spatial interaction and contiguity increases the volume of produce cultivated.

Hayri Abar (2011), "Determinants of Intercity Migration of Turkey: Spatial Econometric Approach": The focus of this dissertation thesis is the set of determinants for inter-provincial migration in Turkey. The model for analyzing the determinants for inter-provincial migration used,as the dependent variable, the total population leaving the province of exodus, and as the independent variables, the attributes of the province of exodus as well as the provinces receiving the influx.In addition to the aforementioned variables, spatial econometric models were incorporated into the model which contributed weighted averages for dependent variables of those neighboring provinces with specific attributes. This wasdeemed necessary as it was considered that interaction between the neighbors as well as geographical settlements were influential. The results of the estimations using the model were generally in line with economic theories and were supportive of stated expectations.

Ayşe Demir (2011), "The Effects of Civilian and Military Defence Expenditure on Gross Demostic Product in Turkey: Spatial Econometrics Approach": The goal of this dissertation thesis is to determine the spatial effects on economic growth of province-level civil and military expenditures in Turkey. The relationship between military and civil defense spending and economic growth is examined within a framework of spatial econometrics, using annual data from 67 provinces in Turkey. According to empirical findings, for the years 2004 through 2007, there exists a statistically significant and negative relationship between military and civilian spending and economic growth in Turkey, and a statistically significant and positive relationship between the index of economic development and economic growth.

Fatma Zeren and Burcu Kılınç Savrul (2012), "Analysis of Factors affecting Urbanization in Turkey: A Spatial Econometric Analysis": In the study, factors determining urbanization have been explored using spatial econometric models. Contiguity was found to have a positive effect on urbanization. Other factors include industrialization, education and poverty, where it was observed that industrialization increased urbanization while poverty reduced urbanization.

Nuri Yavan (2012), "Regional Determinants of Investment Incentives in Turkey: A Spatial and Statistical Analysis": The study examines the determinant factors that govern the allocation and dispursement of incentives at the regional level.The study analyzes through statistical methods the determinants for investment incentives provided to provinces in Turkey between 2001 and 2008. Data sets encompassing all 81 provinces have been utilized and the hypotheses put forth have been tested using regression analyses.The findings based on the results obtained from the regression analyses indicate that level of income, levels of industry investments, openness to foreign trade, political/electoral power, the ideological tendency of the administration, and status as

prioritized region for development, are determining factors for a province or region to receive government economic incentives.

3. Methodology and data

3.1. Spatial econometrics

As an identifiable field, spatial econometrics emerged in the early 1970s in Europe to accommodate the challenges in handling regional econometric model data. In general terms, spatial econometrics can be characterized as the set of techniques to deal with methodological concerns relating to the explicit consideration of spatial effects, specifically spatial autocorrelation and spatial heterogeneity (Anselin 2001).

In theoretical econometrics, location and spatial interaction have gained significant attention as of late, notably in their implementations. Aside from being used in applied research in the more traditional fields of economics, methods of spatial econometrics are also finding increasing use in such fields as the study of demand analysis, international economics, labor economics, social economics, social finance, and agriculture and environmental economics.

Spatial autocorrelation

In general terms, spatial autocorrelation may be defined as similarity of values at locations, based on similarity of location. In other words, a random variable with a high or low value has the tendency to be clustered in space with similar values (positive spatial autocorrelation) or with dissimilar values (negative spatial autocorrelation). Of these two types of autocorrelation, positive spatial autocorrelation is the most intuitive. Negative spatial autocorrelation is a lot like a checkerboard pattern and does not always present a concrete interpretation.Existence of positive spatial autocorrelation indicates a sample set that contains less information than an equivalent set without correlation.To conduct proper statistical inference, this loss of information must be explicitly acknowledged in the estimates and the specification tests, which accounts as the essence of the problem with spatial autocorrelation in applied econometrics.Existence of spatial autocorrelation may be formally stated as shown below (Anselin and Bera 1998):

$$Cov(y_i, y_j) = E(y_i y_j) - E(y_i).E(y_j) \neq 0 \qquad i \neq j \text{ için} \qquad (1)$$

In the above covariance expression, y_i and y_j are values for the random variable observations corresponding to locations i and j in space. As an example, i and j could be the latitude and longitude values for locations such as showrooms, storesor metropolitan centers, or for areal units such as states, districts or census tracts. The expression in Equation (1) is the nonzero covariance of the random variable y and does not contain anything meaningful in spatial terms. The covariance expression becomes spatially meaningful when the *i, j* configuration pair with nonzero correlation has an interpretation for spatial structure, spatial interaction or the spatial arrangement of the observations (Anselin and Bera 1998).

Spatial regression models

Spatial dependence may be integrated into the classical regression model in two ways: as an additional variable (Wy) in the form of a spatially lagged dependent variable, or as the error structure [$E(e_i e_j) = 0$].

The first approach is named the spatial lag model and is used when existence and strength of a spatial interaction must be determined. As a closed-form expression, the spatial lag model, or a spatial autoregressive model, may be expressed as shown below:

$$y = \rho W_1 y + X\beta + \varepsilon \qquad (2)$$

In the above expression, ρ is the spatial autoregressive coefficient, ε is the error terms vector, and W is the spatial weights matrix. The spatial lag term is related to the W_1 error term. This can be observed in the reduced form below:

$$y = (I - \rho W)^{-1} + X\beta + (I - \rho W)^{-1}\varepsilon \qquad (3)$$

In Equation (3), both explanatory variables and the inverse matrices containing error terms at all locations may be expanded as infinite series.Therefore, the spatial lag term must be treated as an endogenous variable and proper variable estimation methods must be used that account for this endogeneity (OLS estimators will be biased and inconsistent due to simultaneity bias).

The spatial autoregression error model is as shown below:

$$y = X\beta + \varepsilon and \varepsilon = \lambda W_2 \varepsilon + u \quad (4)$$

Since $\varepsilon = (I - \lambda W)^{-1} u$ and $y = X\beta + (I - \lambda W)^{-1} u$, (4) is equivalent to:

$$y = \lambda W_1 + X\beta - \lambda W X\beta + \varepsilon \quad (5)$$

This is in fact the spatial lagged model including a spatially lagged exogenous variable set (WX) with k nonlinear (common factor) constraints on the coefficients. The similarity between the error model in Equation (5) and the pure lag model in Equation (2) makes specification tests difficult in practice, as the tests designed for a spatial lag alternativewill also are robust for a spatial error alternative, and the reverse will be true as well.

Most of the spatial regression models used in practice involve a single weights matrix. At the same time, it is possible to devise models of a higher order. In addition to a dependent variable, higher order spatial autoregressive models may include spatially lagged values for independent variables as well (Anselin 1999).

Estimation methods for spatial models

Standard least squares method cannot be used to generate consistent estimates for spatial regression models. A number of approaches to estimating the parameters for spatial regression models have been proposed (Le Sage 2008), including maximum likelihood estimation (Ord 1975), instrumental variable / generalized moments (IV/GM) approach suggested by Kalejian and Prucha (1998, 1999), spatial filtering (Griffith 2003), Bayesian Markov chain Monte Carlo method (LeSage 1997), generalized maximum entropy estimator (Marsh and Mittelhammer 2004) and the use of matrix exponential spatial specification (Le Sage and Pace 2007).

Specification tests

Prior to setting up a spatial model, certain tests must be carried out to determine model specifications. These tests include Moran's I test and tests based on maximum likelihood.

3.2. Implementation

This study uses the NUTS (Nomenclature of Territorial Units for Statistics) Level 3 data set obtained from the Turkish Statistical Institute, which includes data attributes for: foreign trade, labor, energy, justice, transportation, education, health, agriculture, environment, culture, census and housing. The data for banking indicators have been obtained from The Banks Association of Turkey. For all 81 provinces in Turkey, the most current versions of the data have been acquired. With a goal towards devising complete data sets, certain indicators, which were felt, would not produce meaningful results and which did not include data points for all provinces, were left out of the analyses.

What sets this study apart from others is the application of spatial econometric analysis to the results obtained from the output-oriented BCC and CCR models for principle component analysis and data envelopment analysis. Using the results from all three analyses, spatial error and spatial autoregressive model estimates have been performed (See Table 1).

Table 1 - Number of Models per analysis

Principle Component Analysis	• Foreign Trade Component • Labor Component • Energy and Justice Component • Transportation Component • Education Component • Health Component	• Agriculture Component • Environment Component • Culture Component • Banking Component • Census Component • Housing Component
Data Envelopment Analysis	CCR (output-oriented) 12 Models	BCC (output-oriented) 12 Models
Spatial Econometric Analysis	SAR • PCA (12 Models) • BCC (12 Models) • CCR (12 Models)	SEM • PCA (12 Models) • BCC (12 Models) • CCR (12 Models)

The total number of analyses carried out is 72, including sub-analysis activities for all three main analyses methods, leading to estimates devised for 72 models. However, those models which did not result in spatial autocorrelation as a result of the Moran's I test were excluded. A total of 13 models contain spatial

autocorrelation, as follows: estimated using PCA: foreign trade (M1), labor (M2), energy and justice (M3), education (M5), agriculture (M7), and housing (M12); estimated using CCR models: labor (M2), transportation (M4), and agriculture (M7); estimated using BCC models: labor (M2), energy and justice (M3), transportation (M4), and environment (M8). The spatial distribution information related to the aforementioned models is provided below.

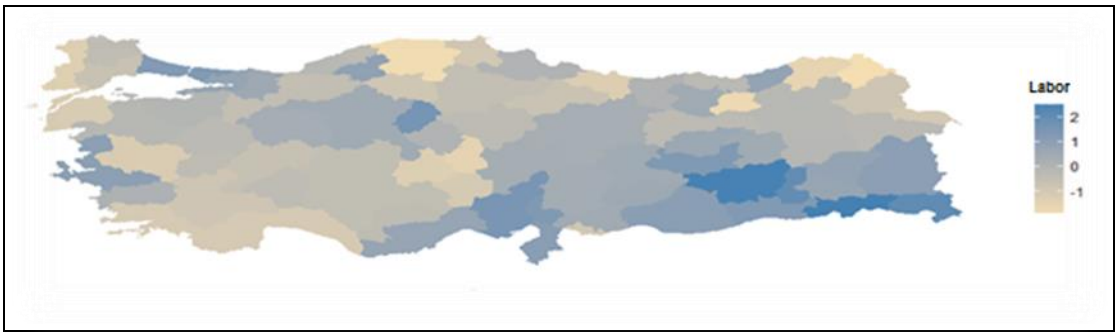
PCA Model 1 Foreign Trade SAR/SEM estimate

The provinces with dark colours in the map are those having the highest potential for foreign trade. These provinces are: Istanbul, Ankara, İzmir, Kocaeli, Bursa and Gaziantep (See Map 1).

Map 1. Spatial distribution for provinces in Turkey (PCA – Foreign trade)

PCA Model 2 Labor SAR/SEM estimate

Visual analysis of the map indicates a spatial dependence where those provinces with similar labor makeup are clustered and have the same coloration (See Map 2).



Map 2. Spatial distribution for provinces in Turkey (PCA – Labor)

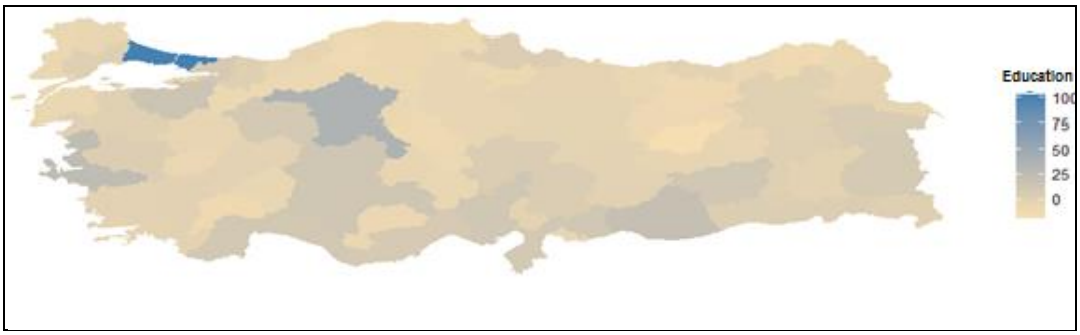
PCA Model 3 Energy and Justice SAR/SEM estimate

The clusters for provinces with respect to energy and justice have similar coloration in the map. These are, notably, Istanbul, Ankara, and İzmir, followed by Gaziantep, Bursa, Antalya and others (See Map 3).

Map 3. Spatial distribution for provinces in Turkey (PCA – Energy and Justice)

PCA Model 5 Education SAR/SEM estimate

Spatial mapping related to Model 5 is provided in the map below. Provinces that are similar in terms of education have the same colour and form clusters (See Map 4).



Map 4. Spatial distribution for provinces in Turkey (PCA – Education)

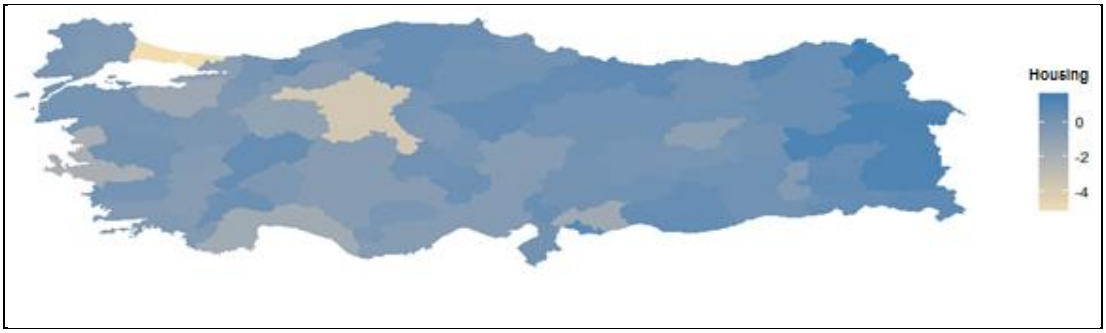
PCA Model 7 Agriculture SAR/SEM estimate

The spatial distribution for provinces with respect to agriculture is provided in the map below. The provinces with similar agricultural makeup have the same color and form clusters (See Map 5).

Map 5. Spatial distribution for provinces in Turkey (PCA – Agriculture)

PCA Model 12 Housing SAR/SEM estimate

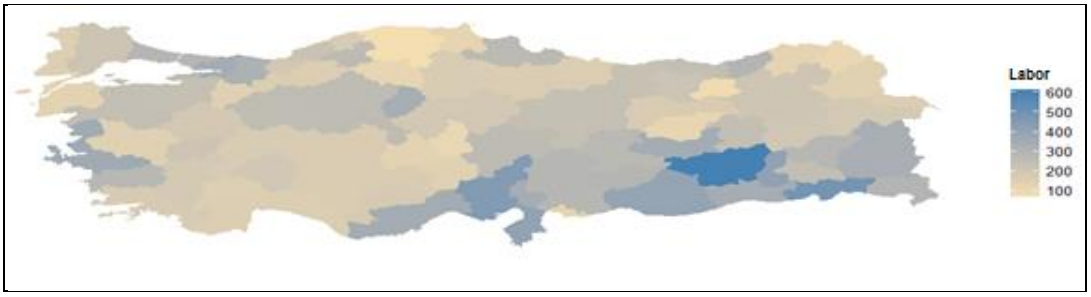
The spatial distribution for the model analyzed is provided in the map below. The clusters formed by provinces with respect to housing may be observed based on coloration (See Map 6).



Map 6. Spatial distribution for provinces in Turkey (PCA – Housing)

CCR Model 2 Labor SAR/SEM estimate

The spatial mapping providing a visual expression of the numerical spatial interaction results for the related model is provided in the map below. It can be observed that provinces with similar labor makeup form clusters and have the same coloration (See Map 7).



Map 7. Spatial distribution for provinces in Turkey (CCR – Labor)

CCR Model 4 Transportation SAR/SEM estimate

The spatial map relating to the model for transportation is provided below. The provinces having spatial interaction are shown with identical coloration (See Map 8).

Map 8. Spatial distribution for provinces in Turkey (CCR – Transportation)

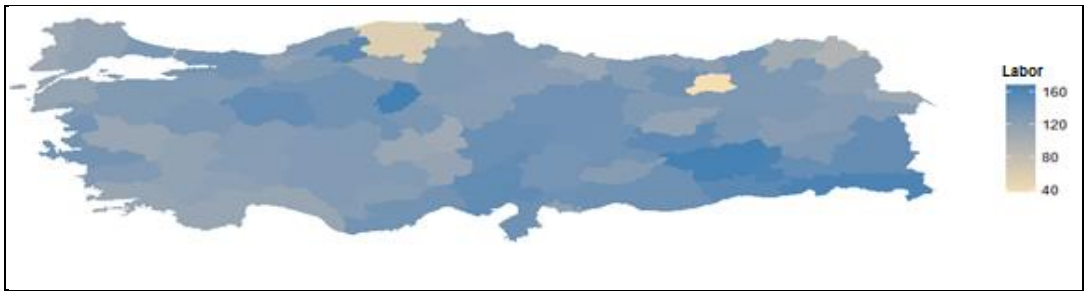
CCR Model 7 Agriculture SAR/SEM estimate

The provinces with similarities relating to agriculture may be observed in the spatial map provided below. In the map, the provinces having the darkest colour are those with best scores with respect to agriculture (See Map 9).

Map 9. Spatial distribution for provinces in Turkey (CCR – Agriculture)

BCC Model 2 Labor SAR/SEM estimate

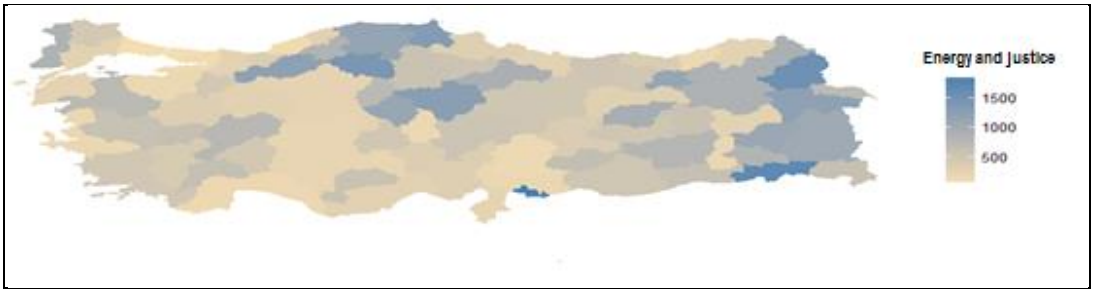
Analysis of the map below for labor visually confirms spatial sequential dependencies, in addition to the tests conducted (See Map 10).



Map 10. Spatial distribution for provinces in Turkey (BCC – Labor)

BCC Model 3 Energy and justice SAR/SEM estimate

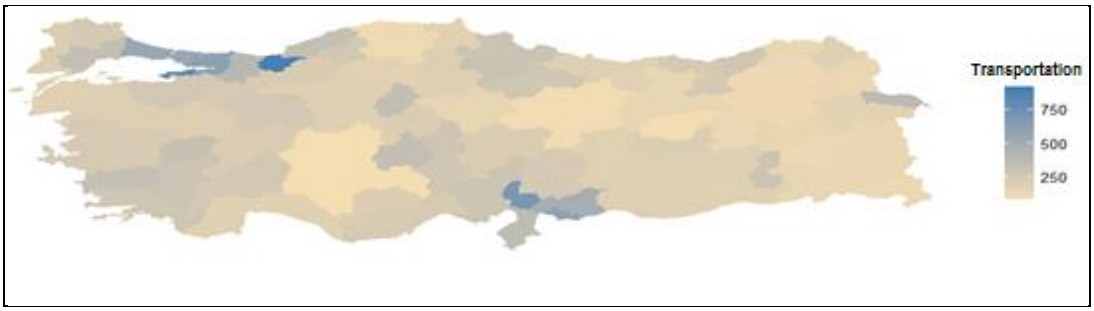
The information resulting from spatial mapping is provided below. The provinces having spatial interaction per the model have the same coloration (See Map 11).



Map 11. Spatial distribution for provinces in Turkey (BCC – Energy and justice)

BCC Model 4 Transportation SAR/SEM estimate

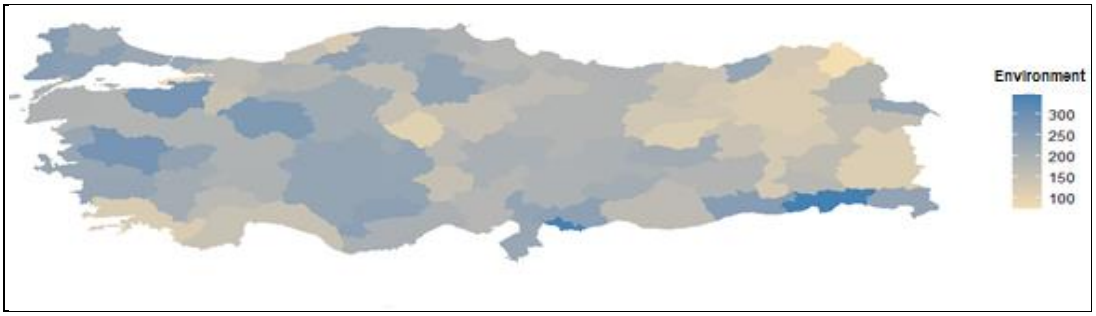
The spatial interaction between provinces is provided visually in the spatial mapping of the model for transportation below. Those provinces having similar transportation makeups have the same coloration (See Map 12).



Map 12. Spatial distribution for provinces in Turkey (BCC – Transportation)

BCC Model 8 Environment SAR/SEM estimate

Analysis of the map below indicates the existence of spatial interaction among the provinces and the clusters formed thereby (See Map 13).



Map 13. Spatial distribution for provinces in Turkey (BCC – Environment)

It is notable that the labor model revealed spatial autocorrelation in the results for all three analyses, a finding that is indicative of the capabilities of spatial econometrics where distinct data sets subjected to alternative data preparation processes were used.

In addition to spatial mapping, SAR and SEM estimates have been performed and coefficients have been analyzed for models determined to have spatial autocorrelation properties. When based on small sample AIC (Akaike Information Criterion) and log-likelihood criteria, SAR was used for final selection among 10 models and SEM was used for final selection among 3 models. The results indicate spatial autocorrelation originating mostly from interaction among locations and necessitating the incorporation of lagged dependent variables for neighbouring locations as explanatory variables to the models (Yılmaz 2014).

Conclusion

Many economic studies ignore the geography of the locations where said economic activity takes place. This is regrettable as spatial data used in regional and inter-regional studies provide researchers with expanded possibilities in their decision making processes, and it would help to include into models the spatial autocorrelation existing among observations. This study used spatial econometric analysis to take into account the geography information for locations included in the data sets. Based on their spatial autocorrelation structures, spatial econometric models are divided into two categories: SAR and SEM. SAR indicate autocorrelation existing due to interaction among locations, and SEM indicates autocorrelation resulting from errors in measurements (Yılmaz 2014).

The spatial econometric analysis performed using the results from the three analyses conducted provided us with further information for choosing the analysis results to which SAR and SEM methods could be applied to improve results. This is a distinctive outcome of the study, which was not initially targeted, but which emerged following the implementation stage of the study. For data sets used in regional spatial analysis that were generated using distinct types of analyses, the results indicate that it is possible to form and model disparate spatial relationships. Instead of obtaining heterogeneous relationships from raw data, researchers can generate data through various analyses and measure distinct relationships.

Consequently, taking into account indicators relating to 12 dimensions for 81 provinces, the existence of spatial contiguity has been proven both statistically and visually. It was observed that provinces mimic other provinces in such traits as agriculture, foreign trade, education and housing, and each province has an exogenous effect on its neighbours.

It will be beneficial for the results obtained in this study to be duly taken into consideration by those responsible for policy creation relating to regional development. One significant aspect ignored by policies aiming to mend the inequalities existing among regions is the effectiveness of the assistance provided to underdeveloped or developing regions. As such, consideration of the results of this and other scientific studies when planning for the aforementioned regional assistance will help in the success rates of those activities (Yılmaz 2014).

References

[1] Abar, H. (2011). Determinants of Intercity Migration of Turkey: Spatial Econometrics Approach. Master Thesis, Atatürk University.

[2] Aldan, A. (2005). Convergence across Provinces of Turkey: A Spatial Analysis. Master Thesis, Middle East Technical University.

[3] Anselin, L. (1999). *Spatial Econometrics*, Bruton Center, 3-22.

[4] Anselin, L. (2001). Spatial Econometrics. B.H. Baltagi (Eds.), a Companion to Theoretical Econometrics, Blackwell Publishing Ltd.

[5] Anselin, L. (2010). Thirty Years of Spatial Econometrics. *Papers in Regional Science*, 89(1). DOI:10.1111/j.1435-5957.2010.00279.x

[6] Anselin, L. and Bera, A. K. (1998). Spatial dependence in linear regression models with and introduction to spatial econometrics. A. Ullah and D. E. A. Giles (Eds.), Handbook of Applied Economic Statistics. New York: Marcel Dekker Inc.

[7] Biles, J.J. (2003). Using Spatial Econometric Techniques to Estimate Spatial Multipliers: An Assessment of Regional Economic Policy in Yucatán, Mexico. *The Review of Regional Studies*, 33(2).

[8] Chi, G. and Zhu, J. (2008). Spatial Regression Models for Demographic Analysis. *Popul Res Policy Rev*, 27, DOI 10.1007/s11113-007-9051-8

[9] Çubukçu, Mert. 2005. Ekonometrik Modellerde Coğrafi Bilgi Sistemleri ile Yeni Açılımlar. Paper presented at the Bilimde Modern Yöntemler Sempozyumu, November 16-18, Kocaeli, Turkey.

[10] Demir, A. (2011). The Effects of Civilian and Military Defence Expenditure on Gross Demostic Product in Turkey: Spatial Econometrics Approach. Master Thesis, Afyon Kocatepe University.

[11] Deniz Başar, Ö. (2009). Spatial Regression Analysis. Ph.D. Thesis, Mimar Sinan University.

[12] Elhorst, J.P. (2011). Spatial Panel Models. Working Paper. http://www.york.ac.uk/media/economics/documents/seminars/2011-12/Elhorst_November2011.pdf (accessed June 17, 2014)

[13] Gezici, Ferhan. And Hewings, Geoffrey. J.D. (2003). Spatial Analysis of Regional Inequalities in Turkey. Paper presented at 43rd Congress of European Regional Science, August 27-30, Jyvaskyla, Finland.

[14] Griffith, D. (2003). Spatial autocorrelation and spatial filtering: gaining understanding through theory and scientific visualization, Berlin: Springer-Verlag.

[15] Kalejian, H. and Prucha, I.R. (1998). A generalized spatial two-stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances, *Journal of Real Estate and Finance Economics*, 17(1). http://econweb.umd.edu/~prucha/papers/JREFE17(1998).pdf

[16] Kalejian, H., Prucha, I. R. (1999) A generalized moments estimator for the autoregressive parameter in a spatial model, *International Economic Review,* 40(2). http://econweb.umd.edu/~prucha/papers/IER40(1999).pdf

[17] Kaya, A. (2008). Net Financial Convergence per Regions in Turkey. Master Thesis, Dokuz Eylül University.

[18] Le Gallo, Julie. and Ertur, Cem. 2000. Exploratory Spatial Data Analysis of the Distribution of Regional Per Capita GDP in Europe, 1980 – 1995. Paper presented at 40th ERSA Congress European Monetary Union and Regional Policy, August, in Barcelona, Spain.

[19] LeSage, J. and Pace R.K. (2009). Introduction of Spatial Econometrics. N. Balakrishnan and W. R. Schucany (Eds.), STATISTICS: Textbooks and Monograps, CCR Press.

[20] LeSage, J.P. (1997) Bayesian Estimation of Spatial Autoregressive Models, *International Regional Science Review*, 20(1-2). DOI: 10.1177/016001769702000107

[21] LeSage, J.P. (2008). An Introduction to Spatial Econometrics. *Revue D'économıe Industrıelle*, http://rei.revues.org/3887#tocto1n1

[22] LeSage, J.P. and Pace, R.K. (2007). A Matrix Exponential Spatial Specification, *Journal of Econometrics*, 140(1). DOI:10.1016/j.jeconom.2006.09.007

[23] Marsh, T. L. and Mittelhammer R.C. (2004). Generalized Maximum Entropy Estimation of a First Order Spatial Autoregressive Model, J.P. LeSage and R.K. Pace (Eds.), Advances in Econometrics: Volume 18: Spatial and Spatiotemporal Econometrics. Oxford: Elsevier Ltd.

[24] Önder, A. Ö., Karadağ, M. and Deliktaş, E. (2007). The Effects of Public Capital on Regional Convergence in Turkey. Ege Üniversitesi Working Paper in Economics, 07/01. http://iibf.ege.edu.tr/economics/papers/wp07-01.pdf

[25] Ord, J.K. (1975). Estimation methods for models of spatial interaction, *Journal of the American Statistical Association*, 70(349). http://www.stat.purdue.edu/~tlzhang/stat598TZ/readings/ord1975.pdf

[26] Rey, S.J., Montouri B.D. (1998). US Regional Income Convergence: A Spatial Econometric Perspective. *Regional Studies*, 33(2). http://web.pdx.edu/~crkl/SEAUG/papers/Rey_RS99.pdf

[27] Sağbaş, İsa, Kaya, Ayşe. (2009). Türkiye'de Kamu Harcamalarının Bölgesel Dağılımının Analizi: Mekansal Ekonometri Yaklaşımı. Paper presentedat the 24. Türkiye Maliye Sempozyumu, May 19-23 in Antalya, Turkey.

[28] Şener, B. (2009). Employment Growth in a Cross-Section of Turkish Districts: A Spatial Analysis. Master Thesis, Koç University.

[29] Tunay, K.B. and Silpagar, A. M. (2007) Regional Inflation Convergence Analysis In Turkey With Dynamic Space-Time Panel Data Models. *Periodical of Gazi University Faculty of Economics and Administrative Sciences*, 9(1). http://www.yildiz.edu.tr/~btunay/2007-1.pdf

[30] Yaman Yılmaz, C. (2014). The Provinces According To the Level of Regional Efficiency Measurement in NUTS 3 and Review in Spatial Neighbourhood. Ph.D. Thesis, Gazi University.

[31] Yavan, N. (2012). Regional Determinants of Investment Incentives in Turkey: A Spatial and Statistical Analysis, *Geographical Sciences Periodical*, 10(1). http://dergiler.ankara.edu.tr/dergiler/33/1676/17877.pdf

[32] Yeşilyurt, M.E. (2007) Spatial Relationships Based on Sectoral Efficiency in Manufacturing Industry: Turkey Case. *Periodical: Finance, Politics and Comments on Economics*, 44(514). http://www.ekonomikyorumlar.com.tr/dergiler/makaleler/514/Sayi_514_Makale_03.pdf

[33] Yeşilyurt, M.E. (2008) Spatial Contiguity Relations in the Manufacturing Industry in Turkey. *Atatürk University Periodical for Economics and Administrative Sciences*, 22(1). http://e-dergi.atauni.edu.tr/atauniiibd/article/view/1025003764/1025003593

[34] Yıldırım, J. (2009). Regional Policy and Economic Convergence in Turkey: A Spatial Data Analysis. 18th European Advanced Studies Institute in Regional Science. http://wz.uni.lodz.pl/ersa/abstr/yildirim_p.pdf (accessed June 17, 2014)

[35] Zeren, F. (2010). Spatial Interaction Analysis. I*stanbul University Faculty of Economics Periodical on Econometrics and Statistics*, 12. http://eidergisi.istanbul.edu.tr/sayi12/iueis12m2.pdf

[36] Zeren, F. and Kılınç Savrul, B. (2012). Analysis of Factors Affecting Urbanization in Turkey: A Spatial Econometric Analysis. *Journal of Yaşar University*, 28(7). http://dergipark.ulakbim.gov.tr/jyasar/article/view/5000066200/5000061706

Liquidity Analysis of Select Firms Listed in Muscat Securities Market – Sultanate of Oman

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Abstract

The study is to examine the liquidity of select manufacturing and service companies listed in Muscat Securities Market. The study examines the value of liquidity analysis using the traditional ratios compared to cash flow ratios. The traditional ratios used are Current Ratio, Quick Ratio, Total Assets to Total Liabilities and Interest Coverage Ratio. The Cash Flow Ratios used are Operating Cash Flow Ratio; Critical needs Cash Coverage, Cash Flow to Total Debt Ratio and Cash Interest Coverage Ratio. Correlation and Paired T Test are used to check the statistical significance. The study concludes that exists between Traditional Ratios and Cash Flow Ratios. Cash Flow Ratios can lead to better decision regarding the liquidity of a firm.

Keywords: liquidity, traditional ratios, cash flow ratios, muscat securities market.

JEL Classification code: M41.

1. Introduction

The need for liquidity analysis is crucial for companies and of interest to all stakeholders especially creditors like bankers and suppliers (Weygandt *et al.* 1998). Financial metrics that measure a company's ability to pay short term obligations are called liquidity ratios (Kiesco *et al.* 2004). Financial Ratios are used for predictive, explanatory and descriptive purposes (Barnes 1987).

These ratios look at a company's ability to pay off the short term liabilities with the help of most liquid assets. Shareholders also will take the help of these liquidity ratios when performing fundamental analysis on a firm. A higher liquidity ratio would indicate that the company is in a strong position to pay off its short term debts whereas; a lower ratio should be a warning to the company's management and investors / creditors. Companies that find it difficult to pay off their short term debts from liquid assets would certainly struggle to pay off their long term obligations. Liquidity of a company is affected by the cash inflows and outflows which in turn affects the future prospects and performance (Larson *et al.* 2006). Liquidity Analysis of a company is done using traditional ratios like Current ratio, Quick Ratio, Total Assets to Total Liabilities Ratio and Interest Coverage Ratio. The traditional ratios are useful in obtaining an indication of meeting current liabilities but do not reveal how effective the cash resources can be managed. Liquidity Analysis these days are done by using Cash Flow Ratios. They provide supplementary information in understanding the real operational status of business. The cash flow ratios are Operating Cash Flow Ratio; Critical needs Coverage Ratio, Cash Flow to Total Debt Ratio and Cash Interest Coverage Ratio.

To understand more about these ratios Current Ratio is a liquidity ratio that measures a company's ability to pay off its current liabilities with total current assets. Without considering how liquid some current assets are e.g.: stocks, this ratio assumes that companies with high current assets will find it easier to pay off their short term liabilities. A higher current ratio is always more favourable than a lower current ratio as it shows that the company can make the payments of current liabilities easily.

Quick Ratio or Acid Test Ratio tries to find whether a company is able to pay off its current liabilities with its quick assets. Quick assets are those that can be converted into cash in 90 days or less. Cash and cash equivalents, short term investments/marketable securities and current account receivables are considered quick assets. The difference between Quick ratio and Current ratio being, while calculating the Quick Ratio, we leave out inventories as these are considered to be less liquid.

Total Assets to Total Liabilities Ratio indicates how many times the total assets of the company cover the total liabilities. Assets here include all assets tangible and intangible, fixedand current. Similarly the total liabilities would include all liabilities, short term and long term. This ratio would only give a broad indication of the coverage

the company has towards its liabilities and would help one to compare the company with others in the industry. Higher the ratio, more comfortable is the company in servicing its debts. Also, high ratio would indicate that lower value of assets are bought / serviced by debt.

Interest Coverage Ratio tells us the adequacy of Profits (Earnings before Interest & Tax) to pay the interest expenses. This ratio indicates how many times the interest expense is covered by the profits. When a company reaches a ratio of 2.5, it is a warning sign that the company should not dip further. A ratio of 1.5 is bare minimum. But when a company slips below a ratio of 1, the profits generated are not sufficient to meet the interest expenses. Interest Coverage Ratio is a very important indicator to the investors and the management. When we plot a trend of the ratio over the past 5 or more years, it will give us an indication whether the ratio is improving or worsening

Operating Cash Flow Ratio is the money generated from the business activities. Revenue generated from business activities minus the operating expenses would give us the operating cash flow. For a business to perform well, the operating revenue should always be higher than operating expenses. Operating cash flow ratio would tell us how many times the short term liabilities are covered by the operating cash flow. It is important for a company to ensure that business debts are collected faster and inventory is rotated faster in order to achieve a high operating cash flow ratio.

Critical Needs Cash Coverage Ratio explains whether the Net Cash Flow from Operations is adequate to pay off the urrent liabilities and interest. It is important that any company has enough cash generated to service its current liabilities and interest. Cash Flow to Total Debt Ratio indicates whether the yearly cash flow from operations is adequate or to what extent it is adequate to pay off the total liabilities of the company. The liabilities here include both current and long term liabilities.Though few companies that have very high cash flow from operations can service their total debt out of cash flow from operations, this ratio gives an indication as to the financial health of the company. Cash Interest Coverage Ratio tells us the adequacy of the cash generated from operations to fund the interest expenses. A high ratio will give investors' confidence about the capacity of the company to generate cash to pay off its interest expenses many fold. This is also an indication that the company has the capacity to pay off interest of more debt taken, if required.

2. Review of literature

There is abundance of past research which supports the fact that operating cash flow ratios provide a complete picture of firm's ability to generate sufficient cash flow to take care of its obligations (Carslaw and Mills 1991, Giacomimino and Mielke 1993). Very less research is done on comparing the traditional and cash flow ratios in liquidity analysis on companies listed in Muscat Securities market in Sultanate of Oman.

Baki *et al. (*2015) has done a study on liquidity analysis of select public listed companies in Malaysia. The researchers compared the traditional ratios and cash flow ratios and the results show that the traditional ratios should not be used in isolation in measuring liquidity as the company can have cash flow problems which traditional ratios do not speak about.

Salayman (2014) examines the liquidity of pharmaceutical sector in Jordon by using cash flow and traditional ratios. As per their research decisions based on liquidity using traditional ratios may be incorrect. The company may become bankrupt due to poor cash flows. Cash Flow Ratios give more information about the companys ability to meet commitments compared to traditional ratios.

Kajananthan and Velanampy (2014) examine the performance of Sri Lanka Telecommunications sector by employing cash flow ratios and traditional ratios. Their study revealed that the results generated by traditional ratios were quite different and contrasting from cash flow ratios in liquidity analysis. The study highlights the use of cash flow ratios in conducting liquidity analysis.

Thomas and Brian (2012) in their study explore whether cash flow ratios or traditional ratios provide a better insight in the financial analysis of retail firms. The researchers in the study used factor analysis to examine the ratios to be employed in financial analysis. The study found that cash flow ratios provide better insight compared to traditional ratios regarding the firm's ability to pay. The study concluded that the cash flow ratios are more predictive in nature compared to traditional ratios.

Ross (2012) examined the liquidity of twenty five companies in Telecom sector in Australia over a period of five years using traditional and cash flow ratios. The researcher revealed in the study that better decision making and holistic approach is seen in using cash flow ratios compared to traditional ratios. Cash flow ratios provide a better perspective in liquidity analysis.

3. Methodology

A sample of 21companies from manufacturing and service sector listed in Muscat Securities Market are selected for the study. The purpose of this study is to analyse the liquidity of sample companies using traditional and cash flow ratios. The time period selected is 2011-12 to 2014-15 a period of four years. The data was obtained from financial statements of the companies listed in Muscat Securities market. The sample list of companies taken for this study is given in Table 1.

Table 1 - List of sample companies

No.	Name of Company	Nature of Company
1	Voltamp Energy	Manufacturing
2	Asaffa Foods	Manufacturing
3	Salalah Mills Company SAOG	Manufacturing
4	Raysut Cement	Manufacturing
5	Oman Cement	Manufacturing
6	Oman Cables	Manufacturing
7	National Aluminium Products	Manufacturing
8	Gulf International Chemicals	Manufacturing
9	GALFAR Engineering & Construction	Manufacturing
10	Al Jazeera Steel Products	Manufacturing
11	Al Anwar Ceramic Tiles	Manufacturing
12	United Power	Service
13	Shell Oman Marketing	Service
14	SMN Power Holding	Service
15	Sohar Power	Service
16	Renaissance Services	Service
17	Oman Telecommunications	Service
18	Oman Oil Marketing	Service
19	Oman Investment and Finance Company	Service
20	National Gas	Service
21	Al Jazeera Services	Service
22	Ooredoo	Service

There are four traditional ratios and four cash flow ratios examined. The traditional ratios used in the study are Current Ratio, Quick Ratio, Total Assets to Total Liabilities Ratio and Interest Coverage Ratio. The cash flow ratios used are Cash flow from Operations to Current Liabilities; Critical needs Coverage Ratio, Cash Flow from Operations to Total Liabilities and Cash Flow Interest Coverage Ratio. Descriptive statistics was used to analyse each ratio separately. Correlation is used to check the strength of relationship between traditional and cash flow ratios if any. The hypotheses formulated for the study are as follows:

Hypothesis 1: H0: There is no significant difference between current ratio and cash flow ratio.

Hypothesis 2: H0: There is no significant difference between quick ratio and critical needs ratio.

Hypothesis 3: H0: There is no significant difference between total assets to total liabilities ratio and cash flow to total liabilities ratio.

Hypothesis 4: H0: There is no significant difference between interest coverage ratio and cash interest coverage ratio.

Paired t test is used to test the statistical significance of the hypotheses. It is used to signify statistical difference if any as traditional ratios and cash flow ratios are calculated for the same sample of companies.

4. Data analysis and findings

The traditional ratios and cash flow ratios are calculated for all the twenty one companies and descriptive statistics of them is calculated which is shown in Table 2.

Table 2 - Representing descriptive statistics of current ratio and cash flow ratio

RATIOS	N	Range	Minimum	Maximum	Mean	Standard Deviation	Skewness	Standard Error
Current Ratio	88	4.68	0.32	5.00	1.78	1.05	1.20	0.11
Operating Cash Flow Ratio	88	6.67	-0.20	6.47	1.08	1.02	2.40	0.11

Table 2 shows that the Current Ratio ranges from 0.32 to 5.00. In a comparison of Current Ratio and Operating Cash Flow Ratio it is observed that except in two companies, the Current Ratio shows a higher coverage of current liabilities than shown by the Operating Cash Flow Ratio. This is because, firstly the companies are holding higher current assets as compared to the operating cash flow generated. This is also because the Current Ratio considers all current assets, without considering the degree of their liquidity. Inventories may be less liquid as compared to other current assets. But still, these are considered in the calculation of Current Ratio.

On the other hand, the Operating Cash Flow Ratio considers only the operating cash flow that has been generated by the company and tries to find how many times the current liabilities are covered by it. In this approach we will find that operating cash flow ratios shown by the companies are lower than those shown by the current ratios. Operating Cash Flow Ratio ranges from - 0.20 to 6.47.

It is to be noted that the two companies ie. M/s. United Power and Ooredoo, have a high cash flow from operations as compared to the current assets they hold. As such, their Operating Cash Flow Ratios are higher than the Current Ratios. Further, an extreme swing of ratios is observed in M/s. Voltamp Energy, Salalah Mills Co., Galfar Engineering, Al Jazeera Steel and Al Jazeera Services, where the Operating Cash Flow Ratio in certain years is seen to be negative. The reasons for this swing are (a) Increase in debtors and stocks of some companies (b) receipts from customers being low in certain companies (c) Advance payment made. This swing is of concern, though the companies may have funds locked up in high inventories and receivables, which are not very liquid. It would be better for the investors to take note of Operating Cash Flow Ratios in this regard and be cautious. Standard Deviation is a little higher in Current Ratio (1.05) compared to Operating cash Flow Ratio (1.02). Both the ratios are positively skewed.

Table 3 - Representing descriptive statistics of quick ratio and critical needs coverage ratio

RATIOS	N	Range	Minimum	Maximum	Mean	Standard Deviation	Skewness	Standard Error
Quick Ratio	88	6.67	-0.20	6.47	1.25	1.01	2.26	0.10
Critical Needs Coverage Ratio	88	5.90	-0.18	5.72	0.66	0.78	3.51	0.08

In Table 3 we compare Quick Ratio and Critical Needs Cash Coverage Ratio; we find that the Quick Ratio is higher in all companies except M/s. United Power, SMN Power and Ooredoo. The Quick Ratio is higher in most companies because they have high amount of current assets. It ranges from -0.20 to 6.47. However the three companies mentioned above have a robust cash flow from operations and hence, the Critical Cash Coverage Ratio is higher.

It is also to be noted that in five companies' viz. M/s. Voltamp Energy, Salalah Mills Company, National Aluminium Products, Galfar Engineering and Al Jazeera Services the Critical Needs Cash Coverage Ratio goes into the negative in certain years, though the Quick Ratio is positive. The Critical Needs Cash Coverage Ratio ranges from - 0.18 to 5.72. This is the result of negative cash flow from operations in those years. The negative cash flow in these companies arises from less receipt from customers and high build up of receivables and inventories and also due to high advance payments in case of Galfar Engineering Co.

Table 4 - Representing descriptive statistics of total assets to total liabilities ratio and cash flow to total debt ratio

RATIOS	N	Range	Minimum	Maximum	Mean	Standard Deviation	Skewness	Standard Error
Total Assets to Total Liabilities	88	9.90	0.26	10.16	2.84	2.03	1.56	0.22
Cash Flow to Total Debt Ratio	88	1.79	-0.18	1.62	0.36	0.40	1.46	0.04

In Table 4 we find that the Total Assets to Total Liabilities ratios are much higher as compared to Cash Flow to Total Debt Ratio. Invariably, all companies have higher assets as compared to liabilities and hence this ratio is bound to be high. The Total Assets to Total Liabilities ranges from 0.26 to 10.16.

On the other hand, when we see the Cash Flow to Total Debt Ratio, the ratios range from - 0.18 to 1.62. This is because it is difficult for most companies to generate enough cash from operations in one year to pay off all their debts. However, the higher ratios indicate better health of companies and their ability to generate good cash flows. Certain companies have shown negative ratios. These arise out of negative cash flows during particular years. The negative cash flow comes from lower receipts from customers and high build-up of stocks and receivables. In one case (Galfar Engineering) the negative cash flow is due to high payment of advances. The standard deviation of Total Assets to Total Liabilities is high (2.84) compared to the Cash Flow to Total Debt Ratio (0.36).

Between the two ratios, the former would give an overall view of the health of the company whereas the atter i.e. Cash Flow to Total Debt Ratio would be more indicative towards the company's ability to service its debts from the cash flows.

Table 5 - Representing descriptive statistics of interest cover ratio and cash interest coverage ratio

RATIO	N	Range	Minimum	Maximum	Mean	Standard Deviation	Skewness	Standard Error
Interest Cover Ratio	88	46,499	0.01	46499.0	623.63	4951.75	9.35	527.86
Cash Interest Coverage Ratio	88	8,120	-10.84	8109.5	203.50	896.25	8.15	95.54

In Table 5, we find a mixed reaction in Interest Coverage Ratio and Cash Interest Coverage Ratio. In some cases the Interest Coverage Ratio is higher and in certain cases the Cash Interest Coverage Ratio is higher. Companies that generate higher cash flows will naturally show a higher Cash Interest Coverage Ratio. It is to be noted that while the Interest Coverage Ratio will give a fair idea about the health of the company and its capacity to pay interest, the profits generated may not be readily available to pay off the interest expense. On the other hand, the Cash Interest Coverage Ratio will give a better indication about the ability to pay interest from the operating cash generated.

Certain companies show negative cash interest coverage ratio during certain years. It ranges from -10.84 to 8109.5. This is because of the negative cash flow during that particular year which is due to lower cash receipts from customers and excessive locking up of cash in inventories and debtors. In one case this is also due to high amount of advance paid during a particular year.

Table 6 - Representing correlation between traditional ratios and cash flow ratios

Traditional vs Cash Flow Ratios		N	Correlation
Pair 1	Current Ratio to Cash Flow Ratio	88	0.479
Pair 2	Quick Ratio and Critical Needs Ratio	88	0.540
Pair 3	TA to TL Ratio and Cash Flow to Total Debt Ratio	88	0.501
Pair 4	Interest Coverage Ratio and Cash Interest Coverage Ratio	88	0.965

Table 6 represents correlation between traditional ratios and cash flow ratios. The relationship is positive i.e. if traditional ratios increases the cash flow ratios also increases. The highest correlation is 0.965 is with Interest Coverage Ratio and Cash Interest Coverage Ratio. It demonstrates a very strong relationship which is close to 1. The lowest is 0.479 between Current Ratio and Cash Flow Ratio.

The hypotheses are formulated and paired T Test is used to check the statistical significance between Traditional Ratios and Cash Flow Ratios.

Table 7 - Representing paired T Test of current ratio and cash flow ratio

Pair 1	Current Ratio and Cash Flow Ratio	Mean	Standard Deviation	t Stat	df	Significance (2 tailed)
		1.78	1.66	10.65	87	0.000

Hypothesis 1: H0: There is no significant difference between current ratio and cash flow ratio.

From Table 7 it can be seen that the p value is less than 0.05. So null hypothesis can be rejected and alternative hypothesis accepted. Two tailed paired *t* test reveals that there is a significant difference between current ratio and cash flow ratio.

Table 8 - Representing paired *t* test of quick ratio and critical needs ratio

		Mean	Standard Deviation	t Stat	df	Significance (2 tailed)
Pair 2	Quick Ratio and Critical Needs Ratio	1.42	1.53	8.96	87	0.000

Hypothesis 2: H0: There is no significant difference between quick ratio and critical needs ratio.

From Table 8 it can be seen that the p value is less than 0.05. So null hypothesis can be rejected and alternative hypothesis accepted. Two tailed paired t test reveals that there is a significant difference between Quick ratio and critical needs ratio.

Table 9 - Representing paired T Test of total assets to total liabilities ratio and cash flow to total liabilities ratio

		Mean	Standard Deviation	t Stat	df	Significance (2 tailed)
Pair 3	Total Assets to Total Liabilities Ratio and Cash Flow to Total Debt Ratio	2.75	4.01	1.98	87	0.335

Hypothesis 3: H0: There is no significant difference between total assets to total liabilities ratio and cash flow to total liabilities ratio.

From Table 9 it can be seen that the p value is less than 0.05. So null hypothesis can be rejected and alternative hypothesis accepted. Two tailed paired t test reveals that there is a significant difference between Total Assets to Total Liabilities Ratio and Cash Flow to Total Liabilities Ratio.

Table 10 - Representing paired T Test of interest coverage ratio and cash interest coverage ratio.

		Mean	Standard Deviation	t Stat	df	Significance (2 tailed)
Pair 4	Interest Cover Ratio and Cash Coverage Ratio	626	245	1.39	87	0.000

Hypothesis 4: H0: There is no significant difference between interest coverage ratio and cash interest coverage ratio.

From Table 10 it can be seen that the p value is less than 0.05. So null hypothesis can be rejected and alternative hypothesis accepted. Two tailed paired t test reveals that there is a significant difference between interest coverage ratio and cash interest coverage ratio.

Discussion and conclusion

The analysis reveals that differences exist between the traditional liquidity ratios and cash flow ratios. Traditional ratios are used by companies for analysis but cash flow ratios speak more about a company where the traditional ratios fail. Traditional Ratios are based on accrued data and are calculated at a particular period of time.

Taking data from cash flows will correct this deficiency (Schmidgall *et al.* 1993). Cash Flow information is more reliable than Balance sheet or Income statement information. Balance sheet data are static due to the measurement of only a single point in time. In contrast the cash flow statement records the changes in other statements and nets out the book keeping focusing on cash available for operations and investments which the shareholders are interested in Coltman and Jagels (2001).

Cash flow ratios give more insights and are more meaningful to the stakeholders and researchers as they need information about the firm's ability to service debt and fund capital expenditure if any in the long run. These discrepancies between traditional and cash flow ratios is a cause of concern to investors to question a future strategic plan of expansion that may not be generating the required cash flow to support future capital expenditures. Finally the ability of a company generating cash flows also might affect the rating given by credit rating institutions to debt instruments issued by a particular company to raise future capital.

References

[1] Baki N.M., Billah Noor, A.J. and Mc Gowan, C.B. (2015). Liquidity Analysis of Selected Public Listed Companies in Malaysia. *International Economics and Business*. 1(1): 1-19.

[2] Barnes, P. (1987). The Analysis and use of Financial Ratios: A Review Article. *Journal of Business Finance and Accounting*, 14(4): 449-461.

[3] Carslaw, C.A. and Mills, J.R. (1991). Developing Ratios for Effective Cash Flow Statement Analysis. *Journal of Accountancy*, 172 (5): 63-70.

[4] Coltman, M.M. and Jagels, M.G. (2001). Hospitality Management Accounting. 7th Ed. New York, Wiley.

[5] Giacomino Don. E.D., Mielke, E. (1993). Cash flows another approach to Ratio Analysis. *Journal of Accountancy,* 175(3): 55-58.

[6] Kajananthan, R. and Velanampy, T. (2014). Liquidity, Solvency and Profitability Analysis Using Cash Flow Ratios and Traditional Ratios: The Telecommunications Sector in Sri Lanka. *Research Journal of Finance and Accounting,* 5(23): 163-171.

[7] Kiesco, D.E., Weygandt, J.J. and Warfield, T.D. (2004). Intermediate Accounting. 11th Ed. New Jersey: John Wiley & sons.

[8] Larson, K.D., Wild, J.J. and Chiappetta, B. (2006). Fundamental Accounting Principles, 17th Ed. New York: McGraw Hill.

[9] Kirkham, R. (2012). Liquidity Analysis Using Cash Flow Ratios and Traditional Ratios: The Telecommunications Sector in Australia. *Journal of New Business Ideas & Trends,* 10(1): 1-13.

[10] Schmidgal, R.S., Geller, A.N. and Ilvento. C. (1993). Financial Analysis using the statement of cash flows. *Cornell Hotel and Restaurant Administration,* 34(1): 46-53.

[11] Sualayaman, H.A. (2014). Liquidity Analysis using Cash Flow Ratios in the Pharmaceutical sector in Jordon, *International Journal of Financial Research*, 5(3): 146-158.

[12] Thomas, L., Zeller, B. and Stanko, B. (2012). Operating Cash Flow Ratios Measure A Retail Firms "Ability To Pay". *Journal of Applied Business Research,* 10(4): 51-59.

[13] Weygandt, J.J., Kiesco, D.E. and Kimmel, P.D. (1998). Fundamental Accounting, 2nd Ed. New Jersey: John Wiley & Sons.

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Problems of Attracting Foreign Investment in Russia

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Abstract

In the current international economic relations, the research is devoted to the relevant problem of modern Russian economy, namely the article considers the problems of attracting foreign investment, the fall of the ruble and fears of foreign investors in investing their capital in the Russian economy. The relevance of the research of the problem of attracting foreign capital is determined by the need to improve the economy by strengthening its investment base. Socio-economic and political development in Russia at the present stage is aimed at shaping the developed open market economy. At the same time, the most important condition for attracting foreign investment in our country is the creation of favorable investment attractiveness.

Keywords: investments, foreign investments, direct foreign investments, investment climate, investment politics, rate.

JEL Classification: E22, O16.

1. Introduction

The relevance of the research topic is determined by the need to attract foreign investments to address both strategic and current tasks of the financial, economic and social development of Russia. The main task of foreign investment is not only to provide additional financial investment in the economy, but also to meet the needs of the recipient country in new progressive working methods and means of production. At the same time, new production relations form in the recipient country, which allow for more efficient use of available foreign capital. Increased foreign investment is not only the basis of the recovery processes, but also a factor of the reduction of unemployment, growth of tax revenues, raise in the level of the Russian management, increased competition in the national economy and social development (Shadskaja *et al.* 2015, Kryukova *et al.* 2013, Kryukova *et al.* 2014, Zaernjuk *et al.* 2014, Ilina *et al.* 2015).

However, along with the positive effects, due to its complex nature, this form of international economic relations can also have a negative impact on the economic processes in the country receiving foreign investments (Kaurova and Kanina 2012). Often, the purpose of foreign investment is speculation on the financial markets, which under certain conditions can lead to destabilization of the financial and economic system of the country. International practice has accumulated a lot of factors to support this assumption. Unfortunately, Russia also has negative experience in this field. According to experts, foreign investors played a significant role in exacerbating the financial crisis of 1998 and 2008.

2. Methodology

Foreign direct investment (hereinafter – FDI) represent one of the most important instruments for the implementation of the program of modernization of the Russian economy that promotes the influx of new technologies of production and management (Bondaletov VV 2012). With the advent of foreign players on the Russian market, the level of competition in the industries of presence increases, which encourages the modernization of these industries. The main goal of attracting FDI to modernize the economy should be considered to ensure its influx into the key industries for the radical renewal and sustainable development.

Currently, however, the desired result is not obtained both by virtue of the fact that the interests of investors and recipients rarely coincide and by virtue of the macroeconomic factors affecting the attraction of FDI.

Given the competition from the newly industrialized countries and the countries of the former socialist bloc, Russia has to intensify the process of creating favorable investment attractiveness in the country as a whole and in each individual region (Gribkova 2000, Gribkova 2005). Investment flows directed into the Russian economy are unevenly distributed across regions. In this regard, all regions of Russia can be divided into three groups: regions with a favorable investment climate, intermediate regions, and regions with unfavorable investment activity. Most of the foreign investment goes to Moscow, Moscow region, Leningrad region, Sverdlovsk region, Sakhalin region, Kaliningrad region, Nizhny Novgorod region, Republic of Tatarstan and Republic of Sakha (Yakutia). Saratov region has a moderate risk investment and a fairly high investment potential (in terms of investment potential it ranks tenth in the list of regions of Russia).

Due to the above stated, the author's research of the process of attracting foreign investment and its operations in the Russian economy seems relevant and timely.

3. Result

The material on the study of foreign investment as a special form of financing for development of the Russian economy set out in the research leads to the following conclusions.

3.1. Basic concepts in the research

Attracting foreign investment took place back in the middle of the XIX century. Due to the inflow of foreign capital into Russia, new industries have seen intensive development. After 1917, the first concession agreements were made. The largest number of concession agreements was signed with the United States, Germany, Britain, France, Japan, Poland, Austria, Sweden and Iran. However, in the late twenties of the XX century, the Soviet government adopted a policy to eliminate concessions. Up until the 80s, attraction of foreign investment in the domestic economy was being minimized. To date, investment relations are an effective means of effective international and economic development (Gribkova 2005).

The basic concepts of the research are: "foreign investment", "objects of investment activity", "financial and investment attractiveness." They are relatively new terms for the Russian economic thought. When analyzing the definition of the term "foreign investments", it was found that like many other definitions, they are not complete and exhaustive. Therefore, this paper proposes one variant of the definition of "foreign investment."

In our view, foreign investment is an economic category that characterizes the system of economic relations arising in the process of attracting property and intellectual valuables of a foreign state, foreign legal entities and individuals, and their direction in the creation of new enterprises, reconstruction and modernization of existing ones, purchase of real estate, stocks, bonds and other securities and assets of the Russian economy.

3.2. Functions that foreign investment performs

The author's research also examines the three functions that foreign investment performs: reproductive, stimulating and speculative. Reproduction function is characterized by the fact that the dynamic process of reproduction and technical development of modern countries is expected to attract significant financial resources from outside. As a result, foreign investment becomes one of the objective sources of funding technological development of various regions of the country. The reproduction function of foreign investment is manifested in financing the construction of new enterprises, funding expansion and renovation of existing ones (Sitdikova et al. 2015). Stimulating function should be considered through the processes of receipts of foreign investment in the regions accompanied by the acceleration of technological development, growth of wages of employees of enterprises with foreign investment (Bakhtina *et al.* 2015). In general, these processes have beneficial effect on the socio-economic conditions of the regions. Stimulating function creates interest among managers at all levels of government to increase the investment attractiveness of the regions through tax incentives (Vinichenko 2014), legislation and specific conditions under which foreign investors are economically interested to direct their financial resources in a particular region of the country.

Speculative function. Movement of foreign capital is often aimed at obtaining excess profits in the financial markets of the country. Once this process becomes unmanageable, the financial and economic crisis begins in the country manifesting itself in hyperinflation, falling national currency, etc. This phenomenon is called "hot money" in the international practice. There are the following sources of "hot money": rentiers, central banks, commercial banks, multinational companies, exporters, importers, issuers of bonds. Russia first encountered this

phenomenon during the 1998 financial crisis. Special measures are required to prevent the negative effects of hot money.

Financial and investment policies should be seen as an activity of the state on attraction and purposeful use of foreign investment. Contents of financial and investment policy are multifaceted and include production of science-based concepts to attract foreign investment, definition of the main directions of their use and the development of measures aimed at achieving these goals. The purpose of the financial and investment policy is implementation of the strategic plan for economic and social development of the country (Kirillov 2010).

3.3. Financial mechanism to attract foreign investment

Financial mechanism can be viewed as a set of forms of the organization of financial relations, the methods (ways) to attract and use foreign investment used by the state in order to create favorable conditions for economic and social development. When considering the financial mechanism, its functional units should be allocated: attraction of foreign investment, encouraging them through legislation, tax holidays, and investment tax credits. Each unit of the financial mechanism is part of a whole. The structure of the financial mechanism contains the mobile block of elements: tax rates, tax incentives, depreciation rates, refinancing rate. These elements are subject to adjustment given the interests of economic entities. Combination of the elements of the financial mechanism – forms, kinds, methods of organization of financial relations – forms the "construction" of the financial mechanism, which is driven by the establishment of quantitative parameters of each element. Institutional reforms should be aimed at strengthening functions of strategic management and formation of the investment focus of the authorities (Bondaletov et al. 2014). Shaping the financial mechanism, the government is committed to ensure its most comprehensive compliance with the financial and investment policy, which guarantees the completeness of the implementation of its goals and objectives.

One of the elements of the financial mechanism is taxes and depreciation policy. The taxes that have the most effective impact on foreign investment include profits tax, property tax, tax on income from capital, income tax on individuals. Changing the order of calculation of payments on these taxes (increase or decrease in tax rates, expanding or reducing the list of elements taken into account when calculating the tax base) allows the state to more effectively influence the increase or decrease in the investment activity of both organizations in need of investment and potential investors. It should be noted that with the adoption of the new Tax Code, the investment allowance for income tax, which allows exempting a significant portion of the profit allocated for production development from tax, is abolished. This fact has a negative impact on the attractiveness of the investment, especially from abroad. As you know, one of the conditions of expanded reproduction is mandatory investment of income exempt from tax.

Based on the positive experience of foreign countries in the field of privileges for foreign investors, the variant of the tax holiday of 5-7 years is suggested. In this case, foreign and domestic investors will have an additional incentive to invest. Investment tax credit is of great importance for attracting investment. The main purpose of the investment tax credit is to encourage business investment.

For investors, the progressive (gradual) increase in taxation is also possible, from the lower tax rates to legally fixed ones, depending on the share of foreign capital, but no more than the period required to compensate for the real value of the initial investment and the established level of profitability.

An important place in the process of improving the mechanism of functioning of the foreign investment belongs to the evaluation of investment attractiveness of the Russian economy (Kirillov 2014). Considering this concept in the market environment, it can be defined as a set of political, socio-economic, financial, organizational and legal factors inherent in a given country, attracting or repelling investors. Financial and investment attractiveness on the macroeconomic level includes indicators of political, economic and social environment for investment. At the micro level, it manifests itself through the bilateral relations of the investing company and specific government agencies, banks, labor collectives of the recipient country. An analysis of the sectoral structure shows that trade and public catering, energy, financial, banking, insurance sectors and food industry are the most attractive to foreign investors. The main organizational form of foreign capital in Russia is foreign-invested enterprises.

The analysis revealed that the main foreign investors in the Russian economy are Cyprus, USA, UK, Germany, Netherlands, Switzerland and other countries. It is very important to attract investments from CIS countries.

3.4. Effects of attracting foreign investment

The research notes the positive and negative effects of attracting foreign investment. Positive effects are:

- importation of capital and loans increase capital accumulation in the recipient country, accelerate its economic development, improve the balance of payments;
- foreign investment is accompanied by transfer of technology, organizational and managerial experience, results of scientific and technological research and development embodied in technology, patents, licenses, trademarks, etc.;
- increasing employment rate and skills of the local workforce;
- manufacturing operations of foreign firms expand range of manufactured products, promote the more active development and fuller utilization of local resources;
- improving the living standards and purchasing power of the population;
- foreign investments have a stimulating effect on the development of services, starting with banks and insurance and ending with transport and advertising;
- foreign investment creates an additional incentive for other investors, as it increases confidence in the country facilitating the flow of capital;
- foreign investment increases competition in the national economy and reduces the level of monopolization (Sitdikova *et al.* 2015);
- foreign investment contributes to the development of the social field;
- foreign investment inevitably contributes to the development of information and Internet technologies (Volkova *et al.* 2015, Sitdikova *et al.* 2015).

The authors also observed negative effects of foreign investment:

- possible repatriation of capital and transfer of profits from foreign investment in various forms abroad;
- it can worsen the balance of payments of the recipient country;
- foreign investors may overwhelm local producers and suppliers and thereby restrict competition;
- foreign investors do not always honor local conditions, despite the fact that the success of their operations in the recipient country depends on the stability and capacity of the local market.

A proposal was made to use the method of ranking score for the evaluation of investment attractiveness of the region (Kirillov A.V. *et al.* 2015). This is because this method is easy to interpret and is based on an integrated multi-dimensional approach to evaluating the investment attractiveness of the region. The calculation of the final indicator of the ranking score is based on the comparison of the analyzed region with a nominal reference region with the best performance. The set of these indicators will vary for different regions. The following parameters may be used as basic: investment risk – probability of loss of investments and the income from them, which includes economic, financial, political, social, criminal risks; legislative activity (presence of regional investment legislation); physical volume of industrial production; number of operating enterprises with foreign investment and enterprises with 100% foreign capital; investment capital.

The authors also reviewed the financial mechanism of rational distribution of foreign investment in the research. It is noted that the rate of the financial and investment attractiveness of the country is uneven and has considerable inter-regional differences. When assessing the amount of investments made by foreign investors, it should be noted that the Central District takes the first place, the Far East and Northwest regions take the second place, and the regions with unfavorable investment activity and slow pace of forming new economic structures (number of Central Black Earth regions, North Caucasus republics) take the third place. The authors proposed general principles of the regional investment policy formulated in the form of five main blocks:

- development of regional investment legislation.
- creation of a system of taxation that encourages the participants of the investment process.
- ensuring investment transparency of the region.
- establishment of regional investment infrastructure.
- establishment of a general infrastructure in the region that stimulates business activity.

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volume of industrial production; number of operating enterprises with foreign investment and enterprises with 100% foreign capital; investment capital.

3.5. Research of the investment policy of Saratov region

The research analyzed the financial and investment policy of Saratov region. Particular attention is paid to the analysis of legislative base in the area. The author believes that Saratov region has significant natural resource and industrial potential, i.e. it has favorable conditions for attracting foreign investors. However, a program to attract foreign investment in the development of export production, engineering and complex of the conversion defense enterprises is required to better attract foreign capital to Saratov region.

This paper suggests ways to improve the efficiency of foreign investment in the Russian economy. The study of the problems of attracting foreign capital allowed the author to make conclusions about the need to develop a comprehensive program to attract foreign investment in accordance with the main objectives of national economic development. This program must be combined with the strategic development of the productive capacity in the long term. The author believes that industries and regions where foreign investment should be directed must be named in the Program. This can be done through a system of safeguards to protect the rights of foreign investors. The sources of state guarantees can include: federal funds, real estate and other property in federal ownership, primary natural resources. In addition, a comprehensive program must include a system of protection against the negative effects of foreign investment. The state receiving the investment may limit the amount of cash income that can be repatriated (transferred) to the country of origin of investment. In industries with high income (production of tobacco products), the positive experience of other countries should be taken into account, where the company has no right to repatriate part of the profit, depreciation and amortization within the first 3-5 years of operation and should direct them in socially important sectors (e.g., in the production of medicines, production of goods for children, etc.). This measure is necessary to prevent Russia from turning into a base for the production of tobacco products only, i.e., to prevent creating conditions for reinvestment of foreign capital in the manufacturing of this product. There have been such measures in world practice when the governments of some countries imposed restrictions aimed at trying to force foreign investors to reinvest earnings in certain industries of the recipient state. Meanwhile, it should be borne in mind when choosing the optimal solution that there are various forms of cooperation with foreign partners and attracting foreign resources.

3.6. Attraction and mobility of foreign investment financial flows

The author believes that the Russian capital taken abroad could be another source of investment resources.

For attraction and mobility of foreign investment financial flows in the economy of the country, Russia's accession to the WTO and joining the current global practice and administrative regulation of international economic relations is very important. One of the most important conditions for expanding the attraction of foreign investment in Russia is the conclusion of intergovernmental and inter-state agreements on the encouragement and mutual protection of capital investments.

At the same time, international cooperation can be the primary form of long-term cooperation with foreign partners. One form of such international cooperation is enterprises with foreign investment. Establishment of commercial companies with foreign participation plays an important role in attracting foreign investments to the Russian market. Small and medium enterprises owned by foreign capital in sectors that do not have strategic importance are of particular importance to the Russian economy. The creation of commercial companies with foreign participation must be licensed in a number of sectors that are crucial for the national economy.

Creation and development of investment funds may be important for attracting foreign capital in the form of the purchase of stocks. This requires a number of conditions:

- creation of the Russian stock market, functioning of which will be familiar to foreign investors;
- interest of a foreign investor in participation in the Russian stock market;
- determination of the procedure of admission of a foreign investor to the stocks of companies that have strategic importance, companies – natural monopolists.

Concession is one of the forms of attracting foreign investors. The author believes that with the development of competent legislation in the field of concessions, this form of attracting foreign investment can significantly strengthen the economic and financial situation of the Russian regions. Currently, foreign investment is also attractive for Russia in the form of production sharing agreements (Vetrova 2013, Vetrova 2008).

According to the authors, it is necessary to consider many factors when deciding on the formation of free economic zones. These zones are formed gradually and give maximum effect in a short time at relatively low cost of their creation.

Of course, this paper does not cover the whole range of issues and characteristics of the financial mechanism to attract foreign investment. Such purpose and objectives were not set for the research. At the same time, we believe that the proposed solutions of some key problems in this area, in our view, can be used to develop the concept of a mechanism to attract foreign investment into the Russian economy.

Discussion

The Russian government has made a number of significant steps towards stimulating foreign investment (hereinafter – FI): regulatory framework was changed, special economic zones were set up, tax incentives were established, etc.

In 2011, two organizations were created to facilitate the inflow of investment into the economy and development of medium-sized businesses: the Russian Direct Investment Fund (hereinafter – RDIF) and the ANO "Agency of strategic initiatives to promote new projects" (hereinafter – ASI).

The RDIF aims to develop mechanisms for accelerating the inflow of FDI into the economy, and its main priority is to ensure maximum return on the capital invested by the Fund and co-investors. The RDIF's investment is aimed at improving production efficiency and management in leading companies of the Russian economy. The ASI aims to create opportunities for self-realization of ambitious young leaders who can lead Russia to the forefront in the world. Until 2013, the quality of foreign investment resources has been deteriorating; the share of foreign direct investment (FDI) has been declining (Table 1).

As can be seen from the table, there is an increase in the share of other investment consisting mainly of short-term loans. Therefore, foreign investors do not want to or are afraid to leave the capital in Russia for a long time and the Russian market is used as a platform for highly profitable speculative operations. (OK-inform.ru public control, 2014)

Table 1 - Structure of foreign investment in the Russian economy, %

YEARS	2000	2005	2008	2009	2010	2011	2012	2013
Direct	40.42	24.36	26.05	19.41	12.04	9.66	9.7	15.4
Portfolio	1.32	0.84	1.36	1.08	0.94	0.42	0.4	0.6
Other	58.26	74.79	72.59	79.51	87.03	89.92	89.9	0.9
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

However, according to the organization, the inflow of foreign investment in Russia amounted to $94 billion in 2013 (third place in the world for foreign investment). That's 83% more than in 2012, when the Russian Federation ranked ninth in the world by amount of raised assets. The sharp rise in the inflow of foreign capital in the Conference was explained by a deal to acquire 18.5% of "Rosneft" stocks by British petroleum company BP.

Despite the sharp rise in the inflow of investment in 2013, there was another decline in 2014. For the first six months of 2014, about $17 bln was received, which strongly differs from 2013. In 2014, Russia was not included in the 25 most attractive countries for investors in the world, despite ranking 11th in 2013. The figure shows the distribution of 25 countries according to the "Confidence index in terms of foreign direct investment", which is calculated according to the survey of 300 heads of companies, the turnover of each of which exceeded $1 bln. (OK-inform.ru Public control 2014)

Another problem that prevents the development of a sustainable economy and social area is strengthening the disparities in the socio-economic development of Russian regions. The overwhelming share of direct investment is directed only in three federal districts – Central, Far East and North-West, where the most attractive region for investors is Moscow. It successfully competes with the major European centers, moving closer to London and Paris, which have formed their investment image for many years.

We should also mention the problem of the outflow of investments from Russia. During the period of 2008-2012, total net capital outflow from Russia amounted to $361 bln, in 2013 it was about 63 bln rubles, and in the 10 months of 2014 it has already reached $110 bln, which is more than all the official forecasts (forecast of the Central Bank for 2014 is $90 bln, forecast of the Ministry of Economic Development is $100 bln).

Within the period of 2000-2014, over $446.8 bln was illegally taken from Russia to offshore jurisdictions and luxurious countries, which is more than 13.4 trillion rubles and is comparable to the total expenditure of the federal budget of Russia in 2013.

A heavy blow to the Russian economy was the introduction of sanctions by the EU and the US in March 2014. The response of the political course of Russia's development was the further active cooperation with the great eastern neighbor – China. This can be proved by the fruitful talks in Beijing in the framework of the informal meeting of APEC leaders. The meeting fully confirms the high level of Chinese-Russian comprehensive strategic partnership and cooperation.

Over the past 10 years, volume of trade between Russia and China has increased more than 5.5 times. One good example of effective partnership between our countries, according to experts, is the work of the Russian investment and industrial group "Wee Holding". Investment of "Wee Holding" is the largest Russian investment in China's industrial assets. The main directions of its activity are the extraction and processing of minerals, non-ferrous metallurgy, energy and real estate. The aggregate value of the assets of the holding group of companies, according to experts, is more than $6 bln.

The Russian-Chinese enterprise "Yulian" engaged in deep processing of aluminum was created. The project is unique because it covers all stages of production: from coal mining, power generation, production of baked anodes, electrolytic aluminum and alloy production to deep processing of primary aluminum in high-tech products. It is one of the largest private investments in the Chinese economy by the size of the accumulated capital investment. The volume of investment is currently $3.3 bln, of which 1.2 bln is shareholders' equity, the rest is loans of Chinese banks and reinvested earnings.

At the moment, the Russian Direct Investment Fund (RDIF) considers seven investment projects in the agricultural sector with the involvement of Chinese partners. Volume of trade between Russia and China is growing, approaching $100 bln. The level of Chinese investment in the Russian economy is expected to grow from $4 bln in 2014 to $12 bln in 2020. The main areas of Chinese investment in the Russian Federation are development of mineral resources, forestry, energy, trade, communications, construction and services (Russian newspaper 2014).

Conclusion

Russia is open to cooperation and participation in the Chinese Silk Road mega project. There is a program of development of Siberia and the Far East and the scope for mutual cooperation and investment in Russia. The head of the investment firm Rogers Holdings, Jim Rogers, believes that the sanctions, which the United States use in a bid to "intimidate" and somehow "stop" us will in the end haunt the United States. After all, by doing so, they "push" Russia and Asia to each other. As Jim Rogers says, "Russians, Chinese and Brazilians are trying to find a way to move away from the US dollar. And it will have a long-term effect, because if they succeed, they will create a new World Bank and new currency; America will lose a huge portion of its prestige and power (Russian newspaper 2014)."

As President Vladimir Putin said in his address to the Federal Assembly (December 4, 2014), Russia will be open to the world, to collaboration, to attraction of foreign investment for the realization of joint projects. But most importantly, we must understand that our development depends primarily on us (Address of the President of the Russian Federation to the Federal Assembly, 2014).

References

[1] Bakhtina, O. Yu., Kirillov, A.V., Matyash, S.A. and Urzha, O.A. (2015). The development of technology for higher education institution's administrative personnel assessment. *International Education Studies*, 8(5): 179-190. DOI: 10.5539/ies.v8n5p179

[2] Bondaletov, V.V. (2012). Analysis of the mechanism of state regulation of investment and innovation processes in the sphere of housing construction. *Materials Afanasievskiy readings*, 1(10): 63-72.

[3] Bondaletov, V.V., Medvedeva, N.M., Sencheva, L.V., Frolova, E.V. and Santos, E. (2014). Local Politics, Business, People: Issues and Cooperation Strategies. *Journal of Advanced Research in Law and Economics*, Volume V (Winter), 2(10): 63 – 73. DOI: 10.14505/jarle.v5.2(10).02. http://www.asers.eu/journals /jarle/jarle-issues.

[4] Gribkova, N.B. (2000). Tax regulation of the economy. Finance.

[5] Gribkova, N.B. (2005). Economic indicators of the regional tax potential. Entrepreneurship, 3: 108-124.

[6] Gribkova, N.B. (2005). Taxes in the system of state regulation of the Russian economy, thesis of Dr. of Economy, Moscow.

[7] Ilina, I.Y., Kryukova, E.M., Zotova, A.I., Chardymskiy, M.G. and Skudareva, N.Z. (2015). Scientific degrees as a status characteristic of Russian university teachers. *International Education Studies*, 8(5): 165-171. DOI: 10.5539/ies.v8n5p165

[8] Kaurova, O.V., Kanina, T.I. (2012). Factors constraining the development of tourism. Service Plus, 2: 37-42.

[9] Kirillov, A.V. (2010). Modern trends in social development and humanization of work. *Human Capital*, 10(22): 22-24

[10] Kirillov, A.V. (2014). Technology personnel management and environment. *Social policy and sociology*, 4(173-184): 2071-3665.

[11] Kirillov, AV., Tanatova D.K., Vinichenko M.V. and Makushkin S.A. (2015). Theory and Practice of Time-Management in Education. *Asian Social Science*, 11(19): 193-204. DOI: 10.5539/ass.v11n19p193.

[12] Kryukova, E.M., Makeeva, D.R., Atamanova, M.A. and Shadskaja, I.G. (2013). Financial mechanism of housing and utilities infrastructure. *Life Science Journal* (Life Sci J), 10(4) (Cumulated No. 35): 25. Date Views: 12.10.15 http://www.lifesciencesite.com/lsj/life1004/099_21206life1004_790_794.pdf

[13] Kryukova, E.M., Novikova, N.G., Zikirova, S.S. and Podsevalova, E.N. (2014). Financial support of the formation of social housing in Russia and Abroad. *World Applied Sciences Journal*, 30(12): 1746-1748. DOI: 10.5829/idosi.wasj.2014.30.12.14252

[14] Shadskaja, I., Kryukova, E., Kaurova, O., Maloletko, A. and Druchevskaya, L. (2015). Current state and prospects of development of sheep and goat breeding in the Russian Federation. *Biosciences Biotechnology Research Asia.*

[15] Sitdikova, L.B., Shilovskaya, A.L., Volkova, M.A., Lenkovskaya, R. R. and Stepanova, N.A. (2015). Legal regulation and copyright protection in Internet in Russia and abroad. *Mediterranean Journal of Social Sciences MCSER Publishing*, Rome-Italy. 6(6): 163-169. DOI:10.5901/mjss.2015.v6n6p163

[16] Sitdikova, L.B., Shilovskaya, A.L., Starodumova, S.J., Lenkovskaya, R.R. and Neznamova, A.A. (2015). The problems of the obligations fulfillment on the phase of unfinished construction. *Mediterranean Journal of Social Sciences*, 6(6) (Supplement 5), December 2015. Special edition.

[17] Sitdikova, L.B., Volkova, M.A., Kuzahmetova, S.E., Gridneva, O.V. and Efimova, O.V. (2015). Legal nature and legal personality of the self-regulatory organizations (SRO). *Mediterranean Journal of Social Sciences*, 6(6) (Supplement 5), December 2015. Special edition.

[18] Vetrova, E.A. (2008). Tendencies of development of the service sector in the global economy. Herald of Tambov University. Series: *Humanities*, 10(66): 367-370.

[19] Vetrova, E.A. (2013). Main features of support of small business at the municipal level in Russia. Herald of Tambov University. Series: Humanities, 12(128): 49-52.

[20] Vinichenko, M.V. (2014). Innovative development of personality in the course of training for managerial specialties. *Human Resources and Intellectual Resources Management in Russia*, 4(21-25): 2305-7807. http://dx.doi.org/10.12737/5418

[21] Volkova, M.A., Sitdikova L.B., Starodumova S.J. and Shilovskaya A.L. (2015). Legal problems of the information services implementation in Russian civil law. *Review of European Studies*, 7(6): 243-271. DOI: 10.5539/res.v7n6p273

[22] Zaernjuk, V.M., Kryukova E.M., Bokareva E.V. and Chernikova L.I. (2014). Study of theoretical approaches banking financial intermediation and directions of its development in Russia and Abroad. *World Applied Sciences Journal*, 30(12): 1746-1748. © IDOSI Publications. DOI: 10.5829/idosi.wasj.2014.30.12.14252

*** OK-inform.ru Public control. Date Views: 12.15.15 http://ok-inform.ru/ekonomika-i-biznes/26771-kitaj-priglashaet-druzhit-investitsiyami.html

*** Russian newspaper. Date Views: 12.17.15 http://www.rg.ru/2014/11/07/partnery.html

*** Address of the President of the Russian Federation to the Federal Assembly. Date Views: 12.10.15 http://www.kremlin.ru/news/47173

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Is Advertising Innovation the Same as Shocking?

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Abstract:

Shockvertising is an innovative advertising technique that purposely attempts to gain and keep attention with horror and disgust. What makes fantastic marketing? The greatest marketing campaigns are those that are memorable. They are the ones that resonate with your audience and really create an affinity between your customer, the messaging, and the product or service. In order to obtain accurate and relevant information, current science only deals with the controversial and unethical advertising campaigns of companies. In this paper the values of each generation are presented then the concept of generation marketing is discussed in more details, from the advertising innovation point of view. In this research our goal is to find out how various age groups react to this kind of advertising or to innovation advertising. It is examined with the focus group technique, and, in order to extract quantitative data, the mentioned technique is combined with a questionnaire. Our assumptions and hypothesis are supported with statistical data, charts and tests of independence.

Keywords: shockvertising, shocking adverts, innovation, generations, generation marketing.

JEL Classification: M31, M37, Z33.

1. Introduction

In today´s society, with the increasingly cluttered advertising space, marketers are challenged with the tak of breaking through the clutter in an attempt to get their respective brand noticed. (Urwin and Venter 2014) Advertisement are considered offensive or "shocking" when they violate personal and values, regardless of whether it is because of being sexually inappropriate, indecent, vulgar or aesthetically unappealing. (Dahl, Frankenberger and Manchanda 2003) In order to cut through the daily clutter of advertising, that causes a decline in terms of its effectiveness perceptions, many marketing communicators opt for an offensive strategy that would stand out, attract attention and be memorable. (Dahl, Frankenberger and Manchanda 2003) Shockvertising is well utilized for charity issues, for example anti-fur or anti-smoking campaigns. This type of advertising turned out to be effective despite the fact that it has been critised because of its offensive style. Products or issues that require special attention are more likely to be advertised with negative shock rather than with positive (Uprety 2013).

Execution strategies that have been gaining attention in the past few years range from emotional to informational. Irritation (Greyser 1973, Aaker and Bruzzone 1985), humor (Sternthal and Craig 1973, Gelb and Zinkhan 1986), warmth (Aaker *et al.* 1986), fear (Ray and Wilkie 1970, La Tour and Zahra 1988), and sexuality (Bello *et al.* 1983, Severn *et al.* 1990) trigger various feelings.

Provocation, which is another form of execution strategy, has been popular recently. Its aim is to shock and gain attention. Provocation as a communication strategy has been used only recently, despite the fact that shocking has always been a strategy in advertising. The main objective of this research is to define provocation as a form of strategy and to analyse consumers´ reactions to various provocative advertising. The first shocking advertisements are connected to United Colors of Benetton. Oliviero Toscani photographer made some controversial advertising campaigns for the company. Benetton, a clothing retailer, which is based in Ponzano Veneto, Italy, is considered to be the pioneer of provocative advertising ("United Colors" publicity campaign). Their graphic ads sometimes contained images unrelated to any actual products being sold by the company.

These images included a variety of shocking subjects, for instance, a deathbed scene of a man dying from AIDS, a bloodied, unwashed newborn baby with umbilical cord still attached, a priest and nun about to engage in a romantic kiss, three different hearts with "black", "white" and "yellow" written onto them. Their strategy was adopted by other global brands, like Diesel (it debuted a series of ads for their "Be Stupid" campaign with cynicism in which women and men were in various indecent, unsafe and provocative situations)

and Espirit (who raised eyebrows with its advertising ´´Unless George Bush is Available to Babysit´´, in which they took a stand on the abortion debate in the USA). Racism, AIDS, war and death appeared in the ads putting aside all ethical norms that were valid in the society. This advertising technique is called "Shockvertising", which is the blend of the expression shocking advertising. (Vézina and Paul 1997)

2. Innovation in advertising

Product innovation is increasingly valued as a key component of the sustainable success of a business's operations. As a result, there has been a noticeable increase in the number of studies directed at explicating the drivers of new product success. (Henard and Szymanski 2001) Dahl, Frankenberger and Manchanda (2003) define shock advertising as one that deliberately violates social norms. They also provide a framework of offense elicitors, their description, examples and published reactions. Elicitors, for example, include sexual references, vulgarity, moral offensiveness, impropriety, disgusting images, religious taboos and profanity/obscenity. Provocation has a close similarity to fear, humor, warmth, irritation, sexuality and nudity, the one which can shock many people of various countries and cultures. The three main elements of provocation are distinctiveness, ambiguity and transgression of norms and taboos.

Distinctiveness is associated with the Helson (1964) Adaptation Level Theory which says that our perceptions of things such as waiting time, size or value change based on experience. In experiments – testing the theory – distinctiveness has been used with the aspects of size, position, color and movement. The results show that distinctive stimuli have a positive effect on the degree to which attention is attracted and the ad is memorized. (Childers and Houston 1984)

Ambiguity in advertising is aimed to raise intrigue, invoke associations – or an advertisement is simply confusing, misspelt, a jumble of bad grammar. Ambiguity can be effective if it captures layers of meanings in a memorable slogan. In the Howard and Sheth (1969) model stimulus ambiguity is defined as ´´the lack of clarity of the stimulus display in communicating the descriptive and evaluative aspects of the brand, product class and the nature of motives´´ (Howard and Sheth 1969, 158-159). According to the results of Zinkhan and Martin (1983), there is a connection between the level of complexity of the message and responses to advertising.

The transgression of norms and taboos has also been investigated by some researchers recently. We can find studies where advertising is described as one of the elements contributing to changed norms (Pollay 1986). But one fact cannot be ignored, that changed norms have also influenced advertising.

There is a growing number of such advertising in Slovakia as well; therefore we found it important to assess how society reacts to such advertising. (Mura and Lincényi 2015) The purpose of our research is to demonstrate statistically if there is any difference between generations in perception of shocking advertisements. We are trying to prove or disapprove it with our assumptions and hypotheses. From statistical results we can get an idea which group the campaign should target, where to introduce it, and how much risk we take regarding winning or losing loyalty.

3. Methods of research

To implement this research the analysis of the focus groups turned out to be the most effective method. Various generations were the focus groups, and there were eight people in each group. The creation of groups was necessary because the selected shocking advertisements were shown simultaneously to the members of each generation. The qualitative research was carried out interactively, but each participant was given a form on which their opinions were recorded - thus facilitating the subsequent processing of responses. It was a quantitative questionnaire containing relevant questions that helped with testing of the hypotheses and processing of the responses. The validity and depth of the qualitative research was increased by several methods that revealed the examined phenomenon. We obtained primary, qualitative and quantitative data.

Our study was based on the research conducted by Sarry Parry and the team focusing on the response to the shock therapy applied in the profit and non-profit sectors. Using shock advertisements is a phenomenon with increasing tendencies, taking into account the final efficiency, which brings their application. Shock advertisements are more frequently observed in the non-profit sector in comparison with the profit sector. The basic research methodology of Sarry Parry and the team was based on examining:

- differences in responses to shock advertisements applied in the profit and non-profit sectors
- analysis of the cultural characteristics of respondents and their responses to shock advertisements.

The authors applied the method of group discussions (so-called focus groups), the sample consisted of international post-graduate students between the ages of 21 and 35. It is a typical age group that shock advertisers aim to influence (Vezina and Paul 1997).

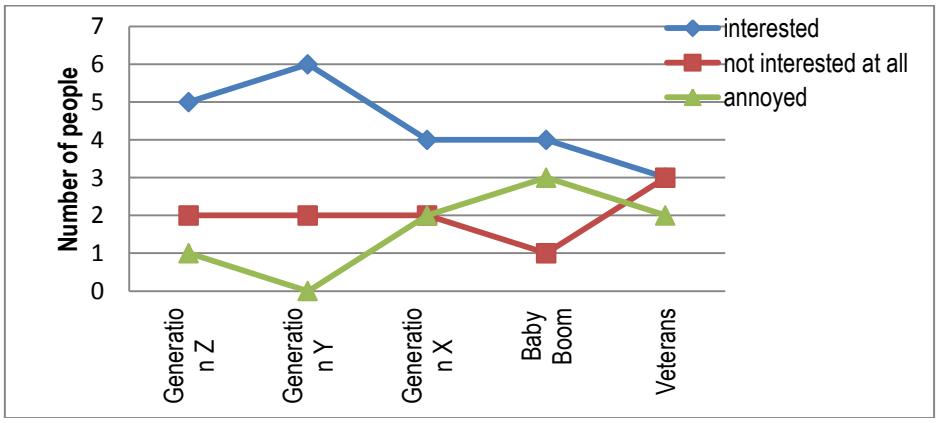
In North West Wales students were recruited by a researcher who was responsible for controlling the focus group. 12 shocking billboard advertisements were selected. The researchers´ aim was also to achieve an equal balance of FP and NFP advertisements (six from NFP sector and six from the FP sector). The sample was cross-cultural and for that reason some of the advertisements were international. Controversial advertisements were included which had received complaints or had been banned in their country of origin.

The research explored the use of shock advertising in NFPs and FPs from a cultural perspective, which indicates that responses to advertising relieve over time, customers accept social taboos more easily. This research generates new insights into the use of shock advertising. Consumer reactions, shown in Sarra Parry´s study, were influenced by religion and gender. These student participants accepted shock advertising more easily than expected, though.

The research explores attitudes and emotional reactions to extreme marketing communications. Although shock advertising is an effective way of attracting attention, persuasion depends on the sector as well as on the consumer´s cultural characteristics.

4. Results of the research

At the beginning of the interview some members of certain generations had to answer a question that focused on the impacts of advertising. Using a line chart various trends became visible. Younger generation is much more interested in advertisements than older generations. Advertisements have no effects on Baby Boomers, but if they are impressed after all, then they consider advertisements annoying. Advertisements do not annoy the members of generation Y, and what is more, most of them are interested in commercials, which show an outstanding result compared to other generations. The number of people of Veterans who are interested in advertisements is the same as the number of people who are not interested at all.



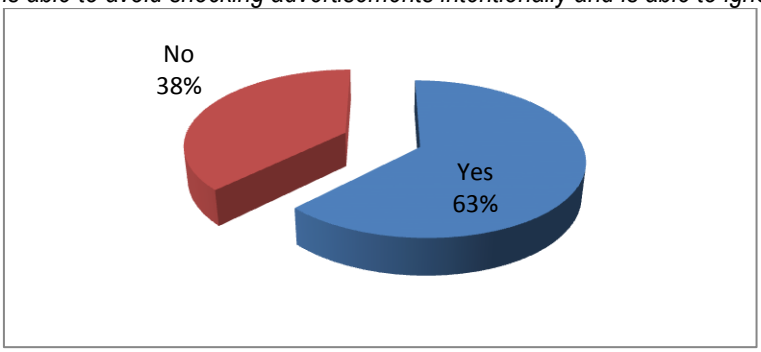
Source: own graph

Figure 1 - Impact of advertisements on each generation

The rest of the interview had an important role since we tested our hypotheses and assumptions.

Assumption 1: Generation X

Generation X is able to avoid shocking advertisements intentionally and is able to ignore them.

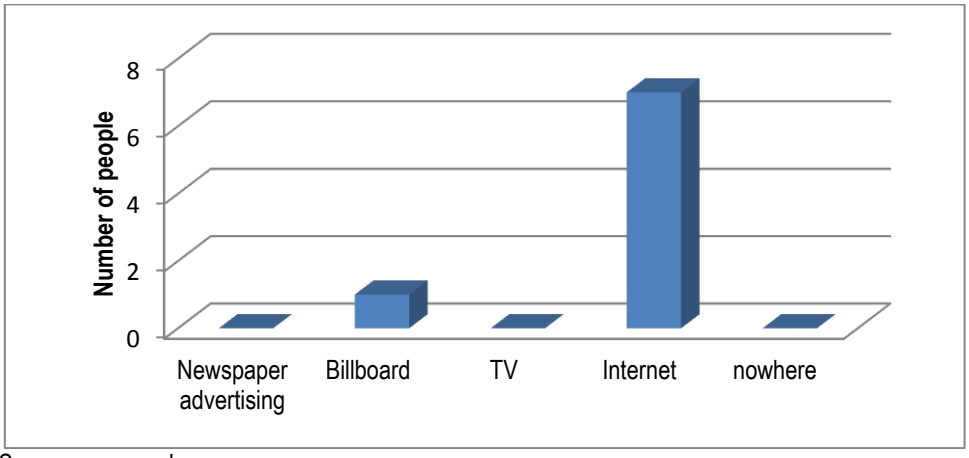


Source: own graph

Figure 2 - The ratio of intentional switching of channels when a schocking advertisement appears

Since the majority, 62.50% would intentionally or unintentionally switch channels, *assumption 1 is true*. To get relevant information, we examined the next question, whether this has ever happened to generation X at all. Here we took into consideration only those who had experienced this type of advertisements indeed. Two people out of four – the total number of people- switched channels. We can therefore say that those members of generation X who had already met shocking advertisements either switched TV channels (50%) or clicked away on the Internet (50%). Half of the Veterans would switch channels, if a shocking advertisement appeared, the other half of the group, however, would not do that. Those who would not switch channels, they would probably not do so because as shown in Graph 1, compared to other generations, advertisements have the least impact on them. The majority of Baby Boomers, 62.5% stated that they would not switch channels, even though Graph 1 shows that they are the ones who are the most annoyed by advertisements. We must consider that the latter question is generally related to traditional advertising, so as a conclusion we can say that such shocking and controversial advertisements are likely to arouse their interest. 87.5% of generation Y and 75% of generation Z would neither click away nor switch channels. In the case of generation Y the reason of the high rate is that they are interested in the advertisements the most compared to other generations. So it is logical that the majority of them would watch these shocking advertisements and would not switch channels.

Assumption 2: Generation Y
Generation Y see shocking advertisements mostly on the Internet



Source: own graph

Figure 3 - Distribution of location where shocking advertisement are displayed

Based on the research results, *the second hypothesis was confirmed* that members of generation Y come into contact with shocking advertisements mostly on the Internet (87.50%).

Since none of the Veterans ever met shocking advertisements, it is clear that all of them answered "nowhere." The majority of Baby Boomers, 75%, have never met this type of advertisement before. 12.5% of generation X met such controversial advertisements on billboards, 37.5% of them met them on the Internet and 50% has never met them. 12.5% of generation Z met these advertisements also on billboards, 25% of them met them on the Internet and 62.5% of them have never met shocking advertisements. Taking it all around, it is clear that the majority of the members of all generations have not met this type of advertising technique. This is due to the fact that their usage is not as widespread in our country as it is widespread abroad. In addition, we can meet more of these advertisements on the Internet, but mostly if we look for them intentionally – and this is rare. Pop-ups, that appear intentionally or unintentionally, do not present such content yet.

Since with the combination of the interview and the questionnaire of the focus groups we obtained some relevant information, thus we assigned a reason to carry out some independent tests using excel program:

- *Is the level of distraction caused by shock advertisements related to the ability of developing brand loyalty?*

The horizontal lines of the cross table display the Likert scale representing distraction, the vertical columns of the table show the willingness of loyalty (yes, no).

Table 1 - Cross table 1

Satisfaction	Willingness of loyalty		TOTAL
	Yes	No	
did not upset me at all	2	2	4
slightly upset me	4	3	7
moderately upset me	6	3	9
significantly upset me	8	6	14
completely upset me	4	2	6
TOTAL:	24	16	40

Sources: Author's own research.

First we had to propose two hypotheses. On the basis of hypothesis H0 the two criterions are unrelated, and on the basis of hypothesis H1 there is interdependence. Step by step we defined the value of X2, which is 0.516.

Hypothesis	H_0:	P_{ij}	=	unrelated
	H_1:	P_{ij}	=	dependent

Table 2 - Expected frequencies in the case of existence of H0:

Satisfaction	Willingness of loyalty		TOTAL
	Yes	No	
did not upset me at all	2	2	4
slightly upset me	4	3	7
moderately upset me	5	4	9
significantly upset me	8	6	14
completely upset me	4	2	6
Total:	24	16	40
E		**K**	
	c_f		
0,516	**9,49**		

Source: Author's own research.

"n" stands for the sample size, "r" is the number of rows and "c" is the number of columns in the cross table, "v" stands for the degree of freedom, which, by using a formula, was calculated by rows and columns. The X^2 critical value, using a function and with the fourth degree of freedom, has a value of 9.49. Because the defined value of 0.516 is less than 9.49, it does not belong to the critical range. It means that on the significance level of 5% hypothesis H0 is true, the counter hypothesis is false. Thus, the answer is that *product loyalty is not related to the distraction level of shock advertisements.* Therefore, companies using shock advertisements do not need to worry about losing their loyal customers because of controversial advertisements. It is of course questionable whether this kind of advertisement influences the first purchase. But if the person has already purchased and is satisfied, the controversial advertisement will not influence his/her loyalty.

- *The question is whether the impacts of traditional advertisements on a person are related to the fact that the person deliberately switches TV channels when a shock advertisement appears.*

Table 3 - Cross table 2

Effects of traditional advertisements	**Intention to switch TV channels in case of shock advertisements**		**TOTAL:**
	Yes	No	
Interested	5	17	22
No impact	3	7	10
Annoying	7	1	8
TOTAL:	15	25	40

Sources: Author's own research.

The effects of traditional advertisements can be found in the three lines of the cross table, and intention to switch TV channels in case of shock advertisements can be seen in the two columns. We proposed the two hypotheses again: H0 and H1, then we determined the estimated frequency if H0 is valid. We defined X2, which

took up the value of 10.822. Using INVERZ.KHI function on the significance level of 5% and with the second degree of freedom we defined also the critical value of X^2 that is 5.99.

E		K
	c_f	
	5,99	**10,822**

Sources: Author's own research.

Since the value of 10.822 belongs to the critical range, we can say that *the two factors are related*. So it does matter what a person thinks about advertisements in general, if we wanted to find out whether an intention to avoid shock advertisements may occur in the future. Therefore somebody who substantially gets annoyed with traditional advertisements will more likely switch channels when a shock advertisement appears – it can hardly be expected that the person´s curiosity will make him/her to watch the shock advertisement.

Conclusion

Our research has shown that from the five generations only 5 people have already heard the phrase "Shockvertising", and after explaining the terminology we found out that mostly the members of generation Y have already seen this type of advertisements.

The first hypothesis was proved, that generation X is able to avoid shocking advertisements intentionally and is able to ignore them. The second assumption is also true, as our research also showed that members of generation Y meet shocking advertisements mostly on the Internet, and they find the presented advertisements less controversial as the members of generation X do. In addition, we performed two independent analyses, where the five generations were considered as a group. We found out that brand loyalty is not related to the level of distraction caused by a shocking advertisement. Based on the other independent analysis we stated that the fact how a person thinks about traditional advertising does matter, if we want to predict whether in the future the person intends to avoid shocking advertisements.

References

[1] Aaker, D.A., Bruzzone, D.E. (1985). Causes of irritation in advertising. *Journal of Marketing*, 49(2):47-57. DOI: 10.2307/1251564

[2] Baráth, K. (2014). Generációs különbségek a sokkoló reklámok megítélésénél. Komárno: Selye János Egyetem, diplomadolgozat.

[3] Bello, D.C. *et al.* (1983). The communications effects of controversial sexual content in television programs and commercials. *Journal of Advertising*, 12(3): 32-42.

[4] Childers, T.L., Houston, M. J. (1984). Conditions for a picture-superiority effect on consumer memory. *Journal of Consumer Research,* 11(2): 634-654.

[5] Dahl, D.W., Frankenberger, K.D. and Manchanda, R.V. (2003). Does it pay to shock? Reactions to shocking and non-shocking advertising content among university students, *Journal of Advertising Research*, 4(33): 268 - 280.

[6] Greyser, S.A. (1973). Irritation in advertising, *Journal of Advertising Research*, 13(1): 3-10.

[7] Helson, H. (1964). Adaptation-level theory: An experimental and systematic approach to behavior. New York: Harper and Row.

[8] Henard, H.D. and Szymanski, D.M. (2001). Why Some New Products Are More Successful Than Others. *Journal of Marketing Research*, 38(3): 362-375.

[9] Howard, J. A. and Sheth, J. N. (1969). The theory of buyer behavior. New York: Wiley. Pp. 458.

[10] LaTour, M. S. and Zahra, S. A. (1988). Fear appels as advertising strategy: Should they by used? Journal *of Services Marketing,* 2: 5-13.

[11] Mura, L. and Lincényi, M. (2015). Základy marketingu. Brno: Tribun EU, 137 s.

[12] Pollay, R. W. (1986). The distorted mirror: Reflections on the unintended consequences of advertising. *Journal of Marketing*, 50(2): 18-36.

[13] Ray, M. L. and Wilkie, W.L. (1970). Fair: The potential of an appeal neglected by marketing. *Journal of Marketing,* 34(1): 54-62.

[14] Severn, J. *et al.* (1990). The effects of sexual and nonsexual advertising appeals and information level on cognitive processing and communication effectiveness. *Journal of Advertising* 19(1): 14-22.

[15] Sternthal, B. and Craig, C. S. (1973). Humor in advertising. *Journal of Marketing,* 37(4): 12-18.

[16] Uprety, N. (2013). Sockvertising – Method or madness. *Abhinav Journal*, 2(6): 43-46.

[17] Urwin, B. and Venter, M. (2014). Shock Advertising: Not So Shocking Anymore. An investigation among Generation Y. *Mediterranean Journal of Social Sciences*, 5(21): 203-2014.

[18] Vézina, R. and Paul, O. (1997). Provocation in advertising: A conceptualization and an empirical assessment. *International Journal of Research in Marketing* 14: 177-192.

[19] Zinkhan, G.M. and Martin, C.R. Jr. (1983). Message characteristics and audience characteristics: Predictors of advertising response. In: Bagozzi, R. P. and Tybout, A. M. eds., Advances in consumer research, Vol. 10. Ann Arbor, MI: Association for Consumer Research.

Market Segmentation in Developing Markets Evidence from Thai Non-Voting Depository Receipts

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Abstract

The introduction of Non-Voting Depository Receipts (NVDR) in the Stock Exchange Thailand allows for nearly ideal natural experiment to investigate the differences between three segments of traders; local, foreign and NVDR trades. We hypothesize NVDR traders who forgo any rights of control, must be compensated in some way for giving up this valuable aspect of equity ownership. We find that NVDR traders exhibit a higher probability of informed trades, NVDR order imbalances are significant in predicting daily returns and naive traders can use information from NVDR trades to generate trading profits. The implications of this study are of great interest to caretakers of emerging markets who must balance the desires of local constituents while maintaining a market that is liquid and attractive to foreign investors.

Keywords: voting right, emerging market, market segmentation, Thailand.

JEL classification: G10, G190.

1. Introduction

We exploit a very unique aspect of the Thai equity markets, the Non-Voting Depository Receipts (NVDRs), to investigate the trading results and behavior of three different investor segments in the Thai equity markets; local traders; foreign traders and NVDR traders. This segmentation of the market provides a very unique natural experiment to test some long held beliefs about the interaction between noise and informed traders and creates an interesting trading lab where, at least at some level, profits of informed traders are made at the expense of noise traders.

In 2002, the Stock Exchange Thailand, created a special share class, called NVDR, to allow foreign traders to participate in the Thai stocks market, while preventing potential control of Thai firms not to exceed the Foreign Ownership Limit (FOL). Foreign traders in Thailand are subject to control limitations for Thai companies, which generally limit the percentage that a non-Thai can own. FOL is currently 49% of the available equities of a Thai company (although percentage varies across firms). Prior to the introduction of NVDRs, if equity ownership of any company reached a predetermined limit, foreign traders were forced to trade in the foreign board to avoid a violation and potential fine. Equities on the foreign board were much less liquid compared to the main board, which led to excess volatility and valuation complications for equity markets in Thailand. In response, NVDR shares were introduced to create a more liquid market for foreign investors without diminishing potential control of a Thai firm. Those investing in NVDR securities must receive some form of extra compensation similar to Bailey and Jagtiani (1994) or will exhibit characteristics similar to noise traders. From a research perspective, the segmentation of unique traders provides a rich dataset to evaluate the trading activities of investors with virtually the same underlying equities.

NVDR trades have been embraced by foreign traders not only as a way to participate in equity ownership of Thai companies over the FOL, but NVDR have developed into a more liquid investment alternative compared to equities on the foreign board. Since the inception of NVDRs, foreign investors have shifted their trading activity from the foreign board to the NVDR market and the number of trades on the foreign board has decreased while number and liquidity of NVDR equities have significantly increased.

Several studies have reported the differences in performance between foreign and local traders such as Grinblatt and Keloharju (2000) and Hau (2001) who find foreign investors have superior information compared to local investors, while Dvořák (2005), Choe *et al.* (2005) and Agarwal et al (2009) find advantages fall to the local investors and Bae *et al.* (2012) document that foreign investors have an advantage with their better resources

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and expertise in processing global market information. This paper builds on this idea, but with the advantage of segmentation which allows us to more closely identify local and foreign traders. We find the performance of foreigners, as well as NVDRs traders, experience higher long-run returns while local investors trading performance is not as profitable. Using the Probability of Informed Trading (PIN) model by Easley *et al.* (1996), we find foreign and NVDR traders experienced the high proportion of informed trades relative to local traders. The NVDR traders were significantly different from trading groups and trades were informed, despite being foreigners and despite the inability or threat to exert any control over publicly traded Thai firms.

The existence of NVDR shares also allow us to investigate some microstructure issues in the Stock Exchange of Thailand and we measure the impact of contemporaneous and lagged order imbalance by investor groups on open-to-close stock returns. NVDR and foreign investors exhibit positive and significant performance on the returns when order imbalances are used as a trading proxy. Time-series regressions show contemporaneous order imbalance of NVDR trades result in a 28% positive daily return. We also find the lagged terms on order imbalance results are negative and smaller which are present to compensate for "over-weighting of the auto-correlated portion of contemporaneous imbalance" (Chordia and Subramanyam 2004, 492), which is consistent with prediction by Chordia and Subrahmanyam (2004). The results are robust after controlling for foreign, and local traders imbalance. We also find the evidence that one-day lagged order imbalance of NVDR traders has significant predictive power.

Finally given the information revealed by NVDR traders, we explore whether the information is sufficient to develop a profitable trading strategy using net NVDR trading activity. When there is a positive imbalance of NVDR trades, naïve investors can generate returns from 0.008% over a 1-day horizon to 2.69% over a 60-day horizon. However, the trading strategy based on negative order imbalance of NVDR shares does not exhibit a strong influence which results in 0.176% over a 1-day horizon to 0.11% over a 60-day horizon.

2. Related literatures and hypotheses

Finance literature has long investigated the relationship between noise and informed traders with varied results. Both noise traders and informed traders exist, but the ability to clearly identify these traders ex-ante is at best a guessing game. Only after trades are made and results tabulated can we accurately determine who is a noise trader and who is an informed trader, leading to many endogeneity issues. Several papers examine results of different segments of an equity market, i.e. domestic versus foreign or retail versus institutional traders in an effort to determine noise vs. informed traders. The first group of literatures argue that foreigner investor perform no better than the local investors due to information disadvantage. Choe *et al.* (2005) find that foreign investors perform worse than domestic investors in Korean market and Dvořák (2005) documents those domestic investors in Indonesia trade at better prices than foreign investors. However, Grinblatt and Keloharju (2000) find the superior performance of foreign investors in the Finnish stock market. Kamesaka et al (2003) and Bae et al (2006) document that foreign investors in Japanese market can perform better than domestic investors. More recently Hao *et al.* (2015) and Gençay *et al.* (2015) study foreign traders' impact of trading activity with diverse results. These conflicting results can be a result of country specific factors, investment frictions, regulatory framework or simply not accurately identifying ex-ante, who is a noise trader and who is an informed trader. Strict identification between noise and informed is necessary for any results to be properly interpreted.

Another area of research interest addressed in this paper is the performance differences between individual and institutional investors. Griffin *et al.* (2003) show that institutions are more likely to trade on the right direction compared to individual investors. Phansatan *et al.* (2012) argue that foreign investors in the Thai equity market follow the momentum strategy and exhibit short term performance, however, do not have superior security selection ability. In the Shanghai Stock Exchange, Lee, Li, and Wang (2010) argue that individual investors' exhibit trend chasing trading patterns more than related institutional investors and institutional trading contributes to market information more than that of individuals. Barber *et al.* (2009) document that individual trader's exhibit herding pattern and strong short-term returns follow trades of individual, however, stocks heavily bought by individuals underperform stocks heavily sold over the long term. These studies generally find that institutions are more informed and engage in more profitable trading compared to individual investors.

This paper is also related to the literature of monitoring, corporate control and voting rights that have almost always found voting, in a variety of issues, has positive value to shareholders (Zingales (1995), Chung and Kim (1999), Nenova (2003) Hauser and Lauterbach (2004), Agrawal (2012) and Iliev *et al.* (2015), among others). If the voting right is stripped from equity ownership, traders should be compensated in other forms. Kalay, Karakas, and Pant (2014) also estimate a positive value to voting rights. Ødegaard (2007) shows the peculiar case of negative voting premium in Oslo Stock Exchange and attributes such phenomenon to the

market segmentation which outweighs the impact of corporate control. Although the value of voting rights is not the focus of this paper, it is worth exploring to detect if a voting premium also exists in Thailand. If there is a positive value to voting rights, investors who give up these rights must believe the trades they are entering will provide value over and above those of non-restrictive shares and therefore are more informed about these equities.

Thus, NVDR traders, by definition, must be informed and act on this information to compensate for the loss of voting and control rights of a firm. NVDR shares which were created to eliminate control issues for Thai firms, have also provided a clear distinction between informed traders and a general population of traders, which provides a natural experiment for comparisons. We cannot eliminate the presence of informed traders in the Thai local and foreign board markets, but we hypothesize a significant proportion of informed traders participate in the NVDR segment and allow for a much cleaner comparison between informed and noise traders.

If trades between voting and non-voting shares were random, no significant differences in trading profits would be expected, but if traders had to give up this voting "value" some compensation must be forthcoming to induce trading activity. We exploit this fact and hypothesize that traders who give up voting, by definition, are informed traders who know more about the positions they are entering than the other market participants. Thus we hypothesize that

H1: Foreign traders consist of higher proportion of informed traders than local individual traders.

H2: NVDR traders consist of higher proportion of informed traders than local individual traders.

Identification of NVDR trades also allows us to investigate some interesting microstructure issues. Chordia and Subrahmanyam (2004) measure the impact of contemporaneous order imbalance on individual stock returns and find a positive relationship between the contemporaneous imbalances and stock returns. However, after controlling for current imbalance, lagged imbalances are negatively related to current price return with smaller impacts. Their model also yields positive returns when using the imbalance-based trading strategy by buying (selling) securities when previous imbalances are positive (negative). Shenoy and Zhang (2007) document the contemporaneous order imbalances and stock returns in Chinese stock markets and find the predictive power of order imbalance on the returns on the following day are not significant. Bailey *et al.* (2009) segment trader types as; individuals, institutional and proprietary investors, find that individual order imbalance constitutes as much as 21.8% of daily returns compared to the 8.5% returns from the other two groups.

We hypothesize that, if NVDR trade returns are positively correlated with the market returns, daily returns should be positively associated with the contemporaneous daily order imbalances after controlling for order imbalances of other traders. We regress the daily open-to-close returns on its lagged terms, and expect to find a positive relationship if NVDR traders have predictive power.

H3: Contemporaneous order imbalance from NVDR traders exhibits positive relationship with stock daily returns.

H4: Lagged order imbalance from NVDR traders exhibits predictive power on daily stock returns.

Given the availability of this dataset, we hypothesize that one might be interested in developing a trading strategy using signal provided by NVDR traders, which may result in persistent abnormal profits. This is important from a practical standpoint because NVDR trades are published on the website of the Stock Exchange of Thailand (SET) in addition to other public information[2] and should provide superior information for other traders. Thus, it has practical implication for the market in that naive traders can form an opinion and employ the simple trading strategy by mimicking the buys and sells of NVDR. After the information is reported at the end of each day, naive investors can react on the following day by buying (selling) at the opening price and selling (buying) at the closed price after various holding periods ranging from the same day to 60 days holding period returns.

H5: Naïve traders can make profitable trading strategy byfollowing public information on the order imbalance of NVDR traders.

3. Institutional background of the stock exchange of Thailand

The Stock Exchange of Thailand (SET) is a pure limit order driven market using the continuous order matching system to match orders from all traders. The trading hours are divided into 2 sessions, morning (10:00

[2] http://www.set.or.th/set/nvdrbystock.do (accessed December 15, 2015)

AM – 12:30 PM) and afternoon (2:30 – 4:30 PM). The call auction matching is used to determine the opening price at the beginning of both sessions and the closing price at the end of the afternoon session. The trading venues consists of 4 trading boards including the main board which is open to all traders, foreign board which is primarily for foreign traders, odd lot board where less than 99 shares are traded, and big lot board where traders negotiate outside of the market for large volume trades and report the trade to the SET (now called 'trade report'). SET classifies traders into 4 groups; foreign traders, local retail, local institution, and proprietary traders. The major participants, who will be focused on in this study, in Thai market are local individual traders (65-75%) and foreign traders (20 – 25%) by value of daily trading value (Phansatan *et al.* 2012). The local institution and proprietary traders comprise approximately 10-15% of trading value. The interaction and participation of both local individuals and foreign traders play important roles in daily trading activity and are both necessary to create a fluid and liquid market.

A foreign trader can participate in the Thai market in a variety of ways. The first is to purchase shares on the main board. In this market, a foreign buyer may not be aware if the shares will create a violation of the foreign ownership limit (FOL) rule. In response, the SET attempted to resolve the ownership issue by creating a foreign board in 1987 where foreigners can trade among foreigners without violating the FOL rule. Segmenting the foreign traders to only trade between each other, removes the uncertainty of violating the rule. This ensures that foreign ownership will not exceed FOL since all shares traded are among only foreign traders. Even though stocks traded on the main board and foreign board share the same underlying firms and receive the same benefits, Bailey and Jagtiani (1994) find that stocks on the foreign boards are traded at premium relative to the main board. Note that, at the time of their study, the foreign board had been newly created to resolve the FOL issue due to foreign capital inflow into the SET during 1980s.

Equity market regulators in emerging markets, such as Stock Exchange of Thailand (SET), must strike a balance between the need for foreign investors who demand a liquid market with Thai firms who are reluctant to give up control. Several countries have enacted capital controls on foreign investors, but these restrictions usually reduce liquidity to such a degree that any other benefits are overwhelmed; the law of unintended consequences has not been repealed in international investing. The issue of capital controls has been explored in several papers such as Fernández *et al.* (2015), Li and Rajan (2015) and Dell'Erba and Reinhardt (2015) as capital flows between countries has exploded in magnitude over the past 15 years, a full collection of studies is summarized in Moore (2014).

With the goal to solve the liquidity issue on the foreign board, the SET setup Thai NVDR Co., Ltd (hereafter Thai NVDR) to issue new trading instruments called non-voting depository receipts (NVDRs). As indicated on their website[3] that *"The main purpose of NVDRs is to stimulate trading activities in the Thai stock market. It is due to the fact that foreign investors who are interested in making investment in these companies may be prevented from doing so because of these foreign ownership restrictions regulated under Thai law"*. The creation of the NVDR market is an attempt for Thai regulators to balance the needs of a liquid market for foreign investors with the desire for Thai firms to maintain local control. Foreigners are allowed to participate in the market in order to enhance liquidity but are subject to the FOL which usually limits ownership to 49% of the shares outstanding. This limitation restricts foreign investors from establishing a controlling interest in Thai firms, but allows for significant participation in the Thai equity market.

NVDR holders will receive full financial benefits as they would, if they hold stocks, except the right to limit potential control foreign traders can exert on a Thai firm. Foreigners who trade on the foreign board will be eligible for all rights of owning share in Thailand, but face a higher probability of experiencing low liquidity. We hypothesize that the NVDR traders will be the most informed traders in the Thai equity markets. With this assumption, we can accurately measure the difference in performance between noise and informed traders with the exact same underlying securities. Additional information specific to the SET is discussed in Visaltanachoti and Luo (2009), Phansatan *et al.* (2012) and Bailey *et al.* (2012).

4. Data and sample selection

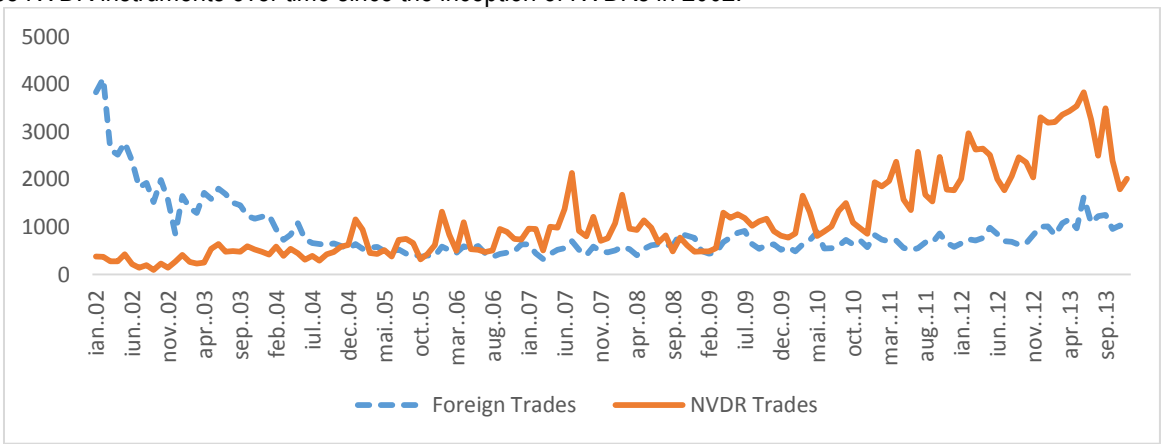
We obtain the proprietary microstructure data from the SET which contain the details of trading activities including date, time, security symbol, trade price and volumes. The advantage of this dataset is that it also includes trader groups who initiated the transaction and the NVDR flag to indicate whether the trader used an NVDR instrument to complete the trade or not. In addition, each trade clearly indicates whether it is a buy or sell, which eliminates the misclassification error on trading side. The sample period covers from 2002 when NVDR

[3] http://www.set.or.th/nvdr/en/about/whatis.html (accessed December 15, 2015)

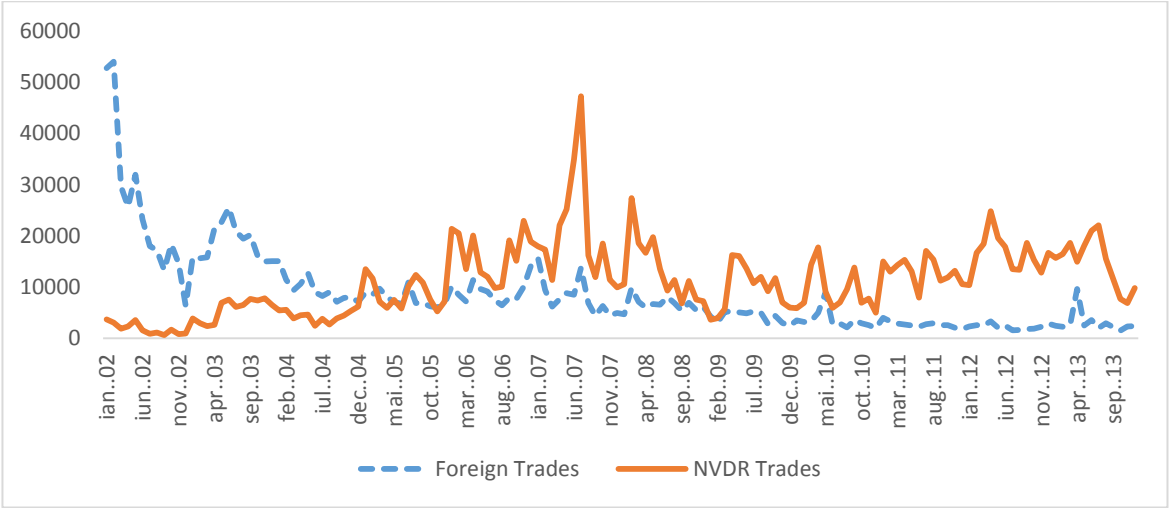
has been introduced to the market up to 2013, which is the limit of the dataset at time of study. Since the foreign board is less liquid, we restrict our sample to include only stocks which have at least 10 trading days on the foreign board and match with the same stocks on the main board in each year to control for firm specific characteristics and minimize any matching errors in trying to create a representative matching sample. Total number of unique stocks which meet our requirement is 67 stocks. Preferred shares, warrants, ETFs are excluded from the study along with trades during the call auction market are also eliminated.

Table 1 presents summary statistics of the sample from 2002 to 2013 for main board, foreign board and NVDR shares. The trading activity on the foreign board has declined over the sample period while the volume of trading in NVDR shares has increased. On the foreign board, the number of stocks traded by foreign traders was 31 in 2002 and gradually reduced to 14 in 2013 which is a small fraction of stocks listed on the SET. This indicates that foreign traders do not actively trade on the foreign board. The trading volume was 25.4 million shares per stock per day with a daily value of 612 million Baht in 2002 and has declined to 2.9 million shares and 419 million Baht in 2013.

The main board (excluding trades by NVDRs) still remains the most liquid and active equity market in Thailand. Daily trading volume of each stock was 31.8 million shares per stock per day with a daily value of 689.0 million Baht in 2002. The volume increased to 35.7 million shares per stock per day with a value of 2,218 million Baht in 2013. Over that time period, the NVDR market has evolved to become a very attractive venue for foreign traders, where trading increased from 1.8 million shares daily or 61 million Baht to 14.8 million shares daily or 959.4 million Baht during our study period. The number of transactions has also experienced a significant increase; Figure 1 plots daily trading activities of the stocks traded by foreign traders who trade on the foreign board and NVDR traders. The graph shows significant drop in number of trades and volume over time on the foreign board. This also indicates that foreign traders gradually shift their trading activity from the foreign board to use NVDR instruments over time since the inception of NVDRs in 2002.



Panel A - Number of Trades



Panel B - Trade Volumes

Figure 1 – Plot of Trading Activities of Foreign Shares and NVDRs.

Table 1 – Summary statistics of sample

		Foreign Board			Main Board			NVDR		
Year	Sample	Volume ('000s)	Value ('000s)	#Trade	Volume ('000s)	Value ('000s)	#Trade	Volume ('000s)	Value ('000s)	#Trade
All	67	8,381	413,639	877	71,967	2,171,469	7,738	11,119	416,618	1,148
2002	31	25,456	612,330	2,335	31,822	689,040	4,272	1,839	60,809	251
2003	29	18,535	584,660	1,477	101,433	1,650,736	7,860	5,683	134,254	451
2004	19	9,561	499,727	770	32,247	1,342,841	4,981	4,384	170,910	457
2005	21	7,681	392,032	488	51,082	1,163,448	4,510	8,731	250,798	612
2006	26	9,022	467,102	506	67,405	1,268,702	4,016	16,233	363,554	752
2007	30	8,105	455,543	510	94,710	2,478,804	7,824	20,416	458,379	1,033
2008	23	6,629	385,317	627	128,060	3,046,088	11,875	13,185	359,661	883
2009	20	4,204	238,723	633	86,878	3,092,953	11,823	9,566	310,385	959
2010	18	3,451	272,739	635	95,239	3,993,887	12,163	9,135	445,417	1,100
2011	16	2,684	330,112	671	43,306	2,938,991	8,800	13,071	747,527	1,892
2012	17	2,230	304,325	766	95,829	2,188,193	7,898	16,329	738,152	2,382
2013	14	2,972	419,180	1,102	35,728	2,218,224	6,861	14,823	959,442	3,002

5. Methodology

Probability of Information-Based Trading (PIN)

Easley *et al.* (1996) propose a model to estimate the probability of informed trades. Noise traders will be unable to distinguish between good and bad trading days while informed trades are assumed to have this ability, therefore informed traders should buy (sell) on the good (bad) news days. Prior researches that employ the model include but not limited to Barclay and Hendershott (2003), Jackson (2013) and Hua *et al.* (2016). Barclay and Hendershott (2003) study the after-hours trading in the NASDAQ market and show that the level of information-based traders is higher than the normal trading hours. Jackson (2013) provides the estimation of PIN model for firms with high level of trading activity. Hua *et al.* (2016) study the extended trading hours of China Shanghai Shenzhen 300 Index Futures and Jiashi HS 300 ETF. They find that the probability of an informed trade is higher during the extended trading session than those of the regular trading session. We employ this model to distinguish between informed vs. uninformed trades and predict the actions of the two different trader groups. At the beginning of a trading day, the probability that it is an information day is α. On any information day, probability of good news arrival is δ and bad news is 1- δ. Let's μ is the rate of informed trades and ε is the rate of uninformed trade information. The trading process is depicted in Figure 2.

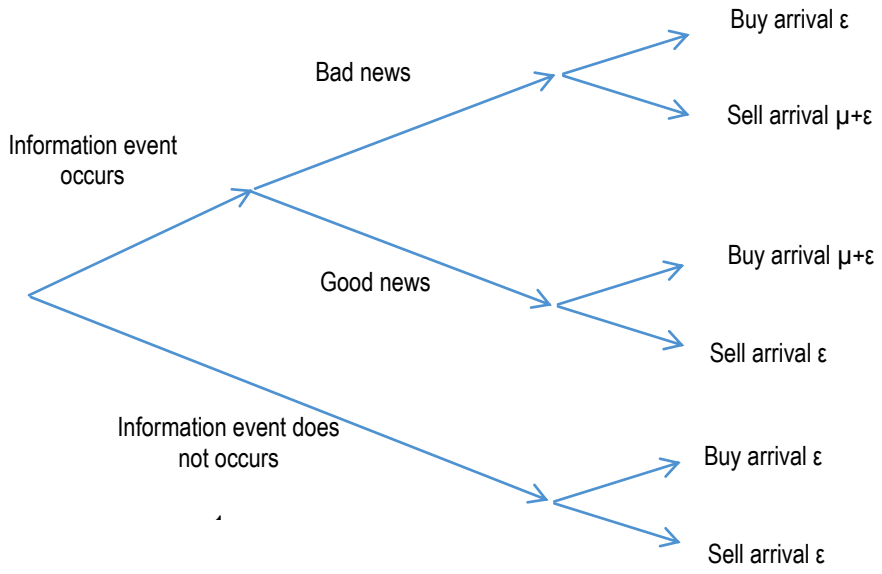


Figure 2 – Tree diagram of trading process structure

The tree diagram shows the structure of trading given the probability of information event and the subsequent representative trader actions. On a day with good (bad) news, informed investors should buy (sell) while the uninformed investors may either buy or sell without any information or distinguishing trend. Given the structure of trade, Easley *et al.* (1996) demonstrate that the probability of informed traders can be estimated from the following equation.

$$PIN = \frac{\alpha\mu}{\alpha\mu+2\varepsilon} \quad (1)$$

Since the information event and rate of informed and uninformed trades are not observable, the parameters must be estimated from the likelihood function using the observable quantity of the number of buys and sells. The likelihood function can be computed from the following likelihood function.

$$L[(B,S)\mid\theta]=(1-\alpha)e^{-\varepsilon T}\frac{(\varepsilon T)^B}{B!}e^{-\varepsilon T}\frac{(\varepsilon T)^S}{S!}$$
$$+\alpha\delta e^{-\varepsilon T}\frac{(\varepsilon T)^B}{B!}e^{-(\mu+e)T}\frac{[(\mu+\varepsilon)T]^S}{S!}$$
$$+\alpha(1-\delta)e^{-(\mu+\varepsilon)T}\frac{[(\mu+\varepsilon)T]^B}{B!}e^{-\varepsilon T}\frac{(\varepsilon T)^S}{S!}$$

where L() is the likelihood function, θ is parameter vector of $\alpha,\delta,\varepsilon,\mu$. B and S denotes the number of buys and sells on a trading day. For every trading day we collect the number of buys and sells initiated by each investor type, specifically, foreign traders, local retail traders and NVDR traders.

Individual stock returns and order imbalance

Chordia and Subramanyam (2004) argue that volume alone is not sufficient to explain stock returns, one million shares traded may be the result of 500,000 shares from the buy and sell side or could be one sided buy or sell. Informed order imbalances would provide useful information about the future price, while noise order imbalances would not reveal any useful information. We exploit the unique aspect of the NVDR shares to investigate this within the SET.

To examine the trading pattern of various groups, order imbalance is calculated as the total value of shares bought minus total value of shares sold, divided by total value of shares traded by investor type *j* of the stock *i* on day *t* in equation 2. The scaled imbalance should provide clear pattern of trading pattern of each traders group. If investors type *j* at the aggregate level exhibit the buy (sell) more than sell (buy), the order imbalance is positive (negative).

$$OIB_{i,t}^{j}=\frac{Value\ Buy_{i,t}-Value\ Buy_{i,t}}{Value\ Buy_{i,t}+Value\ Buy_{i,t}} \quad (2)$$

An important test is whether buy or sell orders submitted by each segment of investors has any impact on contemporaneous and lagged daily stock returns. A regression model is used to distinguish between daily individual stock returns and contemporaneous and lagged order imbalances from foreign, local and NVDR traders. We regress the excess daily returns of individual stocks on the order imbalances and lagged terms similar to the model used in Chordia and Subramanyam (2004), Shenoy and Zhang (2007), and Bailey *et al.* (2009).

$$r_{i,t}-r_{m,t}=\alpha_i+\sum_{k=0}^{4}\beta_i OIB_{i,t-k}^{j}+\varepsilon_i \quad (3)$$

Where $r_{i,t}$ is the daily open-to-close return for stock *i* on day *t*. $r_{m,t}$ is the market return on day *t*. $OIB_{i,t-k}^{j}$ is the order imbalance of stock *i* on day *t* of trader *j* and a lagged term is included as in Chordia and Subrahmanyam (2004). In order to investigate imbalance of trades by various investor segment on the SET, order imbalance is calculated for each trader type *j*. Trader types include NVDR traders, foreign traders, and local individual traders. Abnormal daily returns are regressed on contemporaneous order imbalance and its lagged term for 1, 2, 3, and 4 days.

The predictive power of an order imbalance is also investigated to determine if order imbalances created by the different trading segments result in significantly different future returns. This would reveal more evidence that the NVDR traders are in fact more informed compared to all other traders. Only lagged terms of order imbalance of foreign, local retails, and NVDR are used as independent variables with lagged up to 4 days, similar to Chordia and Subramanyam (2004). One important aspect which helps create the natural experiment is the trading order imbalance data is not available in real-time to investors. Order imbalances are not publically available and trading strategies to capitalize on this information is not tradable until after the fact. The private nature of the data allow us to measure difference in trading abilities between the market segments and not other contaminating events or actions which pollute nearly all studies of this nature.

6. Empirical results

Before testing our hypotheses, we examine if the positive voting premium also exists in the SET. Zingeles (1995) compute the voting premium as the price difference between the superior voting share and inferior voting share. In our setting, the voting premium for foreign traders can be computed as:

$$Premium = \frac{P_F - P_M}{P_M} \times 100 \quad (4)$$

where P_F is the price of share on the foreign board and P_M is the price of NVDR shares. Zingeles (1995) argues that these premiums are observed around large and sudden changes in the distribution of voting power, such as sudden death of large shareholder, or conflict between different groups of shareholders. In most markets, a premium exists with voting shares due to control, monitoring and other corporate governance propositions. If some shares in the US were stripped of voting rights, we would expect those shares to drop in value, relative to shares which did not experience a change in voting shares. The magnitude of price action would be different among different securities, but we would expect some drop in value of non-voting shares relative to voting shares.

Table 2 reports the price discrepancy between the prices of same shares traded on the foreign board with prices on the main board. We find that the largest voting premium is 5.5% in 2002 and again gradually diminishes over time to around 1%. Even though we do not investigate the cause of voting premium directly in this paper, we conjecture that demand to trade on the foreign board is reduced substantially due to the increased of NVDRs trading. This instrument virtually eliminated the foreign ownership restrictions and liquidity issues which caused significant price premium discovered by Bailey and Jagtiani (1994).

Table 2 – Price difference between stocks traded on the main board and on foreign board

Year	Foreign Board	Main Board	Premium
All	80.27	78.12	2.75%***
2002	94.32	89.36	5.54%***
2003	76.96	73.87	4.18%***
2004	54.30	52.80	2.84%***
2005	52.38	50.65	3.41%***
2006	46.48	45.12	3.01%***
2007	59.16	58.28	1.52%***
2008	66.36	65.53	1.27%***
2009	74.63	73.92	0.96%**
2010	118.10	116.67	1.23%**
2011	135.51	132.47	2.29%***
2012	115.43	111.47	3.56%***
2013	112.72	110.92	1.62%***

Note: ***, ** denote the significant level of mean difference at 1% and 5%, respectively

The results of testing hypothesis 1 and 2 are contained in Table 3 which reports the average probability of informed trade of the NVDR, foreign and local on main board. Each column reports the pair-wise difference between the PIN of NVDR traders and those of the foreign traders on the main board, and retail traders on the main board. NVDR traders have an average value of PIN at 0.477. Foreign traders, who trade on the main board, are positioned at 0.498, and local investors at 0.264. Due to smaller sample size, we employ the signed-rank test for the difference in mean between 3 groups. We find that foreign and NVDR traders have significantly higher PIN than local trader groups every year. Local traders exhibited the lowest PIN during the sample period. This finding is consistent with the notion that local traders are less informed than foreigners and both H1 and H2 are confirmed, there is a difference between the market segments and foreign and NVDR are more informed when compared with the local traders segment of the SET.

Finding positive NVDR trade performance has implications for regulators in developing markets, as many struggles with the trade-off between protecting domestic interests and attracting and maintaining a liquid market for foreign traders. According to the above finding, restricting trading among foreign investors in an attempt to reduce volatility may in fact create more volatility, as any attempt to limit foreign traders may reduce capital flows and also increase the proportion of noise traders in a market.

Table 3 – PIN estimate for NVDR trade and normal trade

Year	NVDR	Foreign	Local	*p-value NVDR -Foreign*	*p-value NVDR -Local*	*p-value Foreign - Local*
All	0.477	0.498	0.264	0.159	<0.000	<0.000
2002	0.367	0.478	0.270	0.208	0.174	<0.000
2003	0.527	0.474	0.273	0.004	<0.000	<0.000
2004	0.499	0.487	0.273	0.048	<0.000	<0.000
2005	0.532	0.494	0.272	0.048	<0.000	<0.000
2006	0.482	0.466	0.260	0.138	<0.000	<0.000
2007	0.508	0.511	0.278	0.002	<0.000	<0.000
2008	0.514	0.461	0.250	0.012	<0.000	<0.000
2009	0.512	0.442	0.262	0.003	<0.000	<0.000
2010	0.475	0.478	0.261	0.640	<0.000	<0.000
2011	0.506	0.593	0.237	0.083	<0.000	<0.000
2012	0.420	0.587	0.314	0.001	0.051	<0.000
2013	0.340	0.583	0.191	<0.000	0.021	<0.000

Note: We report the p-value of the signed-rank test for the difference in mean between the corresponding trader groups

Table 4 reports the time-series regression results of order imbalance and tests hypothesis 3. Model 1 investigates only the contemporaneous impact of buys and sells for NVDR foreign and local retail traders. NVDR and foreign trades have a positive influence on the stock returns, while local retail traders have negative influence on the stock returns. Another interesting finding is that on average, 80% of daily return is driven by foreign trades. In contrast, the retail traders experienced the negative return of 56%. As shown in Chordia and Subramanyam (2004), investors may break down their trading volume in to small pieces which lead to autocorrelation of returns. In model 2 – 5, lagged order imbalances from 1 to 4 trading days are included into the models. The results are generally in line with predictions of Chordia and Subramanyam (2004). Lagged order imbalances for longer period are negative for both foreign and NVDR trades and positive for retail trades. One interesting result is that the magnitude of coefficients is lower than that of the contemporaneous values and decreasing as the lagged term increases. The lagged terms of order imbalance also show reverse signs with smaller magnitude to compensate for "over-weighting of the auto-correlated portion of contemporaneous imbalance". Surprisingly, the order imbalance of retail traders shows a negative association with the stock returns, which indicates that when retail individual traders use market buy (sell) orders, the stock price falls (rises). The signs also reverse for the lagged order imbalance for 2 or more days.

A natural extension is to investigate the predictive power associated with order imbalances and to investigate if any positive persistent profits are available using this information for a trading strategy. Prior work by Chordia and Subramanyam (2004) propose that lagged imbalance is positively related to daily returns and we extend this analysis to the Thai market. Table 5 reports the lagged order imbalance on the individual stock returns. The results show some predicting power from order imbalance information for both foreign and NVDR traders. First lagged order imbalances of the foreign and NVDR traders are significant and positively related with daily stock returns, while local traders are not as significant.Similar to previous literature, the first lagged order imbalance has significant predictive power for next-day returns. The results are only persistent with lagged terms for two days of imbalance.

Table 4 – Order imbalance and stock returns

Variable	Model1	Model2	Model3	Model4	Model5
Intercept	0.0098	0.0123	0.0155*	0.0186**	0.0188**
Foreign(0)	0.5543***	0.6105***	0.6242***	0.6284***	0.6320***
NVDR(0)	0.2870***	0.3041***	0.3104***	0.3139***	0.3145***
Local(0)	-0.5642***	-0.6644***	-0.6860***	-0.6936***	-0.6960***
Foreign(-1)		-0.1633***	-0.1322***	-0.1261***	-0.1235***
NVDR(-1)		-0.0555**	-0.0393***	-0.0363***	-0.0355***
Local (-1)		0.2453***	0.1850***	0.1723***	0.1693***
Foreign(-2)			-0.1038***	-0.0858***	-0.0812***
NVDR(-2)			-0.0663***	-0.0559***	-0.0549***

Variable	Model1	Model2	Model3	Model4	Model5
Local(-2)			0.1546***	0.1143***	0.1078***
Foreign(-3)				-0.0566***	-0.0436***
NVDR(-3)				-0.0427***	-0.0379***
Local(-3)				0.1197***	0.0982***
Foreign(-4)					-0.0485***
NVDR(-4)					-0.0159***
Local(-4)					0.0574***

Note: ***, ** denote the significant level at 1% and 5% respectively

Table 5 – Predictive model of order imbalance on stock returns

variable	model1	model2	model3	model4
intercept	0.0205**	0.0238**	0.0269***	0.0271***
foreign(-1)	0.0605***	0.0698***	0.0718***	0.0724***
nvdr(-1)	0.0561***	0.0645***	0.0671***	0.0672***
local(-1)	0.0010	-0.0236	-0.0308	-0.0319
foreign(-2)		-0.0200	-0.0146	-0.0137
nvdr(-2)		-0.0324**	-0.0265*	-0.0264*
local(-2)		0.0645***	0.0449**	0.0432**
foreign(-3)			-0.0100	-0.0077
nvdr(-3)			-0.0253*	-0.0248*
local(-3)			0.0652***	0.0600***
foreign(-4)				-0.0077
nvdr(-4)				-0.0009
local(-4)				0.0180

Note. ***, **, * denote the significant level at 1%, 5% and 10% respectively

7. Trading strategy based on NVDR order imbalance

When trades are placed, there is no way to determine ex-ante whether the trades are from noise or informed traders. Absent this financial innovation, researchers are forced to search for such labels in a more natural setting. NVDR trades in Thailand offer a very good alternative to ex-ante distinguish between informed and a general population of traders.

Our assumption is that NVDR traders are informed, at least to the extent that the information they possess is more valuable than the right to vote. Naive investors aware of this fact would be able to create a strategy and follow their trading behavior which could result in a profitable trading strategy. The naïve strategy for the noise traders is to buy (sell) at the opening price of the trading day following the positive (negative) NVDR order imbalance and sell (buy) at the closing price on day t, assuming that short-selling is possible for the case of negative imbalance without any friction. Grinblatt and Keloharju (2000) argue that foreign traders tend to use momentum strategy while local traders tend to be contrarian. If a certain group of traders are more informed than others, the informed traders will profit at the expense of noise traders and profits will be persistent as long as noise traders remain solvent. Firstly, we measure the returns of each group of traders when they purchase and sell stock. Portfolio returns are computed as the average of volume weighted returns from the trades each day when stocks are bought and sold compared with the closing price over several holding periods from the end of same day to 60 trading days.

Figure 3 presents cumulative returns of trades by 3 trader groups on the main board: foreign, local, and NVDR traders. Stock returns are computed as the average of volume weighted returns from the trades each day when stocks are bought and sold compared with the closing price over several holding periods from the end of same day to 60 trading days. The figure shows that the portfolio of stocks purchase minus sales of foreign traders exhibit about 0.03% return in one week period and increases to 0.76% in 3 months. The portfolio of stock purchase minus sale of NVDR traders shows no profit within one week but the average profits become 0.64% in 60 days. Likewise, the portfolio of local traders are in line with previous findings in that the average returns are negative 0.11% in the short term and negative 0.35% over the 60-day trading period. We notice that the return of all segments is relatively flat during one week but significant changes of returns occur in the long run.

It is important to note that, SET reports NVDR purchases and sales of each stock every day after market close. If NVDR traders are more informed about future price movement, their trading information should offer a direct signal to other market participants and allow them to act on this information and create a possibly create a profitable trading strategy. A simple strategy would be to observe the NVDR trades and ghost their trading decisions. NVDR order imbalances are classified in 2 groups, positive and negative. Long (short) positions are created for stocks which experienced a positive (negative) NVDR imbalance larger (smaller) than its own 1-month (20 trading days) average order imbalance. A longer event window is used to eliminate noise trading in the model. The open-to-close returns are computed from logarithm of closing price on day *t* divided by the opening price the following day for the positive (negative) NVDR order imbalance. The holding period is ranging from 0 to 60 trading days

Table 6 reports the portfolio of returns by year. Panel A presents the results when a stock exhibit positive imbalance. If a naïve trader utilizes NVDR information and buys at the opening price following such event, he earns slightly negative return of 0.039% for same day holding period, and become positive in the longer period with the maximum of 2.69% over 60-day holding period. This strategy is generally persistent when segmenting results by year, but may not be persistent to shorter time periods. If the holding period is long enough, a naïve trader earn profits, with the exception of 2006, 2008 and 2013. Panel B reports the results of using negative NVDR order imbalances to create a trading strategy. Assuming that short-selling is possible, a trader will sell on the following days after the negative imbalance. The results are not as profitable as the positive imbalance, on average no profits are available using the short stocks on negative NVDR imbalances. When segmenting results by year, this strategy generates negative returns. We conjecture that NVDR sell imbalance may be due to liquidity reason and carry less information to naïve traders.

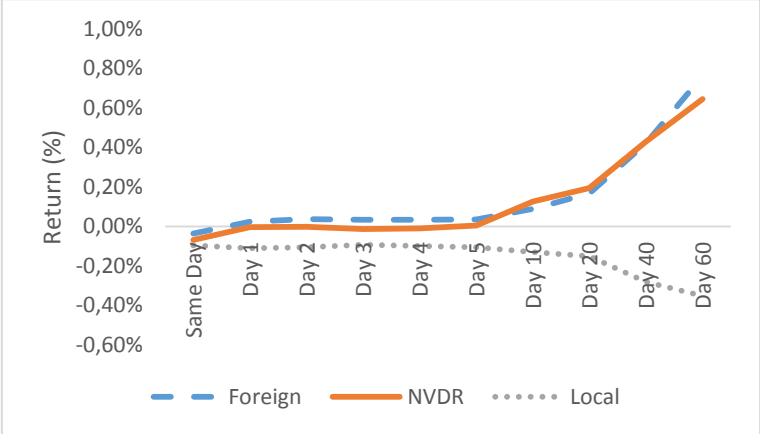


Figure 3 – Cumulative Returns of Trades following Investors' Trade

Conclusion

As an emerging market, the Stock Exchange of Thailand must strike a balance between the desire for Thai firms to maintain control and foreign investor's desire for a liquid and attractive equity market for capital. One method SET devised to balance these sometimes contradictory goals is the Non-Voting Depository Receipt (NVDR). Using returns from NVDR trades and other segments of the SET, we investigate the trading results of foreign, NVDR and local traders to test several hypotheses. We find NVDRs trades have a higher probability of being informed as well as foreign traders. NVDRs traders achieve higher returns in the long-run compared to local investors. NVDR trades generally reveal important information about future stock returns, positive (negative) order imbalances result in positive (negative) and significant returns. Our findings offer another piece of evidence consistent to those of Grinblatt and Keloharju (2000), Kamesaka *et al.* (2003) and Bae *et al.* (2006) in that foreign traders are more informed than local traders and obtain higher profit on trading.

The results have important implications as restrictions in capital flow may reduce the liquidity and increase the proportion of noise traders in a market. Regulation designed to reduce stock market liquidity, may actually have the opposite effect in markets similar to the Stock Exchange Thailand. In the case of NVDR in Thailand, the creation of this innovative product has been able to both maintain local control for Thai corporations and increase liquidity of the underlying equities. The results of this paper reveal that shares restricting voting may be a remedy for equity market regulators of developing nations who must strike a balance between maintaining local control and creating liquid markets for foreign investors.

Table 6 – Return following positive and negative NVDR order imbalances

Panel A. Positive Order Imbalance

Year	Same day	1 day	2 days	3 days	4 days	5 days	10 days	20 days	40 days	60 days
All	-0.039***	0.008	0.049*	0.078***	0.143***	0.205***	0.528***	0.992***	1.817***	2.689***
	-2.93	*0.42*	*1.95*	*2.66*	*4.37*	*5.69*	*11.08*	*14.94*	*18.95*	*22.66*
2002	-0.084*	-0.055	0.030	0.038	0.089	0.180	0.333*	0.243	-1.025***	-2.621***
	-1.74	*-0.76*	*0.34*	*0.37*	*0.75*	*1.38*	*1.92*	*1.06*	*-3.24*	*-6.89*
2003	-0.013	0.260***	0.465***	0.746***	0.994***	1.318***	2.547***	5.147***	11.358***	16.987***
	-0.26	*3.50*	*4.82*	*6.93*	*8.03*	*9.45*	*12.95*	*18.83*	*28.99*	*33.61*
2004	-0.142***	-0.198***	-0.226***	-0.320***	-0.352***	-0.403***	-0.286*	-0.645***	-0.820***	-1.088***
	-2.98	*-2.88*	*-2.63*	*-3.24*	*-3.21*	*-3.33*	*-1.79*	*-3.13*	*-3.07*	*-3.35*
2005	-0.076**	-0.094*	-0.094	-0.083	-0.003	0.005	0.067	-0.067	-0.983***	-0.775***
	-2.27	*-1.94*	*-1.60*	*-1.22*	*-0.04*	*0.06*	*0.57*	*-0.42*	*-4.46*	*-3.08*
2006	-0.001	-0.078	-0.094	-0.174*	-0.292***	-0.434***	-0.663***	-1.300***	-2.191***	-3.844***
	-0.01	*-1.14*	*-1.11*	*-1.82*	*-2.74*	*-3.79*	*-4.62*	*-6.50*	*-7.74*	*-11.88*
2007	-0.026	0.046	0.158*	0.167*	0.241**	0.415***	1.116***	1.975***	3.523***	5.138***
	-0.66	*0.75*	*1.95*	*1.73*	*2.23*	*3.58*	*7.33*	*9.13*	*12.85*	*15.67*
2008	-0.135**	-0.345***	-0.627***	-0.870***	-0.922***	-1.146***	-1.852***	-3.863***	-8.887***	-13.821***
	-1.98	*-3.34*	*-4.90*	*-5.80*	*-5.49*	*-6.25*	*-7.95*	*-11.74*	*-18.36*	*-24.27*
2009	0.094*	0.324***	0.518***	0.688***	0.951***	1.206***	2.435***	4.527***	9.517***	14.253***
	1.87	*4.45*	*5.71*	*6.61*	*8.14*	*9.43*	*14.66*	*19.16*	*26.88*	*35.79*
2010	0.001	0.188***	0.319***	0.513***	0.670***	0.852***	1.437***	2.488***	4.176***	6.869***
	0.03	*3.19*	*4.30*	*5.91*	*6.95*	*8.15*	*10.63*	*14.07*	*16.41*	*22.72*
2011	0.038	0.071	0.042	0.052	0.099	0.130	0.187	0.647***	2.284***	4.449***
	0.82	*1.02*	*0.49*	*0.52*	*0.89*	*1.07*	*1.24*	*3.10*	*7.66*	*12.29*
2012	0.027	0.140***	0.279***	0.413***	0.543***	0.668***	1.427***	2.949***	5.588***	7.943***
	0.75	*2.68*	*4.35*	*5.55*	*6.51*	*7.34*	*12.07*	*18.32*	*25.46*	*30.11*
2013	-0.154***	-0.214***	-0.347***	-0.484***	-0.605***	-0.739***	-1.198***	-1.386***	-2.942***	-4.378***
	-3.00	*-2.93*	*-3.67*	*-4.32*	*-4.89*	*-5.43*	*-6.84*	*-5.99*	*-9.94*	*-12.27*

Panel B. Negative Order Imbalance

Year	Same day	1 day	2 days	3 days	4 days	5 days	10 days	20 days	40 days	60 days
All	0.146***	0.176***	0.165***	0.181***	0.214***	0.230***	0.232***	0.099	0.165	0.112
	6.41	*5.00*	*3.68*	*3.44*	*3.60*	*3.52*	*2.69*	*0.81*	*0.96*	*0.55*
2002	0.124	0.099	0.053	0.086	0.142	0.258	-0.132	-0.631	-0.479	0.566
	1.51	*0.72*	*0.32*	*0.40*	*0.58*	*0.93*	*-0.38*	*-1.37*	*-0.78*	*0.83*
2003	0.148*	-0.266**	-0.612***	-0.946***	-1.303***	-1.628***	-3.122***	-6.108***	-10.283***	-13.162***
	1.73	*-2.05*	*-3.73*	*-4.96*	*-6.05*	*-6.97*	*-9.60*	*-13.24*	*-17.99*	*-20.28*
2004	0.208**	0.347***	0.482***	0.623***	0.725***	0.816***	1.169***	0.932**	0.498	-0.704
	2.11	*2.65*	*2.61*	*2.90*	*3.07*	*3.01*	*3.35*	*2.08*	*0.86*	*-1.16*
2005	0.117**	0.096	0.040	0.068	0.069	0.071	0.118	0.013	-0.949***	0.181
	1.99	*1.09*	*0.37*	*0.56*	*0.50*	*0.48*	*0.63*	*0.05*	*-2.48*	*0.37*
2006	0.176***	0.285***	0.337***	0.456***	0.606***	0.718***	1.441***	1.973***	2.178***	2.113***
	2.39	*2.67*	*2.54*	*3.08*	*3.60*	*3.92*	*5.93*	*5.74*	*5.20*	*4.29*
2007	0.085	0.080	0.030	-0.060	-0.187	-0.237	-0.587***	-0.251	0.060	-0.517
	1.57	*0.98*	*0.30*	*-0.51*	*-1.41*	*-1.64*	*-3.33*	*-1.04*	*0.17*	*-1.29*
2008	0.402***	0.773***	1.172***	1.601***	2.099***	2.455***	4.494***	7.811***	15.046***	22.013***
	4.73	*5.61*	*6.58*	*7.56*	*8.71*	*9.40*	*13.49*	*16.35*	*23.03*	*30.41*
2009	0.108	-0.149	-0.321*	-0.658***	-0.768***	-1.015***	-2.885***	-5.215***	-9.954***	-17.460***
	1.04	*-1.00*	*-1.74*	*-3.17*	*-3.30*	*-4.00*	*-8.41*	*-10.22*	*-14.03*	*-21.16*
2010	-0.022	-0.135	-0.294**	-0.304*	-0.369**	-0.465***	-0.818***	-2.716***	-5.968***	-7.595***
	-0.30	*-1.26*	*-2.25*	*-1.96*	*-2.13*	*-2.49*	*-3.34*	*-7.73*	*-11.91*	*-13.58*
2011	0.001	0.051	-0.033	-0.175	-0.279	-0.359*	-0.291	-1.481***	-3.194***	-4.492***
	0.01	*0.47*	*-0.23*	*-1.03*	*-1.49*	*-1.72*	*-1.00*	*-3.84*	*-6.73*	*-9.26*
2012	-0.026	-0.088	-0.249*	-0.455***	-0.624	-0.777***	-1.885***	-3.667***	-6.433***	-9.719***
	-0.38	*-0.88*	*-1.96*	*-2.97*	*-3.53*	*-3.94*	*-7.43*	*-12.47*	*-14.89*	*-19.26*
2013	0.159***	0.371***	0.338***	0.440***	0.527	0.596***	0.613***	1.240***	3.543***	3.870***
	2.36	*3.51*	*2.58*	*2.94*	*3.29*	*3.50*	*2.73*	*4.02*	*8.11*	*7.53*

References

[1] Agarwal, S., Faircloth, S., Liu, C. and Rhee, S. G. (2009). Why do foreign investors underperform domestic investors in trading activities? Evidence from Indonesia. *Journal of Financial Markets,* 12(1): 32 – 53.

[2] Agrawal, A. (2012). Corporate governance objectives of labor union shareholders: Evidence from proxy voting, *Review of Financial Studies,* 25(1): 187 – 226.

[3] Bae, K., Ozoguz, A., Tan, H. and Wirjanto, T. (2012). Do foreigners facilitate information transmission in emerging markets? *Journal of Financial Economics,* 105(1): 209 – 227.

[4] Bae, K., Yamada, T. and Ito, K. (2006). How do individual, institutional, and foreign investors win and lose in equity trades? Evidence from Japan. *International Review of Finance*, 6(3-4): 129–155.

[5] Bailey, W., Cai, J., Cheung, Y. L. and Wang, F. (2009). Stock returns, order imbalances, and commonality: Evidence on individual, institutional, and proprietary investors in China. *Journal of Banking and Finance,* 33(1): 9 – 19.

[6] Bailey, W. and Jagtiani, J., 1994. Foreign ownership restrictions and stock prices in the Thai capital market, *Journal of Financial Economics,* 36(1): 57 – 87.

[7] Bailey, W., Mao, C. X. and Sirodom, K. (2012). Locals, foreigners, and multi-market trading of equities: Intraday evidence from Thailand, *Pacific-Basin Finance Journal*, 20: 101 – 121.

[8] Barber, B. M., Odean, T. and Zhu, N. (2009). Do retail trades move markets? *Reviews of Financial Studies*. 22: 151 – 186.

[9] Barclay, M. and Hendershott, T. (2003). Price discovery and trading after hours. *Review of Financial Studies* 16(4): 1041 – 1073.

[10] Choe, H., Kho, B.C. and Stulz, R. (2005). Do domestic investors have an edge? The trading experience of foreign investors in Korea. *Review of Financial Studies* 18: 795–829.

[11] Chordia, T. and Subrahmanyam, A. (2004). Order imbalance and individual stock returns: Theory and evidence, *Journal of Financial Economics,* 72 (3): 485 – 518.

[12] Chung, K. H. and Kim, J. K. (1999). Corporate ownership and the value of a vote in an emerging market, *Journal of Corporate Finance*, 5(1): 35 – 54.

[13] Dell'Erba S. and Reinhardt D. (2015). FDI, debt and capital controls. *Journal of International Money & Finance,* 58: 29 – 50.

[14] Dvořák, T. (2005). Do domestic investors have an informational advantage? Evidence from Indonesia. *Journal of Finance*, 60(2): 817–839.

[15] Easley, D., Kiefer, N., O'Hara, M. and Paperman, J. B. (1996). Liquidity, information, and infrequently traded stocks, *Journal of Finance*, 51(4): 1405 – 1436.

[16] Fernández, A., Rebucci, A. and Uribe, M. (2015). Are capital controls countercyclical? *Journal of Monetary Economics* 76: 1 – 14.

[17] Gençay, R., Gradojevic, N., Olsen, R. and Selçuk, F. (2015). Informed traders' arrival in foreign exchange markets: Does geography matter? *Empirical Economics,* 49: 1431 – 1462.

[18] Griffin, J. M., Harris, J. H. and Topaloglu, S. (2003). The dynamics of institutional and individual trading, *The Journal of Finance*, 58(6): 2285 – 2320.

[19] Grinblatt, M. and Keloharju M. (2000). The investment behavior and performance of various investor types: a study of Finland's unique data set. *Journal of Financial Economics*, 55(1): 43 – 67.

[20] Hao, Y., Chou, R.K., Ho, K.Y. and Weng, P.S. (2015). The impact of foreign institutional traders on price efficiency: Evidence from the Taiwan futures market. *Pacific-Basin Finance Journal,* 34: 24 – 42.

[21] Hauser, S. and Lauterbach, B. (2004). The value of voting rights to majority shareholders: Evidence from dual-class stock unifications, *The Review of Financial Studies*, 17(4): 1167 – 1184.

[22] Hua, R., Liu, Q. and Tse, Y. (2016). Extended trading in Chinese index markets: Informed or uninformed? *Pacific-Basin Finance Journal,* 36: 112 – 122.

[23] Iliev, P., Lins, K., Miller, D. and Roth, L. (2015). Shareholder voting and corporate governance around the world. *Review of Financial Studies,* 28(8): 2167 – 2202.

[24] Jackson, D. (2013). Estimating PIN for firms with high levels of trading. *Journal of Empirical Finance,* 24: 116 – 120.

[25] Kalay, A., Karakas, O. and Pant, S. (2014). The market value of corporate votes: Theory and Evidence from Option Prices, *Journal of Finance*, 69(3): 1235–1271.

[26] Kamesaka, A., Nofsinger, J. R. and Kawakita, H. (2003). Investment patterns and performance of investor groups in Japan, *Pacific-Basin Finance Journal,* 11(1): 1 – 22.

[27] Lee, B. S., Li, W. and Wang, S. S. (2010). The dynamics of individual and institutional trading on the Shanghai Stock Exchange, *Pacific-Basin Finance Journal,* 18(1): 116 – 137.

[28] Li, J. and Rajan, R.S. (2015). Do capital controls make gross equity flows to emerging markets less volatile? *Journal of International Money and Finance,* 59: 220 – 244.

[29] Moore, W. (2014). Managing the process of removing capital controls: What does the literature suggest? *Journal of Economic Surveys*, 28(2): 209 – 237.

[30] Nenova, T. (2003). The value of corporate voting rights and control. A cross-country analysis. *Journal of Financial Economics*, 68(3): 325 – 351.

[31] Ødegaard, B.A. (2007). Price differences between equity classes. Corporate control, foreign ownership or liquidity? *Journal of Banking and Finance*, 31(12): 3621 – 3645.

[32] Phansatan, S., Powell, J. G., Tanthanongsakkun, S. and Treepongkaruna, S. (2012). Investor type trading behavior and trade performance: Evidence from the Thai stock market, *Pacific-Basin Finance Journal*, 20(1): 1 – 23.

[33] Shenoy, C. and Zhang, Y. J. (2007). Order imbalance and stock returns: Evidence from China. *The Quarterly Review of Economics and Finance,* 47(5): 637 – 650.

[34] Visaltanachoti, N. and Luo, R. (2009). Order imbalance, market returns and volatility: Evidence from Thailand during the Asian crisis. *Applied Financial Economics*, 19(17): 1391 – 1399. DOI: 10.1080/09603100802599522

[35] Zingales, L. (1995). What determines the value of corporate votes? *Quarterly Journal of Economics*, 110 (4): 1047 – 1073.

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Regional Aspects of Business Cycle Synchronization in the V4 Countries

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Abstract:

The aim of the paper is to identify the degree of business cycle synchronization in the Visegrad countries on their regional level. Rising synchronization should be the outcome of their integration process. To increase robustness of the findings, we performed our analysis using traditional and alternative approach, i.e. Pearson correlation coefficients and minimum spanning tree method. To complete view on this topic we calculated Krugman specialization indices. Comparatively high level of specialization was revealed in the capital regions in the Czech Republic and Slovakia. Obvious heterogeneity was observed among Hungarian regions and negative correlations in case of some Polish regions.

Keywords: business cycle synchronization, Visegrad countries, minimum spanning tree, regional cycles.

JEL Classification: F40, F44, R10.

1. Introduction

Business cycle synchronization is one of the main aspects of integration and is crucial especially in terms of monetary unions. However, it seems superficial to measure level of national economy synchronization among member countries if their particular regions suffer from significant disparities. National economy indicators expressed usually via averages naturally smooth regional differences. In addition, the regional perspective of economic development is in line with the European integration principles. Despite shorter time series concerning regional indicators we consider to be important to focus on regional business cycle synchronization, too. During last decades the Visegrad countries, i.e. Czech Republic, Hungary, Poland, and Slovakia experienced significant integration changes. However, we would like to quantify if they had positive impacts on countries´ regional symmetry.

The structure of this paper is organized as it follows. Section 2 provides a literature review on recent research of business cycle synchronization and main determinants. Section 3 describes methodology and used data. Section 4 presents empirical results and discussion about synchronization of regional business cycles in the V4 countries. The last section provides some final conclusions.

2. Literature review

Business cycle synchronization has become widely discussed topic, mainly associated with the European integration process and the creation of the common monetary union - the euro area.

The importance of the examination of the business cycle synchronization arises from the well-known critique of the monetary union called "*one size does not fit all*" problem. As the goal of particular country belonging to monetary union in the downward phase of the business cycle would be to stimulate economy by expansionary monetary policy, on the contrary, country in the upward phase would like to decelerate it by restrictive arrangements. Respecting these business cycle differences, common monetary policy may not be thereby convenient for all countries involved in the monetary union. (Montoya and Haan 2007)

In case that the members of monetary union converge significantly, monetary union and its common monetary policy will be optimal for all of them. (Haan, Inklaar and Jong-A-Pin 2008)

2.1. The optimal currency area theory

Closely related to this issue is optimal currency area (OCA) theory. The OCA theory proposed by Mundell (1961) represents considerable contribution to the research of the benefits and costs arising from the establishment of the monetary unions, especially in the European Union. As Bofinger (1994) stated, OCA theory: "*seems to be almost generally accepted as the main touchstone of the advantages of EMU and as the theoretical basis for all empirical tests in this area*." Following that, OCA theory has been essential in creating Economic and

Monetary Union (EMU) in Europe and it is also broadly discussed in consideration of dollarization (eurization) and establishment of new monetary unions. (Horvath 2003)

According to the OCA theory, countries facing symmetric shocks should accept common currency and abandon independent monetary policy. Creating monetary union is convenient even in conditions of asymmetric shocks – in case of absorbing flexible mechanisms.

Various criteria and mechanisms are mentioned in literature in order to consider an area as optimal to implement common currency, stated as OCA properties - labour mobility (Mundell 1961), the degree of economic openness (McKinnon 1963), product diversification (Kenen 1969), price and wage flexibility (Friedman 1953), similarities of inflation rates (Fleming 1971), financial market integration (Ingram 1973), fiscal integration (Kenen 1969) or political integration. (Mintz 1970)

2.2. Business cycle synchronization and its recent research

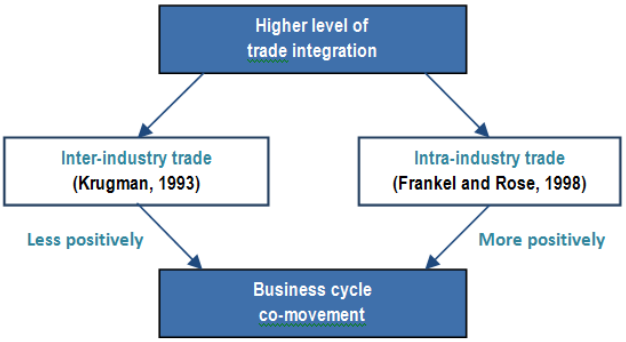
Generally, two opposite views reflecting synchronization of business cycles and the level of economic and monetary integration among countries are examined in the literature. First, "*optimistic view*" presented by the European Commission (The European Commission View) and "*pessimistic view*" declared by Krugman (1993) (The Krugman View). The European Commission view assumes that further economic integration leads to lower number of asymmetric shocks and greater similarities among cycles. From the opposite point of view of Krugman, higher level of integration leads to concentration of similar industries. Hence higher level of specialization will result in increased likelihood of appearance of asymmetric shocks.

Various studies examine if business cycles became more similar in the monetary unions (mainly in the EU) and try to explain which factors drive this process. Studies conclude both convergence and divergence processes in the eurozone during selected time periods - empirical research on business cycle synchronization provides wide range of results. They vary due to different methods used in studies, available data or methods of filtering.

Fatas (1997), Altavilla (2004) or Angeloni and Dedola (1999) conclude that business cycles in the European Union have became more synchronized in the 1990s – especially after 1992 (in the Maastricht Treaty period). According to evidence of Darvas and Szapary (2007), synchronization of business cycles in the Europe increased significantly before the introduction of the common currency, predominantly in periods 1993-1997 and 1998-2002. Beine *et al.* (2003) found greater level of synchronization among the EMU members than in the countries beyond the euro area. Artis *et al.* (2004), Fidrmuc and Korhonen (2006) confirm this conclusion by their findings about lower degree of synchronization of the new members of the EMU than that of the EU-12 countries. Despite this fact, some new members of the euro area or candidates countries – e. g. Hungary, Poland and Slovenia showed remarkable similarities of the business cycle phases with the EU-15 countries. (Fidrmuc and Korhonen 2006)

2.3. Main drivers of business cycle synchronization

The goal of research on business cycle synchronization is to understand why business cycles of certain countries are more similar than the others. Different determinants are connected to this area. Trade intensity, industrial structure, specialization, monetary or financial integration are often stated as the main drivers of the synchronization.



Source: Rana, Cheng and Chia (2012)

Figure 1 – Trade intensity and its impact on business cycle co-movement

Trade intensity is a determinant of business cycle synchronization with ambiguous effects. Frankel and Rose (1998) affirmed that intensified trade relations among countries leads to more synchronized business cycles. Predominantly, in case that these trade connections occur within one sector (intra-industry), increased bilateral trade results in synchronicity of cycles. On the other hand, international trade in different sectors (inter-industry) leads to higher degree of specialization and less synchronized business cycles (Krugman 1993) - see Figure 1.

Monetary integration may result in increased similarity between business cycles due to stabilized exchange rate and common monetary policy with less asymmetry (Bartóková and Ďurčová 2015). Rose (2000) also found positive effect of monetary union on trade volume - according to his research, countries with same currency trade tree times as much as they would with different currencies.

There are also ambiguous effects of financial integration on synchronization (Mirdala *et al.* 2015). According to Kose (2003), financial integration and its contagion effect results in positive impact on synchronization due to spillovers of macroeconomic fluctuations. However, Kalemli-Ozcan *et al.* (2003) argue that financial integration results in specialized industrial patterns and asynchronous economic fluctuations.

Some studies also examined impact of fiscal policy, fiscal transfers, and similarities of exports in relation with business cycles and their synchronicity or the distance between observed countries.

2.4. Regional business cycle synchronization

A business cycle synchronization phenomenon is mainly explored on the national level. Regional level is not a main area of present research although it can provide important additional information.

Considering Krugman´s point of view, industrial concentration and specialization play an important role resulting in divergence of economies. Averaging differences among regions can result in erroneous impression of convergence on the national level. According to Krugman (1963), industrial specialization of regions and geographic concentration of industries are two connected aspects, both resulting in creation of asymmetric shocks and divergence?

Regional level provides wider set of information that can bring new perspective on this matter. However, the main disadvantage of research on regional level is lack of availability of data – shortness of time series, lower frequency of data. While, on national level quarterly data are available, analysis on the regional level can be performed only with yearly data.

Trade openness is one of the main drivers that have greater impact on regional level. If regional disparities are not considered in forming strategies on the national level, selected policies will not be effective and suitable. Similarities among certain regions do not have to be induced by synchronized business cycles, they may result from factors specific for given location, e.g. language, migration, habits or culture (Panteladis and Tsiapa 2014).

The goal of the analysis presented in this article is to identify a degree of business cycle synchronization in the V4 countries on the regional level. While the Slovak Republic is the only member of the euro area from this group, we try to identify a level of cycles' synchronicity also in non-member countries (Czech Republic, Hungary, and Poland) in order to examine recent development and to review their future contribution to the euro area considering business cycle synchronization.

Similar research was performed on the example of France and Germany where high level of synchronization of national cycles was affirmed, but notable differences were identified on the regional level – Germany seems to have synchronized business cycles, whereas France shows non-synchronous regional business cycles. (Štiblárová 2015)

3. Data and methodology

In this section, we present methodology and data used to analyse business cycles of the V4 countries. Presented article contributes to the recent research of synchronicity of business cycles by usage of two approaches – traditional and alternative one that will be explained below.

3.1. Data

In the analysis of the regional business cycle synchronization, we use data from the OECD Regional Database – this database provides large set of regional time series allowing us to compare the V4 countries – the Czech Republic, Slovakia, Hungary, and Poland from the regional point of view. However, only yearly time series are available on this level.

To measure output fluctuations, we decided to use real GDP in constant prices from database mentioned above (in mil. USD, OECD base year 2010) in time period 1999-2012 (due to limited data availability for Poland). We analyze synchronicity of regional output gaps with the national level – we used data of national and regional level – both NUTS 2 and NUTS 3 analyses are performed (see description of data in Table 1).

Table 1– Description of data, time period 1999-2012

	National level	Regional level – NUTS 2	Regional level – NUTS 3
Czech Republic	CZE	8 regions	14 regions
Slovakia	SVK	4 regions	8 regions
Hungary	HUN	7 regions	20 regions
Poland	POL	16 regions	66 regions

Source: own editing, data from OECD regional database

3.2 Methodology

In order to identify business cycles, firstly real GDP data have to be filtered. To quantify synchronization of business cycles, output gaps have to be calculated. We decompose time series of real GDP (in logarithmic form) in two components – trend and cyclical part.

$$\log(y_t) = g_t + c_t \tag{1}$$

Cyclical component will represent output gap as a fluctuation of economic activity. Several techniques can be used to identify cyclical component of selected data, e.g. Hodrick-Prescott (1997) filter, the Baxter-King (1999) or the Christiano-Fitzgerald (2003) band-pass filters. We apply commonly used Hodrick-Prescott filter that estimates cyclical and trend component by minimizing following equation:

$$\min_{g_t}\left[\sum_{t=1}^{N}(y_t - g_t)^2 + \lambda\sum_{t=2}^{N-1}\left[(g_{t+1} - g_t) - (g_t - g_{t-1})\right]^2\right] \tag{2}$$

Smoothing parameter λ was set as 6.25 as it is recommended with yearly data (Ravn and Uhlig, 1997). As it is stated in Haan, Inklaar and Jong-A-Pin (2008), a main advantage of this filtering technique is its simple implementation and results comparable to those of the band-pass filtering techniques.

We contribute by this article to the recent empirical research by using combination of traditional and alternative approach. Two methods were used on filtered data:

- Pearson correlation coefficient,
- Minimum spanning tree approach.

Firstly, we applied traditional method to estimate level of synchronization of business cycle by calculating Pearson correlation coefficient defined as a covariance (*cov*) divided by the product of standard deviations (*σi, σj*) of given time series.

$$\rho_{ij} = \frac{\mathrm{cov}(i,j)}{\sigma_i \sigma_j} \tag{3}$$

In our case, we measure level of synchronization of regional cycles with the national one, in that order we calculate correlation coefficient between output gap of region (*i*) and output gap of the whole economy – national output gap (*j*).

Alternative way to measure business cycle synchronization is usage of minimum spanning tree approach (MST) originally implemented on stock returns in the financial markets by Mantegna (1999). In the minimum spanning tree, stocks represented the graph nodes and relationships among them were represented by graph edges. These edges reflected correlation between graph nodes.

In this approach, we transform correlation matrix of given time series into distance matrix *dij* that is symmetric with zero diagonal values. MST consists of *n* nodes and *n-1* edges.

$$d_{ij} = \sqrt{2(1-\rho_{ij})} \tag{4}$$

This alternative approach allow us to visualise complex relations among *n* subject (in our case regions and their similarity from point of view of output and its phase) seeing that this method is applicable on different areas – e.g. exchange rates (Rešovský *et al.* 2013), interest rates (Siničáková and Šulíková 2014) and others.

To consider Krugman's point of view about important role of specialization in divergence of economies, we compare results showing regional business cycles synchronicity with calculated Krugman specialization index (or Krugman dissimilarity index) of each regions in selected time period:

$$K_i^S = \sum_{j=1}^{m} \left| g_{ij}^S - g_j \right| \quad \text{,where} \quad g_{ij}^S = \frac{X_{ij}}{X_i} \quad \text{and} \quad g_j = \frac{X_j}{X} \,. \tag{5}$$

X_{ij} represents GVA (gross value added) in branch *j* in region *i*, X_i represents total GVA in region *i*, X_j represents total GVA in branch *j* and X represents total GVA on national level. Range for its values is from 0 (sectoral structure of regions is identical) to 2 (structure of selected region is highly different from others).

All the calculations were performed in the R environment using packages ape, igraph, maptools, rgdal, shape and zoo.

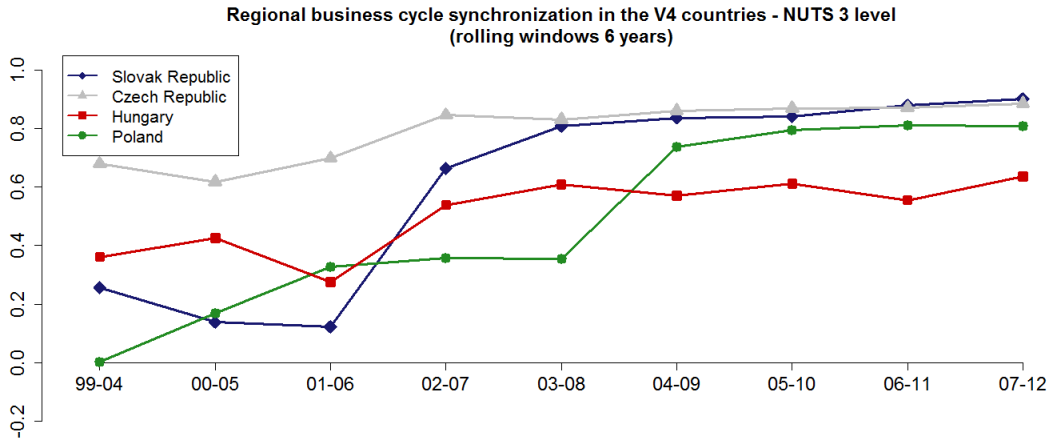
4. Results and discussion. Synchronization of regional business cycles in the V4 countries

The aim of our analysis is to measure level of synchronization between national and regional cycles in the V4 countries – the Czech Republic, Slovakia, Hungary, and Poland. Firstly, descriptive statistics are available in Table 2. Statistics are related to real GDP data (in mil. USD) on regional and national level. Region with the lowest GDP from V4 countries in selected time period is observed in Hungary (NUTS 3 level) and with the highest GDP in Poland (NUTS 2 level).

Table 2 - Descriptive statistics, time period 1999-2012

Regional level:	Min		Max		Mean		Standard deviation	
	NUTS 2	NUTS 3	NUTS 2	NUTS 3	NUTS 2	NUTS 3	NUTS 2	NUTS 3
Czech Republic	18,717	4,997	74,487	74,487	31,501	18,001	13,098	14,141
Slovakia	16,630	7,097	44,825	37,463	27,437	13,719	7,846	6,646
Hungary	12,785	1,921	109,409	85,555	29,398	10,289	27,602	15,473
Poland	11,830	2,417	184,086	108,775	41,545	10,071	33,272	10,253
National level:	**Min**		**Max**		**Mean**		**Standard deviation**	
Czech Republic	19,8736		291,079		252,008		34,518	
Slovakia	81,134		137,455		109,749		21,486	
Hungary	168,859		228,033		205,787		19,316	
Poland	514,950		841,841		664,712		113,800	

Source: own editing, data from OECD regional database, in mil. USD



Source: own calculations, data from OECD regional database

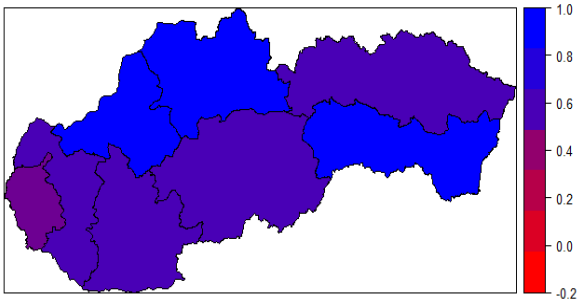
Figure 2 – Regional business synchronization in the V4 countries – rolling correlations (windows of 6 years), period 1999-2012

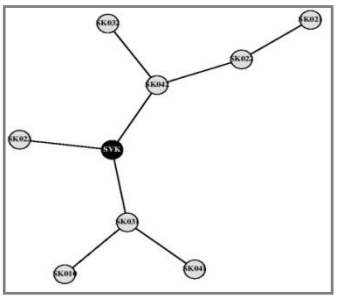
After output gap calculations, synchronization was measured. First approach represents calculation of correlation coefficients. We computed correlation coefficients between national level and regions (on NUTS 2 and NUTS 3 level). Also we used rolling window technique. From the Figure 2 we can see the development of synchronization on NUTS 3 level by rolling window technique (synchronization on NUTS 2 level – see Appendix 1). This technique enables us to observe the development of correlation coefficient during certain period – we chose rolling window of 6 years. Generally, results for all V4 countries showed increased synchronization of regions with national economy mainly in period 2001-2006 and 2002-2007. It can represent rising convergence of these countries as they entered the European Union in 2004.

4.1. Regional business cycle synchronization in Slovakia

Figure 3 presents results for synchronization of regional cycles with national cycle of Slovakia in time period 1999-2012 for the NUTS 3 level (results for the Visegrad regions on NUTS 2 level are available in Appendix 2). We can see overall homogeneity of economic activity from that point of view – correlation coefficients in selected period are in all regions higher than 0.6, but as we have seen from rolling window (Figure 3) if we will divide period into number of smaller sub-periods, we will see the differences. Bratislava Region is during selected time period the less synchronized region.

Another view at synchronization can be minimum spanning tree (left side of Figure 3). From this approach we can observe relations between regions, as well as with national level. As the distance between regions is smaller, regions are more similar from point of view of output gap and they are connected by edges. We can see from minimum spanning tree of Slovakia, that national cycle (SVK) has quite central position; other regions are similar to it and are coupled together.





Source: own calculations, data from OECD regional database

Figure 3 – Regional business synchronization in Slovak Republic – correlation coefficients (right) and MST approach (left), period 1999-2012, map layers by © Euro Geographics for the administrative boundaries

National cycle has at most edges from all regions, Trnava region has the further position (list of used abbreviations of Visegrad regions is available in Appendix 3). Bratislava region is also distant to national cycle – this alternative approach is in accordance with the traditional of correlation coefficients. This region of capital city is concentrating economic activity and its business cycle is different from less developed regions.

Table 3– The Krugman specialization index for Slovakia, period 2000-2012

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Average	0.18	0.18	0.20	0.21	0.22	0.23	0.25	0.25	0.24	0.25	0.24	0.23	0.22
Bratislava	0.27	0.30	0.32	0.32	0.34	0.31	0.42	0.43	0.42	0.40	0.40	0.38	0.35
Banská Bystrica	0.12	0.12	0.17	0.16	0.15	0.19	0.14	0.15	0.13	0.12	0.11	0.15	0.15

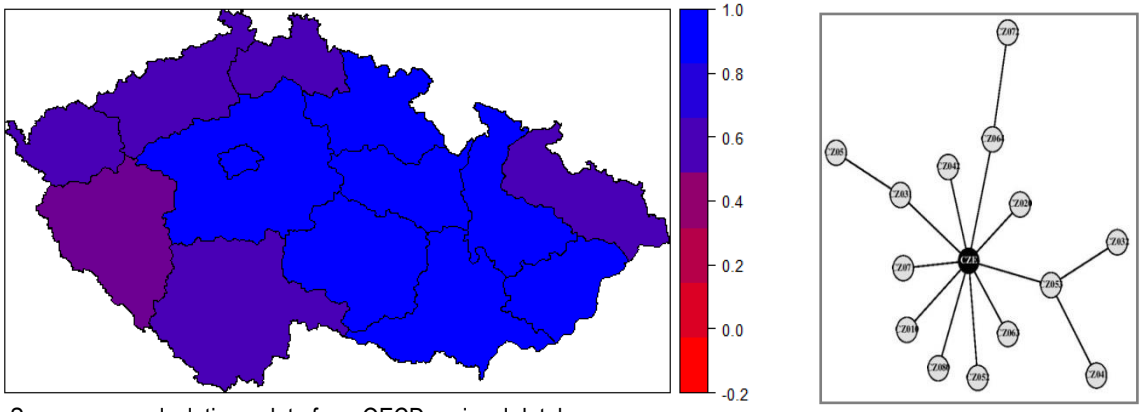
Source: own calculations, data from OECD regional database

To complete view on this topic, we calculated the Krugman specialization indices for each of the V4 regions. Results considering specialization of Slovak regions are available in Table 3. Average value of the Krugman specialization index for NUTS 3 regions is in the whole selected period lower than 0.30 – sectoral structure of Slovak regions is relatively similar. In Table 3 are also available results of the most specialised region and the least specialised region in Slovak Republic. According to this index, Bratislava Region is the most specialised region, whereas Banská Bystrica Region reached the lowest values of an index.

Similar pattern of business cycles within Slovak NUTS 3 regions is in accord with calculated specialization index and the Krugman's view about synchronicity and specialization. Comparing results within the European Union (as it is seen in Čutková and Donoval 2004), Luxembourg, Greece or Finland are the countries with the highest level of specialization.

4.2. Regional business cycle synchronization in the Czech Republic

Regional business synchronization in the Czech Republic through correlation coefficients is presented in Figure 4 during selected time period 1999-2012. These results are similar to those of Slovakia – we do not see notable differences among regions. The less synchronized region from the Czech Republic is Plzen, the highest correlation coefficient has South Moravia, but it still shows high level of synchronicity with the national cycle. In this case, we do not see the situation in which region of capital city has strong non-synchronous business cycle – as it was in the Slovak Republic.



Source: own calculations, data from OECD regional database

Figure 4 – Regional business synchronization in Czech Republic – correlation coefficients (right) and MST approach (left), period 1999-2012, map layers by © EuroGeographics for the administrative boundaries

From minimum spanning tree is also evident that regions are similar to national level, almost each region has edge with national cycle – except for Plzen, Zlin, Karlovy Vary and Liberec. Results from MST approach are again with the accordance with the traditional correlation coefficients approach.

Table 4 – The Krugman specialization index for the Czech Republic, period 2000-2012

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Average	0.26	0.27	0.26	0.26	0.27	0.27	0.29	0.29	0.29	0.29	0.30	0.30	0.30
Prague	0.61	0.63	0.58	0.59	0.59	0.59	0.61	0.63	0.63	0.59	0.63	0.66	0.68
South Moravia	0.1	0.09	0.09	0.11	0.13	0.13	0.18	0.13	0.08	0.1	0.1	0.1	0.09

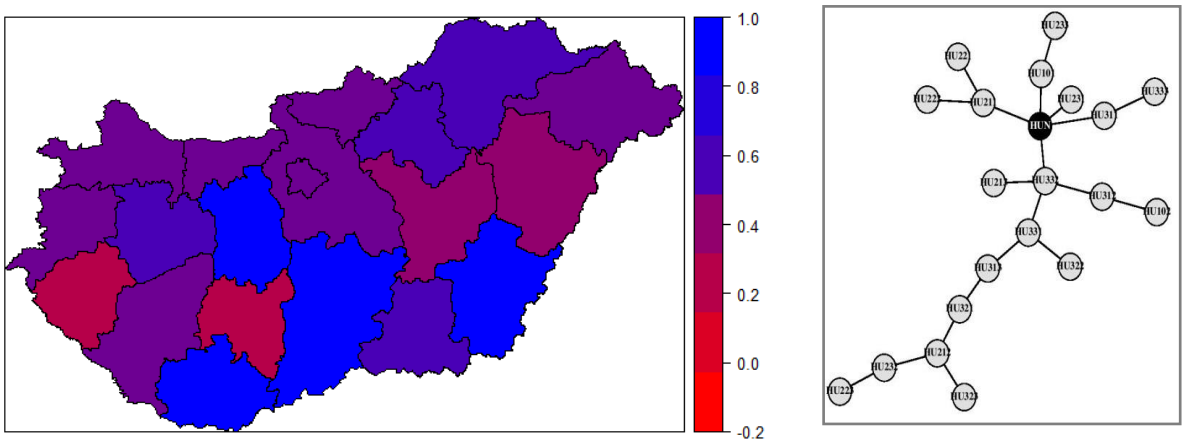
Source: own calculations, data from OECD regional database

Table 4 represents results of the Krugman specialization index for the Czech Republic. Comparing the results with those of the Slovak Republic, the average level of specialization is similar, lightly higher. But we can see differences concerning region with the higher index of specialization – Prague, its values are higher than for Bratislava. In this case we see that region of capital city has unique position associated with the concentration of the economic activity.

The least specialized region in the Czech Republic seems according to calculated index to be South Moravia and also from traditional correlation coefficients approach it is the highest synchronized region.

4.3. Regional business cycle synchronization in Hungary

Different situation can be seen in case of Hungary. Level of synchronization of number of regions is lower than 0.5 (in region Zala is lower than 0.25), there is notable heterogeneity among regions. The highest level of synchronicity according our analysis is showed in Baranya.



Source: own calculations, data from OECD regional database

Figure 5 – Regional business synchronization in Hungary – correlation coefficients (right) and MST approach (left), period 1999-2012, map layers by © EuroGeographics for the administrative boundaries

However, minimum spanning tree approved similar results than in previous two countries, national cycle has central position. This situation can be compared with analysis of France (Štiblárová 2015), but in that case minimum spanning tree approach confirmed marginal position of national cycle – for Hungary, national cycle has still large number of edges. The further position has region Zala.

Table 5 – The Krugman specialization index for Hungary, period 2000-2012

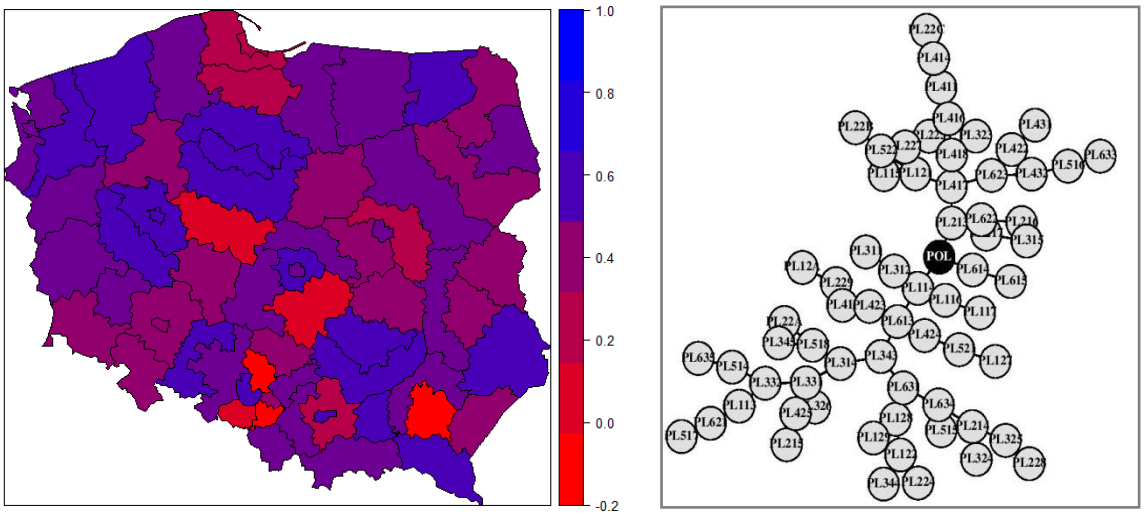
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Average	0.31	0.31	0.31	0.32	0.33	0.35	0.36	0.37	0.37	0.37	0.38	0.39	0.38
Komárom-Esztergom	0.34	0.50	0.57	0.74	0.82	0.88	0.82	0.95	0.90	0.84	0.84	0.82	0.69
Hajdú-Bihar	0.19	0.16	0.16	0.19	0.17	0.21	0.17	0.22	0.20	0.21	0.19	0.18	0.23

Source: own calculations, data from OECD regional database

Decreased level of synchronicity of regional business cycles is supported by results of specialization and affirms Krugman's point of view. Relatively high level of specialization is seen in region Komárom-Esztergom, mainly because of its automotive industry concentration. On the other side, Hajdú-Bihar is the region with the lower value of the Krugman specialization index. In general, Hungary became more specialized by undergoing restructuring process in the 1990s; we can explain this process by intense inflows of foreign direct investment into the country. It caused concentration mainly of the manufacturing of electrical and optical equipment, technology industry and skill-intensive industry (ECB 2004).

4.4. Regional business cycle synchronization in Poland

Poland as a country with the highest number of population and widest area within V4 countries, presents heterogeneous area from the point of view of cycle synchronization – at NUTS 3 level. Figure 6 presents synchronization at NUTS 3 level with quite low degree of regional business cycles synchronicity. Even further, we can observe negative correlation coefficients of certain regions with the national cycle – e.g. Bytomski, Tyski or Rzeszowski.



Source: own calculations, data from OECD regional database

Figure 6 – Regional business synchronization in Poland – correlation coefficients (right) and MST approach (left), period 1999-2012, map layers by © EuroGeographics for the administrative boundaries

In minimum spanning tree we see central position of national cycle too. Regions with further position seem to be Walbrzyski and Lomzynski.

Table 6 – The Krugman specialization index for Poland, period 2000-2012

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Average	0.14	0.14	0.14	0.14	0.16	0.15	0.15	0.16	0.16	0.16	0.17	0.18	0.17
Legnicko-Glogowski	0.36	0.32	0.33	0.33	0.41	0.52	0.63	0.65	0.59	0.59	0.74	0.77	0.73
Krosnienski	0.10	0.06	0.03	0.05	0.04	0.04	0.05	0.04	0.02	0.03	0.02	0.03	0.02

Source: own calculations, data from OECD regional database

Considering level of specialization in Polish regions, we see that sectorial structure is in average similar in regions, Legnicko-Glogowski region seems to be the most specialised region, whereas Krosnienski the least specialised region. Results are in accordance with recent development, while Legincko-Glogowski region represents one of the most important industrial centres in Poland.

Legnicko-Glogowski, the sub-region of Lower Silesia (mainly known for its cooperation in automotive and electro-mechanical cooperation with China), is also known as “Copper Valley”, it plays an important role in cooperation with China.

Conclusion

Regional and national business cycle synchronization as one of crucial conditions of overall monetary union symmetry exists in all V4 countries. Using alternative minimum spanning tree approach, we conclude that their national cycle has central position throughout observed period. However according to traditional correlation coefficients approach, remarkable differences among the V4 regions are observed.

Whereas the Slovak and the Czech Republic show relatively high level of regional business synchronization, Hungarian and Polish regions seem to be less synchronized with the national cycle. Assumptions about significant disparities among regions were affirmed and provided analysis extended by calculated Krugman specialization indices showed notable reasons to examine synchronization from the regional perspective. Besides specialization indices, other determinants can be examined and enlarged our analysis, i. e. trade patterns among regions or factors specific for given location.

Acknowledgement

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References

[1] Altavilla, C. (2004). Do EMU members share the same business cycle? *Journal of Common Market Studies*, 42(5): 869-898. DOI http://dx.doi.org/10.1111/j.0021-9886.2004.00533.x

[2] Angeloni, I. and Dedola, L. (1999). From the ERM to the euro: new evidence on economic and policy convergence among EU countries. *ECB Working Paper* No. 4.

[3] Artis, M., Krolzig, H. M. and Toro, J. (2004). The European business cycle.*Oxford Economic Papers*, 56: 1–44. DOI http://dx.doi.org/10.1093/oep/56.1.1

[4] Bartóková, Ľ. and Ďurčová, J. (2015). Effectiveness of the monetary policy implementation in the context of crisis: use of short-term interest rate in the Czech Republic and the EMU. *E&M Economics and Management*, 1(18): 4-17. DOI http://dx.doi.org/10.15240/tul/001/2015-1-001

[5] Baxter, M. and King, R. G. (1999). Measuring business cycles: approximate bandpass filters for economic time series. *Review of Economics and Statistics,* 81(4): 575–593.

[6] Beine, M., Condelon, B. and Sekkat, K. (2003). EMU membership and business cycle phases in Europe: Markov swiching VAR analysis. *Journal of Economic Integration*, 18(1): 214-242.

[7] Bofinger, P. (1994). Is Europe an Optimum Currency Area? *Discussion Paper Series*, No. 915.

[8] Čutková, Z. and Donoval, M. (2004). Sectoral specialization in the SR. *Biatec*, 7(10): 5-7.

[9] Darvas, Z. and Szapary, G. (2007). Business Cycle Sychronization in the Enlarged EU. *Open Economies Review. 19(1): 1-19.* DOI http://dx.doi.org/10.1007/s11079-007-9027-7

[11] Fatas, A. (1997). EMU: Countries or regions? Lessons from the EMS experience. *European Economic Review*, 41(3–5): 743–751. DOI http://dx.doi.org/10.1016/s0014-2921(97)00033-0

[12] Fidrmuc, J. and Korhonen, I. (2006). Meta-analysis of the business cycle correlation between the Euro area and the CEECs. *Journal of Comparative Economics*, 34: 518–537. DOI http://dx.doi.org/10.1016/j.jce.2006.06.007

[13] Fleming, M.J. (1971). On Exchange Rate Unification. *Economic Journal*, 81: 467–88.

[14] Frankel, J.A. and Rose, A.K. (1998). The endogeneity of the optimum currency area criteria. *Economic Journal*, 108: 1009–1025.

[15] Friedman, M. (1953). The Case for Flexible Exchange Rates. *Essays in Positive Economics*.

[16] Haan, J., Inklaar, R. and Jong-A-Pin, R. (2008). Will business cycles in the Euro area converge? A critical survey of empirical research. *Journal of Economic Surveys*, 22(2): 234–273.

[17] Hodrick, R. C. and Prescott, E. C. (1997). Postwar US business cycles: an empirical investigation. *Journal of Money, Credit, and Banking,* 29(1): 1-16. DOI http://dx.doi.org/10.2307/2953682

[18] Horvath, J. (2003). Optimum currency area theory: A selective review. *BOFIT Discussion Papers 15/2003*. DOI http://dx.doi.org/10.2139/ssrn.1015480

[19] Christiano, L. and Fitzgerald, T. J. (2003). The band-pass filter. *International Economic Review,* 44(2): 435–465. DOI http://dx.doi.org/10.1111/1468-2354.t01-1-00076

[20] Ingram, J. C. (1973). The Case for the European Monetary Integration. *Essays in International Finance*, 98.

[21] Kalemli-Ozcan, S., Sørensen, B.E. and Yosha, O. (2003). Risk sharing and industrial specialization: regional and international evidence. *American Economic Review*, 93(3): 903–918.

[22] Kenen, P. (1969). The Theory of Optimum Currency Areas: An Eclectic View. *Monetary Problems of the International Economy*, 41-60.

[23] Kose, M. A., Prasad, E. S. and Terrones, M. E. (2003). How Does Globalization Affect the Synchronization of Business Cycles? *American Economic Review,* 93(2): 57- 62.

[24] Krugman, P. (1993). Lessons of Massachusetts for EMU. *Adjustment and growth in the European Monetary Union.* DOI http://dx.doi.org/10.1017/cbo9780511599231.016

[25] Mantegna, R. N. (1999). Hierarchical Structure in Financial Markets.*The European Physical Journal B.* 11: 193-197. DOI http://dx.doi.org/10.1007/s100510050929

[26] McKinnon, R. I. (1963). Optimum Currency Area. *American Economic Review*, 4: 717-725.

[27] Mintz, N. N. (1970). Monetary Union and Economic Integration. *The Bulletin of New York*, 64.

[28] Mirdala, R., Svrčeková, A. and Semančíková, J. (2015). On the Relationship between Financial Integration, Financial Liberalization and Macroeconomic Volatility. *Journal of Applied Economic Sciences*, 4(34): 552-570.

[29] Montoya, L. A. and Haan, J. (2007). Regional Business Cycle Synchronization in Europe? *International Economics and Economic Policy*. 5(1-2): 123-137. DOI http://dx.doi.org/10.1007/s10368-008-0106-z

[30] Mundell, R. (1961). The theory of optimum currency areas. *American Economic Review*. 51(4).

[31] Panteladis, I. and Tsiapa, M. (2014). Fragmented Integration and Business Cycle Synchronization in the Greek Regions. *European Planning Studies,* 22(5): 909-928.

[32] Rana, P. B., Cheng, T. and Chia, W.-M. (2012). Trade intensity and business cycle synchronization: East Asia versus Europe. *Journal of Asian Economics*, 23: 701–706.

[33] Ravn, M. and Uhlig, H. (1997). On adjusting the HP-filter for the frequency of observations. *Review of Economics and Statistics*, 84(2): 371–376. DOI http://dx.doi.org/10.1162/003465302317411604

[34] Rešovský, M, Horváth, D, Gazda, V. and Siničáková, M. (2013). Minimum Spanning Tree Application in the Currency Market. *Biatec*, 21(7): 21-23.

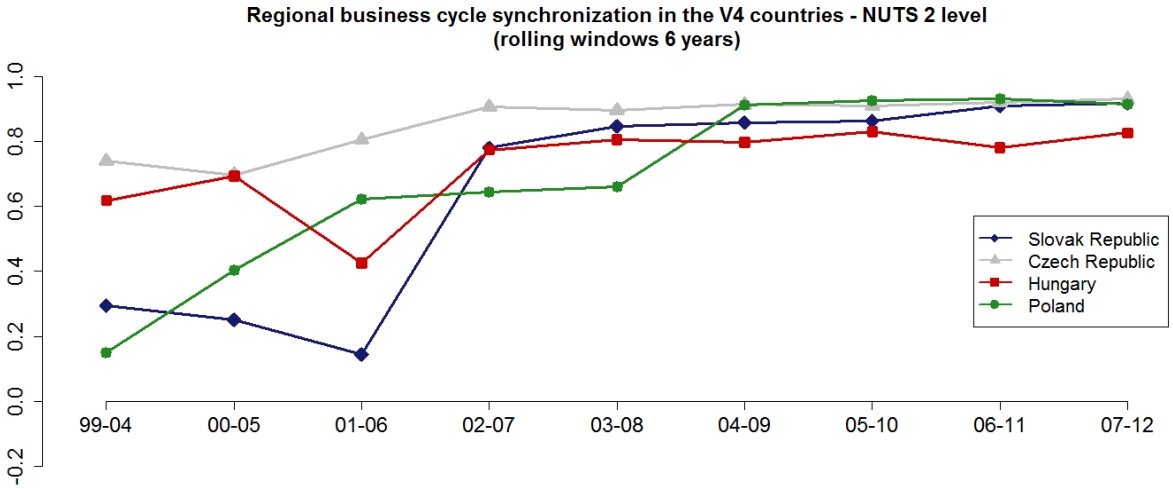
[35] Rose, A. (2000). One money, one market: the effect of common currencies on trade. *Economic Policy*, 30: 7–46. DOI http://dx.doi.org/10.1111/1468-0327.00056

[36] Siničáková, M. and Šuliková, V. (2015). Interbank Interest Rate Interdependencies Using the MST Approach. *5th Central European Conference in Regional Science*, 860-868.

[37] Štiblárová, Ľ. (2015). Synchronizácia národných a regionálnych hospodárskych cyklov krajín EÚ-15: prípad Francúzska a Nemecka. *Forum Statisticum Slovacum*, 6: 160-167.

*** ECB (2004). Sectoral specialization in the EU.*Occasional paper series*, 19.

APPEDIX 1



Source: own calculations, data from OECD regional database

APPENDIX 2

Code	Region (NUTS 2 level)	Synchronization with national cycle
SK01	Bratislava Region	0.6471
SK02	West Slovakia	0.8908
SK03	Central Slovakia	0.8389
SK04	East Slovakia	0.8943
CZ01	Prague	0.9108
CZ02	Central Bohemian Region	0.8877
CZ03	Southwest	0.7384
CZ04	Northwest	0.8134
CZ05	Northeast	0.9517
CZ06	Southeast	0.9566
CZ07	Central Moravia	0.9577
CZ08	Moravia-Silesia	0.8274
HU10	Central Hungary	0.7831
HU21	Central Transdanubia	0.8449
HU22	Western Transdanubia	0.6381
HU23	Southern Transdanubia	0.8424
HU31	Northern Hungary	0.8773
HU32	Northern Great Plain	0.5854
HU33	Southern Great Plain	0.8553
PL11	Lodzkie	0.8358
PL12	Mazovia	0.8204
PL21	Lesser Poland	0.8904
PL22	Silesia	0.6695
PL31	Lublin Province	0.7412
PL32	Podkarpacia	0.6059
PL33	Swietokrzyskie	0.7210
PL34	Podlasie	0.6475
PL41	Greater Poland	0.7243
PL42	West Pomerania	0.8200
PL43	Lubusz	0.7370
PL51	Lower Silesia	0.7689
PL52	Opole region	0.7457
PL61	Kuyavian-Pomerania	0.8735
PL62	Warmian-Masuria	0.8442
PL63	Pomerania	0.5818

Source: own calculations, data from OECD regional database

APPENDIX 3

Code	Region (NUTS 3 level)	Code	Region (NUTS 3 level)	Code	Region (NUTS 3 level)
SVK	Slovak Republic	HU313	Nógrád	PL324	Przemyski
SK010	Bratislava Region	HU321	Hajdú-Bihar	PL325	Rzeszowski
SK021	Trnava Region	HU322	Jász-Nagykun-Szolnok	PL326	Tarnobrzeski
SK022	Trenčín Region	HU323	Szabolcs-Szatmár-Bereg	PL331	Kielecki
SK023	Nitra Region	HU331	Bács-Kiskun	PL323	Krosnienski
SK031	Žilina Region	HU332	Békés	PL343	Bialostocki
SK032	Banská Bystrica Region	HU333	Csongrád	PL344	Lomzynski
SK041	Prešov Region	POL	Poland	PL345	Suwalski
SK042	Košice Region	PL113	City of Lódz	PL411	Pilski
CZE	Czech Republic	PL114	Lódzki	PL414	Koninski
CZ010	Prague	PL115	Piotrkowski	PL415	City of Poznan
CZ020	Central Bohemia	PL116	Sieradzki	PL416	Kaliski
CZ031	South Bohemia	PL117	Skierniewicki	PL417	Leszczynski
CZ032	Plzen	PL121	Ciechanowsko-Plocki	PL418	Poznanski
CZ041	Karlovy Vary	PL122	Ostrolecko-Siedlecki	PL422	Koszalinski
CZ042	Ústí nad Labem	PL127	City of Warsaw	PL423	Stargardzki
CZ051	Liberec	PL128	Radomski	PL424	City of Szczecin
CZ052	Hradec Králové	PL129	Warsaw-East	PL425	Szczecinski
CZ053	Pardubice	PL12A	Warsaw-West	PL431	Gorzowski
CZ063	Vysocina	PL213	City of Krakow	PL432	Zielonogórski
CZ064	South Moravia	PL214	Krakowski	PL514	City of Wroclaw
CZ071	Olomouc	PL215	Nowosadecki	PL515	Jeleniogórski
CZ072	Zlín	PL216	Oswiecimski	PL516	Legnicko-Glogowski
CZ080	Moravia-Silesia	PL217	Tarnowski	PL517	Walbrzyski
HUN	Hungary	PL224	Czestochowski	PL518	Wroclawski
HU101	Budapest	PL225	Bielski	PL521	Nyski
HU102	Pest	PL227	Rybnicki	PL522	Opolski
HU211	Fejér	PL228	Bytomski	PL613	Bydgosko-Torunski
HU212	Komárom-Esztergom	PL229	Gliwicki	PL614	Grudziadzki
HU213	Veszprém	PL22A	Katowicki	PL615	Wloclawski
HU221	Gyor-Moson-Sopron	PL22B	Sosnowiecki	PL621	Elblaski
HU222	Vas	PL22C	Tyski	PL622	Olsztynski
HU223	Zala	PL311	Bialski	PL623	Elcki
HU231	Baranya	PL312	Chelmsko-Zamojski	PL631	Slupski
HU232	Somogy	PL314	Lubelski	PL633	Trojmiejski
HU233	Tolna	PL315	Pulawski	PL634	Gdanski
HU311	Borsod-Abaúj-Zemplén	PL332	Sandomiersko-Jedrzejowski	PL635	Starogardzki
HU312	Heves				

Source: OECD regional database

Journal of Applied Economic Sciences

Moderating Role of Perceived Organizational Support on Organization Commitment and Person-Organization Fit

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Abstract:

The study is about interaction between the Organizational Commitment and Person's Organization Fit. This has attempted to examine the moderation effects of Perceived Organizational Support on the relationship of Organizational Commitment and Person's Organizational Fit. The research has incorporated survey on 663 members of dual career family members, working with public and private organizations of central part of the India. Findings have supported the conceptual framework. The statistical inference has shown the moderation effect of organizational support on the relationship of Persons' Perceived Organizational Fit and his respective Organizational Commitment.

Keywords: organizational commitment, perceived organizational support, person- organization fit.

JEL Classification: D23, M54, L00, L20, L29.

Introduction

The members of dual career couples face several challenges of workplace and family as both are involved in the aspirations of work, family and career (Moen 2015). These challenges become even more intense, when the organization is having less supportive culture (Dunn and Brien 2013). The dual career couples persistently facing these challenges often leads towards reduced work-satisfaction that eventually affects their respective organizational commitment. On the contrary, it is assumed that the member of the dual career family who finds fit with the organizational values shows commitment for the workplace. The committed employees are less intended to leave the organization (Coulter 2003). Person organization fit refers to the fit between individual work values and job characteristics or perceived work rewards (Hult 2005).

The researchers have found that fits relate to the positive work outcome (Seong, Hong and Park 2012; Oh, Guay *et al.* 2014). The current study has incorporated the presumption that person with high value fit would project high level of commitment and may further eventually move upward (higher level of commitment) or downward (Lower level of commitment) with respect to observed fit. The study tries to answer the question that, those employees who feel fit with the organization possess high level of commitment. Though, the main objective of the study is to explore the moderating effects of Persons' Organizational support on the relationship between the Person Organizational Fit and Organizational Commitment.

2. Conceptual model

Organizational commitment and person organizational fit

The concept of organizational commitment is extensively discussed in literature and given various connotations such as it is the relative strength of an individual's identification with involvement in a particular organization which is characterized by belief in and acceptance of individual, goals and values, willingness to extend effort on behalf of the organization and a desire to maintain membership in organization. (Mowday, Stores and Porters 1979)

This refers to the psychological attachment of employees to their workplace and employees (Allen and Meyer 1990, O'Reilly and Chatman 1986). O'Reilly (1986) defines the concept of organizational commitment as "an individual's psychological bond to the organization, including sense of job involvement, loyalty and belief in the value of organization. Meyer's framework has given three dimensions to the concepts which explained the variations in the level of organizational commitment i.e. first affective commitment as an employee's emotional attachment to, identification with and involvement in the organization, second normative commitment which reflects as pressures on employees to remain with an organization resulting from organizational socialization. Third continuance commitment refers to commitment associated with the costs that employees perceive are related to employee organization. (Allen and Meyer 1996)

The intention to serve the vision and goal of the existing cause of the organization are found more into the committed employees (Hunt and Morgan 1994, Coulter 2003, Mowday, Steers and Porter 1982). The Perceived

Persons' organizational fit reflect the congruence between person and organizational attributes, the researchers in the organizational studies has related Person Organization fit as the match between employee and his broader organization attributes (Chatman 1989). This propagates the strategic measure and their effective implementation with respect to the other employee practices such as employee selection (Sekiguchi 2004), Goal Congruence with organizational leaders and peers (Vancouver and Schmit 1991) and organizational climate (Bowen *et al.* 1991). Though, Person Organization fit is compatibility between employee and his organization that occurs when at least one entity provides what other needs or when they share similar fundamental characteristics or both, in the model (Karakurum 2005). The literature has facilitated the sound evidences of the relationship between person organizational fit and its respective commitment (Syed *et al.* 2014, Thomas 2013, Astakhova 2016). The current research is attempting to identify the impact of the fit on the types of organizational commitment.

Hypothesis 1(a): Perceived person- organizational fit will positively relate to the affective commitment.

Hypothesis 1(b): Perceived person- organizational fit will significantly co relate with the continuance commitment.

Hypothesis 1(c): Perceived person- organizational fit will negatively co-relate with the normative commitment.

Moderating role of perceived organization support

The concept of perceived organization support was originated from Blau (1964) concept of social theories which depicts the relationship between employees and his respective organization. Perceived organization support embraces the employee perception for their organization with respect to their well being and their contribution. This refers to the perceived value given by employees of their efforts, concerns, care and help. Perceived organization support refers to worker's belief in how much the organization values their contribution and care about their well being (Eisenberger, Huntington, Hutchison and Sowa 1986). Hence, composing the distinguished perspective of perceived organizational support is the extent to which employees believe that his organizations values their contribution and care about their well being and fulfills their socioeconomic needs. While investigating the relationship between support and commitment researchers have found considerable output and their contribution support the relationship (Mastro 1999, Dogon 2010).

As the organizational commitment is the employee involvement and expected to be related with his perceived notion of fit with the organization. It is also being expected here that this relationship may get affected by the support being given to him by his organization. Moderating role of person organization fit has widely discussed and explored with various conceptual relationship. Manzoor and Naeem (2011) found the moderation effects of Person organization fit on organizational commitment and organizational socialization. Dihiello, Hungton and Dawley (2011) found moderation of Person organizational support on narrowing creativity gap and creativity, though study that evaluates the moderation effects of perceived organizational support on organizational commitment and Fit has not been found in literature. The current study assumes that the presence of organizational supports moderates the relationship between the person's organizational fit and his respective commitment.

Hypothesis 2(a): The relationship between Person's Organization Fit and Organizational Commitment is moderated by Perceived organization Support.

Since main purpose of this study is to investigate the moderating role of perceived organization support on person organization fit and organization commitment. The logic underlying the current interacting investigations can be elucidated as two-fold. First individual who possess fit with their respective organization would certainly be portraying the affective commitment and fit may impact the type of commitment. This may indicate the deviation in level of commitment.

Second the organization support may moderate the relationship between organization commitment and the respective organizational fit. The study would contribute the literature with the examination of moderation effects of perceived organizational support in Indian context.

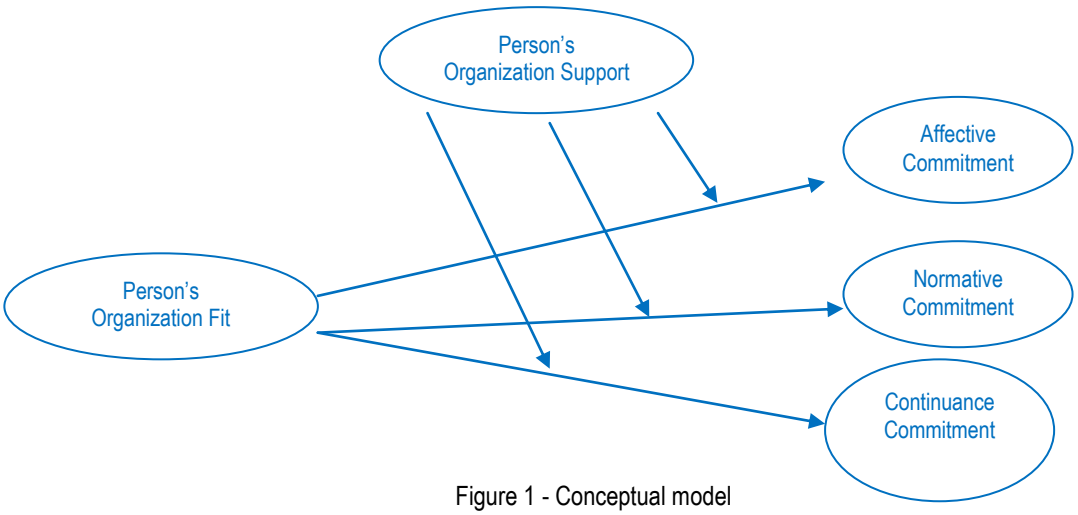

Figure 1 - Conceptual model

3. Method

Data collection

The working age population with dual career family has taken as the target populations in the current study. The study has observed the survey on the 1100 working couples in the two leading city of Madhya Pradesh i.e. Indore and Bhopal, who are employed with public and private firms. The Madhya Pradesh is growing province in the central India with the expansion of diversified workforce particularly in the industrialized area of Indore and Bhopal city. The current study has included 663 response packets with complete response which represents 60.2% response rate. The female and male participation into the study has been reported as 49 and 51 percent respectively. The demographic characteristics show that highest participating age group was 30-40 years with 42 percent participation into the current study. The demographic statistics also revealed that 69% of the participation is being done from the post graduate working members of dual career family.

Measure

The study has taken four factors which were measured though 20 items (responses on five point likert scale) from the established scales. The three conceptual variables organizational commitment (OC), person-organizational fit (POF) and perceived organizational support (POS) have been observed where Organizational Commitment as dependent variable, Person's Organizational Fit as independent variable and Perceived Organizational Support has observed as moderating variable. The comprehensive reliability score obtained for the entire scale is (α = .95). The detail description on the reliability and validity has been depicted on the Table 1. The scale description as per the adopted variables is as follows:

Organizational commitment

The current variable has taken as dependent variables incorporating 12 items as developed by Allen and Meyer (1997), the 12 items has been selected from the scale measuring the operational variables affective, normative and continuance variables. The items framing were as "This organization has a great deal of personal meaning for me", " I was taught to believe in the value of remaining loyal to one organization", "I feel that I have too few options to consider leaving this organization. The reliability score obtained for the current scale is α = .93.

Perceived person organization fit

Person organizational fit has observed as independent conceptual variable. This was measured with the scale consisting of 3 items developed by Cable and Judge (1996). The item framing as "To what degree do you feel your values match or fit this organization and the current employees in this organization" has been taken. The reliability score obtained for the current scale is α = .69.

Perceived organizational support

Person organizational support was measured with the 5 items developed by Eisenberg *et al.* (1986) the items framing for the current measure was "The organization strongly consider my goals and values" and "help is

available from organization when I have a problem". The Chronbach alpha score for the current scale has been reported as α = .82.

Statistical analysis

The SPSS has been taken as a means to support the analysis (SPSS 2009). Descriptive Statistics; means, standard deviation and kurtosis were used to analyze the data. Chronbach alpha coefficients were used to assess the internal consistency, homogeneity and uni-dimensionality of the measuring instrument (Clark and Watson 1995). The Eigen values were studied to extracted factors. Exploratory Factor analysis was conducted to determine the number of extracted factors. To specify the relationship between variables, Pearson Moment Correlation coefficient was used in the case of normal distribution. In terms of statistical significance it was decided to set the value at a 95% confidence interval level ($p<0.05$). In order to identify the proportion of variance between dependent and independent variable logistic regression analysis was conducted. The hierarchical regression analysis was performed to observe the moderating effects of moderating variable (Person Organization Support) on the relationship between the independent variable (Perceived person organizational fit) and dependent variable (Organizational Commitment). In Step 1 the independent variable was regressed with the dependent variables. In the following step the moderating variable (Person Organizational Support) were entered. The strength of correlation has been observed between moderating variables and dependent variables in order to enter the moderated variable in the current step. In the final step , the interaction term (Perceived organizational support × Person's Organizational Fit) was added, moderation effect was confirmed if the interaction term was statistically significant and if explained variance (R^2) was significantly increased ($p<0.05$).

Results

Measurement and factor analysis

Table 1 gives the analysis on the exploratory factor analysis being implied on the items in the survey tools.

Table 1 - Result of EFA Analysis

Item No	Construct	Loadings
I1	The organization takes pride in my accomplishment at work The organization takes pride in my accomplishment at work	.94
I 2	I think that people these days move from company to company too often	.94
I 3	If I got another offer for a better job elsewhere i would not feel it was right to leave my organization	.94
I 4	It would be very hard for me to leave my organization right now, even if I wanted to Normative Commitment (α = .77)	.94
I 5	I really feel as if this organizations problems are my own	.94
I 6	The organization really cares about my well being	.94
I 7	Right now staying with my organization is a matter of necessity as much as desire	.94
I 8	The organization strongly consider my goals and values Continuance Commitment (α = .77)	.94
I 9	I would be very happy to spend the rest of my career with this organization	.85
I 10	This organization has a great deal of personal meaning for me	.84
I 11	The organization cares about my general satisfaction at work	.85
I 12	I was taught to believe in the value of remaining loyal to one organization Comprehensive Score for Organizational Commitment (α = .93) (α = .82) Percieved person organization fit	.84
I 13	I Feel that I have too few options to consider leaving this organization	.84
I 14	One of the major reason I continue to work for this organization is that i believe that loyalty is important and therefore feel a sense of moral obligation to remain	.75
I 15	Help is available from organization when I have a problem	.75
I 16	Too much in my life would be disrupted if I decided I wanted to leave my organization now	.75

I 17	I enjoy discussing my organization with people outside of it Person Organizational Fit (α =.69)	.78
I 18	My vales match those of current employees in this organization	.87
I 19	To what degree do feel your values match or fit this organization and the current employees in this organization	.87
I 20	Do you think the values and personality of this organization reflect your own values and personality	.53
Reliability for 20 items is α = .95 S		

Source: Primary data analysis

Descriptive statistics, internal consistencies

Table 2 represents the descriptive statistics, internal consistencies (Chronbach Alpha Coefficients) and correlation between the variables sub heads of organizational commitment as normative commitment, continuance commitment and affective commitment. The items have been observed with normal distribution and approximately symmetric. The obtained Chronbach alpha coefficient has observed with more than 0.70 which proves as internal consistencies are acceptable enough in the current study.

Table 2 - Descriptive statistics, cronbach alpha coefficient and correlation coefficient

Item –Measure	Mean	SD	Skewness	Kurtosis	Alpha
Affective Commitment	4.26	.397	.449	.40	.80
Normative Commitment	4.28	.419	.211	366	.77
Continuance Commitment	4.28	.419	.211	.366	.77
Person's Organization Support	4.27	.403	.095	.058	.71
Perceived Person Organization Fit	4.26	.39	.361	.182	.82

Source: Primary Data Analysis

Test of the hypothesis

The correlation observed between variables is depicted in Table 3. This indicates that affective commitment has been found positively related and practically significant with the perceived persons organizational fit and person's organization support. The similar observation has been reported with the normative and continuance commitment.

The correlation scores are statistically observed with positives scores and significantly correlated. To draw the statistical inferences, the H1 (a), H1(b) the statistics has supported the presumptions hence the first two have been accepted this depicts that perceived person organizational fit are found significantly correlated with the affective and continuance commitment (r=.31, p>.01 and r=.32,p>.01). The presumption third has also partially proved mentioning the supportive results score (r=.32, p>.01). Though as pre assumed that the negative relationship may observe has not been found into the relationship H1(c) though the current assumption has partially supported. As per other variables are concerned, the observed positive statistical value is projecting significant co-relationship.

Table 3 - Correlation between variables

	1	2	3	4	5
Affective Commitment	1				
Normative Commitment	.849**	1			
Continuance Commitment	.849**	1.00**	1		
Persons Organization Support	.904**	.987**	.987**	1	
Perceived Person Organization Fit	.319**	.323**	.323**	.351**	1

Note: N=663; ** = Correlation is statistically significant at the 0.01 level

Source: Primary data analysis

To address the core objective of the research, a moderated hierarchical regression analysis was conducted in order to identify the moderation effects of the person organizational support on organizational commitment and persons organization fit, as depicted into the H2(a). Table 4 gives the requisite detailing of the respective steps involved into the moderated regression analysis.

In Step one of the hierarchical regression, organizational commitment was regressed on perceived person's organizational support and produced significance model (β=0.9, p=0.00) which support the presumptions that person organization fit has strong prediction on the members' organizational commitment. Proceedings to the further step the perceived persons organizational fit was entered as predictable variables, which has produced significance models (β=1.0, p=0.00). In respective third step the interaction has been incorporated in ordered to observe the moderation effects. Hence, grouping variables was entered (i.e. POS and PPOF) into the current step and produced significance model as (β=1.53, p=0.00). Thus, person's organizational support proves to play a significant relationship between the organizational commitment and perceived persons organizational fit. This depicts that the members confined with organizational and personal fit together will possess commitment towards the organizational objectives and vision. This also reveals that the members associated with supportive organization are found more committed with respect to the incorporation of fit between organization's and their personal values.

Table 4 - Hierarchical regression analysis with organization development as dependent variable

	Model	Unstandardized Coefficient		Standardized Coefficient	t	P	F	R	R^2	R^2 Change
		B	SE	β						
1.	Constant	0.91	.91	-	4.8	0.00	501.6	.99	.98	.98
	POS	0.98	.04	.99	22	0.00	-	-	-	-
2	Constant	1.51	2.44	-	6.2	0.00	32304	.99	.99	.99
	POS	-0.82	0.01	-0.21	4.9	0.00	-	-	-	-
	PPOF	2.3	0.01	1.0	23.9	0.00	-	-	-	-
3	Constant	3.2	1.79	-	1.8	0.04	2175	.99	.99	.99
	POS	2.6	0.08	10.09	2.11	0.03	-	-	-	-
	PPOF	.01	18.3	0.73	2.1	0.00	-	-	-	-
	POS*PPOF	-0.17	0.06	1.53	-2.7	0.07	-	-	-	-

Source: Primary data analysis

Discussion and conclusion

The statistical inference in the previous section has supported the moderation effects of Perceived organizational support on the relationship of organizational commitment and persons' organizational fit. Therefore, Person Organizational Support was investigated as possible moderating variable in the relationship between the organizational commitment and person's organizational fit. The Organizational commitment (Affective, Normative and Continuance Commitment) has been incorporated as dependent variables and a co-relational study was performed in order to examine the relationship between the conceptual variables. The internal consistency and the reliability score being observed into the current study is quite satisfactory as all the construct has reported with reliable score with coefficient above 0.7. Interpreting the result of the first 3 hypotheses i.e. 1(a), 1(b), 1(c), the significance of the correlation confirmed the hypothesis. Hence, result has supported that perceived person organization fit relates positively with the affective commitment, normative commitment and continuance commitment. Although the current findings are consistent with the study of Karakurum, (2005) which states that the person who find fit with the value norms and culture of the organization would certainly possess the commitment though this may not refer the extent of commitment. Finding reveals here by that fit can be assumed as contributing factors to gain committed employees in the work. As the current study was intended to understand the relationship of PO fit with type of commitment, the statistics revealed that relationship exists between the variables.

Having explained the first part of the presumption in the current study, the second part of the hypothesis which was proposed to observe the moderation effects of person organization support on the relationship between of Person organizational fit and organizational commitment, has also statistically supported and confirmed the moderation effects. This reveals the understanding that the propensity to possess commitment may get affected by the organizational support in terms of psychological, physical and mental well being, employees' need of general satisfaction at work, his need of achievement and appreciation etc. This is suggesting that when

organization would facilitate the support to its respective employees it may avail the strong commitment and boost the ratio of fit between individual and organization perseverance.

In sum and substance it has been found that perceived persons' organizational fit strongly relates to the organizational commitment with the moderation effects of the perceived organizational supports.

Limitation and future scope of the study

The current study has observed with four limitations. First, since the data has been gathered from the one state of the India where respondents were members of the dual career family and belonging to public and private sectors working domain may restrict the generalized implication of the research findings. Second the data collected at single point of time, which hindered the investigation of possibility reserve causality between the studied variables. Hence, this depicts the need of longitudinal studies which would allow researchers to get more accurate result with respect to the conceptual understanding. Third the study has limited fund to conduct research with wider sample collection geographically and fourth limitation revolves around the fact that study has been incorporated on multi-sectors which may counter reacts the implication on particular sector. The current study has observed the relationship among the Dual Career Couples where their respective home engagement, family type and industry type has not been considered hence this may take the scope of future study.

Implications for organizational development

The study has given important implication on the managerial settings, especially with respect to managing career couples in the organization. Dual career couples are often found themselves struggling for balancing the home and work life and in doing so, they often compromise with several personal and professional aspirations. Since the study has been taken in Indian context hence, this is implied that if the support would be well planned throughout the employment cycle, the employee satisfaction and commitment both can be achieved. Further, to assure the comprehensive performance from the members, HR manager requires designing of the supportive plans with respect to values and goal congruence. The issues pertaining work-life has more or less being the biggest contributing factor for the improved organizational commitment and the practices which are carrying family friendly policies and more assistance to work life balancing (Callier 2011). These are having direct impact on the couples' perceived affective commitment (Eisenberg *et al.* 1990).

HR practices which are well managed and implemented, are able to increase organizational commitment and decrease turnover intention as the employee starts relating him with top level's commitment and support. While assigning the roles and responsibilities, the strength of the employee should be considered with the consistent communication of the mutual purpose. Employees' personal and career need should be identified and recorded in order to give proper care and support. If the timely support has been facilitated with possible appreciation and award recognition, the commitment would boost and it may be assured with persistent implication of love and mutual care (Allen and Meyer 1990).

References

[1] Allen amd Meyer. (1990). A three components and conceptualization of organizational commitment. *Human Resource Management Review,* 1: 61-89. DOI:10.1016/1053-4822(91)90011-Z

[2] Allen, Meyer. (1996). Affective, Cognitive and Normative Commitment to the Organization: An examination of construct validity. *Journal of Vocational Behavior,* 49: 252-276. DOI:10.1006/jvbe.1996.0043

[3] Astakhova, M. N. (2016). Explaining the effects of perceived person supervisor fit and person organization fit on organizational commitment in US and Japan. *Journal of Business Reserach*, 956-963. DOI:10.1016/j.jbusres.2015.08.039

[4] Blau, M. (1964). Exchange and Power in Social Life. *New York Wiley*.

[5] Bowen, D.E., Ledford, G.E. and Nathman, B.R. (1991). Hiring for organization not the job. *Academy of management* 5(4): 35-49. DOI:10.5465/AME.1991.4274747

[6] Cable and Judge. (1996). Person-Organziation Fit, job choice decision and organization entry. *Organizational Behaviour and Human decision Processes,* 63: 294-211. DOI:10.1006/obhd.1996.0081

[7] Caldwell, O., Reilly, C.A. and Chatman, J. (1991). People and Organizational Culture: A Profile Comparison approach to assessing Person - Organization Fit. *Academy of Management Journal,* 34: 487-516. DOI:10.2307/256404

[8] Caillier, J.G.I (2011). Want to Quit: A Closer Look at Factors that Contribute to the Turnover Intentions of State Government Employees. *State and Local Government Review*, *43*: 110–122. DOI: 10.1177/0160323X11403325.

[9] Chatman, J.A. (1989). Improving interactional organizational research - a model of person-organization fit. *Academy of Management Review*, 14(3): 333-349.

[10] Clark, L.A. and Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*. DOI:10.1037/1040-3590.7.3.309

[11] Coulter, R. (2003). Management. 7th Edition . Prentice Hall Engle Wood.

[12] Dogan, Daji, S.D.H. (2003). Distress in Nigeria banking industry, causes effects and remedies. *Management Network,* 2(4): 16-13.

[13] Diliello, T.C., Houghton, J.D. and Dawley, D. (2011). Narrowing the creativity gap; the moderating effects of perceived support for creativity. *The Journal of psychology,* 145: 151-172.

[14] Dunn, M.G. and O'Brien, K.M. (2013). Work-family enrichment among dual-earner couples: can work improve our familiy life. *Journal of Counselling psychology,* 60: 634-40.

[15] Eisenberg, R., Fasalo, P.M. and Devis-La Mastro. (1990). Effects of Percieved Organziational Support on employee diligence, innovation and commitment. *Journal of Applied Psychology,* 71: 500-507. DOI:10.1037/0021-9010.75.1.51

[16] Eisenberger, R., Huntington, R., Hutchison, S. and Sowa, D. (1986). Perceived Organizational Support. *Journal of Applied Psychology*, *71*: 500–507. DOI:10.4135/9781412956246.n419

[17] Hult, C. (2005). Organizational Commitment and Person- Environment Fit in Six Western Countries. *Organizational Studies,* 26 (2): 249-270. DOI:10.1177/0170840605049800

[18] Hunt and Morgan (1994). Organizational Commitment one of many commitment or key mediating construct. *The Academy of Management Journal*, 37: 1568-1587. DOI:10.2307/256799

[19] Wood, J. (2005). Greenberg. *Managing Behavior in Organization.* 4th Edition. Prentice Hall Engle.

[20] Karakum. (2005).The effects of Person Organization Fit on Employee Job Satisfaction. Performance and Organizational Commitment in Turkish Public Organization.

[21] Manzoor, M. and Naeem, H. (2011). Relationship of organization socialization with organizational commitment and turnover intention; Moderating role of perceived organziational support. *Interdisciplinary Journal of Contemporary Reserach in Business* 3: 512-529. Retrieved from http://www.liberty.edu:2048/login?url=http://search.proquest.com/docview/928450053?accountid=12085

[22] Mastro, Valerie La. (1999). Commitment and Perceived organiztional support. *National Forum of Applied Educational Reserach Journal* 12(3): 10-13.

[23] Moen, P. (2015). Scaling Back: Dual Earner Couples' work strategies. *Journal of Marriage and Family,* 61: 995-1007. DOI:10.2307/354019

[24] Mowday, R.T., Steers, R.M. and Porter, L.W. (1979). The measurement of organizational commitment. *Journal of Vocational behaviour,* 14: 224-247. DOI:10.1016/0001-8791(79)90072-1

[25] Vancover, J.B. and Schmit, N.W. (1991). An exploratory examination of person organziation fit; organziaional goal congruence. *Personnel Psychology*, 44: 333-352. DOI:10.1111/j.1744-6570.1991 .tb00962.x

[26] Oh, I. S., Guay, R. P., Kim, K., Harold, C. M., Lee, J. H., Heo, C. G. and Shin, K. H. (2014). Fit happens globally: A meta-analytic comparison of the relationships of person-environment fit dimensions with work attitudes and performance across East Asia, Europe, and North America. *Personnel Psychology, 67*: 99–152. DOI:10.1111/peps.12026

[27] O'Reilly, C. A. and Chatman, J. (1986). Organizaional commitment and Psychological attachment. the effects of complinace , identification and internationalization on Prosocial behavior. *Journal of Applied Psychology,* 71: 492-499. DOI:10.1037/0021-9010.71.3.492

[28] Mowday P. and Steers, R.T. (1982). Employee-Organization linkage; the psychology of commitment, absenteeism and turnover. http://www.nationalforum.com/Electronic

[29] Eisenberg, R. (1990). Perceived Organizational Support, discretionary treatment and job satisfaction. *Journal of applied psychology*, 500-507. DOI:10.1037/0021-9010.82.5.812

[30] Sekiguchi (2004). Person Organization Fit and Person Job Fit in employee selection: A review of Literature. *Osaka keide Ronshu* Sekiguchi, 54: 179-196.

[31] Syed, Ali. A.A., Mohammadpour, B., Rajabi, M. and Baghbani, F. (2014). Effects of POFIT on Organizational Commitment. *International Journal of Information Technology and Management Studies,* 33-43.

[32] Seong, J.Y., Hong, D.S. and Park, W.W. (2012). Work status, gender and organizational commitment among Korean worker; the mediating role of person-organization fit. *Asia Pacific Journal of Management*, 29 (14): 11-29. DOI.org/10.1007/s10490-011-92148-6.

[33] Thomas Tammara P. (2013). The effect of Personal Values, organizational Values and PO fit on ethical behavior and organizational commitment outcomes among substance abuse counselors: A preliminary Invsetigation. Ph D. Dessertation, University of IOWA, 2013.

[34] Vancauver, J.B., Schmitt, N.W. (1991). An Exploratory examination of Person-Organization Fit; Organizational Goal Congruence. *Personal Psychology,* 44: 333-352. DOI:10.1111/j.1744-6570.1991.tb00962.x

*** OTKEN (2010). Dogan UCAR and Begum. http://www.acarindex.com/dosyalar/makale/acarindex-1423875702.pdf

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Predictive Possibilities of Day Surgery Hospitalized Patients' Rate in Slovakia during 2009 – 2013 and its Health Policy Significance

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Abstract:

The significance of health system expenses led politicians of different countries to search for optimal tools to regulate hospital expenses and support economy efficiency of health facilities for the last two decades. At present, countries reduce the beds' numbers and decrease an average length of stay in the hospital. Day surgery development is connected with a process of beds' reduction and increase of hospitalized healthcare efficiency. Slovak day surgery is supported by MOH SR government programme within a system of hospital bed reduction. It is declared as a highly-effective treatment that emphasizes patient's painless and easy treatment in a short time, while highlighting quality and the lowest costs. However, its rate within the total amount of surgical procedures is very low and there is no evident positive progress. The reasons are systemic, while related to a policy of procedures' financing and health insurance companies' strategies. The paper focuses on solving the partial issues of Slovak day surgery development. It also deals with analysing the rate of pediatric and adult patients' hospitalization regarding specific field, region and analysed years. The analysis results provide a valuable platform for the authors of a strategic health system framework, or other actors of health and social policy.

Keywords: day surgery, healthcare system, performance risk in day surgery, performance efficiency in day surgery, development barriers in day surgery.

JEL Classification: I13, I19, C38.

1. Introduction

The present health system needs to solve two main issues. On the one hand, there is an issue of medical ethics, i.e. requirements to provide as optimal the best possible healthcare for each patient. On the other hand, it is necessary to solve an issue of expenses with regard to healthcare provisioning (Bem and Michalski 2014, 2015, Szczygieł *et al.* 2014). It is important to ensure balance between these two issues (Gavurová *et al.* 2014, Szabo and Sidor 2014). However, it is very difficult as for the Slovak health system so abroad. Many opinions exist on possible solutions (Zelený and Bencko 2015). Each state takes it seriously, while developing models of effective healthcare provisioning and changing the methods and forms of health facilities' ownerships, their financing, principles as well as level of human solidarity.

The economic matter highlights a necessity to solve particular questions: Who will cover the treatment costs? What method will be used? What extent should a patient participate in this process to? What should be covered from public, state funds? The Slovak health system belongs to one of the most risky sectors from a sustainability of public finances point of view together with a pension system. Financial balance of the Slovak health system will negatively influence the process of demographic aging. If the health policy does not change, the deficit of resources in the health system will increase till 2060 to 2% GDP according to basic scenario (or 1.7%/2.6% according to optimistic/pessimistic scenario). This is confirmed by the forecasts of health system public expenses till 2060 (Kovalčík and Tunega 2015) as well as by the Council for Budget Responsibility. However, the income will not cover approximately 22% - 31% of public expenses to health system. Therefore, it is inevitable to search for options of increasing health system efficiency by unveiling the allowances and completing the additional income.

2. Day surgery – its essence and development determinants

Day surgery represents one of the possibilities of financial resources' saving in the health system (Jarrett and Staniszewski 2006). In the European countries, the development of high-quality services of day surgery is a priority of governments in relation to healthcare, while many countries declare significant financial and non-financial benefits that emerge from its use (Kroneman 2001, Gavurová and Hyránek 2013). The primary aim of

day surgery use is to separate patients with easy surgical procedures (and thus support less traumatized hospitalization in the hospitals), to protect a patient against nosocomial infection, to emphasize a treatment in home environment, which provides a higher comfort (Šoltés *et al.* 2010, Popa *et al.* 2015). Many foreign specialized research teams focus on the analysis of the individual day surgery procedures and their appropriateness for particular groups of patients. This significantly contributes to appropriate specification of surgical procedures and reinforcement of developing processes. The Slovak day surgery development is different in relation to other countries. Its rate is still very low in spite of the MOH SR government support. It is probably caused by many system failures, which still persist.

In Slovakia, day surgery began in 1998. Its main philosophy was based on the fact that a hospital does not represent an expensive hotel. The Slovak experts emphasize its advantages, such as the fact that a person is not considered as a patient, then the support of decreasing a risk of hospital infections, hospitalization stress, and a possibility to remain in a working process. However, the level of day surgery use in the Slovak health system is still very low and it does not even reach 10% out of total number of surgeries. Day surgery ratio was increased fourfold in the Czech Republic and in other developed European countries or the USA this ratio was exceeded nine-fold (Hudecová 2010). In Slovakia, day surgery has appropriate conditions for its development, such as medical practice, a wide range of provided procedures, or public resources' saving that is of 30% cheaper than inpatient surgery. Similarly, its development is influenced by many negative processes, e.g. insufficient number of workplaces, de-motivational system of day surgery procedures' financing (Šoltés 2011).

There absents a stronger legal support, coordinative approach to day surgery actors, better communication between healthcare providers and health insurance companies, etc. Also, potential patients are not informed enough of a character, conditions and other attributes of day surgery from health insurance companies' side, or from the individual healthcare providers, etc. In Slovakia, there has not been realized and published any research study that would focus on day surgery yet. If we focus on chosen economic aspects of day surgery, there also exist very few clinical studies based on comparing the traditional bed procedures and day surgery procedures in abroad (Castoro *et al.* 2007). However, those which were realized, they do not show any significant differences in the results (e.g. Castells *et al.* 2001, Corvera *et al.* 1996, Fedorowicz *et al.* 2005, Hollington *et al.* 1999). Their conclusions emphasize a safety of day surgery procedures in case all recommended actions and organizational principles of day surgery programme have been met. One of those day surgery success indicators is a number of hospital visits and re-admission of a patient to hospital in case of complex procedures and of patients with a high level of comorbidity. The most frequent reason of a patient's re-admission to hospital is bleeding (statistics show 40% - 50% of cases). Other frequent causes are infections in the range of 0.3 – 0.4% out of total number of day surgery patients (Mattila 2010). The financial results of day surgery as opposed to bed surgery (while taking into consideration an application of the same surgical procedures) are relatively quantifiable and they represent a decrease of expenses in average of 25% - 68% (Castoro *et al.* 2007). It is necessary to complementary use those studies which include economic evaluations that are related to a choice of medicaments and facilities, influences of procedure time savings on its price, etc.

The advantages of day surgery are multilateral, but the specialized literature introduces the following (Castoro *et al.* 2007):

- shorter time of stay in the hospital that would enable to examine a larger number of patients and thus decrease waiting time for surgical procedures,
- availability of bed facilities for acute cases,
- possibility of immediate cancellation of planned procedures for a particular day in emergency cases,
- exact and effective planning system that would be available for patients,
- decreasing the number of necessary medical personnel during night shifts,
- decrease of time that is necessary to perform a surgical procedure and thus decrease its expenses; use of progress in surgical and anesthesiological care,
- proper use of highly-expensive specialized equipment in the operating rooms and supplies.

Generally, the difficulties occur during the complications (surgical, anesthesiological) (Šoltés *et al.* 2011). However, only few health facilities may deal with these issues, and therefore, if a patient needs to be moved to the nearest hospital that has a particular department, it needs to be provided by that specific health facility. The shorter is the time a patient spends in the hospital the higher is a risk of some allergic complications to certain medicaments. The patients' access to nursing care is low after a surgery is performed and also during a

convalescence period. Thus, day surgery is not suitable for patients who live alone as in Slovakia, there has not been evolved a proper system of a subsequent healthcare yet.

The surgical procedures performed by day surgery may save financial resources and also provide high efficiency and rationalization of work for the Slovak doctors. Day surgery may be performed only by experts who are able to estimate the itra and post-operational process (Šoltés and Radoňak 2014). The given form of a healthcare is especially used in the cities, but it is gradually expanding to the towns. Day surgery is reimbursed by health insurance companies in the private centres. However, patients have to pay for any extra services. The total costs for day surgery represent 10% in comparison to 90% of costs that need to be covered by health insurance companies in case of hospitalization in medical facilities that perform day surgery procedures. Health insurance companies consider these day surgery procedures as a form of costs' decrease, saving of financial resources that could be used for other costly treatments of severe illness.

In our paper, we focused on hospitalized day surgery patients in Slovakia in the analysed years. Patient's hospitalization after day surgery procedure represents an additional financial burden of a given procedure, because the reimbursement of the costs is realized by means of lump-sum irrespective of a further need of patient's hospitalization. As a consequence of this fact, it is necessary to observe the hospitalization ratio, and if it increases, it is inevitable to determine its significant determinants. Socio-economic and bio-social characteristics play important roles in this process. Their analysis in a context of day surgery realization would require a particular database and cooperation with multidisciplinary research teams.

3. Methods

The objective of our paper is to find meaningful, understandable and simple model of dependence between proportion of hospitalized day surgery patients (both pediatric and adult) and available possible influence variables: specialized field, region and year. In previous papers we used cross tables (QWE lit). We have found many significant associations between proportion of hospitalized day surgery patients on one side and the specialized field, year and region on the other side. But cross tables are large and it is not easy to grasp the core of a lot of present associations. There is another valid method for our objective – long-linear models. However, they have many restrictive requirements and interpretation of results is also not easy at first sight. Specialized field and region are categorical (qualitative) variables. This is important complication in our research of day surgery. That is why also classic logistic regression does not offer simple interpretation.

So finally we chose decision trees as main methodological instrument in our paper. There are many significant associations between proportion of hospitalized day surgery patients and available variables: specialized field, region and year. The aim of our research was to find and present the most significant associations of them. For this reason we used decision trees from statistical system IBM SPSS version 19 (IBM SPSS Decision Trees 19, 2010). The decision tree creates a tree-based classification model which classifies into values of a dependent (target) variable based on values of independent (predictor) variables.

The decision tree methods available in SPSS are:

- CHAID. Chi-squared Automatic Interaction Detection. At each step, CHAID chooses the independent (predictor) variable that has the strongest interaction with the dependent variable. Categories of each predictor are merged if they are not significantly different with respect to the dependent variable (Kass, 1980).
- CRT. Classification and Regression Trees. CRT splits the data into segments that are as homogeneous as possible with respect to the dependent variable. A terminal node in which all cases have the same value for the dependent variable is a homogeneous, "pure" node (Breiman *et al.* 1984).
- QUEST. Quick, Unbiased, Efficient Statistical Tree. A method that is fast and avoids other methods' bias in favor of predictors with many categories. QUEST can be specified only if the dependent variable is nominal (Loh – Shih, 1997). We wanted to gain decision tree as simple as possible and yet with relatively high prediction of hospitality proportion (70%). In our case the QUEST model produced best results (prior probabilities where set to equal to increase the number of correct classifications in case of hospitality rate proportion because real proportion was around 11% in both groups of day surgery patients).

4. Results

Results and interpretation of suitable classic statistical methods (*e.g.* cross tables) are rather large that is why we used data mining decision trees to gain brief meaningful results. We wanted to know which from available variables (region, specialized field or year) influence significantly the proportion of hospitalized day care pediatric patients and how they do it. We used QUEST decision tree for the problem (equal prior probabilities, with minimum parent (child) number of cases 4,000 (2,000), see Figure 1).

- At the beginning in node 0 the proportion of hospitalized patients is 10.8 % (5,676/ 52,526).
- First division is made by the region. Left node 1 contains 48 152 cases of seven Slovak regions: Bratislava, Košice, Nitra, Prešov, Trnava, Trenčín and Žilina. The proportion of hospitalized patients in the node is 8.1 %. For these cases the next best predictor is the specialized field. In the right terminal node 2 the proportion of hospitalized patients is 40.9 %, which is significantly higher than in the left node 1. The right node 2 has got 4,374 cases of Banská Bystrica region.
- On the left side of decision tree the left node 1 is further divided by the specialized field. If the day surgery procedure belongs to one of three specialized fields: ophthalmology, otolaryngology or urology then the proportion of hospitalized patients is 4.7 % (left node 3). If it comes from surgery or gynecology then the proportion of hospitalized patients is 18.3 % (right terminal node 4).
- Last division is made by the year. Left node 3 is divided into cases from the years 2009, 2010, 2011 and 2013 with the proportion of hospitalized patients 3.0 % (left terminal node 5) and into cases from the year 2012 (right terminal node 6, hospitalized patients proportion 9.3 %).

The classification table of pediatric day surgery procedures shows that the QUEST decision tree model classifies 73.2% of all cases correctly (see Table 1). The classification rate of the proportion of hospitalized patients is 70.2 %. We see prediction strength of the QUEST decision tree model. We need to ask only three questions to get correct classification more than 70 % of the pediatric day surgery hospitalization rate.

Table 1 - Classification matrix of pediatric day surgery hospitalisation rate

Observed	Predicted		
	Hosp	Non hosp	% Correct
Hosp	3,986	1,690	70.2
Non hosp	12,403	34,447	73.5
Overall Percentage (%)	31.2	68.8	73.2

Source: own

We also wanted to know how available variables (region, specialized field or year) influence the proportion of hospitalized day care adult patients.

Again we used QUEST decision tree for the problem with other parameters (equal prior probabilities, SE(1) pruning, with minimum parent (child) number of cases 40,000 (20,000) (see Figure 2).

- In node 0 the overall proportion of hospitalized adult patients is 11.1% (61,159 / 489,426).
- First division is made by the specialized field. In the left terminal node 1 are all day surgery procedures from ophthalmology field with hospitalization rate 1.6%. Right node 2 represents day surgery procedures from all other specialized fields: surgery, gynaecology, otolaryngology and urology (hospitalization rate 15.5%).
- Right node 2 is then divided by the year. In the left node 3 are day surgery procedures from the years 2010 and 2011 with proportion 10.4%. Right node 4 contains cases from the years 2009, 2012 and 2013 (proportion 18.3%). Both groups are further divided by the region.
- Left node 3 splits into left terminal node 5 with day surgery procedures from three regions: Košice, Nitra and Trnava (proportion 14.7%) and to the right node 6 with procedures from the other Slovak regions: Banská Bystrica, Bratislava, Prešov, Trenčín and Žilina (proportion 8.3%). Right node 4 splits into left terminal node 7 with day surgery procedures from regions: Banská Bystrica, Košice, Nitra and Trnava (proportion 24.3%) and to the right node 8 with procedures from the rest of the Slovak regions: Bratislava, Prešov, Trenčín and Žilina (proportion 12.4%).
- Last division is made by the specialized field again. Right node 6 is divided into left terminal node 9 with day surgery procedures from the fields: gynaecology, otolaryngology and urology (proportion 5.7%) and to the right terminal node 10 with surgery cases (proportion 11.3%). Right node 8 is divided into left

terminal node 11 with day surgery procedures from the fields: gynaecology and urology (proportion 6.5%) and to the right terminal node 12 with surgery and otolaryngology cases (proportion 15.9%).

Adult day surgery procedures classification table shows that the QUEST decision tree model classifies 56.5% of all cases correctly (see Table 2). The classification rate of the proportion of hospitalized patients is 86.1%. QUEST decision tree model is now more complicated, it contains six decision rules. It could be expected because number of adult day surgery procedures is about ten times larger than the number of pediatric day surgery procedures. What is more adult day surgery patients group is much more heterogenous (e.g. influence of lifestyle, of environment, of the age etc. to the health).

Table 2 - Classification matrix of adult day surgery hospitalisation rate

Observed	Predicted		
	Hosp	Non hosp	% Correct
Hosp	52,632	8,527	86.1
Non hosp	230,878	258,548	52.8
Overall percentage	51.5	48.5	56.5

Source: own

Overall prediction rate of both hospitalized and non-hospitalized patients is by 16.7% lower in case of adult day surgery in comparison to pediatric day surgery. It is simple demonstration of a complexity of day surgery analysis. We have only three available predictors (field, region, year) for prediction of both hospitality and non-hospitality rates on cumulated count levels.

Conclusion

The Slovak day surgery is not sufficiently regulated for a longer period of time. It was already implemented into the process of health system efficiency increase; however, there is an absence of some important existential interconnections. Day surgery rate is still very low in comparison to other countries. Insufficiently performed system measurements represent the main reason of its development, which are also related to a low rate of clinics' specialization, unclear price strategies and preferential criteria of health insurance companies, insufficient social support that is connected to subsequent healthcare, etc. Procedure risk rate should provide information of additional financial burden of a particular procedure, and thus of a significance of such procedure implementation into day surgery process in a specific region. Therefore, it is necessary to question if this value of a hospitalization rate is not a result of a certain adjustment to contractual prices of health insurance companies in a given year by not accepting day surgery procedure due to more advantageous financial reimbursement per procedure. Health insurance companies' policies, financial policy and pricing strategy of day surgery procedures play an important role in day surgery development. In this article, we analysed an issue of day surgery procedures risk that was measured by patients' hospitalization rate.

We observed significant differences in hospitalization rates during analysed years, fields and regions especially in case of pediatric day surgery. All available predictors (field, region, year) are significant, but they can not explain other aspects of day surgery hospitalization rates. Data on individual level should be considered for further and more precious analyses. In Slovakia, there are formed good conditions for day surgery development, while considering its total evaluation. Therefore, it would be necessary to solve it systematically and it would represent a great challenge for all interested health system subjects.

Acknowledgement

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References

[1] Bem, A. and Michalski, G. (2014). The financial health of hospitals. V4 countries case, *Sociálna ekonomika a vzdelávanie*. Banska Bystrica, 1-8.

[2] Bem, A., Michalski, G. (2015). Hospital profitability vs. selected healthcare system indicators, *CEFE 2015 – Central European Conference in Finance and Economics*, Technical University of Kosice, Kosice, pp. 52-61.

[3] Breiman, L. *et al.* (1984). *Classification and Regression Trees*, New York, Chapman & Hall.

[4] Castells, X., Alonso, J., Castilla, M. *et al.* (2001). Outcomes and Costs of Outpatientand Inpatient Cataract Surgery: A Randomised Clinical Trial, *Journal of Clinical Epidemiology*, 54(1): 23 – 29. http://dx.doi.org/10.1016/s0895-4356(00)00271-7

[5] Castoro, C., Bertinato, L., Baccaglini, U., Drace, C. A. and McKee, M. (2007). *Policy Brief. Day Surgery: Making it Happen.* Brussels: WHO European Centre for Health Policy.

[6] Corvera, G., Gespedes, B. and Ysunza, A. *et al.* (1996): Ambulatory vs. In-patient Stapedectomy: A Randomized Twenty-patient Pilot Study, *Otolaryngol Head and Neck Surgery*, 114(3):355 – 359. http://dx.doi.org/10.1016/s0194-5998(96)70203-6

[7] Fedorowicz, Z., Lawrence, D. and Gutierrez, P. (2005). Day Care versus Inpatient Surgery for Age-related Cataract. Art. No.: CD004242. Cochrane Database of Systematic Reviews. http://dx.doi.org/10.1002/14651858.cd004242.pub3.

[8] Gavurová, B., Hyránek, E. (2013). Determinanty rozvoja jednodňovej zdravotnej starostlivosti na Slovensku. (Determinants of Day Health Care Development in Slovakia), *Ekonomický časopis*, 61(2): 134-154.

[9] Gavurová, B., Štefko, R. and Bačík, R. (2014). The Analysis of Social Services' Structure in a Specific Region and its Significance for Health and Social Policy in Slovakia, *Polish Journal of Management Studies,* 10(2): 43-53. URL: *http://www.pjms.zim.pcz.pl/table-of-contents.php*.

[10] Hollington, P., Toogood, G. J. and Padbury, R. T. (1999): A Prospective Randomized Trial of Day-stay Only versus Overnight-stay Laparoscopic Cholecystectomy, *Australian and New Zealand Journal of Surgery*, 69(12): 841 – 843.

[11] Hudecová, D. (2010): Záujem o jednodňovú chirurgiu rastie. Kde je výhodná? [Online.]Cit. 06. 08. 2012, http://zdravie.pravda.sk/zdravie-a-prevencia/clanok/12966-zaujem-o-jednodnovu-chirurgiu-rastie-kde-je-vyhodna/

[12] Jarrett, P. and Staniszewski, A. (2006). The Development of Ambulatory Surgery and Future Challenges. In: Lemos, P. Jarrett, P. and Philip, B. (eds): Day Surgery Development and Practice. London, UK: *International Association for Ambulatory Surgery* (IAAS), pp. 21 – 34.

[13] Kass, G. (1980). An exploratory technique for investigating large quantities of categorical data, *Applied Statistics*, 29(2): 119–127. http://dx.doi.org/10.2307/2986296

[14] Kovalčík, J. and Tunega, M. (2015). Ako Slovensko zaplatí za neliečenie zdravotníctva. INEKO, p.76. http://www.ineko.sk/clanky/ineko-predstavuje-analyzu-ako-slovensko-zaplati-za-neliecenie-zdravotnictva

[15] Kroneman, M. W. *et al.* (2001). International variations in availability and diffusion of alternatives to in-patient care in Europe: the case of day surgery, *Ambulatory Surgery*, 9(3): 147-154. http://dx.doi.org/10.1016/s0966-6532(01)00120-2

[16] Loh, W. Y., Shih, Y. S. (1997). Split selection methods for classification trees*, Statistica Sinica,* 7: 815–840.

[17] Mattila, K. (2010). Day Surgery in Finland.Randomized and Cross-sectional Studies on Treatment, Quality, and Outcome. Helsinki: Department of Anaesthesiology and Intensive Care Medicine Helsinki University Hospital, Jorvi Hospital University of Helsinki, Finland.

[18] Popa, D., Šoltés, M., Uranues, S. and Fingerhut, A. (2015). Are There Specific Indications for Laparoscopic Appendectomy? A Review and Critical Appraisal of the Literature, *Journal of Laparoendoscopic & Advanced Surgical Techniques and Videoscopy*, 25(11): 897-902. http://dx.doi.org/10.1089/lap.2014.0624

[19] Šoltés, M. (2011). Ekonomické aspekty laparoskopickej chirurgie, *Miniinvazívna chirurgia a endoskopia*, 15(3): 7-10.

[20] Šoltés, M. and Radoňak, J. (2014). A risk score to predict the difficulty of elective laparoscopic

cholecystectomy, *Vidoesurgery and other miniinvasive techniques,* 9(4): 608-612. http://dx.doi.org/10.5114/wiitm.2014.47642

[21] Šoltés, M., Pažinka, P. and Radoňak, J. (2010). Laparoskopická hernioplastika TAPP v liečbe slabinovej prietrže – 10 ročné skúsenosti, *Rozhledy v chirurgii: měsíčník Československé chirurgické společnosti*, 89(6): 384-389.

[22] Šoltés, M., Pažinka, P. and Radoňak, J. (2011). Termické lézie v laparoskopickej chirurgii, *Endoskopie*, 20(1): 14-16.

[23] Szabo, S. and Sidor, J. (2014). The Performance Measurement System – Potentials and Barriers for its Implementation in Healthcare Facilities, *Journal of Applied Economic Sciences*, 9(4): 728-735.

[24] Szczygieł, N., Rutkowska-Podolska, M. and Michalski, G. (2014). Information and Communication Technologies in Healthcare: Still Innovation or Reality? Innovative and Entrepreneurial Value - creating Approach in Healthcare Management.*5 th Central European Conference in Regional Science – CERS*, 2014, pp. 1020-1029.

[25] Zelený, T. and Bencko, V. (2015). Healthcare System Financing and Profits: All That Glitters is Not Gold, *Central European Journal of Public Health*, 23(1):3-7.

*** IBM SPSS Decision Trees 19 (2010).

APPENDIX 1

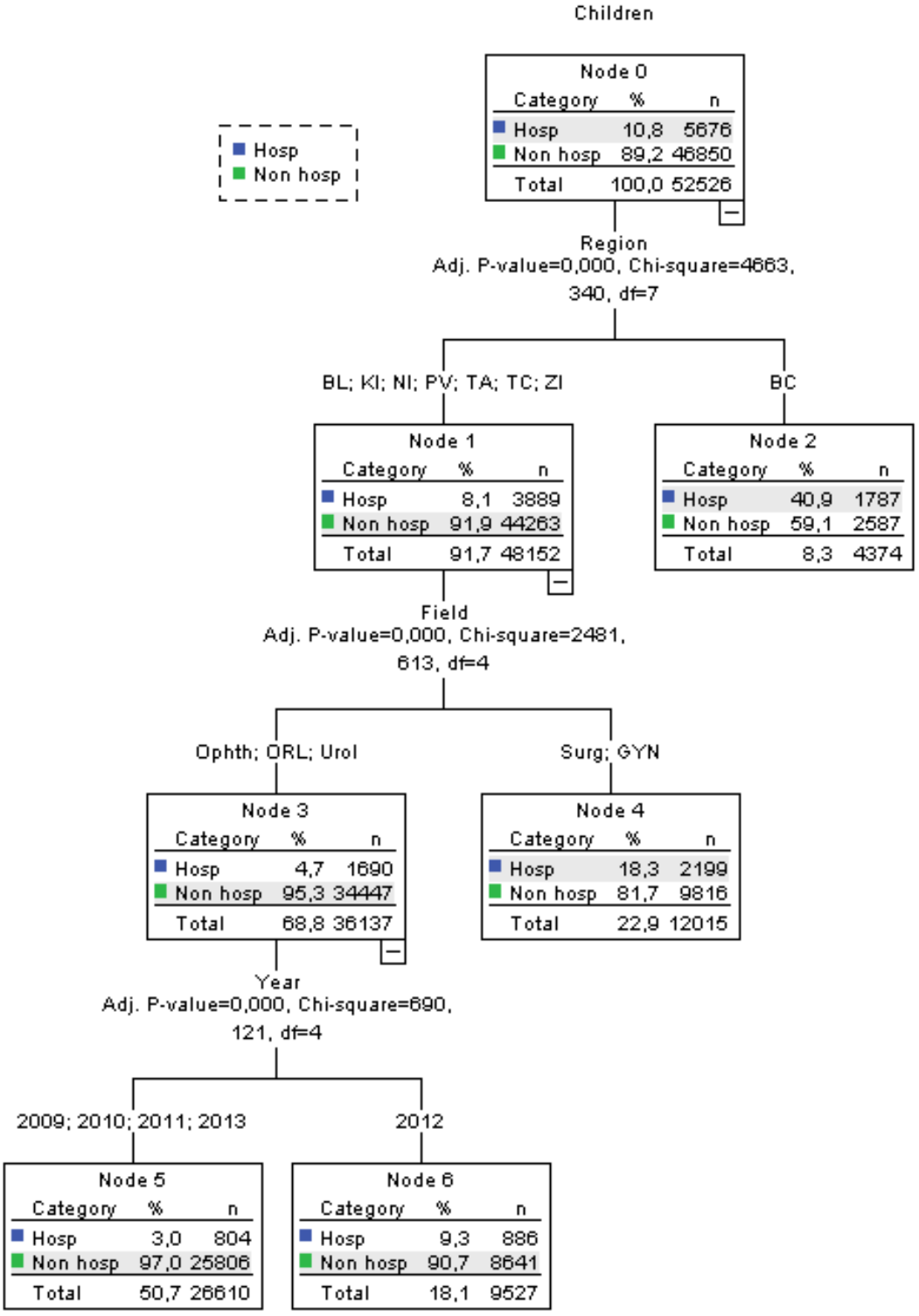

Figure 1 - QUEST decision tree of pediatric day surgery hospitalisation rate

Appendix 2

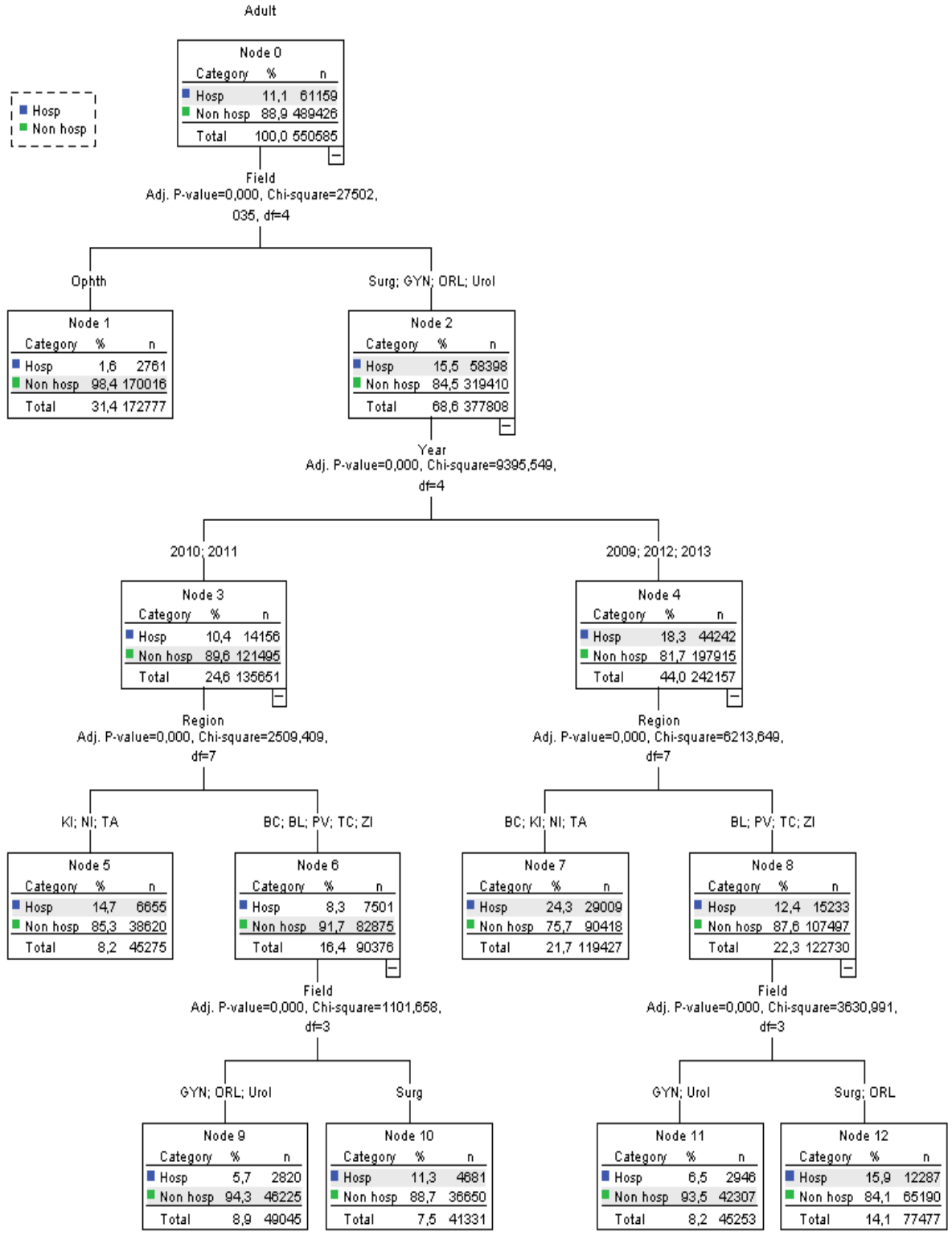

Figure 2 - QUEST decision tree of adult day surgery hospitalisation rate

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Enterprise Investment Attractiveness Evaluation Method on the Base of Qualimetry

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Abstract:

Evaluation of investment attractiveness is very important either for inner or for outer users. The outer users are primarily presented by investors, who want to identify the most prospective projects to invest in; the inner users are interested in revealing «problem areas» and working out managerial decisions for the purpose of raising the level of investments attractiveness. At the same time there are a lot of enterprise investment attractiveness evaluation methods that cover only quantitative factors, which are nonsufficient for receiving an adequate result. If a method takes into consideration both quantitative, and qualitative factors, such evaluation presupposes an expert survey, and, nevertheless, the expert is not always supplied with all the needed information. A method of enterprise investment attractiveness evaluation on base of qualimetry is presented in the article, which allows taking into account qualitative and quantitative factors, and the evaluation result is presented as a numeric value.

Keywords: enterprise investment attractiveness; evaluation; qualimetry.

JEL Classification: D92, G11, G31.

1. Introduction

Implication of different techniques of enterprise investment attractiveness evaluation involves usage of various methods of analysis ranging from expert survey to multivariate regression model, although the result of all the models is creating of an integral index. The difference in the results obtained is derived from the adequateness of the model itself and the factors included in the evaluation.

While selecting factors for enterprise investment attractiveness evaluation authors more often choose exceptionally quantitative factors, hence they are easier to assess to create a mathematical evaluation model. Taking into consideration that not all the factors affecting enterprise investment attractiveness are included in an evaluation model, it cannot be safe to say that the evaluation method comprehensively characterizes the level of investment attractiveness.

If a model includes not only quantitative, but also the qualitative factors, the most commonly encountered method of processing of such data is presented by expert surveys. The method has substantial drawbacks: while comparing great quantity of enterprises it takes a major labor contribution; an expert doesn't always possess the information on potential investment objects.

2. Brief literature review

Issues of enterprises investment attractiveness evaluation were elaborated by such scientists as Goncharuk A.G. and Karavan S. (2013), Aminov K., Kossukhina M., Valinurova L., Endovitskiy D., Zakshevskiy V., Kontorovich S., Kreynina M., Krylov E., Moskvin V., Topsakhalova F., Svetovtsev M., Sevryugin Y., Falkovich E., Shchiborshch K. and others. Theoretical aspects of qualimetry and expert evaluations used in the research were reflected in papers of Azgaldov G. (1972), Galeev V., Nedbay A., Subbeto A. and others.

Despite the great number of literature references, no consistent approach to enterprises investment attractiveness evaluation, taking into consideration both the quantitative and qualitative parameters, has been worked out. In this regard, the goal of the research is to develop a method of enterprises investment attractiveness evaluation on the base of qualimetry.

3. Main text

As long as enterprise investment attractiveness is a quantified unity of quantitative and qualitative properties of an enterprise, it is possible to apply a qualimetric approach for investment attractiveness evaluation. Qualimetry is a scientific theory, studying methodology and problems of complex quantitative evaluation of quality of objects of whatever nature (animate or inanimate; objects or processes; products of labor or products of nature) having a material or spiritual character, artificial or natural origin (2014).

Special feature of reproduction in agriculture is conditioned by specificity of production process. Hence the main mean of production is land therefore capital expenditures are required to improve quality of soil. Unfavorable weather conditions are the major obstacle to obtain heavy yield for crop husbandry and provision of fodder for animal husbandry; this conditions also results in extra expenditures for capital farm construction, heating systems etc. Besides the production process is obviously seasonal, highly fund-intensive therefore it makes, ceteris paribus, operation of the industry enterprises more capital intensive with long period of recoupment and with higher risks.

The author determined factors influencing the agricultural enterprises' investment appeal (Figure 1) required to provide continuity of the reproduction process; besides the indirect factors (economic, technological, social, political conditions of operation) influencing the investment appeal in every industry it is necessary to take into considerations factors of direct influence (natural and climate conditions, state support for the industry, economic potential of the agro-industrial complex sector, level of agro-industrial integration) conditioned by the industry specificity.

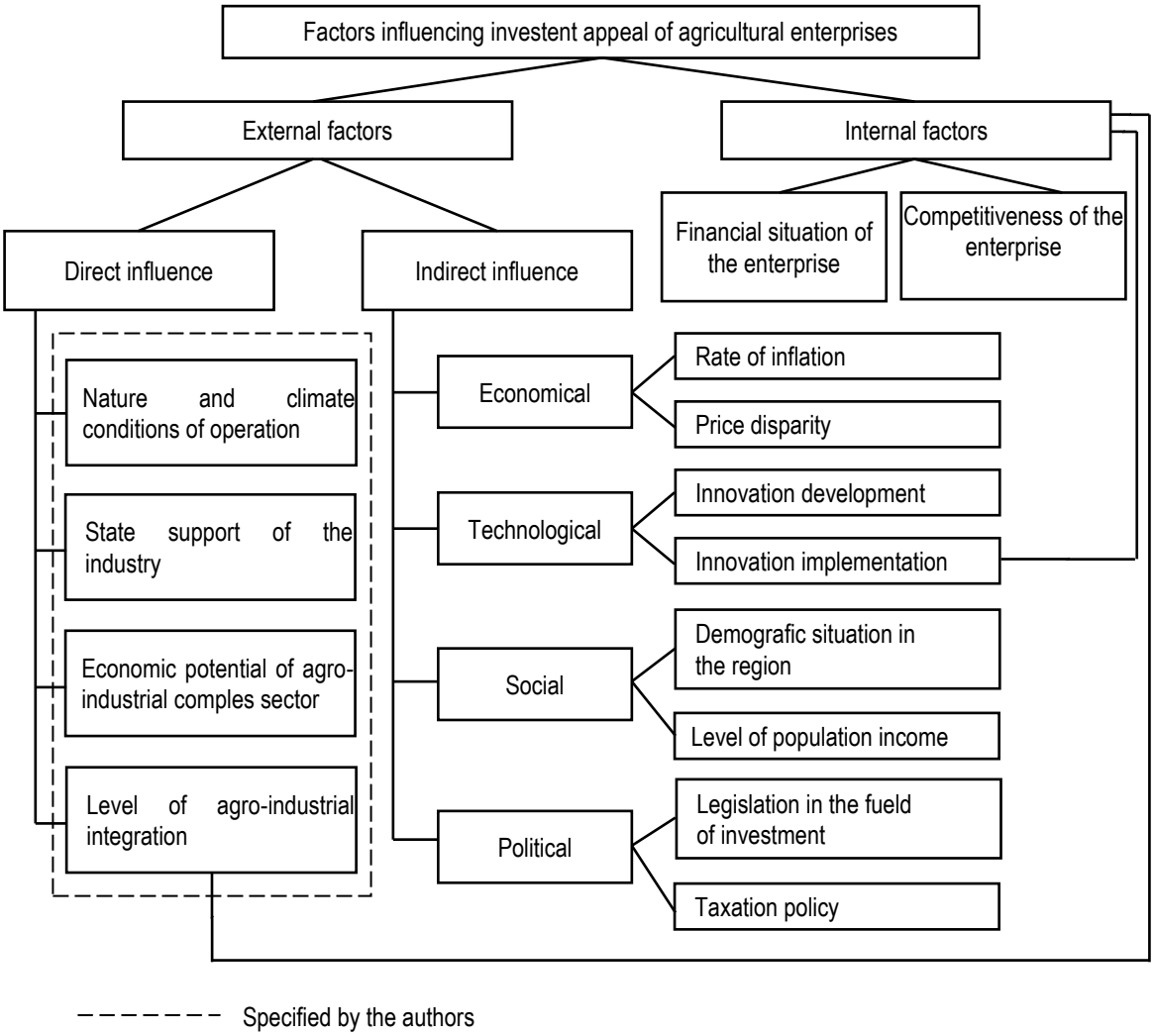

Figure 1 - Factors influencing the agricultural entreprise investment appeal

Necessity of the government support for the industry enterprises is determined by specificity of agricultural production, vitally essential products and conditions required for stimulation of reproduction process. Economic

potential serves as an overall assessment of potentialities within the application process of existing resources, at that it is important to assess economic potential of the enterprise agro-industrial complex sector making possible to assess the enterprise potentialities as well as the sector potentialities.

Agro-industrial integration of the enterprises positively influence on the reproduction process since this type of consolidation allows to reach operation sustainability, extend product markets and sell products on favourable terms.

Therefore, specification and classification of factors makes it possible to characterize investment attractiveness of agricultural enterprises in an integrated manner.

Existing methods of investment attractiveness evaluation are not always appropriate for agricultural enterprises, they are focused on one user and disregard specific quantitative and qualitative factors: climate and environmental conditions of economy management, a level of governmental support of the sector, economic potential of AIC sub-complex, financial state and competitive ability of an enterprise.

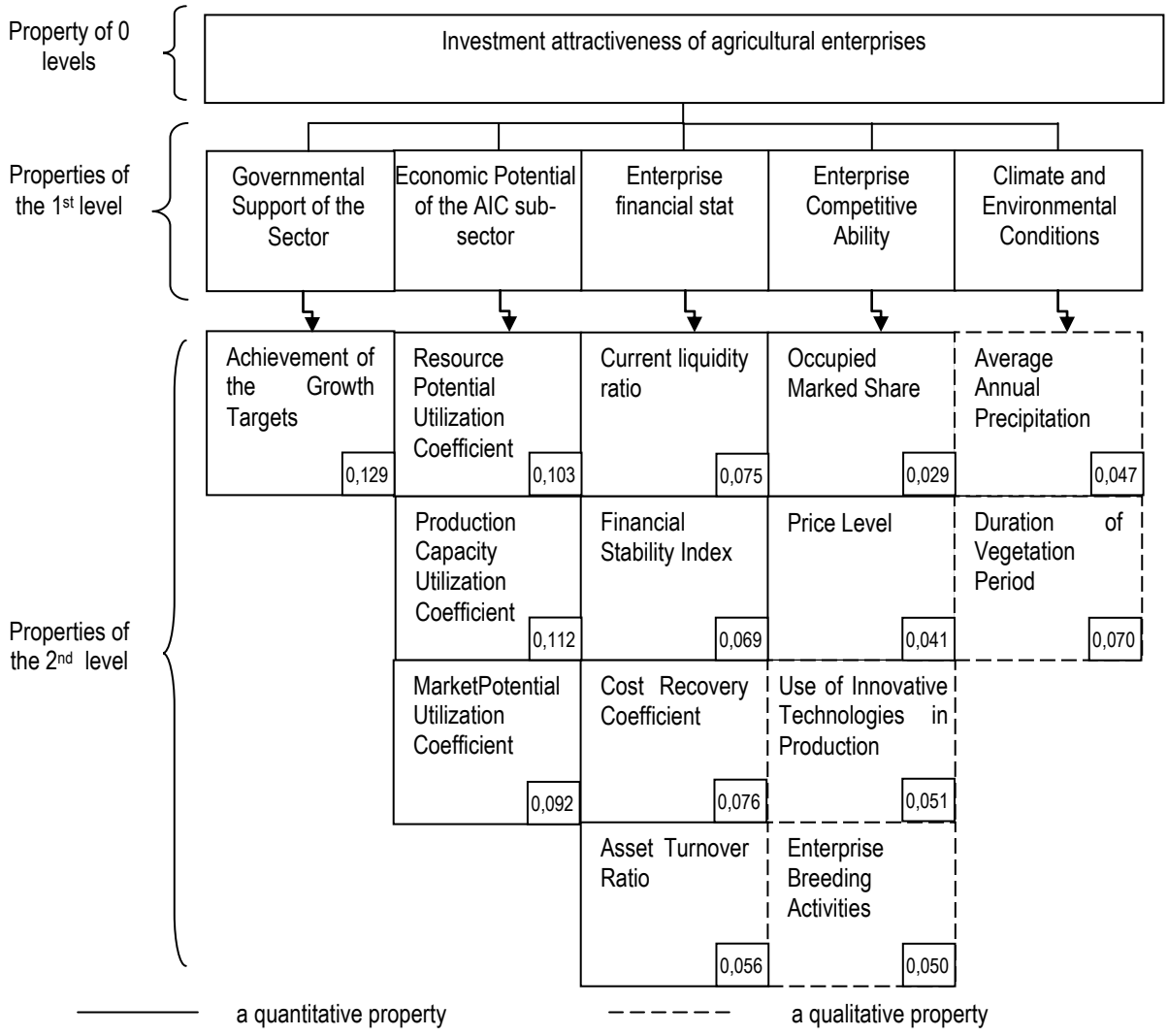

Figure 2 - Hierarchic «tree» of properties of qualimetric model for investment attractiveness evaluation of agricultural enterprises with significance coefficients

In this regard, the author revised the method of investment attractiveness evaluation of agricultural enterprises on the base of qualimetric approach, where the basis is presented by a hierarchic «properties tree » (Figure 2), on the first level there are the specified factors, determined by the sector profile, the second level – quantitative and qualitative aspects, which characterize the properties of the first level.

Significance of the properties of the first and the second level was identified on the base of expert survey of strategic and financial investors, which allowed working out an integral index of investment attractiveness evaluation of agricultural enterprises.

The algorithm of the revised method of agricultural enterprises investment attractiveness evaluation on the base of the qualimetric approach includes the following steps:

- defining the actual value of quantitative and qualitativeindexes, presented in Figure 2;
- revaluation of various quantitative and qualitative factors to single consistent measuring scale with the aid of point rating system (Table 1);
- calculation of integral coefficient of enterprise investment attractiveness (EIAC) with account for significance coefficients (Figure 2) by formula:

$$EIAC = \frac{\sum_{i=1}^{n} K_i * X_i}{X \max}, \quad (1)$$

where, i = 1,2,3…n – number of factors; K_i - integral significance coefficient of factor i; X_i – factor *i* point rating; Xmax – maximum possible total point rating.

Table 1 - Point rating of agricultural enterprises investment attractiveness factors

Property	Point rating
Achievement of the Growth Targets specified in the Development Programme	Target achievement higher than 102% (3 p.); target achievement is 98-102% (2 p.); failure to achieve targets (1 p.)
Resource Potential Utilization Coefficient	More than 0,7 (3 p.); 0,4 to 0,7 (2 p.); less than 0,4 (1 p.)
Production Capacity Utilization Coefficient	More than 0,7 (3 p.); 0,4 to 0,7 (2 p.); less than 0,4 (1 p.)
Market Potential Utilization Coefficient	More than 0,7 (3 p.); 0,4 to 0,7 (2 p.); less than 0,4 (1 p.)
Current liquidity ratio	1,5 to 3,5 (3 p.); more than 3,5 (2 p.); less than 1,5 (1 p.)
Financial Stability Index	0,6 to 0,9 (3 p.); more than 0,9 (2 p.); less than 0,6 (1 p.)
Cost Recovery Coefficient	More than 1,25 (3 p.); 1,0 to 1,25 (2 p.); less than 1,0 (1 p.)
Asset Turnover Ratio	More than 1,0 (3 p.); 0,3 to 1,0 (2 p.); less than 0,3 (1 p.)
Occupied Marked Share	More than 20% (3 p.); 10% to 20% (2 p.); less than 10% (1 p.)
Price Level	high (3 p.); middle (2 p.); low (1 p.)
Use of Innovative Technologies in Production	Innovative technologies are used throughout the production process (3 p.); use of innovative technologies in some stages of production process (2 p.); innovative technologies are not used in production (1 p.)
Enterprise Breeding Activities	enterprise with the «pedigree breeder» status (3 p.); breeding activities without the status (2 p.); lack of breeding activities
Average Annual Precipitation	400-600 mm per year (3 p.); 300-400, 600-700 mm per year (2 p.); less than 300, more than 700 mm per year (1 p.)
Duration of Vegetation Period	more than 150 days (3 p.); 100-150 days (2 p.); less than 100 days (1 p.)

4. Application functionality

Depending on the level of investment attractiveness coefficient, enterprises are subdivided into: investment-attractive enterprises (EIAC more than 0.75), potentially attractive enterprises (EIAC more than 0.5 and less than 0.75), investment-unattractive enterprises (EIAC less than 0.5), for the purpose of identifying characteristic features of each group.

Thus, investment-unattractive enterprises are characterized by unprofitability of the main activity attributable to low soil quality, ineffective production setup, high level of self-cost; bad financial state and inability to pay for obligations incurred; low level of competitive abilities due to insignificant market share; high level of consumption of assets; lack of qualified personnel.

There are two types of enterprises included in the second group «Potentially investment-attractive enterprises», the first type comprises enterprises with good financial state, but low level of competitive abilities. Such enterprises are characterized by lack of sales areas that brings on decrease in price. Usually, some of the enterprises are engaged in breading activities without the status «pedigree breeder». The enterprises purchase young breeder, but fail to supply it with quality feed-stuff in accordance with feeding technology, and are unable to create conditions for high quality animal management because of insufficient physical infrastructure.

The other type of enterprises, included in the second group, is presented by competitive enterprises with insufficient financial state. As a rule, these are the enterprises, «shifted» to the closed production cycle; they sell manufactured goods at high price, have established sales areas, are engaged in breeding activities with the

«pedigree breeder» status, and use innovative technologies in production process. As long as proprietory funds are not sufficient for replacement of fixed assets and implementation of innovative methods, the enterprises actively use borrowed funds with high debt ratio, which brings on inability to cover them with proprietory funds, which is, consequently, detrimental to their financial state.

It is important for the Investment-attractive enterprises to focus not only on working out quality investment projects, but on viewing them from the standpoint of investors.

Conclusion

Therefore, the proposed method of investment attractiveness evaluation of agricultural enterprises on the base of qualimetric approach takes into account sectoral factors characterized by quantitative and qualitative indexes; it is oriented to different groups of users: investors – for pinpointing the most prospective investment projects, enterprises – for evaluation the level and dynamics of their investment attractiveness, and revealing «problem areas», the State – for identifying the way the developed support programmers affect the investment attractiveness of enterprises .

The division of enterprises by level of investment attractiveness made it possible to specify the main problems attributed to each group. In this regard, development of a differential approach to upgrading investment attractiveness of enterprises is considered to be of a particular interest.

References

[1] Azgal'dov, G.G. (2010). Kvalimetriya: initial data. *Moscow: Standards Hhigher School.*

[2] Azgal'dov, G.G. and Rajhman, Je. P. (1972). *About a kvalimetriya*. Standards Publishing House.

[3] Goncharuk, A.G., Karavan, S. (2013). The investment attractiveness evaluation: methods and measurement features. *Polish Journal of Management Studies*, 7:160-166.

[4] Ilina, E.A., Tyapkina, M.F., Domanova, E.O. (2014). Analysis of Agricultural Enterprise Investment Appeal Factors. *Life Science Journal,* 11(12): 873-877, http://dx.doi.org/10.7537/marslsj111214.15

The Behavioral and Social Implications of Sequential GroupLending: A Multi-agent comparative Approach between ROMCA, Debt Financing and ROSCA

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Abstract:

In this research we study complexity and how it affects social value creation in a small microeconomic environment. We compare a new model of musharakah called ROMCA with debt financing and ROSCA as three sequential group lending systems using Net logo as multi-agent environment. We found evidence that the new model of musharakah can dominate debt financing in terms of employment creation, consumption, wealth creation even under risks of adverse random shocks. We also found evidence that the new model of musharakah can be better for tax authorities in terms of quicker tax recovery.

Keywords: Conditional collaborative reinvestment Musharakah, charity, altruism, employment, social value, moral hazard.

JEL Classification: C7, G02, G24, G17.

1. Introduction

In group lending, the borrower has a joint liability for the repayment of their loans. The group is considered in default if at leas tone of them does not fulfil the obligations of repayment. The fact that each borrower guarantees his groupmates helps in reducing asymmetric and moral hazards problems.

Our model however is based on a rotating musharakah with credit association, hence named later ROMCA, where funds are handed over to the other entrepreneur after a roll-over period of work. The profits are then shared between the financial operator and the entrepreneurs on one hand according to a predetermined ratio and then shared between the financial operator and investors who provided the fund according to another sharing ratio. We use a net-logo simulation to compare the robustness of our model against other modes of financing specifically ROSCA and standard debt financing.

Our paper will proceed as follow: In section 2 we provide a literature review about what was achieved in group-lending and what are the agency problems associated with debt financing, ROSCA and Musharakah. In section 3, we present the three models including our ROMCA model. In section 4, we present the methodology. In section 5, we present the results of our simulation. In section 6 we provide a discussion of the outcomes. Finally the last section will conclude with some possible venues of extension.

2. Literature review

A laboratory experiment was done in a Peruvian market and found that joint liability stimulates risk-taking when borrowers know the investment strategies of co-borrowers (Giné *et al.* 2010). In line with this findingitwasalsofoundthatunder limited information, group liability stimulates risk-taking as borrowersactas free-riders on the insurance provided by co-borrowers. (Fisher 2011)

To assess the impact of switching from individual to group lending an experiment was done on an Indian MFI there was evidence that the repayment rates improved significantly. (Cole *et al.* 2011) The impact of group-lending on consumption was studied in Bangladesh used in an experimental approach (Khandker 2005). There was an evidence found that group lending has improved consumption. To assess the impact of micro credit on business creation, a study found that microcredit increased entrepreneurship (Karlan and Zinman 2011). In line with study, group lending in rural Morocco has been shown to have a positive impact on the expansion of pre-existing entrepreneurial activities (Duflo *et al.* 2007). Another study investigated access to group micro credit in the Indian city of Hyderabad (Banerjee *et al.* 2013). It was found that business creation and investment has improved. However mixed negative and positive results regarding the impact on consumption were recorded.

However the semicrocredit lending is not acceptable from an Islamic jurisprudence point of view as the yentailusury (Karlan and Zinman 2011). To compare a standard GRAMEEN Bank model with ROSCA - model a lab- oratory experiments in rural areas in Egypt has been conducted (El-Gamal 2014). It was found that, in

comparison with the GRAMEEN-Bank the insured-ROSCA model has higher rates of take-up, and atleast as high rates of repayment. In line with this research another one (Ambec and Treich 2007) showed that ROSCAs are similar to other mechanisms in terms of savings improvements and poverty alleviation. The efficiency of various ROSCA mechanisms were analysed concluding that some types of ROSCAs enhance welfare. (Besley *1992)*

There are some important points to note about musharakah: Musharakah contracts suffer from the risk of misreporting and under declaration of profits by the agent. To overcome this problem, it is argued that there should be a higher due diligence from the part of the Islamic institutions as compared to conventional banks (Al-Suwailem 2006). In our model, we allowed for monitoring as a mechanism to reduce moralhazard. We also allowed for training as a mechanism to improve performance.

Inconventional system banks can use collateral in debt contracts to over come information asymmetries, in particular arising fromex-ante adversese- lection (Berger *et al.* 2011). To overcome the problem of information asymmetry, Karim (2002) proclaims that the submission of a warranty can resolve the adverse selection problemin a profit and loss contract. Unlike its conventional counterpart, however, the Islamic financial operator under ROMCA can not make recourse to warranties in case of projects failure. Never the less, it permissible, from a Shari'ah point of view, to make recourse to warranties in case of negligence or breach of contract.

Moral hazards as a form of information asymmetry can be reduced via information sharing. In fact, credit bureaus have been shown to increase efforts from borrowers (Padilla and Pagano 1997). Information sharing is useful if borrower mobility is higher (Pagaon and Jappelli 1993) and if asymmetric information problems are more important (Brown and Zehnder 2010). Empirical research has shown that, information sharing is correlated with higher access to credit (Pagaon and Jappelli 1993), especially in developing countries with inefficient creditor rights (Djankov *et al.* 2007), but lower lending to low-quality borrowers (Hertzberg 2011). In our ROMCA model, the credit bureau soreven consultancy firms can beused for monitoring purposes in case the financial operator lack the expertise in monitoring. However this might entail a high cost. In our model this high cost can be mitigated by high a tax subsidy for monitoring.

The unfair distribution of profits in case the project fails can be asource of agency problems (Shaikh 2011). The financial institution may then demand a higher share of the profits to compensate for the higher risk. This however induces the agent to be less motivated and there fore results in lower projects profits (Shaikh 2011). In our model, we allow for the flexibility in changing the sharing ratio to fit the requirement of the entrepreneurs. More than that, our model suggests the provision of an altruism bonus for the entrepreneur with high performance compared tohis co-entrepreneur. The altruism bonus is to be reinvested in new projects, allowing the entrepreneur more profit generation. This altruism bonus also proved in our model to be very effective in generating new employments especially if the number of enterprises financed is high.

Enforcing low job protection can be equivalent to demand inghighpledged collateral i.e. a confident manager will demand a high reward in case of success but also signs for alow job protection incase of failure. This is consistent with previous research as in (Subramanian 2002). This is an unfair treatment as the Low job protection may penalize the entrepreneurs for projects failure which might be due to circumstances beyond his/her control. This is indeed against the musharakah objectives of affair sharing of profits and losses (Usmani 2002).

In our ROMCA model however, the entrepreneur is in fact offered more job protection as his generated profitis re-invested in other projects allowing him to get returns from his work and from the work of others who are using his funds. Also, our model, proved to be solid even under adverse market conditions allowing for more market stability.

Are search suggests that moral hazard can be solved under Mudaraba but cannot be solved under musharakah (Yousfi 2013). This can be criticized in a sense that under Mudaraba the financier provides the whole capital and there fore assumes all monetary risks while under musharakah the capital is shared and intuitively the risk of losing capital is shared (ELFakir and Tkiouat 2015a). This criticism is in line with theoretical findings which argue that moral hazards can be reduced given a minimum capital contribution of the entrepreneur (Nabi 2013). This criticism is also in line with a study that argues that sharing contract is not feasible in case of total external financing of the project (Innes 1990).

Another paper (ELFakir and Tkiouat 2015b) proposed the use of an effort based contract rather than an output contract to educe asymmetric information. The paper found theoretical evidence that an effort based contract offer better incentives to the agent by giving him a high part of profit. The result also emphasizes the ethical sentiment of altruism.

Another study (ELFakir and Tkiouat 2015c) tried to reduce asymmetric information by providing two types

of contracts. It was found that under an asymmetric case a lower (less risky) type value can result higher social value. Menu offering is found not to be the ultimate solution for agent's types' separation.

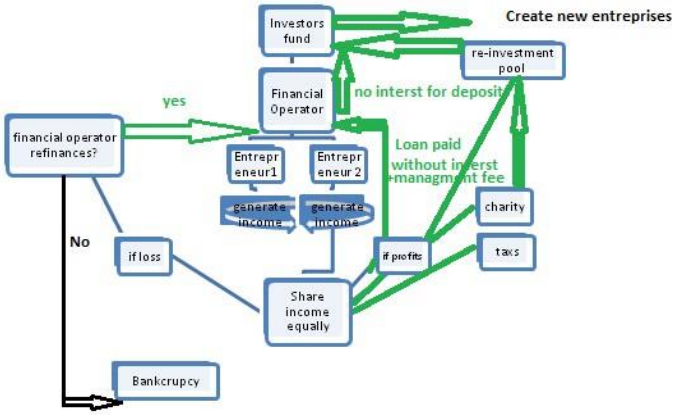
Also, it is proposed that the entrepreneur's participation in the capital can reduce information asymmetries in a profit and loss contract (Karim 2002). Consistent with this finding, and to induce the entrepreneur to exert high effort and therefore reduce moralhazard, are search suggested a minimum capital contribution by the entrepreneur given a minimum profit sharing ratio (Nabi 2013). In our Model, we allow for the entrepreneur to contribute with a personal wealth collectively with others. This has two important features. First, each entrepreneur will co-monitor the other ashek nows that his personal capitalis in the hands of hisco-worker. Second, an entrepreneur would hand over his capital to his co-worker only if a high trust is in place.

One study has argued that to take into consideration the effort of the entrepreneur compared to that of the financier, two profit sharing ratios has to beused (Maheran 2010). This model however can be criticized in a sense that it does not deal with asymmetric information.

3. The model

Our model involves an even number of entrepreneurs *Ne* endowed with an initial wealth W_0 who are engaged in sequential group lending and need extra funding f_0. The lender is a financial operator who gets the extra funding in its turn from depositors.

3.1 The model under ROSCA



3.2. The model under debt financing

If the financial operator is a conventional operator, it lends money at an interest rate *rl* and rewards the depositors at an interest rate *rd*. under this model the financial operator does not engage into any form of training to entrepreneurs and does not organize the collection of charity Z.

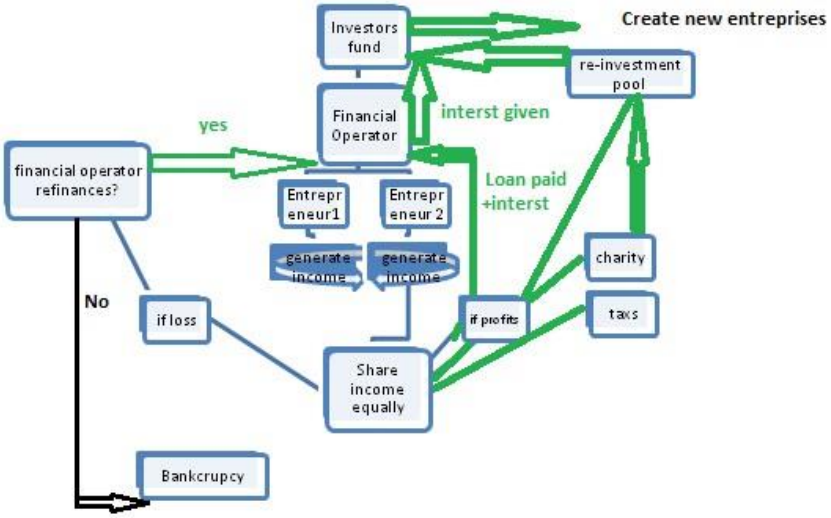
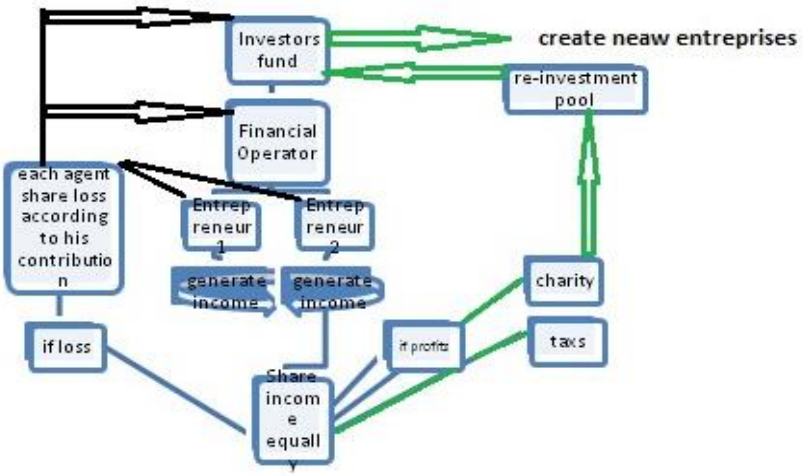


Figure 2: The model debt financing

3.3. The model under rotating Musharakah with credit association ROMCA



If the financial operator is an Islamic operator, it shares profits at *αe* with entrepreneurs and at *αd* with depositors. The sharing of losses to the entrepreneur is at:

$$\beta e = \frac{\text{Wo}}{\text{Wo+fo}}$$

And the sharing of losses to the depositors is at:

$$\beta d = \frac{\text{Wo}}{\text{Wo+fo}}$$

Under this model the financial operator is engaged into providing training and collecting charity. The charity to be collected however is of productive nature where the funds collected are used for employment creation. The financial operator also provides an altruism bonus *Ab* for entrepreneurs with higher output than their peers. The training is estimated to lead to a learning-factor *L* leading to highr productivity. The financial operator is also engaged in monitoring to ensure lower moral hazards from the entrepreneurs. However, the monitoring has a cost *Mc* and characterized by a certain level of efficiency *Meff.*

4. The methodology

What need to be simulated?

Under each model we simulate the following:

- The output for each entrepreneur;
- The profit for the entrepreneurs, the financial operator and the depositors/investors;
- The refinancing-cost when profit is negative;
- Training cost;
- Total wealth created;
- Tax-fund generated;
- Charity fund generated;
- Consumption-level;
- Time for tax authorities to start generating funds (tax-break-even-time);
- Monitoring-cost;
- Altruism bonus given;
- New investors – created;
- New enterprises-created;
- New employment rate.

The simulation under each model takes place using two scenarios: the honest case where entrepreneurs report truly their outputs; and the moral hazard case where entrepreneur make false reports.

Parameters needed for simulation

We need different parameters to run our simulation. They are organized into general parameters, monitoring and training parameters, and behavioural parameters

General parameters

- The combined initial wealth of each pair of entrepreneurs. This wealth serves as the entrepreneurs'contribution in the project.
- The required-fund: this serve as the additional fund required to run the project.
- The initial-entrepreneurs: this serve as the total number of entrepreneurs.
- The roll-over-period: this serves as the time each entrepreneur work before handing the funds to the other entrepreneur to start work.
- The working-period: this serve as the time when both entrepreneurs have worked. I.e each working period contains two roll-over periods.
- Daily-unit-sales and price: this represents the estimated units to be sold at a certain price depending on specific projects.
- Employees-per-enterprise: this allows for the designation of a certain number of employees for each enterprise. This can also be estimated depending on projects characteristics.
- Initial-unemployed: this represents the estimated number of unemployed in a certain community.
- Tax-rate: to allow for tax imposition.
- Random-shock-chance: this gives the model a more realistic approach as it allows for the probability of having an adverse impact on the enterprise profits due to negative market conditions. In this model, it is assumed that as negative random shocks chance is high, the less the entrepreneurs become willing to reinvest their profits with other entrepreneurs.
- Bank-sharing-ratio-with-entrepreneurs: this ratio refers to the rate of profits taken by the financial operator from the profit realized by the entrepreneurs.
- Bank-sharing-ratio-with-investors: this ratio refers to the rate of profits taken by the financial operator from the profit realized by the entrepreneur. The rest will be redeemed of the investors.
- Lending-rate and deposit-rate: these represent the rates at which the financial operator charges for loans and compensates for deposits.

Monitoring and training parameters

- *Ratio-of-training-time-to-working-period:* this represents the represent the estimated rate of time from the total working period that it will take to train the entrepreneurs to achieve better performance.
- *The monitoring-efficiency:* this represent to what extent monitoring is efficient in reducing moral hazards
- *Monitoring-cost:* this represents the ratio of monitoring cost from the required fund. The higher is the extra required fund. The more is monitoring required?
- *Tax-subsidy-for-monitoring-and-training:* this represents the percentage that the tax authorities may choose to subsidize training and monitoring. In fact it is assumed that the subsidy of monitoring, allows for better profit reporting and therefore, better tax collection. Also it is believed, that subsidizing training allows for better performanceandthereforehigher taxcollection.
- *Training cost:* this also represents the percentage of training from the required fund. Higher required fund requires high amount oftraining.
- *Learning factor:* this represents the extent to which an entrepreneur excels in his job from one period to another via training.

Behavioral parameters

- *Altruism benefits:* this represents a percentage of the excess performance of one entrepreneur in excess of the other.This altruism benefit is given to the entrepreneur because of his superior performance and his willingness to share profit equally with the other entrepreneur.
- *The propensity-to consume:* this represent the amount of net profit to be consumed.
- *Charity-rate:* this represents the rate of profits that was agreed to give as charity. The purpose of charity has productive reasons. In fact it is used as a vehicle for the creation of other enterprises.
- *Entrepreneurial-motivation:* the profits generated are to serve in the creation of new investors who are willing to extend their funds to new entrepreneurs. However not all new investors created result in new entrepreneurs created. This depends on whether we have new entrepreneurs who have the will and the motivation to start an enterprise.

- *Moral Hazard:* this represents an estimated probability that the entrepreneurs will false report their results.

5. Results

The following tables show our results for the three modes of financing. The following parameters were used for the simulation:

General parameters

- The combined initial wealth of each pair of entrepreneurs = 15,000;
- The required-fund: 30,000;
- The initial-entrepreneurs: 40 i.e. 20 pairs;
- The roll-over-period: 7 days. Each entrepreneur work 7 days and then hand over the proceeds to the other entrepreneur to work for another 7 days;
- The working-period: 130 working-periods;
- Daily-unit-sales: 100 units;
- Employees-per-enterprise: 2;
- Initial-unemployed: 1,000;
- Tax rate 30;
- Random-shock-chance: 80;
- Bank-sharing-ratio-with-entrepreneurs: 25;
- Bank-sharing-ratio-with-investors: 12;
- Lending-rate and deposit-rate: 10;
- Deposit-rate and deposit-rate: 5.

Monitoring and training parameters

- Ratio-of-training-time-to-working-period: 16;
- The monitoring-efficiency: 70;
- Monitoring-cost: 1;
- Tax-subsidy-for-monitoring-and-training:18;
- Training cost: 20;
- Learning factor: 10.

Behavioral parameters

- Altruism benefits: 5.
- The propensity-to consume: 30.
- Charity-rate: 2.5.
- Entrepreneurial-motivation: 80.
- Moral Hazard chance: 35.

Monitoring and training parameters

- Ratio-of-training-time-to-working-period: 16.
- The monitoring-efficiency: 70.
- Monitoring-cost: 1.
- Tax-subsidy-for-monitoring-and-training: 18.
- Training cost: 20.
- Learning factor: 10.

Behavioral parameters

- Altruism benefits: 5.
- The propensity-to consume: 30.
- Charity-rate: 2.5.
- Entrepreneurial-motivation: 80.
- Moral Hazard chance: 35.

5.1. Simulation of out comes under low market prices

In this approach, we select a low price and test its effect under high and low chance of adverse random market conditions respectively. The price chosen is 13.

Table 1 – simulation out come under high chance of adverse random market conditions and low market price

SUBJECT	ROMCA	Debt − finance	ROSCA
Profit – bank %	1.18	63.00	11.44
Profit – investor %	22.00	7.15	0.00
Profit−entrepreneur1	37.50	14.00	44.00
Profit − entrepreneur2	41.12	14.00	44.00
T otal – wealth	2,663,897.00	2,469,632	1,850,199
T ax – fund	1,599,202.00	1,483,856	1,104,611
Consumption	1,122,369.00	1,038,699	773,228
Tax − recovery(days)	174	187	181
Altruism – bonus	46,291	0	0
New – investors	10	3	0
New – entrepreneurs	8	2	0
Employment%	1.60	0.40	0.00

Table 2 – Simulation out come under low chance of adverse random market conditions and low market prices

SUBJECT	ROMCA	Debt − finance	ROSCA
Profit − bank%	1.46	2.54	3.01
Profit − investor%	22.00	1.48	0.00
Profit−entrepreneur1	37.5	47.98	48.49
Profit − entrepreneur2	40.56	47.98	48.49
Total – wealth	1.195*E7*	1.17291*E7*	6,902,459
T ax – fund	7,287,676	7,152,960	5,247,290
Consumption	5,104,301	5,007,072	3,673,103
Tax − recovery(days)	44	46	46
Altruism – bonus	178,086	0	0
New – investors	161	195	0
New – entrepreneurs	129	156	0
Employment %	25.8	31.2	0

5.2. Simulation of out comes under high market prices

In this approach, we select a high price and test its effect under high and low chance of adverse random market conditions respectively. The price chosen is 30.

Table 3 – Simulation out come under high chance of adverse random market conditions and high market prices

SUBJECT	ROMCA	Debt − finance	ROSCA
Profit − bank%	1.44	6.48	4.25
Profit − investor%	22.00	2.54	0
Profit−entrepreneur1	37.50	45.48	47.00
Profit−entrepreneur2	40.61	45.48	47.00
Total – wealth	6,923,305	6,703,198	4,932,489
T ax – fund	4,207,918	4,076,360	2,992,340
Consumption	2,947,845	2,853,490	2,094,638
Tax − recovery(days)	73	78	76
Altruism – bonus	104,555	0	0
New – investors	26	27	0
New – entrepreneurs	21	21	0
Employment%	4.2	4.2	0

Table 4 – Simulation out come underlow chance of adverse random market conditions and high market prices

SUBJECT	ROMCA	Debt − finance	ROSCA
Profit − bank%	1.45	0.79	0.99
Profit − investor%	22	0.58	0
Profit−entrepreneur1	37.5	49.3	49.5
Profit − entrepreneur2	40.60	49.3	49.5
Total – wealth	2.86*E7*	2.87*E7*	2.09*E7*
T ax – fund	1.75*E7*	1.75*E7*	1.28*E7*
Consumption	1.22*E7*	1.23*E7*	8962421
Tax − recovery(days)	18	18.49	18
Altruism – bonus	433128	0	0
New – investors	396	503	0
New – entrepreneurs	317	403	0
Employment%	63.4	80.6	0

6. Discussion

The results of the simulation show some important facts:

- In term softax-break-even: its eems that the tax authorities start tore- covering tax proceeds quicker under ROMCA than under debt financing and ROSCA. Two reasons can be stated as an explanation. For debt finance, it benefits from tax shield on interest payments and therefore delaying tax recoveries. For ROSCA, there is no training that takes place and therefore lower performance is achieved resulting in lower tax-recipe and therefore slower recovery oftaxes.
- It also seem that under high adverse random shocks, rotating musharakah seem to be able to create employment opportunities better than the conventional counterpart at lease under low markets prices.
- Charity-rate: more ability for employment creation as charity rises. This case is even apparent under negative random shocks.
- Altruism: the role of the altruism bonus seems to be of great importance under adverse random shocks. In fact it helps in creating employment opportunities better than the conventional system.
- Monitoring has a positive impact on outcomes. Most importantly on taxes. More monitoring, means lower moral hazards chances and therefore high taxes recipe. This is another reason for financial operators to ask for tax subsidy for monitoring.
- Training and learning factor seem to be benefiting debt finance, and rotating musharakah equally likely
- Rotating musharakah seems to have better consumption level than debt financing and ROSCA even under adverse random shocks and charity given by entrepreneurs. This can be explained partially because of the interest based refinancing cost under debt financing. In Islamic finance one cannot charge interest for refinancing.
- ROMCA seem to be able to generate better employment level even under deflationary prices compared to debt financing and ROSCA.
- In projects with low prices level, there is a clear unfair distribution of profits. The financial operators, who act simply as an intermediary, seem to take the largest portion of profits. On the other hand whether underlow or high prices ROMCA seem to give more equitable profit distribution to the participants.
- Underlow chance of adverse random conditions and high prices, we can note the superiority of debt-financing in terms of employment generation. We can still note however the disparity in returns for the participants under debt financing. ROSCA seem to be the least in terms of an equitable distribution of returns, wealth, and tax and consumption generation.

Conclusion

In this research we have tried to compare three financing models under different market conditions and price levels. We have found that the ROSCA model due to its non collaborative investment feature have no power in new employment generation. Our rotating musharakah model, ROMCA, seems to prevail against debt financing in terms of employment generation, wealth creation, and consumption. It becomes even dominant under cases of adverse random shocks with low market conditions. Debt financing on the otheriss hown to dominate both ROMCA and ROSCA interms of employment generation in cases of low chances of adverse random market conditions and high market prices.This caseisalsoapparentincasesoflowchanceofadverserandommarketconditions

and low price. We should note the importance of charity and altruism bonus in the model. The More charity and altruism given, the more are the chances of more employment generation and wealthcreation.

References

[1] Al-Suwailem, S. (2006). Hedging in Islamic finance. Islamic Development Bank Islamic Research and Training Institute.

[2] Ambec, S. and Treich, N. (2007). Roscas as financial agreements to cope with self - control problems. *Journal of development economics,* 82(1): 120–137.

[3] Banerjee, A. V., Duflo, E., Glennerster, R. and Kinnan, C. (2013). The miracle of microfinance? Evidence from a randomized evaluation.

[4] Berger, A.N., Frame, W.S. and Ioannidou, V. (2011). Tests of ex ante versus ex post theories of collateral using private and public information. *Journal of Financial Economics,* 100(1): 85–97.

[5] Besley, T., Coate, S., Loury, G. *et al.* (1992). On the Allocative Performance of Rotating Savings and Credit Associations. Research Program in Development Studies, Woodrow Wilson School of Public and International Affairs, Princeton University.

[6] Brown, M. and Zehnder, C. (2010). The emergence of information sharing in credit markets. *Journal of Financial Intermediation*, 19 (2): 255–278.

[7] Cole, S., Sampson, T. and Zia, B. (2011). Prices or knowledge? What drives demand for financial services in emerging markets? *The Journal of Finance* 66 (6):1933–1967.

[8] Djankov, S., McLiesh, C. and Shleifer, A. (2007). Private credit in 129 countries. *Journal of financial Economics* 84 (2): 299–329.

[9] Duflo, E., Glennerster, R. and Kremer, M. (2007). Using randomization in develop ment economics research: A toolkit. *Handbook of development economics* 4: 3895–3962.

[10] El fakir, A. and Tkiouat, M. (2015b). New projects sharing ratios under musharakah financing: a repeated game theoretical approch using an output versus a proposed effort based contract. *American Journal of Applied Sciences*, *12*(9): 654-662.

[11] EL Fakir, A. and Tkiouat, M. (2016c). Single or Menu Contracting: An application of the Hersanyi Model to Mudaraba Financing. *International Journal of Economics and Financial Issues*, *6*(1): 221-230.

[12] EL Fakir, A. and Tkiouat, M. (2015a). An incentive game theory approach to musharakah contracts. *Asian Journal of Applied Sciences*, 3 (4): 736–752.

[13] El-Gamal, M., El-Komi, M., Karlan, D. and Osman, A. (2014). Bank-insured rosca for microfinance: Experimental evidence in poor Egyptian villages. *Journal of Economic Behavior & Organization* 103: S56–S73.

[14] Fischer, G. (2011). Contract structure, risk sharing and investment choice. LSE STICERD Research Paper No.EOPP023.

[15] Gine´, X., Jakiela, P., Karlan, D. and Morduch, J. (2010). Microfinance games. *American Economic Journal*: *Applied Economics*, 2 (3): 60–95.

[16] Hertzberg, A., Liberti, J. and Paravisini, D., 2011. Public information and coordination: evidence from a credit registry expansion. *The Journal of Finance,* 66 (2): 379–412.

[17] Innes, R.D. (1990). Limited liability and incentive contracting with ex-ante action choices. *Journal of economic theory,* 52 (1): 45–67.

[18] Karim, A.A. (2002). Incentive-compatible constraints for Islamic banking: some lessons from bank muamalat. Islamic Finance and Banking: New Perspectives on Profit-Sharing and Risk, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, 95–108.

[19] Karlan, D. and Zinman, J. (2011). Microcredit in theory and practice: Using randomized credit scoring for impact evaluation. *Science* 332 (6035): 1278–1284.

[20] Khandker, S.R. (2005). Microfinance and poverty: Evidence using panel data from Bangladesh. *The World Bank Economic Review,* 19 (2): 263–286.

[21] Maheran, M. (2010). New musyarakah model in managing Islamic investment. *ISRA International Journal of Islamic Finance,* 2 (2): 25–36.

[22] Nabi, M.S. (2013). Access to finance and investment: Does profit sharing dominate debt? Islamic Research and Training Institute Working Paper, 1434–02.

[23] Padilla, A.J. and Pagano, M. (1997). Endogenous communication among lenders and entrepreneurial incentives. *Review of Financial Studies,* 10 (1): 205–236.

[24] Pagaon, M. and Jappelli, T. (1993). Information sharing in credit markets. *The Journal of Finance,* 48 (5): 1693–1718.

[25] Shaikh, S.A. (2011). A critical analysis of Mudarabah & a new approach to equity financing in Islamic finance. Available at: https://mpra.ub.uni-muenchen.de/19697/1/Critical_Analysis_of_Mudarabah-JIBF.pdf

[26] Subramanian, N., Chakraborty, A. and Sheikh, S. A. (2002). Performance incentives, performance pressure and executive turnover. Performance Pressure and Executive Turnover (December 23, 2002).

[27] Usmani, M.I.A. (2002). Meezan bank's guide to Islamic banking. *Research Journal of the Institute of business Administration*, p. 87.

[28] Yousfi, O. (2013). Ouidad Yousfi. Does PLS financing solve asymmetric information problems? *Journal of Islamic Economics, Banking and Finance*, 9 (3): 13-23.

Analysis of National Budget Implementation: Evidence from 2012-2014 Budgets of Nigeria

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Abstract

The paper examines national budget implementation focusing on the 2012-2014 budgets of Nigeria by juxtaposing the actual performances of the budgets against the projections. Evidence from the study revealed that macroeconomic variables (such as real GDP growth rate, inflation rate, exchange rate and crude oil production), components of revenue and expenditure failed to meet their respective budgeted figures during the period. It was also found that the proportion of actual capital expenditure in aggregate expenditure was abysmally low and capital budget implementation was awfully poor. The paper elucidated some possible causes, implications and policy options.

Keywords: national budget, revenue, expenditure, implementation.

JELClassification: H61, H20, H50, H62.

1. Introduction

The importance of government budget in the socio-economic development of a country cannot be overemphasized. This is because the national budget is the vehicle through which government allocates resources to the various sectors of the economy with a view to ensuring economic transformation. As observed by Ohanele (2010), a well-functioning national budget is vital for formulating sustainable fiscal policy and stimulating economic growth. Apart from being the most important economic policy instrument of the government, the national budget enables the government to translate government social and economic policies, political goals and promises into actions as well as make decisions about where to collect and spend funds in any given period. The national budget reveals the proposed expenditure and the expected revenue of the government for a fiscal year.

A typical budget cycle consists of four major stages namely; budget preparation, enactment, implementation and appraisal. Out of these four stages, budget appraisal is the most neglected stage. The reason is probably because the other three stages seem mandatory by law while the last stage appears not adequately backed by law. In a country that practices the presidential system of government such as Nigeria, it is the responsibility of the executive arm of government to prepare the budget in each fiscal year and send it to the legislative arm for enactment (approval). After all the necessary scrutiny and passage into law, the budget is sent back to the executive for assent and implementation. During and after implementation, little or no attempt is made to ascertain the performance of the budget by juxtaposing the actual performances of the budget against the projections with a view to identifying gaps for corrective measures in subsequent years.

Faleti and Myrick (2012) opined that budget as an instrument of national resource mobilization and allocation needs to be properly designed, effectively implemented, adequately monitored and painstakingly evaluated. Thus, since government uses the budget as a vehicle for fiscal and economic management, facilitation and realization of government vision as well as a tool for enhancing economic growth and development, all the phases in the budget process need to be fundamentally linked. In the past three years, the government of Nigeria has budgeted over N12 trillion (USD80 billion) aimed at achieving fiscal consolidation, inclusive growth and job creation. But these objectives have not been achieved after spending such colossal resources as the country is still experiencing high poverty rate, increasing unemployment rate, widespread income inequality, high maternal and infant mortality, unprecedented infrastructural decay, irregular and erratic power supply, decaying health, educational and transport facilities and lately, serious security challenges.

As government continues to budget more financial resources for the country each year, the level of macroeconomic variables are getting unabated and worse. Therefore, the broad objective of this study is to analyse national budget implementation in Nigeria focusing on the 2012-2014 budgets implementation. The

specific objectives of this study include: (i) to examine the performance of macroeconomic variables in the 2012-2014 budgets; (ii) to investigate the performance of revenue and expenditures in the 2012-2014 budgets; and (iii) to examine capital budget implementation by Ministries, Departments and Agencies (MDAs) in the 2012-2014 budgets. In this regards, the contributions of this study are immense. First, it unveils the performances of the national budgets for the period and juxtaposes them with the projected values. Second, it suggests possible reasons for the performances of the budgets for the period. Third, it draws out the implications of the budgets performance on the economy. Finally, the findings from this study will be beneficial to the government in implementing subsequent budgets for the country.

2. Literature review

Several empirical studies have emphasized the importance of the public sector in accelerating economic growth and prosperity especially in most developing countries. For instance, Barro, (1990) revealed that government sector when incorporated into the endogenous growth model increases economic growth and saving rates. Accordingly, an increase in productive government expenditure will increase economic growth and saving rates initially, reach their peaks and thereafter decline. Cashin, (1995) developed an endogenous growth model in which he examined the impact of government spending and taxes on economic growth and found evidence to support a significant impact of public finance on economic growth. Also, Zhang and Zou, (1998) examined how fiscal decentralization and public spending affect economic growth in China and documented a positive and significant impact of central government development spending on economic growth in China. They also showed that public investment in key infrastructure projects such as railways, highways, power stations, energy, telecommunication, etc, have significant impact on economic growth.

Furthermore, Kneller *et al.* (1999) examined the role of fiscal policy in 22 OECD countries for the 1970-1995 sample periods and found that government productive expenditure and non-distortionary taxation promotes economic growth, while non-productive expenditure and distortionary taxation retards growth. Using simultaneous equation model, Fan *et al.* (2000) showed that government expenditures on rural roads, agricultural research, education, health, rural and community development, irrigation, soil and water conservation have positive impact on growth and poverty reduction. Vu Le and Suruga, (2001) also documented evidence of both public capital and private investment having positive impact on economic growth, while the impact of public non-capital expenditure on growth is negative.

Similarly, Gupta *et al.* (2005) used data from 39 low-income countries to examine the effects of expenditure composition and fiscal consolidations on economic growth. Evidence from the study revealed that strong budgetary positions have positive effects on economic growth. Also, the composition of public expenditure matter as countries with higher recurrent expenditure have lower growth rate while countries with higher shares of capital expenditure has faster output expansion. Furthermore, Bose *et al.* (2007) reported that government capital expenditure has positive impact on growth while recurrent expenditure is insignificantly related to economic growth. They also found that government investment in education has positive and significant impact on growth. Baldacci *et al.* (2008) used a panel of 118 developing countries for the 1971-2000 sample periods and found that both public spending on health and education have positive and significant impact on economic growth.

Gemmell *et al.* (2012) examined the composition of government expenditure on economic growth using OECD countries and documented evidence of a positive effect of reallocating total spending in favour of infrastructure and education on long-run growth. Also, Gupta (2013) asserted that many public programs and appropriate public expenditure are effective in accelerating sustained and equitable economic growth even in the short-run. Because of the overtly profit motivation of the private sector, it would be difficult to achieve economic development in developing countries without government efforts. Through the national budget, government has to invest in the provision of social services and directly in the major sectors of the economy such as agriculture, industrial, infrastructural, commerce, and so on.

In the same vein, Gupta *et al.* (2014) investigated the relationship among the stages of public investment process (appraisal, selection, implementation and evaluation), capital accumulation and economic growth in 52 low-income countries and found that public capital has significant contribution to long term growth. It was also revealed that project selection and implementation has significant impact in explaining variations in growth. Thus, project implementation was found to be the most important stage in public investment process. An improvement in project implementation is beneficial to public investment and spurs economic growth. However, Ogujiuba and Ehigiamusoe (2014) investigated capital budget implementation in Nigeria and noted that despite the importance of public capital investment in accelerating long-run growth and development of a country, the capital budget in

Nigeria has been poorly implemented in recent times. Consequently, the budget has not been able to impact positively in the lives of the people, reduce poverty and unemployment rates due to poor capital budget implementation and low index of capture of government expenditure.

Despite the importance of budget appraisal in the budget process (and ultimately in economic growth), most previous empirical studies focused mainly on the relationship between public expenditure (public investment) and economic growth, while budget appraisal or analysis has received little or no attention. Ehigiamusoe and Umar (2013) and Ogujiuba and Ehigiamusoe (2014) attempted to examine the performance of budgets in their studies but focused mainly on the role of legislative oversights in budget performance and capital budget performance, respectively. This present study intends to fill these gaps by analysing budget implementation in Nigeria with special focus on the 2012-2014 Federal Budgets.

3. Data and method

The study employs descriptive statistics and analytical approaches to analyse the 2012-2014 budgets of the Federal Government of Nigeria. It juxtaposes the actual performance against the appropriated or budgeted figures of macroeconomic variables (such as real GDP growth rate, inflation rate, exchange rate, crude oil production and price), components of revenue and expenditures. The variances between the projected and actual performances of these variables are explicitly elucidated. The macroeconomic variables data for the analysis were sourced from National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN) and the 2012-2014 Medium Term Expenditure Framework (MTEF). The data on the components of revenue and expenditure were sourced from Office of the Accountant General of the Federation (OAGF), Central Bank of Nigeria (CBN) and the 2012-2014 Budgets of the Federal Republic of Nigeria.

4. Empirical analysis

4.1 Macroeconomic performance

The performance of macroeconomic variables (such as real GDP growth rate, inflation rate, exchange rate, oil production and oil price) for the 2012-2014 period in Nigeria are presented in Table 1. There exist wide variations between the actual performance and the projected figures during the period under review. For instance, the actual performance of real GDP growth rate deviated from the projected figures by 41.5%, 15.3% and 1.6% in 2012, 2013 and 2014, respectively. Similarly, the actual inflation rates were more than the projected rates by 28.4%, 1.2% and 3.8% in 2012, 2013 and 2014, respectively. This showed that neither real GDP growth rate nor inflation rate was able to meet the projections for the period.

Table 1 - Macroeconomic projections and performances

	2012			2013			2014		
Real GDP Growth Rate (%)	7.2	4.21	-2.99 (41.5%)	6.5	5.5	-1.0 (15.3%)	6.3	6.2	-0.1 (1.6%)
Inflation Rate (%)	9.5	12.2	2.7 (28.4%)	8.4	8.5	0.1 (1.2%)	7.8	8.1	0.3 (3.8%)
Exchange Rate (1USD)	155	157.7	2.7 (1.70%)	160	159	-1 (0.6%)	160	158.5	-1.5 0.9%
Crude Oil Production (million barrel per day)	2.48	2.34	-0.14 (5.6%)	2.53	2.24	-0.29 (11.5%)	2.39	2.20	-0.19 (7.9%)
Crude Oil Price/ Benchmark (USD)	70	113.4	43.462.%	75	110.3	35.3 (47.1%)	77.5	100.3	22.8 (29.4%)

Notes: The values in parenthesis show the percentage of variations of budgeted from actual values.
Sources: National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN), 2012-2014 Appropriations Acts and MTEF

Although the average official exchange rate under the retail Dutch Auction System (rDAS) seems to meet the projections in most of the years, but at the Bureau-de-change (BDC), the Naira traded for over N160.1 per 1USD in 2012, N162.5 in 2013 and N171.5 in 2014. This implies that the actual average exchange rates at the BDC were more than the projections for the period connoting depreciation of the Naira. Similar trends were experienced in crude oil production as the actual performances fell short of the various projections in the Federal Government Budgets. The behavior of crude oil price per barrel also revealed a downward trend from an average of USD113.4 per barrel in 2012 to under USD70 per barrel at the end of 2014, thereby making the proposed oil price benchmark by government unrealistic.

Several reasons accounted for the performance of these macroeconomic variables during the period. First, the high inflation rate was caused by hike in food inflation occasioned by the flood disaster that ravaged

parts of the country in 2012. Others causes include; the partial removal of petroleum subsidy that increase the price of petroleum products and subsequently transportation fares; over-dependence on food imports and its attendance imported inflation; security problems in some parts of the country that affected production and other economic activities as well as unnecessary increase in government expenditures which failed to match up with production; and the inability of government harmonize both fiscal and monetary policies in the country.

Also, economic growth in Nigeria is driven by the non-oil sector and the major contributors in this regard are the services and agriculture. Thus, the poor performance of the agricultural and the services sector were responsible for the slow growth recorded during the period. Unfortunately, government failed to stimulate the growth of the real sector that anchors production of goods and services. Crude oil production could not meet the targeted daily production due to crude oil theft, vandalism of oil installations, security problems and the activities of militancy in the Niger-Delta region of the country. Low crude oil production coupled with low price at the international market adversely affected government revenue and the ability to finance government activities.

4.2. Revenue performance

The performance of revenue revealed that the variance between the budgeted and actual gross federally collected revenue increased from 2.4% in 2012 to 16.9% in 2013 before declining to 5.4% in 2014 implying that none of the years was gross federally collected revenue able to meet the budgeted figures. As showed in Table 2, the structure of gross federally collected revenue revealed that oil revenue failed to meet its targets in 2013 and 2014 falling by 12.1% and 5.8%, respectively. Similarly, non-oil revenue also failed to meet its targets for the period under review. The actual non-oil revenue fell short of the budgeted revenue by 27.9%, 34.1% and 4% in 2012, 2013 and 2014, respectively. One striking point to note is that over a quarter of the budgeted non-oil revenue was not met in 2012 and 2013.

Table 2 - Revenue performance and projections (N Billion)

	2012			2013			2014		
Items	Budget	Actual	Variance	Budget	Actual	Variance	Budget	Actual	Variance
Gross Federally Collected Revenue	9,197.6	8,975.8	-221.8 (2.4%)	9,887.6	8,213.8	-1,673.8 (16.9%)	9,318.2	8,813.4	-505.8 (5.4%)
Oil Revenue	6,636.5	8,025.9	1,389.4 (20.9%)	7,734.1	6,795.6	-938.5 (12.1%)	7,164.8	6,746.3	-418.5 (5.8%)
Crude oil & Gas sales	4,033.5	3,655.1	-378.4 (9.3%)	4,603.4	3,069.3	-1,534.2 (33.3%)	4,390.9	3,139.7	-1,251.2 (28.5%)
PPT, Gas tax, Royalties	2,596.5	4,365.3	1,768.8 (68.1%)	3,124.2	3,718.9	594.7 (19.0%)	2,767.4	3,439.1	671.7 (24.3%)
Others (Rent, Penalty, Fees)	6.46	5.48	-0.98 (15.2%)	6.43	7.4	0.97 (15.1%)	6.43	25.09	18.8 (291.6%)
Non-Oil Revenue	1,317.2	949.84	-367.4 (27.9%)	2,153.5	1,418.2	-735.3 (34.1%)	2,153.4	2,067	-86.4 (4%)
Custom & Excise	600.60	474.92	-125.7 (20.9%)	792.95	432.63	-360.3 (45.4%)	782.38	566.3	-216.1 (27.6%)
CIT, other taxes	716.65	474.92	-241.7 (33.7%)	1,360.5	985.5	-375.0 (27.5%)	986.25	1,207.3	221.1 (22.4%)
Retained Revenue	3,561.0	3,154.8	-406.2 (11.4%)	4,100.2	3,362.2	-737.9 (17.9%)	3,731.0	3,403.3	-327.7 (8.8%)
Share of Federation Acct	2,656.4	2,755.1	98.67 (3.7%)	3,228.1	2,935.2	-292.9 (9.1%)	3,023.7	2,417.7	-605.9 (20%)
Unspent Funds (Previous Year)	306.78	56.61	-250.2 (81.5%)	261.21	24.73	-236.5 (90.5%)	120.0	7.56	-112.4 (93.7%)
Share of VAT	107.91	95.44	-12.47 (11.6%)	127.05	106.93	-20.12 (15.8%)	113.63	108.7	-4.9 (4.3%)
Independent Revenue	446.78	206.77	-240.0 (53.7%)	455.78	274.37	-181.4 (39.8%)	452.04	280.99	-171.1 (37.8%)
Share of Actual Balance in Special Accts	43.11	40.93	-2.18 (5.1%)	28.02	21.0	-7.02 (25.1%)	21.68	0.0	-1.68 (100%)

Notes: The values in parenthesis show the percentage of variations of budgeted from actual values. *PPT=Petroleum Profit Tax, CIT= Company Income Tax, VAT=Value Added Tax.*

Sources: Office of the Accountant General of the Federation (OAGF.) CBN Economic Reports 2015

Furthermore, the components of oil revenue revealed that PPT/Gas tax/Royalties surpassed the budgeted figures during the review period while crude oil and gas sales fell short of the budgeted revenue by 9.3% in 2012,

33.3% in 2013 and 28.5% in 2014. The plausible reasons why oil revenue failed to meet its projection include; inability to meet projected crude oil production per day, plummeting price of crude oil at the international market as well as depreciating exchange rates of the naira against the US dollars. As for the performances of the components of the non oil revenue, only CIT surpassed its budgeted figure in 2014 by 22.4% but it fell short of its budgeted figures in 2012 and 2013 by 33.7% and 27.5%, respectively. Analogously, both custom/excise duty and share of VAT fell short of their budgeted revenue throughout the period under review. Some of the reasons responsible for the poor performances of non oil revenue include; leakages in the tax system and weak tax administration, non-remittance of revenue by MDAs and security challenges that affected economic activities in some parts of the country. It is important to note that the actual revenue available to the federal government to spend in each fiscal year is the retained revenue. The performance of retained revenue (shown in Table 2) revealed that the actual retained revenue failed to meet the budgeted revenue throughout the review period, thereby resulting in a variance of 11.4%, 17.9% and 8.8% in 2012, 2013 and 2014, respectively. The implication of the inability of retained revenue to meet its targets is high fiscal deficits because of the dichotomy between revenue and expenditure. Government might require foreign or domestic borrowing to finance its activities. In any way, foreign borrowing increases debt burdens and its consequences, while domestic borrowing has the potential of crowing out more productive private sector investments.

Comparatively, 2013 seems to be the most awful year for the government in-terms of revenue performance because the actual revenue from gross federally collected revenue, crude oil/gas sales, non-oil revenue and retained revenue whether in-terms of nominal values or as percentage of budgeted figures were the poorest compared to 2012 and 2014. Although 2012 had the highest gross federally collected revenue, but 2014 has the largest retained revenue for the period under review. Also all components of oil revenue performed better in 2012 while non-oil revenue components held sway in 2014.

4.3. Expenditure performance

The actual aggregate expenditure of N4,130.6 billion, N4,522.2 billion and N4,141.8 billion in 2012, 2013 and 2014, respectively, fell short of the budgeted expenditure thereby resulting in variances of 12%, 9.3% and 11.8% for the period. This indicates an increasing trend of aggregate expenditure (though the 2013 expenditure was the highest). This is further confirmed by non-debt recurrent expenditure that increased steadily throughout the review period. Similarly, personnel costs/pensions, overhead costs and debt service payments have remained obstinately high at the expense of capital expenditure. The performance of the latter is very worrisome as capital expenditure fell short of the budgeted figures by 44.4%, 46% and 65% in 2012, 2013 and 2014, respectively. This indicates an increasing trend of dismal performance of capital expenditure in Nigeria.

Table 3 - Expenditure performance and projections (N' Billion)

Items	2012			2013			2014		
	Budget	Actual	Variance	Budget	Actual	Variance	Budget	Actual	Variance
Aggregate Expenditure	4,697.2	4,130.6	-566.6 (12%)	4,986.3	4,522.2	-465.1- (9.3%)	4,695.2	4,141.8	-553.4 (11.8%)
Recurrent Expenditure (Non-Debt)	2,425.1	2,400.3	-24.8 (1.0%)	2,415.8	2,500.4	84.69 (3.5%)	2,454.9	2580.6	125.7 (5.1%)
Personnel costs, Pensions,	1,799.6	1,810.7	11.07 (0.6%)	1,861.5	1,552.7	-308.8 (16.5%)	1,956.5	1,893.9	-62.6 (3.2%)
Overhead Costs, Service Wide Vote	625.45	589.6	-35.8 (5.7%)	554.3	947.9	393.6 (71.0%)	498.4	686.7	188.3 (37.8%)
Capital Expenditure	1,339.9	744.4	-595.5 (44.4%)	1,590.7	855.6	-735.1 (46%)	1,119.6	388.1	-731.5 (65.3%)
Statutory Transfers	372.6	306.6	-66.0 (17.7%)	388.1	331.5	-56.5 (14.6%)	408.7	276.2	-132.5 (32.4%)
Debt Service Payments	559.58	679.28	119.7 (21.4%)	591.8	834.6	242.8 (41.0%)	712.0	896.9	184.9 (25.9%)
Federal Govt. Retained Revenue	3,561.0	3,154.9	-406.1 (11.4%)	4,100.2	3,362.2	-737.9 (17.9%)	3,731.0	3,403.3	-327.7 (8.8%)
Fiscal Deficits	(1,136.2)	(975.7)	-160.4 (14.1%)	(887.1)	(1,160)	272.8 (30.8%_	(964.2)	(738.5)	-225.7 (23.4%)

Note: The values in parentheses show the percentage of variations of actual from budgeted values.
Source: Office of the Accountant General of the Federation (OAGF), CBN Economic Reports 2015.

The high non-debt recurrent expenditure relative to capital expenditure is symptomatic of the fact that the cost of governance is very high in Nigeria, even though the country is confronted with unabated high debt burden

and debt service payments. Consequently, the high aggregate expenditure relative to retained revenue results in colossal fiscal deficits that accounts for about one-thirds of the entire retained revenue in 2013 and about one-quarter of retained revenue in 2012 and 2014. Financing the fiscal deficits from borrowing (as always the case) will continue to exacerbate public debt burden and soar debt service payments. It might be necessary to suggest the implementation of the Oronsaye Report to rationalize government MDAs aimed at reducing non-debt recurrent expenditure with a view to reducing fiscal deficits.

It is worthy to note thatthe proposed capital expenditure in the 2012-2014 budgets were grossly inadequate and need substantial upward review in subsequent budgets if the country is to experience appreciable economic growth and development. Worse still is the poor implemention of the capital expenditure implying that capital projects such as basic infrastructure, social services and public goods will suffer with such paltry allocations and implementation. Also, government will not be able to provide educational and health facilities, construct roads and bridges, or maintain the existing critical infrastructure.

Furthermore, the ratio of capital-recurrent expenditure in the budgets for the period is worrisome. The proportions of capital expenditure in total budget were 28%, 31% and 23% in 2012, 2013 and 2014, respectively, while the remainder 72%, 69% and 77% were budgeted for recurrent expenditure. This low share of capital expenditure in the national budget (even when fully implemented) is not capable of promoting economic growth and development neither can it reduce the high and increasing rates of poverty, unemployment and income inequality in the country.

Another worrisome issue in the 2012-2014 budgets is that they relied on domestic borrowing (FGN Bond) to finance the fiscal deficits. Through budgets proposed to finance the fiscal deficit through various sources such as: privatization proceeds, signature bonus, FGN share from stabilization fund account, etc., but domestic borrowing had been the major sources of financing fiscal deficit in Nigeria. But domestic borrowing has adverse effects on the economy such as increasing the cost of borrowing, crowding-out potential productive private sector investments as well as impeding the growth of the real sector of the economy.

4.4. Capital budget implementation by ministries, departments and agencies (MDAs)

Besides the low proportion of capital expenditure in the 2012-2014 budgets, the implementation of the capital budgets during the period under review was also abysmal. For instance, only 51%, 58% and 34% of capital expenditure were implemented in 2012, 2013 and 2014, respectively. Thus, non-release of funds contributed to the poor implementation of capital budget during the period.

The non-release of capital expenditure could be attributed to the dwindling government revenue and administrative bottlenecks during the period. Poor conceptualization of budget, late releases of funds, cumbersome procurement procedure, low technical capacity in MDAs, lack of implementation plan and ineffective legislative oversights are some of the reasons responsible for the poor performance of capital budget in Nigeria. Consequently, the poor implementation of capital budget in Nigeria is partly responsible for the deplorable state of infrastructure and the inability of government to deliver public goods to the masses.

Table 4 - Capital budget performance of MDAs 2012-2014 (N Billion)

	2012				2013				2014			
Presidency	15.7	13.6	11.7	75	13.3	83.4*	83.0	624	9.1	43.9	42.2	463.8*
SGF	32.7	21.8	10.7	33	32.6	17.6	16.9	52.1	22.8	10.3	6.90	30.3
Youth	7.1	4.4	3.3	47	8.1	3.9	3.9	48.7	5.0	2.2	1.45	28.9
Police & Form.	12.3	12.1	9.3	75	18.5	23.1*	22.9	99.2	10.8	4.8	3.20	29.8
Women	3.2	2.0	1.5	47	3.1	2.0	1.9	65.2	2.9	1.3	1.10	38.0
Agriculture	48.2	32.5	26.1	54	50.6	24.9	24.9	49.2	35.6	15.5	12.10	33.9
Water	79.3	55.6	39.2	49	80.3	31.4	30.0	37.4	44.6	18.7	12.60	28.2
Defence	45.4	37.5	34.3	76	59.3	40.7	39.8	67.2	35.4	34.2	20.90	59.4
Education	66.8	47.6	34.8	52	71.2	36.2	34.0	47.8	51.3	21.8	13.80	27.0
FCTA	46.2	35.5	33.3	72	56.6	32.9	32.9	58.2	30.4	13.4	12.10	39.9
Foreign	7.4	5.9	5.2	70	24.2	20.9	20.8	84.3	27.3	10.6	9.90	36.6
Finance	2.1	1.4	1.1	53	3.5	3.3	3.3	92.8	3.5	2.7	2.10	58.7
Health	60.9	45.0	33.7	55	60.0	34.8	33.4	55.5	49.5	20.5	14.60	29.5
Trade	2.9	1.9	1.3	42	7.9	2.4	2.3	29.0	3.7	1.5	0.86	23.5
Information	4.7	4.2	3.3	68	5.8	4.1	3.6	62.6	3.8	1.6	1.10	27.5
Communication	13.3	11.0	7.6	57	5.7	6.4*	6.2	96.8	4.1	4.0	3.5	86.4

	2012				2013				2014			
Interior	7.6	5.1	4.2	55	11.4	6.3	5.8	51.1	6.9	3.6	2.2	31.9
Head of Service	4.9	3.6	2.8	57	5.7	3.1	3.1	54.0	4.1	1.7	1.3	30.2
Justice	0.6	0.4	0.3	47	1.5	1.1	1.0	67.4	1.1	0.6	0.2	20.5
Labour	3.2	1.9	1.4	45	4.3	1.9	1.3	30.4	1.8	0.7	0.5	26.9
Power	75.5	52.0	39.6	48	73.3	49.2	39.6	53.9	59.8	44.6	37.0	61.9
Science	27.3	18.6	13.1	47	16.3	8.2	7.8	47.9	13.0	6.3	3.7	28.3
Transport	46.9	31.5	24.0	51	44.5	23.7	19.9	45.0	31.8	13.6	9.2	28.9
Petroleum	8.1	5.3	1.7	21	8.6	4.3	2.5	29.5	6.2	2.8	1.4	23.0
Works	159.5	125.6	125.3	79	164.7	79.9	73.0	44.3	106.3	49.3	47.6	44.8
Housing	41.9	27.1	18.8	45	26.6	11.4	11.4	42.7	15.8	7.4	5.6	35.3
Mines	3.2	1.9	1.5	46	3.4	2.1	1.9	57.2	2.2	1.2	0.7	30.3
Aviation	43.2	33.1	30.9	72	48.4	28.5	28.5	58.9	26.2	10.9	4.3	16.4
Environment	14.4	9.6	7.3	51	13.5	6.4	3.2	23.5	8.9	4.5	2.6	29.2
Culture	3.2	2.5	1.9	61	5.1	2.5	2.1	41.5	4.2	1.9	1.4	32.5
Nat. Planning	1.0	1.1	0.9	90	2.8	2.5	2.5	90.9	2.0	1.8	1.8	87.3
Sport	2.0	1.4	1.1	54	2.0	2.9	2.9	100	1.8	5.9	5.5	309.5*
NSA Office	63.9	49.4	49.0	77	50.0	40.2	40.1	80.2	51.1	22.9	17.6	34.4
Niger Delta	59.2	43.7	41.9	71	62.4	30.9	30.3	48.5	49.4	20.6	20.4	41.3
TOTAL	1,345.2	1,018	686.3	51	1,591	1,004	922.2	57.9	1,134.7	476.8	388.1	34.2

Note:*Indicates extra-budgetary expenditure. Source: Office of the Accountant General of the Federation (OAGF)
Source: Office of the Accountant General of the Federation (OAGF), CBN Economic Reports 2015

A critical analysis of the performance of each sector for the 2012-2014 period revealed that the appropriations for the economic sectors (Agriculture, Trade & Investment, Transport, Science & Technology, Works, etc) and social sectors (Education, Health,) declined significantly between 2012 and 2014. Similarly, the funds released to these sectors and the level of capital budget implementation is unsatisfactory. In 2012 for instance, capital budget implementation in Agriculture, Health and Education were 54%, 55% and 52%, respectively, compared to 2013 figures of 49%, 55% and 48% in that order. The performance of 2014 was 38%, 29% and 27%, for Agriculture, Health and Education, respectively. Similar trends were recorded in Housing, Transport, Environment, Works, Power, Water Resources, Trade and Investment, etc.

One striking point to note is the inability of the country to meet the 10% recommended for Agriculture by Maputo Declaration and the 20% recommended by UNESCO for Education in the national budgets. In the 2014 budget for instance, only 1.4% of the total budget was allocated to Agriculture while 10.6% was allocated to education. These allocations show that these sectors are still grossly underfunded. Comparatively, 2014 seem to be the most awful year in capital budget implementation in Nigeria relative to 2012 and 2013, while the latter appear the best year.

Conclusion and policy options

The paper examines national budget implementation with emphasis on the 2012-2014 Federal Budgets of Nigeria. The paper found that actual performances of all the macroeconomic variables such as real GDP growth rate, inflation rate, exchange rate and crude oil production fell short of the projections during the period. Similarly, gross federally collected revenue, oil revenue and non-oil revenue failed to meet the budgeted targets. This had serious implications in the ability of the government to finance the expenditure components of the budgets.

Although the actual aggregate expenditures fell below the appropriated expenditures during the period, but the expenditure components revealed that recurrent expenditures always meet or surpassed the projections, while capital expenditure significantly deviated from the appropriated expenditures. Also, the actual proportion of capital expenditure in aggregate expenditure deviated from the projected ratio. Finally, the overall performance of capital budget implementation by MDAs was colossally poor. The economic and social sectors (such as Agriculture, Education, Health, Transport, Housing, Power and Water) not only suffer from inadequate allocation of funds, but also from poor implementation of the appropriated funds. Therefore, the paper elucidated some possible causes and implications of the abysmal performances of the 2012-2014 Budgets on the Nigerian economy.

The paper recommended some policy options such as diversification of the economy from depending solely on oil revenue to non-oil revenue, ensuring the security of oil installations and systems, reduction of recurrent expenditure and its proportion in aggregate expenditures as well as increasing the proportion of capital

expenditure for developmental projects. Finally, to accelerate the implementation and utilization of capital budget by MDAs, early release of funds, ease procurement procedure, manpower building in MDAs as well as effective legislative oversights is highly recommended. Thus, this paper has succeeded in emphasizing the need for budget appraisal which is a fundamental stage in the budget process and it can stimulate other areas of the budget process that may need further researches.

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References

[1] Baldacci, E., Clements, B., Gupta, S. and Cui, Q. (2008). Social Spending, Human Capital, and Growth in Developing Countries. *World Development,* 36(8): 1317-1341. DOI: 10.1016/j.worlddev.2007.08.003

[2] Barro, R. J. (1990). Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy*, 98(5): S103-S125. DOI: 10.3386/w2588

[3] Bose, N., Haque, M. E., Osborn, D. R. (2007). Public Expenditure and Economic growth: A Disaggregated Analysis for Developing Countries. *The Manchester School*, 75(5): 533-556. DOI: 10.1111/j.1467-9957.2007.01028.x

[4] Cashin, P. (1995). Government Spending, Taxes, and Economic Growth. *Palgrave Macmillan Journals,* 42(2): 237-269. DOI: 10.2307/3867572

[5] Ehigiamusoe, U. K. and Umar, A. (2013). Legislative Oversights and Budget Performance in Nigeria: Issues and Policy Options. *IOSR Journal of Economics and Finance*, 1(5): 01-12.

[6] Faleti, K. O. and Myrick, D. (2012). The Nigerian Budgeting Process A Framework for Increasing Employment Performance. *Mediterranean Journal of Social Sciences*, 3(12): 193-213. DOI:10.5901/mjss.2012.v3n12p193

[7] Fan, S., Hazell, P. and Thorat, S. (2000). Government Spending, Growth and Poverty in Rural India.*American Journal of Agricultural Economics,* 82(4): 1038-1051. DOI: 10.1111/0002-9092.00101

[8] Gemmell, N., Kneller, R. and Sanz, I. (2012). Does the Composition of Government Expenditure Matter for Economic Growth? Working paper, University of Nottingham, pp1-34.

[9] Gupta, H. (2013). Public Expenditure and Economic Growth: Econometric Models from Developing Countries. Synopsis for the Degree of Doctor of Philosophy in Dayalbach Educational Institute, Deemed University. pp. 1-27.

[10] Gupta, S., Clements, B., Baldacci, E., Mulas-Granados, C. (2005). Fiscal Policy, Expenditure Composition, and Growth in Low-income Countries. *Journal of International Money and Finance,* 24(3): 441-463.

[11] Gupta, S., Kangur, A., Papageorgiou, C. and Wane, A. (2014). Efficiency-Adjusted Public Capital and Growth. *World Development*, 57: 164-178. DOI: 10.1016/j.worlddev.2013.11.012

[12] Kneller, R., Bleaney, M. F. and Gemmell, N. (1999). Fiscal Policy and Growth: Evidence from OECD Countries. *Journal of Public Economics*, 74(2): 171-190. DOI: 10.1016/S0047-2727(99)00022-5

[13] Ogujiuba, K. K., Ehigiamusoe, K. (2014). Capital Budget Implementation in Nigeria: Evidence from the 2012 Capital Budget. *Contemporary Economics*, 8(3): 293-314. DOI:10.5709/ce.2084-0845.147

[14] Ohanele, J.C (2010). Government Budgets in Nigeria: Who benefits? The Punch Newspaper, April 27, 6-7.

[15] Vu Le, M. and Suruga, T. (2005). Foreign Direct Investment, Public Expenditure and Economic Growth: the Empirical Evidence for the Period 1970–2001. *Applied Economics Letters*, 12(1): 45-49. DOI: 10.1080/1350485042000293130

[16] Zhang, T. and Zou, H. F. (1998). Fiscal Decentralization, Public Spending, and Economic Growth in China. *Journal of Public Economics*, 67(2): 221-240. DOI: 10.1016/S0047-2727(97)00057-1

Evaluating Operational Efficiency of Airports in Thailand with Special Reference to Low Cost Traffic

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Abstract:

The traffic of Low Cost Airline (LCA) model is burgeoning and growth has now become all pervasive across globe expanding in Europe, Oceania, South America, Asia and Australia. This eventually brings the paradigm shift in aviation business. It is also mandating the change in the business operations of airport operator, which specifically addresses the needs of LCA traffic. In Thailand first LCA started in December 2003 and by 2015 LCA holds 41% of market share and expected to have unprecedented growth in future. The growth of LCA in Thailand has also mandated change in airport operations. However, comparatively, little analysis has been done to evaluate the operational efficiency of the airport in Thailand in parlance to growth of LCA traffic. Hence this paper measures the Operational Efficiency and facilitating the managerial implications to enhance it. Data Envelopment Analysis has been employed to measure the efficiency of six major airports in Thailand covering approximately 87% of total passenger traffic. It has been observed that total passenger enplanements and aircraft movements are contributing significantly in the efficiency scores. The terminal efficiencies of the airports examined are higher than airside efficiencies. It is concluded that the efficiency of airports depends on LCA demands and its characteristics.

Keywords: operational efficiency, airports, low cost airlines and data envelopment analysis.

JEL Classification: RL40, L93, M11, D24, C67.

1. Introduction

The Low Cost Airlines (LCA) model has been initiated by Southwest Airlines in 1970 and became one of the most successful examples in airline business, earning consecutive profits for 42 years and bringing unprecedented benefits to passengers and economy as whole (Southwest Airlines 2015). The traffic of Low Cost Airline (LCA) model is burgeoning and growth has now become all pervasive expanding in Europe, Oceania, South America, Asia, Australia and eventually bringing paradigm shift in aviation business. In December 2003, the first LCA in Thailand, One to Go, owned by Oriental Thai airlines started its operation (Charoensettasilp 2013). In February 2004, Thai Air Asia, jointly owned by Air Asia (Malaysia) and Shin Corp (Thailand), started its operation as second LCA in Thailand. Later Solar Air and Happy Air joined as LCA in Thailand. Nok Air, a subsidiary of Thai airways International, began operating as LCA in July 2004. Later in 2009, Thai smile, a second subsidiary of Thai airways International, was also launched as LCA (Qin 2012). In 2015, LCA holds 41% of market share and is growing with CAGR of 26.3% for the period 2014-2015 in terms of passengers (Department of Civil Aviation 2015). Eventually the increasing role of LCA has in many ways affected the airport operations. However, there has been comparatively little analysis looking at airport efficiency in light of unprecedented growth of LCA.

The purpose of this paper is to fill this apparent gap and examine the efficiency of six major airports in Thailand which handles approximately 87% of total passenger traffic of which 40.3% passengers are pertaining to LCA. (Airport of Thailand 2015). The paper is organized as follows.The next section provides a literature review on previous studies conducted on airport efficiency and productivity measurement. Section 3 briefs about methodologies and data used to measure the airport efficiency. Section 4 presents the empirical findings and analysis results and finally conclusions are drawn in Section 5.

2. Previous studies on performance measurement of airports

Since airport provides a wide range of services to passengers, airlines and other aviation stakeholders ranging from airside to landside, hence it turns out to be very diverse and heterogeneous business with high degree of quality differentiation, different ownership and regulatory structure. Therefore measuring and comparing the performance of airports is a delicate exercise. Eventually, various measures of airport performance has been developed and applied. Parker (1999) examined the performance of airports under British Airport Authority (BAA) using Data Envelopment Analysis (DEA); in which performance was measured and compared between pre and post privatization. Hooper (1997) measured the performance of six Australian airports over a 4 year using in which a deflated revenue index was used as output measure and labor, capital and other cost were considered

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as input measure to compute Total Factor Productivity (TFP) Index. Gillen (1997) and Pels (2001) segregated landside and airside operations and measured the efficiency in which DEA model was used. Nyshadham & Rao (2000) measured the efficiency of 24 European airports performance using TFP. They also examined the relationship between TFP index to various partial measures of airport productivity. Sarkis (2000) examined the operational efficiency of airports in U.S.A. by use of DEA method in which input measures included operational cost, number of employee, gates and runways while the outputs included operational revenue, number of passengers, aircraft movements and cargo. Abbott & Wu (2002) examined the efficiency and productivity of 12 Australian airports using TFP and DEA method, in which two outputs number of passengers and amount of freight were used. The three input measures employed in the study were number of staff, capital stock and runway length. Cejas (2002) estimated a translog cost function to measure the efficiency of 40 airports in Spain. Traffic throughput was considered as single output variable whereas labor and capital were two input variables. Martin & Roman (2001) employed DEA to examine the efficiency 37 airports in Spain, in which, three output variables, aircraft movements, number of passengers and tons of cargo and three input variables, expenditure incurred on labor, capital and material were used. Most of the studies above focus on certain aspect of airport operations to gauge the efficiency. However the study conducted by Gillen (1997) developed two models; one to assess terminal services, while other for airport operations which can be more appropriate in measuring efficiency. Keeping in view the increasing role of LCA perspective certain input variables such as Aeronautical charges, which suits the low cost strategy, Check-in to gate time and practical hourly capacity, which suits the quick turnaround time of LCA are very pertinent. Many of the studies above have also omitted the Non Aeronautical activities in gauging the operational efficiency, which may bias the empirical result (Oum and Yu 2004).

In previous studies of airport efficiency financial performance of output and input variables can be often misleading due to external or social efficiencies (Pyrialakou, Karlaftis and Michaelides 2012). Hence previous studies such as Sarkis (2000) and Oum & Yu (2004) used physical measures of capital stock rather financial such as number of runway, number of gates and passenger terminal size.

3. Data and methodology

The analysis is based on data of six major airports in Thailand, owned by AOT PLC, covering two consecutive years 2014 and 2015. The LCC passenger share at these airports has reached to level of 41% in 2015(Airport of Thailand 2015). As financial performance in efficiency measurement of airport can often be misleading due to external or social inefficiency hence physical measures has been used in line with Gillen (1997) and Pyrialakou, Karlaftis, & Michaelides (2012), in which terminal and airside operations are segregated to gauge the efficiencies.

With increasing competition among airports to attract LCA, the customer service dimension becomes significant in measuring airport performance. ICAO and ACI has given six performance indicators for airport productivity in which customer service is most important aspect in light of growth of LCA. The two most important customer service factors which attract LCA to operate from a specific airport are cost competitiveness and quick turnaround time (Neufville 2006). The cost competitiveness is operationalized variables such as by Aeronautical levies of airport and quick turnaround time is operationalized by average processing time from check in to gate, baggage delivery , security clearing time. Of these variables, average processing time from check in to gate and baggage delivery has been included in our study in line with guidelines of ICAO and ACI for measurement of airport performance for customer service (ICAO 2014) and (ACI 2012). The inputs and outputs used to gauge the airport efficiencies are shown in Table 1. The input and output data are drawn mainly from secondary sources. For secondary sources AOT office records and database has been used. However for the data which were not available in secondary data source such as average processing time from check-in to gate and baggage delivery time, a questionnaire based survey was used to collect data. The questionnaire was based on open ended questions asked to passenger of six AOT airports namely Suwarnabhumi, Don Muang, Chiang Mai, Chiang Rai, Hat Yai and Phuket. Stratified sampling method was used to collect the data. The appropriate sample size for the above pertaining at 95% confidence Interval is 385 (Zikmund 2000). 600 questionnaires were distributed, 100 at each airport, of which we obtained average response rate of 80%.

Table 1 - Input and output variables model used to gauge efficiency

Input Data	Output Data
Terminal Operations Model:	Passenger Efficiency
Terminal Area in Sq. Mt. Gates Average Check-in to gate time Average Baggage Collection time Number of Employees	Passengers
Movement Model:	Flight Efficiency
Airport Capacity (Aircrafts/hour)) Aircraft Parking Area Number of Runways Number Parking Bays	Air Carrier Movements

Source: ICAO 2014, ACI 2012, Gillen 1997

On the depicted input and output variable in Table 1, Data Envelopment Analysis (DEA) has been employed to estimate the Passenger and Flight Efficiency scores of six AOT airports or Decision Making Units (DMU). Based on (Charnes, Cooper and Rhodes 1978) DEA model for input oriented efficiency estimation and variable return to scale following model is deployed on decision variables.

Objective function: $\underset{\lambda_1 \ldots \lambda_L}{\text{Min}} \ \Theta$ (1)

Subject to: $\sum_{L=1}^{l} \lambda_l X_{il} \leq \Theta X_{iL}$ *where* i= 1,….. ,m (2)

$\sum_{L=1}^{l} \lambda_l Y_{jl} \geq Y_{jl}$ *where* j= 1,……..,n (3)

$\sum_{L=1}^{l} \lambda_L = 1$ *where* L= 1,2,……,l (4)

$\lambda_1 \ldots \lambda_l; \Theta \geq 0$ (5)

where Θ is estimated input oriented efficiency score, L is number of Decision Making Units (DMUs), λ_L depicts weightage of Input variable for L^{th} DMU, $X_{il}$and Y_{jl} are i^{th} input and j^{th} output of L^{th} DMU respectively, and *m* and *n* are number of inputs and outputs respectively.

4. Findings

The data set used in this contribution is composed of statistics regarding a sample of six major airports in Thailand which covers 87% of LCA traffic in 2015. Table 2 presents descriptive statistics for each output and input variable used in DEA. The average number of passengers increases from 2015 to 2016. It is also observed that the variability of passenger has also increased across airports as measured by standard deviation. The same observations hold for the total number of aircraft movements. Among inputs, the average figures remain same, from 2014 to 2015, for most of the variables except number of employees, Aircraft Parking area and Airport Capacity. Since Phuket Airport (HDY) had undergone expansion in airside which led to increase in average of aircraft Parking Area and Airport Capacity. The increase in average value of Number of employees from 2014-2015, is attributed to recruitment drive of Airport of Thailand (AOT).

Table 2 - Descriptive statistics for the Input Output variable of Six AOT Airport in Thailand

	2014				2015			
	Mean	Std. Deviation	Min.	Max.	Mean	Std. Deviation	Min.	Max.
Terminal Area in Sq. Mt.	146.72	217.76	14.94	563	146.72	217.76	14.94	563
Gates	16.83	20.11	2	51	16.83	20.11	2	51
Average Check-in to gate time	13.67	7.23	7	25	13.67	7.23	7	25
Average Baggage Collection time	13.67	9.11	7.23	20.11	13.67	9.11	7.23	20.11
Number of Employees	519.66	752.23	104	2,060	579.33	804.09	121	2,190
Airport Capacity (Aircrafts/hour)	29.17	23.73	9	72	30.17	24.97	9	76
Aircraft Parking Area	330.27	406.8	43.2	887.83	340.67	413.8	43.2	887.83
Number of Runways	1.33	0.52	1	2	1.33	0.52	1	2
Number Parking Bays	46	50.81	5	120	46	50.81	5	120
Total Pax	15,088.06	15,487.90	1,379.02	46,423.35	18,302.83	18,067.74	1,745.57	52,902.11
Domestic Pax	6,399.59	50,62.8	1,349.84	15,556.63	7,883.95	6,931.15	1,718.85	21,133.5
International Pax	10,275.35	7,371.67	5,062.79	15,487.90	12,499.45	7,874.77	6,931.15	18,067.75
Total Flight	104.03	107.61	10.98	289.57	121.29	122.07	13.402	317.06
Domestic Flight	49.81	41.88	10.529	125.84	58.73	52.86	12.868	158.8
International Flight	54.22	84.99	456	223	62.57	94.1	534	247.6

Source: Airport of Thailand and Primary data

Table 3 shows the average annual DEA (Charnes, Cooper and Rhodes 1978) efficiency scores for the airports examined, where passenger efficiency are the efficiency scores for the terminal services model, and flight efficiency the scores for the aircraft movements model. The findings vary significantly across airports Suvarnabhumi (BKK) and Don Mueng (DMK).Airports leading in both Passenger and Flight efficiency scores. Since BKK and DMK, are the hub airports in Thailand their efficiency scores are relatively higher than remaining four airports. Among four regional airports Phuket (HDY), Hat Yai (HKT), Chiang Mai (CNX) and Chiang Rai (CEI), HDY and HKT are having high efficiency scores, which can be attributed to Phuket, which is the famous gateway of tourists in Thailand. Hat Yai is also located close to tourist spots and is having small airport infrastructure or relative less input which eventually resulted in high efficiency score.

Table 3 - Efficiency Score of Six AOT Airport

	Passenger Efficiency	Flight Efficiency
BKK	0.88	0.88
DMK	0.88	0.84
CNX	0.59	0.76
CEI	0.49	0.59
HDY	0.70	0.76
HKT	0.62	0.77

In Table 3 the correlation coefficients between the efficiency measures estimated and the input variables used in the models are depicted. It is observed that for all the input variables pertaining to terminal service model i.e. Terminal Area, Gates, Average Check-in to gate time and Average baggage collection time and Number of Employees, are having relatively high correlation with Passenger efficiency than Flight Efficiency. The same observation holds for all inputs pertaining to Flight movement model *i.e.* Airport Capacity, Aircraft Parking Area, Number of Runways and Number Parking Bays, which are having relatively high correlation with Flight efficiency than Passenger Efficiency. It generally appears that there is a relatively high correlation between estimated efficiency and inputdata, with the exception of hours of operation, suggesting that input factors and their combination is affecting the efficiency significantly. Further, the high correlation between the two efficiency measures suggests that airports with efficient terminals enjoy efficient airsides and vice-versa. The correlation coefficients between efficiency findings and input dataare relatively high, as can be expected by the input-oriented nature of the DEA model used.

Table 4 - Correlation coefficients between efficiency scores and input variables

Correlation Coefficient between Average Efficiency Score and Input Variables		
Input Variables	Passenger Efficiency	Flight Efficiency
Terminal Area in Sq. Mt.	0.778	0.695
Gates	0.871	0.773
Average Check-in to gate time	0.851	0.782
Average Baggage Collection time	0.831	0.433
Number of Employees	0.698	0.664
Airport Capacity (Aircrafts/hour))	0.373	0.746
Aircraft Parking Area	0.431	0.755
Number of Runways	0.190	0.726
Number Parking Bays	0.098	0.792
Passenger Efficiency	_	0.897
Flight Efficiency	0.897	_

The correlation coefficient between Efficiency scores and Output Variables are indicated in Table 5. It is observedthat the highest correlation exists between Total Passenger and Aircraft Traffic with Efficiency Scores. Considering that the total passengers and aircraft movements at all the airports and across all years, almost exclusively involve LCA traffic, this indicates that airport efficiency both from a terminal and a landside perspectives depends, to a large extent, on LCA demands and its characteristics.

Table 5 - Correlation coefficient between efficiency scores and output variables

Correlation Coefficient between Average Efficiency Score and Output Variables		
Output Variables	Passenger Efficiency	Flight Efficiency
Total Pax	0.784	0.784
Domestic Pax	0.654	0.760
International Pax	0.660	0.755
Total Flight	0.809	0.863
Domestic Flight	0.661	0.777
International Flight	0.688	0.695
Passenger Efficiency	_	0.897
Flight Efficiency	0.897	_

5. Managerial implications

The study suggests the managerial implications on three folds; the passenger enplanements and flight movement are two key factors to improve the efficiency of airports in Thailand and with the increasing share of LCA in aviation, airport managers must devise their strategies to address the specific needs of Low Cost Airlines and their passengers. The finding reveals that, the terminal efficiency of six AOT airports have higher score than airside efficiencies which is a good result for the airports in short run however it is pointing towards the need of further capacity expansion of terminals in near future growth. Based on the empirical analysis and results of this research, airport managements should set their priorities according to the economic, political, operational and financial conditions of the airports. The author would like to give strategic implications where controllable variables such as specific needs of airlines and passengers, capacity expansion of airside and terminals, processing time of passengers, terminal facilities and number of employeesshould be undertaken as contributing element for planning short term and achieving long term operational effectiveness goals of airports. On the contrary theuncontrollable variables such as regulations, economic growth and competition should be identified, analyzed and combined with the strategies in order to be able to achieve an efficient level of operations.

Conclusion

Data Envelopment Analysis has been utilized on terminal service model and flight movement model of input and output variables of airport; to assess the operational efficiency of airports in Thailand with high LCA traffic. The data used for the above pertaining is for two years for the six AOT Airports in Thailand that account for almost 87% of LCA traffic in the country. By employing the terminal service and flight movement models the input and output variables are distinguished between airside and terminals while exploringthe efficiencies and inefficiencies for each. The results indicate that airport efficiency has high correlation with identified input variables of terminal service model. Similarly high correlation has been identified between input variables of Flight movement model and Flight Efficiency. It is identified that combination of input variables are significantly contributing to efficiencies of airport. It has also been observed that terminal efficiencies are higher than airside efficiencies. High correlation is observed between total passenger enplanements, total aircraft movement and efficiency scores. As total passengers and aircraft movements at all the airports exclusively involve LCA traffic, which indicates that airport efficiency both from a terminal and airside perspectives depends, to a large extent, on LCA demands and its characteristics.

References

[1] Abbott, M., S.W. (2002). Total Factor Productivity and Efficiency of Australian Airports. *Australian Economic Review*, 35(3): 244-260. DOI http://dx.doi.org/10.1111/1467-8462.00241

[2] Cejas, M.R. (2002). An approximation to the productive efficiency of the Spanish airports network through a deterministic cost frontier, *Journal of Air Transport Management*, 8 (4): 233-238. DOI http://dx.doi.org/10.1016/S0969-6997(01)00056-4

[3] Charnes, A., Cooper, W., Rhodes, E. (1978). Measuring the efficiency of decisionmaking units, *European Journal of Operational Research,* 2(6): 429-444. DOI http://dx.doi.org/10.1016/0377-2217(78)90138-8

[4] Charoensettasilp, S., Wu, C. (2013). A Relationship between Expectation (Before) and Satisfaction (After) Receiving Services of Thai Consumers from Domestic Low-Cost Airlines,*International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 7(12): 3053-3060. DOI http://dx.doi.org/10.14257/ijunesst.2013.6.6.11

[5] Gillen, D., Lall, A. (1997). Developing measures of airport productivity and performance: an application of data envelopment analysis. *Transportation Research Part E: Logistics and Transportation Review,* 33(4): 261-273. DOI http://dx.doi.org/10.1016/S1366-5545(97)00028-8

[6] Hooper, P.G. (1997). Measuring total factor productivity of airports — an index number approach, *Transportation Research Part E: Logistics and Transportation Review*, 33(4): 249-259. http://dx.doi.org/10.1016/S1366-5545(97)00033-1

[7] Martin, J.C., Roman, C. (2001). An Application of DEA to Measure the Efficiency of Spanish Airports Prior to Privatization, *Journal of Air Transport Management*, 7(3): 149-157.http://dx.doi.org/10.1016/S0969-6997(00)00044-2

[8] Neufville, R. (2006). Accommodating Low Cost Airlines at Main Airports. mit.edu. 2006. http://ardent.mit.edu/airports/ASP_papers/Accommodating%20Low%20Cost%20Carriers--%20revised.pdf (accessed January 21, 2016).

[9] Nyshadham, E., Rao, V.K. (2000). Assessing Efficiency of European Airports: A Total Factor Productivity Approach, *Public Works Management & Policy*, 5: 106-114. DOI: 10.1177/1087724X0052004

[10] Oum, T.H., Chunyan, Y. (2004). Measuring airports' operating efficiency: A summary of the 2003 ATRS global airport benchmarking report, *Transportation Research Part E: Logistics and Transportation Review* 40(6): 515-532. DOI: 10.1016/j.tre.2004.08.002

[11] Parker, D. (1999). The performance of BAA before and after privatisation a DEA study. *Journal of Transport Economics and Policy*, 33(2): 133-145.

[12] Pels, E., Nijkamp, P., Rietveld, P. (2001).Airport and Airline Choice in a Multiple Airport Region: An Empirical Analysis for the San Francisco Bay Area. *Regional Studies*, 35(1): 1-9. DOI: 10.1016/S1366-5545(97)00027-6

[13] Pyrialakou, V. D., Karlaftis, M.G., Michaelides, P.G. (2012). Assessing operational efficiency of airports with high levels of low-cost carrier traffic, *Journal of Air Transport Management*, 25: 33-36. DOI: 10.1016/j.jairtraman.2012.05.005

[14] Qin, Z. (2012). The Factors Influencing Low-cost Airline Passenger Satisfaction and Loyalty in Bangkok, Thailand, University Thai Chamber of Commerce. Available at: http://eprints.utcc.ac.th/1326/2/1326 fulltext.pdf (accessed Jan 21, 2016).

[15] Sarkis, J. (2000). Analysis of the operational efficiency of major airports in the United States, *Journal of Operations Management,* 18(3): 335-351. DOI: 10.1016/S0272-6963(99)00032-7

[16] Zikmund, W.G. (2000). *Business Research Methods.* 6th Edition, The Dryden Press Harcourt College Publishers.

*** ACI (2012). Guide to Airport Performance Measures. Airport Council International, 8-12.

*** Airport of Thailand. (2015). Corporate Presentation. Airport of Thailand, 4-8.

*** Department of Civil Aviation (2015). Air Transport Statistics. Department of Civil Aviation Thailand.

*** ICAO. (2014). Measuring Airport Economic Performance. http://www.icao.int/MID/Documents/2014/Aviation%20Data%20Analyses%20Seminar/9562_Eco_perfo.pdf (accessed Jan 21, 2016).

*** Southwest Airlines.(2015). http://southwest.investorroom.com/2015-01-22-Southwest-Airlines-Reports-Fourth-Quarter-And-Record-Annual-Profit-42nd-Consecutive-Year-Of-Profitability (accessed Dec 18, 2015)

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Developing a Java Application for Distributive Computations using Semantic Schemas

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Abstract

In this paper I describe an implementation of the Java application for distributive computations using semantic schemas. The application uses the model of distributive system and it is implemented in Java. It contains the server and the client application. A master-slave system is a cooperating system of semantic schema. One of the components is the master of the system and the other components are named the slaves of the system. Both the server side and the client side of the application are described.

Keywords: *master schema, slave schema, semantic schema, master-slave system, knowledge-based system.*

JEL Classification: C63, C88.

1. Introduction

In artifical intellgence, an important concept is Knowledge Representation and Reasoning Sstem (KRRS). The researcher Wagner (Wagner 1994) describe the KRRS such a system with components that cooperate between them and the whole system is able to reason in order to give the answer of an interrogation. The main components of a KRRS are the knowledge base and the answer function (Popîrlan, Țăndăreanu, 2008) and (Popîrlan 2004). The concept of semantic schema was introduced in (Țăndăreanu 2004) as a method of knowledge representation. This structure is based on graph theory and universal algebras. A master-slave system (Țăndăreanu 2007) is a cooperating system of semantic schema. One component is the master of the system that guides the computations of the system. The other components are named the slaves of the system. Two slaves cannot cooperate directly one by another. A slave can help the master to obtain an inference. Two kinds of components are described by a master-slave system: a formal computation and a semantic computation.

The semantic computations in a semantic schema are defined by means of a interpretation. The semantic computation of the master takes into account the semantic computation in a slave. The mecanism leads to the posibility of a direct implementation that will be described in the next section.

2. Java application for distributive computations using semantic schema

In this section I present a Java application that uses the model of distributive system and is implemented in Java. A distributive system consists of a computers-network equipped of software that allows computers coordinate their activities and sharing hardware resources, software and data. The structure of Java application is shown in Figure 1. The distributive system contains the following components:

- The Communication Module: treats the communication to satisfy the requests of the clients. In Figure 1 show in detail the actions of this module.
- Two inference engines: one for master-schema and one for slave-schema.
- A collections of the knowledge bases: KB1 and KB2.

The structure of the distributive application includes a graphical user interface and it is shown in Figure 1. The following components are included:

- Four *TextArea* structures used to introduce the query text (“INTERROGATION”), to display the inference conclusion (“ANSWER”), to display various messages of the server and the explanations of the inference engine (“MESSAGES”), to display the graph image of the communication grammar (“GRAMMAR”).
- Five buttons to perform the actions of the client:
  - “Send query” - to send the query text introduced into the TextArea “INTERROGATION”;
  - “Another query” - to introduce a new interrogation;

- "GRAMMAR" - to display the graph image of the communication grammar;
- "Explanations" - to display the explanations given by the inference engines;
- "FINISH" – to close the client application.

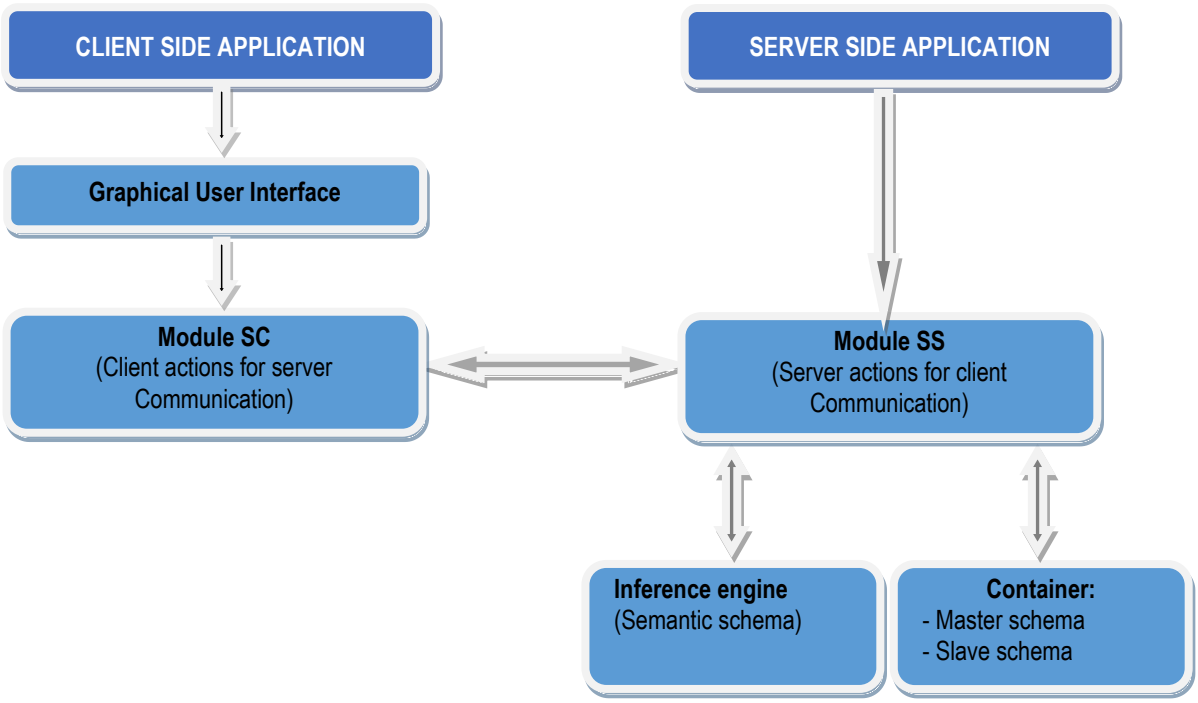

Figure 1 - Java Application Arhitecture

3. Java programming considerations

I implemented this application using Java technologies. In order to listed clients on a specific port, the Java server program (*ServerulMeu class*) implements a new *ServerSocket object* (*serverul_meu*). The Java server communicates with the client over this new *ServerSocket* and continues to list for other clients' connections requests on the original *ServerSocket*. Through the *Thread* technology: one Java thread per each client connection, the Java server program is in service simultaneously for several clients.

```
public class ServerulMeu {
public static void main (String[] args)
{int portul=1021;
try {
  ServerSocket serverul_meu=new SeverSocket(port);
while (true) {
System.out.println (”Astept clienti pe portul”+portul);
Socket clientii_mei=serverul_meu.accept();
Connection_Client handlerul_meu=new Connection_Client(clientii_mei);
Handlerul_meu.start();}
  } catch(Exception ex)
  {System.out.println(”Eroare de conexiune: „+ex);}
  }
}
```

The *Connection_Client* object named *handlerul_meu* is created to examine and process the requests sent to and the responses received from the client. The structure of this *ServerSocket* object includes the method *public void run()* to perform aspects connected by the communication with the client and the inference engines (for master and slaves). The knowledge base is implemented in Java using *JTable* component and is represented as follows:

```
String ss_date0[][] = new String[0][0];
  String ss_col0[]={"Nr_nodes", "List_of_nodes", "Label",
```

```
    "Part1", "Part2", "Part3", "Part4", "Slave"};
  DefaultTableModel ss_model0=
    new DefaultTableModel (ss_date0, ss_col0);
  JTable ss_kb0=new JTable(ss_model0);
String ss_date1[][]=new String[0][0];
  String ss_col1[]={"Nr_nodes", "List_of_nodes", "Label",
    "Part1", "Part2", "Part3", "Part4"};
  DefaultTableModel ss_model1=
    new DefaultTableModel(ss_date1,ss_col1);
  JTable ss_kb1=new JTable(ss_model1);
  -------------
private Object[][] ss_data0={
  {"2", "Maria, Cornelia","theta1(theta1(a,b),c)","","","","","1"},
  {"2","Cornelia salary","a5","","","","","2"},
  -------------
  {"3","Maria,Cornelia salary","theta(theta1(theta1(a,b),c),a5)",
    "Maria,Cornelia","theta1(theta1(a,b),c)","Cornelia salary",
    "a5","0"}};
private Object[][] ss_data1={
  {"2","Maria,Diana","a","","","","",""},
  {"3","Maria,Diana,Dan","theta1(a,b)","Maria,Diana","a",
    "Diana,Dan","b"},
  --------------
  {"4","Maria,Diana,Dan,Cornelia","theta1(theta1(a,b),c)",
    "Maria,Diana,Dan","theta1(a,b)","Dan,Cornelia","c"}};
    --------------
public String Inference_kb_0(String str1, String str2){
  int jj1=-1;
  String path1="";String label1="";String path2="";
  String label2="";String V1="";String V2="";String A1="";
  String A2="";String A3="";String z10;String z11;
  String z12;String z13;String z14;String zn10;
nr_lines=ss_kb0,getRowCount();
for(int j8=0;j8<nr_lines;j8++){
    z10=(String)ss_kb0.getValueAt(j8,2);
    if(z10.equals(str2)){jj1=j8;};}
zn10=(String)ss_kb0.getValueAt(jj1,0);
z11=(String)ss_kb0.getValueAt(jj1,7);
if(zn10.equals("2")){
    if(z11.equals(„1”)){z13=search_in(„1”,str2);
      z14=Inference_kb_1(z13,str2);return z14;}
    if(z11.equals(„2”)){ z13=search_in(„2”,str2);
      z14=Inference_kb_2(z13,str2);return z14;}}
if(z11.equals(„0”)){
    path1=(String)ss_kb0.getValueAt(jj1,3);
    label1=(String)ss_kb0.getValueAt(jj1,4);
    path2=(String)ss_kb0.getValueAt(jj1,5);
    label2=(String)ss_kb0.getValueAt(jj1,6);
    V1=Inference_kb_0(path1,label1);
    V2=Inference_kb_0(path2,label2);
    A1=extract_node(V1,1);A2=extract_node(V2,2);
    return Alg(„0”,str2,A1,A2);}
  return ”finish”;
}
--------------
```

Using a Recursive Transition Network, that is show in Figure 2, I can prepare the interrogation.

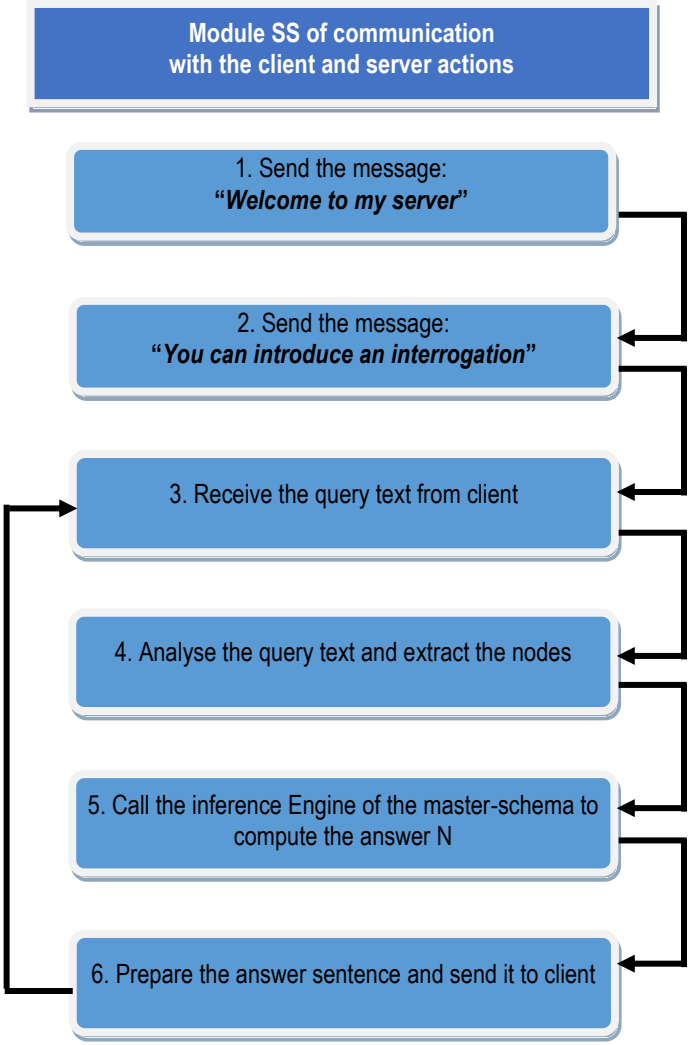

Figure 2. The communication module

4. Running application and results

In this section I illustrate the result of the interrogation process. The connection of the client with the server is started because the server sends the messages: *Welcome to my server!* and *You can introduce an interrogation*. The user can obtain the explanations if he presses on the button *Explanations*. The model presented in this paper allows obtaining distributed inference conclusion. From two conclusions of different slaves the master can obtain a conclusion which can not be obtained by a slave. From the next informations detalied in KB1 and KB2:

KB1: *Maria is the mother of Diana. Dan is the husband of Diana. Maria is the mother-in-law of Dan. Dan is the father of Cornelia*.

KB2: *Cornelia received 3200 RON*.

The system obtain the conclusion: *A granddaughter of Maria is paid with 3200 RON*.

References:

[1] Wagner, G. (1994). Vivid Logic Knowledge-Based Reasoning with Two Kind of Negation, *Lecture Notes in Artificial Intelligence 764*, Springer Verlag.

[2] Popîrlan, C.I., Țăndăreanu, N. (2008). An Extension of Inheritance Knowledge Bases and Computational Properties of their Answer Functions, *Annals of the University of Craiova, Mathematics and Computer Science Series,* 35: 149-170.

[3] Popîrlan, C.I. (2004). A Java Implementation of Modelling Results About Stratified Graphs, 4th Romanian Conference on Artificial Intelligence and Digital Communications Research Notes in Artificial Intelligence and Digital Communications, pp. 31-38.

[4] Țăndăreanu, N. (2004). Semantic Schemas and Applications in Logical Representation of Knowledge, Proceedings of the 10th International Conference on CITSA, July 21-25, Orlando, Florida, Volume III, p. 82-87.

[5] Țăndăreanu, N. (2007). Master-Slave Systems of Semantic Schemas and Applications. The 10th IASTED International Conference on Intelligent Systems and Control (ISC 2007), November 19-21, Cambridge, Massachusetts, USA, p. 150-155.

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