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<u>Contents</u>

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Regional Science Inquiry, Vol. X, (2), 2018 - Editorial

The present issue of RSI Journal includes a number of scientific papers related to regional policy issues which are expected to interest a wide range of scholars and policy-makers on an academic, methodological or practical level.

More specifically, this issue includes the following reviewed papers:

1. A Note on Local Public Good Induced Spillovers between a Leading and a Lagging Region (by Amitrajeet A. Batabyal). This paper analyzes spatial spillovers in an aggregate economy consisting of a leading and a lagging region where the spillovers stem from the provision of a local public good.

2. Investigating the Effect of Financial Innovations on the Demand for Money in Australia Using DOLS and FMOLS and Comparing Their Predictive Powers (by Payam Mohammad Aliha, Tamat Sarmidi and Fathin Faizah Said). This paper uses two different estimation methods, namely DOLS and FMOLS to estimate real demand for money in Australia with the inclusion of financial innovations.

3. Analysis of the impact of foreign investment on the competitiveness of Russian companies (by Anna A. Khryseva, Olga E. Akimova and Olga A. Savchenko). This article analyzes the impact of foreign investment on the competitiveness of Russian companies.

4. The assessment of socio-economic potential density of Arctic territories in Russia (by Vyacheslav L. Baburin, Vladimir S. Tikunov, Svetlana V. Badina and Olga Yu. Chereshnia). The article presents a methodology for assessing the density of social and economic potential.

5. Picturing Spanish filmgoers: Motives, barriers and film theatres (by Manuel Cuadrado-Garcia, Nela Filimon and Juan D. Montoro-Pons). This research presents a multifaceted perspective of Spanish filmgoers focused on motives for and barriers to film theatres attendance.

6. Determinants of Employment Situation in Large Agglomerations in India: A Cross-Sectional Study (by Sabyasachi Tripathi). This paper analyzes the employment situation in different class of cities in urban India.

7. Firms' environmental performance and regional residents (by Kenichi Shimamoto). This paper attempts to use the Nash bargaining solution concept between firms and the surrounding residents to analyze the optimal solution when considering the firms' economic activity and environmental performance.

8. Methodological and practical aspects of human potential management in the region (by Marina Gennadyevna Fedotova, Anastasia Viktorovna Zhiglyaeva and Elena Valentinovna Stolyarova). This article presents a systematic approach to the management of the human potential of the region, which is distinguished by its novelty and based on modern methods of system analysis, management and regional economy.

9. Methodology of investment cycle analysis in the regional economy: territorial and industrial aspects (by Oksana Butorina, Matvey Oborin, Galina Kutergina and Mariya Osipova). The paper gives a brief description of the recurrent approach to the study of modern macroeconomic processes. It defines the role of investment processes in the modern macroeconomic cycle.

10. Scottish independence: how would IT affect the country's foreign trade? (by Lucie Coufalova). The purpose of this paper is to identify the main determinants of Scotland's foreign trade and, above all, the EU's role in the volume of the country's exports, as its EU membership is one of the key arguments in the political discourse about independence.

11. SMEs' Credit demand and economic growth in Indonesia (by M. Shabri Abd. Majid, Hamdani, Muhammad Nasir and Faisal). This study aims at empirically exploring the short- and long-run relationships between economic growth, non-performing loans, interest rates and the credit demand by the small and medium enterprises (SMEs) in Aceh province, Indonesia.

12. Characterization of agricultural systems in the European Union regions: A farm dimension- competitiveness-technology index as base (by Vítor João Pereira Domingues Martinho). This study aims to identify and characterize the main agricultural systems in the European Union, using statistical information available in the FADN (2017), for the periods 2007-2009 and 2012-2013.

13. Patterns of spatial development: Evidence from Russia (by Veronika Maslikhina). The aim of the paper is to analyze the trends of spatial inequality in Russia in 1994-2015 based on the convergence concepts.

14. Shale industry's economic contribution in Ohio, USA: Implications for future activity in the state (by Gilbert Michaud). This research employed a multi-industry economic contribution analysis using IMPLAN and an input-output methodology with 2015 data to quantify the economic contribution of the shale industry across the entire State of Ohio, as well as a 26-county Appalachian Ohio region where most shale extraction activity is taking place.

15. The relationship between health care and tourism demand economy in Iranian economy (by Majid Feshari and Hedayat Hosseinzadeh). The main objective of this study is to investigate the correlation between health care and international tourism in the long-run and short-run by using a fully modified ordinary least square (FMOLS) and Toda-Yamamoto approach over the time period of 1971-2016.

16. Person-oriented irritability, social and educational stereotypes as factors of adopting controlling or non-aggressive position by students (by V.G. Maralov and V.A. Sitarov). The purpose of this paper is to investigate the effect of person-oriented irritability, social and educational stereotypes on adopting either a controlling or manipulative position, or a non-aggressive position by students.

17. Economic Regulation and Mathematical Modeling of Insurance Product Cost Method (by Irina V. Sukhorukova and Natalia A. Chistiakova). The priority of this economic study is to establish a scientific rationale for a transfer to the actuarial cost method of an insurance contract, as this method assures a balanced solution for long-term socio-economic problems and stability of the insurance portfolio.

18. Problem of river bank failure and the condition of the erosion victims: A case study in Dhulian, West Bengal, India (by Smt. Debika Ghosh and Abhay Sankar Sahu). This paper deals with the problem of bank failure and the present condition of erosion victims in Dhulian.

19. Does Trade Openness and Fiscal Policy Affect Inequality and Economic Growth? A Study in Indonesia (by Mohammad Khusaini, Setyo Tri Wahyudi and Zamrud Siswa Utama). This paper examines the impact of trade openness and Indonesia's fiscal policy on income inequality and economic growth.

20. Determinants of affordable housing allocation: Common perspectives from local officials (by Xiang CAI).The main purpose of this paper is to conduct a systematic analysis of the challenges of housing allocation from the perspectives of administrators at the city level.

Finally, the Journal wants to thank each one and all of the contributors and we strongly wish that this issue will provide a pathway for further academic and scientific dialogue.

On behalf of the Editorial Board
Dr. Christos D. Genitsaropoulos

<u>Articles</u>

A NOTE ON LOCAL PUBLIC GOOD INDUCED SPILLOVERS BETWEEN A LEADING AND A LAGGING REGION

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Abstract

We analyze spatial spillovers in an aggregate economy consisting of a leading and a lagging region where the spillovers stem from the provision of a local public good. Specifically, if the leading region provides the public good then the lagging region obtains some spillover benefits and vice versa. We first solve for the Nash equilibrium levels of the local public goods in the two regions when public investment decisions are simultaneous; next, we determine the equilibrium welfare levels in each region. Second, on the assumption that the public investment decisions are centralized, we compute the levels of the local public goods that maximize aggregate welfare. Finally, we describe an interregional transfer scheme that leads each region to choose non-cooperatively in a Nash equilibrium the same public investment levels as those that arise when aggregate welfare is maximized.

1. <u>Introduction</u>

Regional scientists now clearly comprehend the point that irrespective of whether one studies a developed or a developing nation, all manner of inequalities exist in the different regions that make up the nation under consideration. This comprehension has given rise to great interest in examining the characteristics of leading and lagging regions. As pointed out by Batabyal and Nijkamp (2014a), in this two-part classification, lagging regions are generally not dynamic, they are often rural or peripheral or remote, they are technologically backward, and they display slow rates of economic growth. In contrast, leading regions are typically dynamic, they are often urban and centrally located, they are technologically more advanced, and they display relatively rapid rates of economic growth. We now have a fairly large literature on leading and lagging regions. Therefore, before we proceed to the specific contributions of this note, let us first briefly survey this literature.

Desmet and Ortin (2007) study uneven development in a model with two regions and two sectors. In their model, whether the lagging or the leading region profits from technological change is uncertain. Because of the presence of this kind of randomness, these researchers demonstrate that it may make sense for the lagging region to remain underdeveloped. Chronic labor shortages in the remote regions of Queensland, Australia are the focus of Becker et al. (2013). They point out that the remoteness of the regions under study makes it difficult to attract and retain labor. Hence, businesses and communities will need to work together to ameliorate the problems created by these acute labor shortages.

Dawid et al. (2014) study the effect of policies designed to foster technology adoption and improvements in the human capital stock, on the economic performance of what they call stronger and weaker regions. They demonstrate that the impact of such policies depends fundamentally on the extent to which the labor markets in the two regions are integrated. Batabyal and Nijkamp (2014b) examine the economic performance of lagging and leading regions when there is a technology gap between these two regions. Their analysis demonstrates that in spite of the existence of the technology gap, on the balanced growth path (BGP), the physical to effective human capital ratio is identical in both regions. Batabyal and Nijkamp (2018) study an aggregate economy consisting of a leading and a lagging region. They show that relative to the leading region, the lagging region's initial economic disadvantages are magnified on the BGP.

Three recent papers have shed some light on the topic of spatial spillovers between leading and lagging regions. Kalirajan (2004) studies the economic performance of leading and lagging states in India. He contends that the quality of the available human capital and infrastructure will determine the extent to which there are growth spillover effects from the leading to the lagging states. Smulders (2004) analyzes an endogenous growth model where the two regions being studied are countries. Ho shows that capital market integration hurts (aids) the leading (lagging) region if domestic spillovers are more salient than international spillovers and differences in research and development (R&D) are small. Finally, Rodriguez-Pose and Crescenzi (2008) analyze an empirical model of R&D, spillovers, innovation, and the genesis of regional growth in Europe. They point out that a key role of spillovers relates to the transmission of economically productive knowledge. Even so, it is important to comprehend that these spillovers are subject to potent distance decay effects.

The various studies discussed in the preceding three paragraphs have certainly advanced aspects of our understanding of the working of leading and lagging regions in different parts of the world. Even so, to the best of our knowledge, there are no studies in the extant literature that have examined the working of leading and lagging regions when (i) there are spatial spillovers between these two regions and (ii) the source of these spillovers is the level of public investment in a local public good. [1]

Given this lacuna in the literature, the objective of this note is to analyze the nature of the spatial spillovers in an aggregate economy consisting of a leading and a lagging region. The spillovers stem from the provision of a local public good. What this means is that if the leading region provides the public good then the lagging region obtains some spillover benefits and vice versa. Section 2 delineates the theoretical framework. Section 3 first solves for the Nash equilibrium levels of the local public goods in the two regions when the public investment decisions are simultaneous. Next, this section determines the equilibrium welfare level in each region. On the assumption that the public investment decisions are centralized, section 4 computes the levels of the local public goods that maximize aggregate welfare. Section 5 describes an interregional transfer scheme that leads each region to choose non-cooperatively in a Nash equilibrium the same public investment levels as those that arise in section 4. Section 6 concludes and then discusses two ways in which the research delineated in this note might be extended.

2. **The Theoretical Framework**

Consider an aggregate economy consisting of a leading and a lagging region. Following the nomenclature in Batabyal and Nijkamp (2018), we denote the leading region with the subscript L and the lagging or *remote* region with the subscript R. The government in each of these two regions can undertake some public investment in a local public good. This investment improves the quality of the lives and hence the welfare of the people living in these two regions. In the model of this note, public investment in either of the two regions under study leads to some spatial spillovers. In other words, if the leading region (L) provides the local public good then the lagging region (R) obtains some spillover benefits and vice versa.

In principle, the local public good in the two regions can be any one of several possibilities including, but not limited to, the provision of police, the provision of radio and television signals, and the provision of a public park. However, for concreteness, in the remainder of this note we shall think of the local public good as *public education*. As such, the spillovers we have mentioned arise from the fact that it is possible for a citizen of the leading (lagging) region to migrate and either work or live in the lagging (leading) region. [2] Now, in reality, we expect most of the spillovers to be experienced by the leading region because many more citizens from the lagging region are likely to migrate to the leading region in search of better

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[1] As noted by Hindriks and Myles (2013, p. 208), a local public good "has the feature that its benefits are restricted to a particular geographical area and it cannot be enjoyed outside of that area."

[2] We shall use the terms "local public good" and "public education" interchangeably in the remainder of this note.

economic opportunities. Even so, in the interest of generality, we allow the spillovers to exist from the lagging to the leading and from the leading to the lagging regions.

Finally, let g_L and g_R denote the public good levels in the leading and in the lagging regions. In addition, let the welfare function in each region be given by

$$U^i(g_i, g_j) = 2\{\alpha\sqrt{g_i} + \beta\sqrt{g_i g_j}\} - \gamma g_i, \tag{1}$$

for $i \neq j$, $i, j = L, R$, $\alpha > 0$, and $\gamma > \beta > 0$. Our next task is to solve for the Nash equilibrium levels of the local public goods in the two regions when the public investment decisions are simultaneous.

3. The Nash Equilibrium Local Public Good Levels

In this section, the governments in the leading and in the lagging regions make their public investment decisions *simultaneously*. We know that the welfare level in region i as a function of the two public good levels g_i and g_j is given by equation (1). Therefore, differentiating both sides of equation (1) with respect to g_i gives us

$$\frac{\partial U^i(g_i, g_j)}{\partial g_i} = \frac{\alpha}{\sqrt{g_i}} + \frac{\beta g_j}{\sqrt{g_i g_j}} - \gamma. \tag{2}$$

Simplifying equation (2), the first-order necessary condition for the optimal choice of g_i is

$$\frac{\alpha}{\sqrt{g_i}} + \frac{\beta g_j}{\sqrt{g_i g_j}} = \gamma. \tag{3}$$

Equation (3) can also be expressed as

$$\alpha + \beta\sqrt{g_j} = \gamma\sqrt{g_i}. \tag{4}$$

Given equation (4), the best response function of the government in region i to public good level g_j is

$$g_i = \frac{(\alpha + \beta\sqrt{g_j})^2}{\gamma^2}. \tag{5}$$

Similarly, the best response function of the government in region j to public good level g_i is

$$g_j = \frac{(\alpha + \beta\sqrt{g_i})^2}{\gamma^2}. \tag{6}$$

Now, the Nash equilibrium levels of the two regional public goods g_L and g_R are given by solving equations (5) and (6) simultaneously. That said, the reader should note that because of the symmetry in our theoretical framework, we can write the two Nash equilibrium levels we seek as $g_L = g_R = g_{NE}$ which solves, after dropping the subscripts, the equation

$$\alpha + \beta\sqrt{g} = \gamma\sqrt{g}. \tag{7}$$

Simplifying equation (7), we get a distinct value for g_{NE} and that value is

$$g_{NE} = \left(\frac{\alpha}{\gamma - \beta}\right)^2 > 0, \tag{8}$$

for $\alpha > 0$ and $\gamma > \beta > 0$ Inspecting equation (8) we see that there is no corner solution in our model. In other words, it is optimal in both the leading and in the lagging region to provide a *strictly positive* level of the local public good that is public education.

Our second and final task in this section is to ascertain the equilibrium welfare level in each region. We do this in three steps. First, substitute the result in equation (8) into the leading and the lagging region welfare functions given in equation (1). This gives us

$$U^i(g_{NE}, g_{NE}) = 2\{\alpha\sqrt{g_{NE}} + \beta\sqrt{g_{NE}, g_{NE}}\} - \gamma g_{NE}. \qquad (9)$$

Second, using equation (8), equation (9) can be simplified. This simplification yields

$$U^i(g_{NE}, g_{NE}) = 2\alpha\left(\frac{\alpha}{\gamma-\beta}\right) + (2\beta - \gamma)\left(\frac{\alpha}{\gamma-\beta}\right)^2. \qquad (10)$$

Finally, simplifying equation (10), we get

$$U^i(g_{NE}, g_{NE}) = \gamma\left(\frac{\alpha}{\gamma-\beta}\right)^2 > 0. \qquad (11)$$

Inspecting equations (8) and (11) we see that because the Nash equilibrium levels of public education in the two regions are positive, *so is* the equilibrium level of welfare in each of the two regions under study. In addition, the equilibrium welfare level in each region is a *constant* multiple of the Nash equilibrium public education levels. In symbols, we have $U^i(\cdot,\cdot) = \gamma g_{NE}$. We now proceed to compute the levels of the local public goods that maximize *aggregate* welfare on the assumption that the public investment decisions in the leading and in the lagging regions are centralized.

4. Aggregate Welfare

Aggregate or total welfare in the two regions under study is given by $U^L(g_L, g_R) + U^R(g_R, g_L)$. This specification tells us that mathematically, the task before us is to solve

$$max_{\{g_L, g_R\}} U^L(g_L, g_R) + U^R(g_R, g_L). \qquad (12)$$

The two first-order necessary conditions for an optimum are given by

$$\frac{\partial U^L(\cdot,\cdot)}{\partial g_L} + \frac{\partial U^R(\cdot,\cdot)}{\partial g_L} = \left(\frac{\alpha}{\sqrt{g_L}} + \frac{\beta g_R}{\sqrt{g_L g_R}} - \gamma\right) + \frac{\beta g_R}{\sqrt{g_L g_R}} = 0, \qquad (13)$$

and

$$\frac{\partial U^R(\cdot,\cdot)}{\partial g_R} + \frac{\partial U^L(\cdot,\cdot)}{\partial g_R} = \left(\frac{\alpha}{\sqrt{g_R}} + \frac{\beta g_L}{\sqrt{g_L g_R}} - \gamma\right) + \frac{\beta g_L}{\sqrt{g_L g_R}}. \qquad (14)$$

Observe that in both equations (13) and (14), the last ratio term denotes the spillover benefit that accrues to each region from the provision of the local public good. We can now write these two equations differently. This gives us

$$\frac{\alpha}{\sqrt{g_L}} + \frac{2\beta g_R}{\sqrt{g_L g_R}} = \frac{\alpha}{\sqrt{g_R}} + \frac{2\beta g_L}{\sqrt{g_L g_R}} = \gamma. \qquad (15)$$

Inspection of equation (15) and some thought together tell us that the solution we seek must be symmetric. In other words, it must be the case that we have $g_L = g_R = g_A$ where the subscript *A* denotes the fact that we are now studying the "aggregate welfare" maximization case. Using this preceding condition, we reason that the optimal local public good levels in the leading and in the lagging regions solve

$$\frac{\alpha}{\sqrt{g}} + 2\beta = \gamma. \qquad (16)$$

where we have omitted the subscripts because of symmetry. Simplifying equation (16), we obtain

$$g_A = \left(\frac{\alpha}{\gamma-2\beta}\right)^2 > g_{NE}, \qquad (17)$$

and we suppose that $\gamma > 2\beta$

Equation (17) tells us that in the Nash equilibrium studied in section 3, there is *underprovision* of the local public good (public education) in the two regions under study. This underprovision result arises because in the case studied in section 3, the government in the leading (lagging) region *ignores* the spatial spillover benefit stemming from its provision of public education for the lagging (leading) region. Our final task in this note is to delineate an interregional transfer scheme that leads the government in each region to choose non-cooperatively in a Nash equilibrium the same public investment levels as those we have obtained in this section.

5.   An Interregional Transfer Scheme

The interregional transfer scheme we have in mind is based on public investment in the *other* region that induces each of the two regions to select non-cooperatively in a Nash equilibrium the same public investment levels as those obtained in section 4. To this end, suppose that each region $i, i = L, R$, receives a subsidy σ_i per unit of the provision of the local public good g_i In this case, the i_{th} region's welfare is

$$U^i(g_i, g_j) + \sigma_i g_i. \qquad (18)$$

As such, the first-order necessary condition for an optimum for the leading region---see equations (2) and (3)---becomes

$$\frac{\partial U^L(g_L, g_R)}{\partial g_L} + \sigma_L = 0. \qquad (19)$$

Now if we set the subsidy equal to the spillover benefit so that $\sigma_L = \partial U^R(\cdot; \cdot)/\partial g_L > 0$, then we obtain

$$\frac{\partial U^L(g_L, g_R)}{\partial g_L} + \frac{\partial U^R(g_R, g_L)}{\partial g_L} = 0. \qquad (20)$$

From equation (13), we know that equation (20) represents the condition for the efficient provision of the local public good. Therefore, by setting the subsidy equal to the spillover benefit, we can alter the Nash equilibrium studied in section 3 and ensure an efficient allocation of public investment in the leading and in the lagging regions. This completes our discussion of spillovers between a leading and a lagging region induced by the provision of a local public good.

6.   Conclusions

In this note, we analyzed spatial spillovers in an aggregate economy consisting of a leading and a lagging region where the source of the spillovers was the provision of a local public good. In particular, if the leading region provided the public good then the lagging region obtained some spillover benefits and vice versa. We first solved for the Nash equilibrium levels of the local public goods in the two regions when public investment decisions were simultaneous; next, we determined the equilibrium welfare levels in each region. Second, on the supposition that the public investment decisions were centralized, we calculated the levels of the local public goods that maximized aggregate welfare. Finally, we described a subsidy based interregional transfer scheme that led the government in each region to choose non-cooperatively in a Nash equilibrium the same public investment levels as the ones that arose when decision making about public investment was centralized.

The analysis in this note can be extended in a number of different directions. Here are two potential extensions. First, it would be useful to analyze how differences in the magnitudes of the two spillover benefit terms influence migration decisions between the leading and the lagging regions. Second, it would be helpful to explicitly model the financing of the subsidy and to study how a "revenue neutrality" condition affects interactions between the leading and the lagging regions. Studies that analyze these facets of the underlying problem about economic differences between leading and lagging regions will provide additional insights into the connections between remote versus central location on the one hand and the efficient provision of local public goods on the other.

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INVESTIGATING THE EFFECT OF FINANCIAL INNOVATIONS ON THE DEMAND FOR MONEY IN AUSTRALIA USING DOLS AND FMOLS AND COMPARING THEIR PREDICTIVE POWERS

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Abstract

In this paper we apply two different estimation methods, namely DOLS and FMOLS to estimate real demand for money in Australia with the inclusion of financial innovations. We use a conventional money demand function that was enriched with a proxy for financial innovations. This sum of the number of cheques, credit cards, charge cards, ATM and direct entry payment was included in the regression model to proxy the effect of financial innovations on the money demand. The results indicate that the estimated coefficient of TPI using DOLS is not significant yet it is highly significant using FMOLS and it bears positive sign so that 1 percent increase in TPI leads to the increase of money demand by 0.24 percent. Also, using "Root Mean Squared Error" as the benchmark for predictive power, we conclude that FMOLS is superior to DOLD when it comes to forecasting.

Keywords: financial innovations, money demand, dynamic OLS, fully modified OLS, forecast

JEL classification: E41, E42, E52

1. Introduction

It is the payments mechanism of an economy that allows smooth functioning of its financial and real sectors. An efficient payments system is the one that offers real time settlement of financial transactions and facilitate the exchange of goods and services in a speedy, secure and reliable manner.

Huge cost savings can be achieved by migrating from paper-based payments to electronic payments. Improved efficiency of the payment system due to these innovations will enhance the efficiency to the entire economy. Manual processing of cash and cheques requires a huge amount of resources while electronic payments does not. Electronic payment help improve productivity levels and lower the cost of doing business. Moreover, extended financial services to the unbanked communities as a result of using electronic payments will enable them to benefit from lower cost of financial services. More intensive use of electronic payments plays a vital role in achieving higher economic growth and improving the competitiveness of the economy.

Several empirical studies have included financial innovation in the money demand specification due to the growth in financial innovation over the last few years. A money demand function that does not include financial innovation will face the misspecification of the money demand through over estimation, commonly referred to as "missing money" (Arrau and De Gregorio, 1991). Some of the issues such as autocorrelated errors, persistent over prediction and implausible parameter estimates can be solved by including financial innovation in the money demand specification which is all backed by empirical evidence (Arrau et al, 1995). Furthermore, the failure of cointegration of the money demand could be explained by non-stationary processes such as financial innovation, so that accounting for financial innovation will eliminate the periods of "missing money" (Arrau and De Gregorio,

1991). Arrau and De Gregorio (1993), Ireland (1995), Attanasio et al (2002), Alvarez and Lippi (2009) and Nagayasu (2012) are examples of the studies that have accounted for financial innovation in the money demand specification.

The objectives of the current paper is to estimate the demand for money in the presence of financial innovations using annual data from Australia for the period 1995 to 2016. We shall use Dynamic OLS (DOLS) and Fully Modified OLS (FMOLS) as superior methods to the OLS for many reasons. Then, we do forecasts based on these two methods and finally, we compare these two forecast to find out which of them outperform the other.

Plan of the paper is to provide a review of literature in section 2. An overview of financial innovations in Australia is given in section 3. Theoretical background and measurement of variables is mentioned in section 4. Results and discussion of results are reported in section 5. Lastly section 6 is reserved for the main conclusions.

2.   Literature review

There are numerous studies that have examined the cointegration property of money demand. Some of the studies that investigated the long run relationship between money demand and its determinants as follow.

Halicioglu and Ugur (2005) examine the stability of the narrow M1 (money demand function) in Turkey. In doing so, they use annual data from 1950 to 2002. They conduct stability test of M1 for Turkish by applying a cointegration procedure. They demonstrate that there is a long-run relationship between the narrow M1 money aggregate and its determinants: national income, interest rate and exchange rates.

Using quarterly data for the period 1973-2000, Bahmani & Oskooee and Rehman (2005) estimate money demand for seven Asian countries including India, Indonesia, Malaysia, Pakistan, Philippines, Singapore and Thailand. The results indicated that real M1 or M2 are cointegrated with their determinants in some Asian countries.

Akinlo (2006) use quarterly data (1970:1–2002:4). They apply ARDL approach to investigate if money demand (M2) for Nigeria is cointegrated and stable. The results indicate that M2 is cointegrated with income, interest rate and exchange rate.

Using monthly data over the period 1994:12-2006:12, Samreth (2008) estimate the money demand function for Cambodia. They apply ARDL approach to analyse cointegration property. They show that there is a cointegrating relationship between M1, Industrial Production Index, Consumer Price Index, and Nominal Exchange Rate in money demand function. Using ARDL approach, Long and Samreth (2008) examine if short and long run monetary models of exchange rate is valid for monetary exchange rate model of the Philippines. The results confirm that there is both short and long run relationships between variables in the monetary exchange rate model of the Philippines.

Baharumshah, et al. (2009) study M2 (the demand for broad money) in China. They apply ARDL approach to cointegration and use quarterly data over the period 1990:4 &2007:2. Bounds test indicate that there is a stable, long-run relationship between M2 and real income, inflation, foreign interest rates and stock prices.

However, most of these studies failed to account for financial innovation in the money demand specification except for Ndirangu and Nyamongo (2015) who employ the ARDL approach to cointegration for Kenya and use the currency outside banks/time deposit ratio as a proxy for financial development. The results also suggest that there is a long run relationship between money demand and its determinants with inclusion of mobile money.

3.   Payment system in Australia

The 'payments system' refers to arrangements which allow consumers, businesses and other organisations to transfer funds usually held in an account at a financial institution to one another. It includes the payment instruments – cash, cards, cheques and electronic funds transfers which customers use to make payments – and the usually unseen arrangements that ensure that funds move from accounts at one financial institution to another. Types of retail payment instruments include:

Cheques: A cheque is a paper based payment instrument. It is a form of written order directing a bank to pay money to the beneficiary.

Credit Cards: A credit card enables its holder to buy goods and services with a credit line given by credit card issuer and the amount will be settled at a later date.

Charge Cards: The functionality of a charge card is similar to a credit card. However, charge card holders must settle their outstanding amount in full by the due date every month.

Debit Cards: A debit card (such as those used at ATMs) is a payment card where the transaction amount is deducted directly from the cardholder's bank account upon authorisation.

Direct entry: It is a convenient, safe and reliable way to send and receive payments. It is an electronic payment system typically used by businesses to send or collect regular payments from large numbers of their employees or customers.

Cash

The use of cash as a payment method remains widespread. One of the most comprehensive sources of data on individual cash payments is the Reserve Bank's Consumer Payments Survey. This study was first undertaken in 2007 and was repeated in 2010, 2013 and 2016. The results indicate that consumers used cash for most of their low-value transactions, and overall, cash payments accounted for 37 per cent of the number and 18 per cent of the value of all consumer payments in 2016. The latest survey shows continued substitution away from cash use and towards electronic methods. The most common way consumers withdraw cash is through ATMs, which accounted for 69 per cent of the total number of cash withdrawals and 55 per cent of the value of withdrawals in 2016.

Figure 1: Consumer payment methods (percent of number of payments)
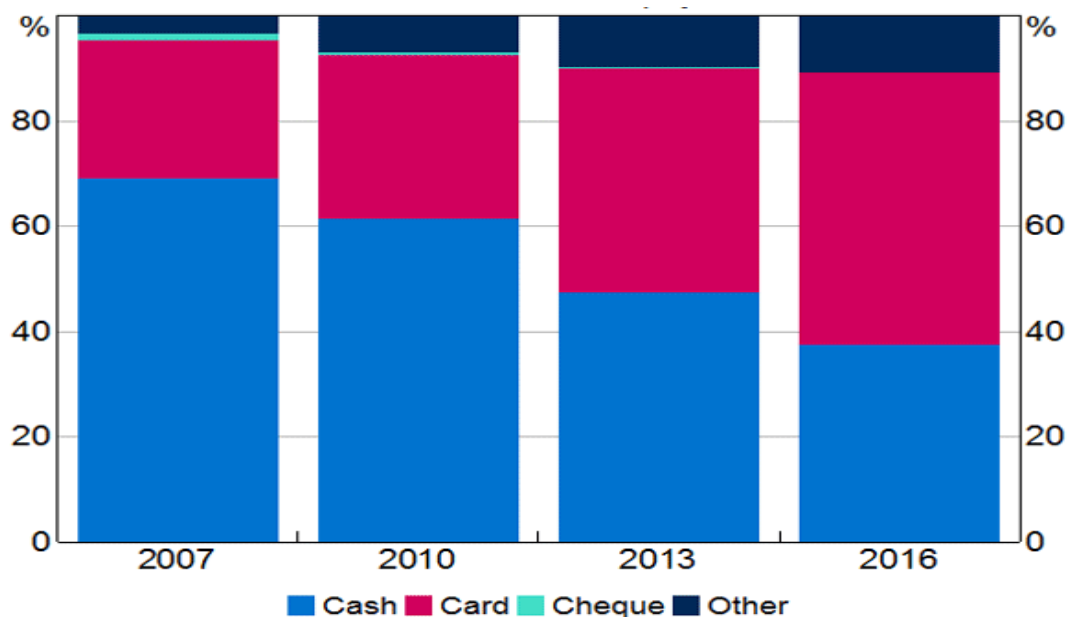
Source: RBA calculations, based on data from Colmar Brunton, Ipsos and Roy Morgan Research

Figure 2: Trend of the number of transactions by financial payment instruments in Australia
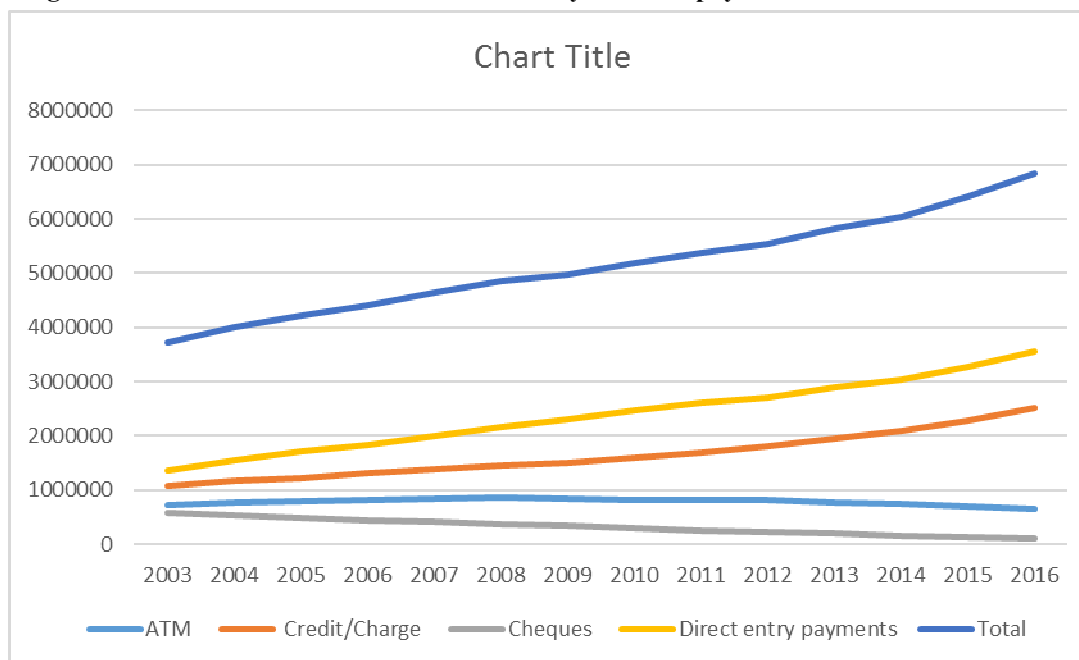
Source: Reserve Bank of Australia

In figure 2, from bottom to the top are cheques, ATM, credit/charge card, direct entry payments and the total. It can be easily seen from the above figure that the number of transactions for cheques and ATM slightly declines while that of credit/charge cards and direct entry payments increases over time. However, the total number of transactions is on the rise.

Non-cash payments

Non-cash payments account for most of the value of payments in the Australian economy. On average, in 2016 non-cash payments worth around $230 billion were made each business day, equivalent to around 14 per cent of annual GDP.

Over 70 per cent of the value of non-cash transactions is accounted for by a small number of high-value payments made through Australia's real-time gross settlement (RTGS) system. Most of the value of these payments relates to the settlement of foreign exchange and securities markets transactions.

The migration of large business payments to the RTGS system saw a decline in the importance of the cheque as a payment instrument. In 2016, around 5 cheques were written per person in Australia, down from 22 cheques per person 10 years earlier. A significant share of cheque use is related to commercial payments, and financial institution ('bank') cheques for certain transactions such as property settlements.

In contrast to the declining importance of cheques, the use of electronic payment instruments at the retail level has been growing rapidly. In 2016, transactions (both purchases and cash withdrawals) undertaken using either credit or debit cards averaged about 305 per person, an increase of 59 per cent on the level of five years earlier.

For many years, Australian governments and businesses have made extensive use of Direct Entry credits for social security and salary payments. Consumers and businesses also establish direct debits for bill payments. Direct Entry payments are an important part of the payments landscape. These payments continue to account for the bulk of the value of non-cash retail payments (i.e. non-RTGS transactions).

Role of the Reserve Bank

A safe and efficient payments system is essential to support the day-to-day business of the Australian economy and to settle transactions in its financial markets. Accordingly, the Reserve Bank of Australia has important regulatory responsibilities for the payments system and plays a key role in its operations.

The Payments System Board (PSB) of the Reserve Bank oversees the payments system in Australia. It is responsible for promoting the safety and efficiency of the payments system and through the Payment Systems (Regulation) Act 1998 and the Payment Systems and Netting Act 1998, the Reserve Bank has one of the clearest and strongest mandates in the world in relation to payments systems.

The Bank consults closely with participants in the payments industry. The Bank is represented on a number of industry committees responsible for the day-to-day management of payments clearing systems and Bank staff regularly meet with industry representatives and other regulators.

Efficiency of the payments system

Australia was among the first countries in the world to make efficiency of payment systems a statutory objective of the central bank. In pursuit of this mandate, the Reserve Bank has encouraged a reduction in cheque-clearing times and the take-up of direct debits as a means of bill payment, and taken a number of steps to improve the competitiveness and efficiency of card systems. Initially the latter focus was on credit card systems. In 2001, the Bank designated the Bankcard, MasterCard and Visa credit card systems as payment systems under the Payment Systems (Regulation) Act. Designation is the first step in the possible establishment of standards and/or an access regime for a payment system. After extensive consultation, the Bank determined Standards for the designated schemes which lowered interchange fees and removed restrictions on merchants charging customers for the use of credit cards, and imposed an Access Regime which facilitates entry by new players (Reserve Bank of Australia).

4. Methodology

Background

Unit root

The theory behind ARMA estimation is based on stationary time series. A series is said to be (weakly or covariance) stationary if the mean and autocovariances of the series do not depend on time. Any series that is not stationary is said to be nonstationary. A common example of a nonstationary series is the random walk:

$$y_t = y_{t-1} + \varepsilon_t \quad (1)$$

Where ε is a stationary random disturbance term. The series y has a constant forecast value, conditional on t, and the variance is increasing over time. The random walk is a difference stationary series since the first difference of y is stationary:

$$y_t - y_{t-1} = (1-L) y_t = \varepsilon_t \quad (2)$$

A difference stationary series is said to be integrated and is denoted as I(d) where d is the order of integration. The order of integration is the number of unit roots contained in the series, or the number of differencing operations it takes to make the series stationary. For the random walk above, there is one unit root, so it is an I(1) series. Similarly, a stationary series is I(0). Standard inference procedures do not apply to regressions which contain an integrated dependent variable or integrated regressors. Therefore, it is important to check whether a series is stationary or not before using it in a regression. The formal method to test the stationarity of a series is the unit root test.

There is a variety of powerful tools for testing a series (or the first or second difference of the series) for the presence of a unit root. In addition to Augmented Dickey-Fuller (1979) and Phillips-Perron (1988) tests, the GLS-detrended Dickey-Fuller (Elliot, Rothenberg, and Stock, 1996), Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992), Elliott, Rothenberg, and Stock Point Optimal (ERS, 1996), and Ng and Perron (NP, 2001) unit root tests are available as a view of a series. In this paper, however, we use Augmented Dickey-Fuller test for this purpose. The following discussion outlines the basics features of unit root tests. Consider a simple AR(1) process:

$$y_t = \rho y_{t-1} + x_t' \delta + \varepsilon_t \quad (3)$$

Where x_t are optional exogenous regressors which may consist of constant, or a constant and trend, ρ and δ are parameters to be estimated, and the ε_t are assumed to be white noise. If $|\rho| \geq 1$, y is a nonstationary series and the variance of y increases with time and approaches infinity. If $|\rho| < 1$, y is a (trend-)stationary series. Thus, the hypothesis of (trend-)stationarity can be evaluated by testing whether the absolute value of ρ is strictly less than one.

The unit root tests use the null hypothesis H_0: ρ = 1 against the one-sided alternative H_1: ρ < 1. In some cases, the null is tested against a point alternative. In contrast, the KPSS Lagrange Multiplier test evaluates the null of H_0: ρ < 1 against the alternative H_1: ρ = 1.

The Augmented Dickey-Fuller (ADF) test

The standard DF test is carried out by estimating Equation (3) after subtracting y_{t-1} from both sides of the equation:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \varepsilon_t \quad (4)$$

Where α = ρ -1. The null and alternative hypotheses may be written as,

$$H_0: \alpha = 0$$
$$H_1: \alpha < 0 \quad (5)$$

and evaluated using the conventional t-ratio for α:

$$t_\alpha = \hat{\alpha} / (se(\hat{\alpha})) \quad (6)$$

where $\hat{\alpha}$ is the estimate of α , and se($\hat{\alpha}$) is the coefficient standard error.

Dickey and Fuller (1979) show that under the null hypothesis of a unit root, this statistic does not follow the conventional Student's t-distribution, and they derive asymptotic results and simulate critical values for various test and sample sizes. More recently, MacKinnon (1991, 1996) implements a much larger set of simulations than those tabulated by Dickey and Fuller. In addition, MacKinnon estimates response surfaces for the simulation results, permitting the calculation of Dickey-Fuller critical values and p-values for arbitrary sample sizes. The more recent MacKinnon critical value calculations are used in constructing test output.

The simple Dickey-Fuller unit root test described above is valid only if the series is an AR(1) process. If the series is correlated at higher order lags, the assumption of white noise disturbances ε_t is violated. The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR(p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \ldots + \beta_p \Delta y_{t-p} + v_t \quad (7)$$

This augmented specification is then used to test (5) using the t-ratio (6). An important result obtained by Fuller is that the asymptotic distribution of the t-ratio for α is independent of the number of lagged first differences included in the ADF regression. Moreover, while the assumption that y follows an autoregressive (AR) process may seem restrictive, Said and Dickey (1984) demonstrate that the ADF test is asymptotically valid in the presence of a moving average (MA) component, provided that sufficient lagged difference terms are included in the test regression.

One will face two practical issues in performing an ADF test. First, you must choose whether to include exogenous variables in the test regression. You have the choice of including a constant, a constant and a linear time trend, or neither in the test regression. One approach would be to run the test with both a constant and a linear trend since the other two cases are just special cases of this more general specification. However, including irrelevant regressors in the regression will reduce the power of the test to reject the null of a unit root. The standard recommendation is to choose a specification that is a plausible description of the data under both the null and alternative hypotheses. See Hamilton (1994, p. 501) for discussion. However, we chose to include only constant.

Second, you will have to specify the number of lagged difference terms (which we will term the "lag length") to be added to the test regression (0 yields the standard DF test; integers greater than 0 correspond to ADF tests). The usual (though not particularly useful) advice is to include a number of lags sufficient to remove serial correlation in the residuals. EViews provides both automatic and manual lag length selection options. Here, we selected automatic lag length.

Cointegration

Cointegration is statistical property of a collection of time series variables $(X_1, X_2, ..., X_k)$. First of all, these series have to be integrated of order 1. Next, if a linear combination of these series is integrated of order zero, then the collection is cointegrated. If X,Y,Z are integrated of order 1, and there exist coefficients a,b,c such that aX+bY+cZ is integrated of order 0, then X,Y, and Z are cointegrated. Cointegration is an important property in time-series analysis. Time series are characterised by having trends either deterministic or stochastic that are also called unit root processes, or processes integrated of order 1 or I(1). Unit root processes have non-standard statistical properties. Therefore, conventional econometric theory methods cannot be used in these cases. In other words, the series are cointegrated if they are individually integrated but linear combination of them has a lower order of integration. In general, it is the case where the individual series are first-order integrated (I(1)) but a vector of coefficients exists to form a stationary linear combination of them (I(0)). We use cointegration test in order to test if there is a statistically significant connection between two series. This cointegration test is called the Johansen test that allows for more than one cointegrating relationship, while the Engle–Granger method allows for only one cointegrating relationship.

Johansen cointegration test

VAR-based cointegration tests use the methodology developed in Johansen (1991, 1995). Consider a VAR of order p:

$$y_t = A_1 y_{t-1} + ... + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (8)$$

Where y_t is a k-vector of non-stationary I(1) variables, x_t is a d-vector of deterministic variables, and ε_t is a vector of innovations. We may rewrite this VAR as,

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma \Delta y_{t-i} + Bx_t + \varepsilon_t \quad (9)$$

where:

$$\Pi = \sum_{i=1}^{p} A_i - I, \quad \Gamma_i = -\sum_{j=i+1}^{p} A_j \quad (10)$$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank r < k, then there exist k * r matrices α and β each with rank r such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is I(0). r is the number of cointegrating relations (the cointegrating rank) and each column of β is the cointegrating vector. As explained below, the elements of α are known as the adjustment parameters in the VEC model. Johansen's method is to estimate the Π matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced rank of Π.

Phillips and Hansen (1990) propose an estimator which employs a semi-parametric correction to eliminate the problems caused by the long run correlation between the cointegrating equation and stochastic regressors innovations. The resulting Fully Modified OLS (FMOLS) estimator is asymptotically unbiased and has fully efficient mixture normal asymptotics allowing for standard Wald tests using asymptotic Chi-square statistical inference.

Fully Modified OLS

The FMOLS estimator proposed by Phillips and Hansen (1990) employs preliminary estimates of the symmetric and one-sided long-run covariance matrices of the residuals.

Let α_{1t} be the residuals obtained after estimating Equation $(y_t = X_t'\beta + D_{1t}'\gamma_1 + u_{1t})$. The α_{2t} may be obtained indirectly as $\alpha_{2t} = \Delta \hat{\varepsilon}_{2t}$ from the levels regressions

$$x_t = \Gamma_{21}' D_{1t} + \Gamma_{22}' D_{2t} + \hat{\varepsilon}_{2t} \quad (11)$$

or directly from the difference regressions

$$\Delta x_t = \Gamma_{21}' \Delta D_{1t} + \Gamma_{22}' \Delta D_{2t} + \alpha_{2t} \quad (12)$$

Let Ω and Λ be the long-run covariance matrices computed using the residuals $\alpha_t = (\alpha_{1t}, \alpha_{21}')'$. Then we may define the modified data

$$y_t^\dagger = y_t - \omega_{12} \Omega_{22}^{-1} \alpha_2 \quad (13)$$

and an estimated bias correction term

$$\lambda_{12}^\dagger = \lambda_{12} - \omega_{12} \Omega_{22}^{-1} \Lambda_{22} \quad (14)$$

The FMOLS estimator is given by

$$\theta = \begin{bmatrix} \beta \\ \gamma_1 \end{bmatrix} = (\sum_{t=2}^{T} Z_t Z_t')^{-1}(\sum_{t=2}^{T} Z_t y_t^{\dagger} - T \begin{bmatrix} \lambda_{12}^{\dagger} \\ 0 \end{bmatrix}) \qquad (15)$$

where $Z_t = (X_t', D_t')'$. The key to FMOLS estimation is the construction of long-run covariance matrix estimators Ω and Λ. Before describing the options available for computing Ω and Λ, it will be useful to define the scalar estimator

$$\hat{\omega}_{1.2} = \hat{\omega}_{11} - \hat{\omega}_{12} \Omega_{22}^{-1} \hat{\omega}_{21} \qquad (16)$$

which may be interpreted as the estimated long-run variance of u_{1t} conditional on u_{2t}. We may, if desired, apply a degree-of-freedom correction to $\hat{\omega}_{1.2}$. Hansen (1992) shows that the Wald statistic for the null hypothesis $R\theta = r$

$$W = (R\theta = r)'(RV(\theta)R')^{-1}(R\theta = r) \qquad (17)$$

With

$$V(\theta) = \hat{\omega}_{1.2}(\sum_{t=2}^{T} Z_t Z_t')^{-1} \qquad (18)$$

has an asymptotic χ_g^2-distribution, where g is the number of restrictions imposed by R.

Dynamic OLS

A simple approach to constructing an asymptotically efficient estimator that eliminates the feedback in the cointegrating system has been advocated by Saikkonen (1992) and Stock and Watson (1993). Termed Dynamic OLS (DOLS), the method involves augmenting the cointegrating regression with lags and leads of ΔX_t so that the resulting cointegrating equation error term is orthogonal to the entire history of the stochastic regressor innovations:

$$y_t = x_t' \beta + D_{1t}' \gamma_1 + \sum_{j=-q}^{r} \Delta x_{t+j}' \delta + v_{1t} \qquad (19)$$

Under the assumption that adding q lags and r leads of the differenced regressors soaks up all of the long-run correlation between u_{1t} and u_{2t}, least-squares estimates of $\theta = (\beta', \gamma')'$. Using Equation (19) have the same asymptotic distribution as those obtained from FMOLS. An estimator of the asymptotic variance matrix of θ may be computed by computing the usual OLS coefficient covariance, but replacing the usual estimator for the residual variance of v_{1t} with an estimator of the long-run variance of the residuals.

Forecast evaluation

When constructing a forecast of future values of a variable, economic decision makers often have access to different forecasts; perhaps from different models they have created themselves or from forecasts obtained from external sources. When faced with competing forecasts of a single variable, it can be difficult to decide which single or composite forecast is "best". Fortunately, there are some tools for evaluating the quality of a forecast which can help one determine which single forecast to use, or whether constructing a composite forecast by averaging would be more appropriate.

Evaluation of the quality of a forecast requires comparing the forecast values to actual values of the target value over a forecast period. A standard procedure is to set aside some history of actual data for use as a comparison sample in which one will compare of the true and forecasted values. It is possible to use the comparison sample to: (1) construct a forecast evaluation statistic to provide a measure of forecast accuracy, and (2) perform Combination testing to determine whether a composite average of forecasts outperforms single forecasts.

There are four different measures of forecast accuracy; RMSE (Root Mean Squared Error), MAE (Mean Absolute Error), MAPE (Mean Absolute Percentage Error), and the Theil Inequality Coefficient. These statistics all provide a measure of the distance of the true from the forecasted values. Suppose the forecast sample is j = T+1, T+2,…, T+h, and denote the actual and forecasted value in period t as ψ_t and y_t, respectively (Eviews help). The forecast evaluation measures are defined as table below.

Table 1: The forecast evaluation measures

Measure	Statistics
Root Mean Squared Error	$\sqrt{\sum_{t=T+1}^{T+h}(\hat{y}_t - y_t)^2 / h}$
Mean Absolute Error	$\sum_{t=T+1}^{T+h}|\hat{y}_t - y_t| / h$
Mean Absolute Percentage Error	$100 \sum_{t=T+1}^{T+h}\left|\frac{\hat{y}_t - y_t}{y_t}\right| / h$
Theil Inequality Coefficient	$\dfrac{\sqrt{\sum_{t=T+1}^{T+h}(\hat{y}_t - y_t)^2 / h}}{\sqrt{\sum_{t=T+1}^{T+h}(\hat{y}_t)^2 / h} + \sqrt{\sum_{t=T+1}^{T+h}(y_t)^2 / h}}$

Empirical model

The general form of the theory of money demand can be represented as below:

$$\frac{M_t}{P_t} = \Phi(R_t, Y_t) \quad (20)$$

where M_t is the demand of nominal money balances, P_t is the price index that is used to convert nominal balances to real balances, Y_t is the scale variable relating to activity in the real sector of the economy (here, GDP as the best proxy for such a variable), and R_t is the opportunity cost of holding money (here, the interest rate or IR as the best proxy).

We start the empirical estimation of money demand functions with introducing the long-run, log linear function that is of the form

$$\text{Log}\left(\frac{MD_t^*}{P_t}\right) = \alpha + \beta_1 \log GDP_t + \beta_2 IR_t + \varepsilon_t \quad (21)$$

Desired stock of nominal money is denoted by MD^*, P is the price index that we use to convert nominal balances to real balances, GDP is the scale variable, and IR is the opportunity cost variable.

The conventional money demand $M^d = (Y_t, R_t)$ is misspecified and leads to the bias that gets into the estimated coefficients. Therefore, it has to be enriched with financial innovation (TPI) so that it can be represented implicitly as $M^d = (Y_t, R_t, r^*)$, (Serletis, 2007) that is:

$$\text{Log}\left(\frac{MD_t^*}{P_t}\right) = \alpha + \beta_1 \log GDP_t + \beta_2 IR_t + \beta_3 TPI_t + \varepsilon_t \quad (22)$$

TPI which stand for the total number of payment instruments is the sum of the number of cheques, credit cards, charge cards, ATMs and direct entry payments. The data are annually, from 1995 to 2016. The official website of the World Bank and the official website of Reserve Bank of Australia were used as the source of data.

GDP (at purchaser's prices) is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates.

Real interest rate (expressed as percent) is the lending interest rate adjusted for inflation as measured by the GDP deflator.

Broad money (in constant 2010 U.S. dollars) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

5. Estimation results

Given the data set, unit root ADF test was applied to determine the order of integration of the variables included in the model. The ADF test statistics reported in Table 1 indicate that the variables are integrated of order I(1) at level and of order I(0) at first-differenced. Therefore, the requirements is met and we can proceed to the cointegration test.

Table 2: Augmented Dickey-Fuller test statistic

Level	Prob.	First Differenced	Prob
LMD	0.8669	D(LMD)	0.0004
LGDP	0.0609	D(LGDP)	0.0147
IR	0.0801	D(IR)	0.0004
LTPI	0.4232	D(LTPI)	0.0203

The cointegration test is applied to identify the number of cointegrating vectors using the likelihood ratio test. From the test results reported in Table 2 the null hypothesis of no cointegrating relationship is rejected at 5 percent significance level. The likelihood ratio statistics identified all the three cointegrating vectors at 5 percent significance level and confirm the presence of relationship among the variables specified in the model.

Table 3: The cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.961946	107.4673	47.85613	0.0000
At most 1 *	0.762914	45.36133	29.79707	0.0004
At most 2 *	0.607027	18.01403	15.49471	0.0204
At most 3	0.013994	0.267774	3.841466	0.6048

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.961946	62.10600	27.58434	0.0000
At most 1 *	0.762914	27.34730	21.13162	0.0059
At most 2 *	0.607027	17.74626	14.26460	0.0135
At most 3	0.013994	0.267774	3.841466	0.6048

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Nest, we proceed to the estimation of the regression model using DOLS.

Table 4: DOLS estimation output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	1.108354	0.043518	25.46887	0.0000
IR	-0.085649	0.027634	-3.099471	0.0362
LTPI	-0.147428	0.069665	-2.116245	0.1018
R-squared	0.995556	Mean dependent var		27.38284
Adjusted R-squared	0.983336	S.D. dependent var		0.319389
S.E. of regression	0.041230	Sum squared resid		0.006800
Long-run variance	0.000556			

For the purpose of forecast evaluation, we use data from 1995 to 2012 as our sample for estimation and use the estimated regression to do forecast for the period 2013 to 2016. It is obvious from table 4 that the estimated coefficients of GDP and IR (interest rate) are significant, meaning that these two variables can influence the dependent variable (money demand). The signs of the confidents are in line with underlying theory. For example, 1 percent increase in GDP leads to 1.10 percent increase in the demand for money. However, TPI (total number of payment instruments) does not have impact on money demand as the estimated coefficient of TPI is not significant. Then, we turn our attention to FMOLS estimation.

Table 5: FMOLS estimation output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.861118	0.024015	35.85730	0.0000
IR	0.016756	0.017444	0.960555	0.3531
LTPI	0.240176	0.042061	5.710248	0.0001
R-squared	0.947189	Mean dependent var		27.35024
Adjusted R-squared	0.939645	S.D. dependent var		0.337204
S.E. of regression	0.082842	Sum squared resid		0.096079
Long-run variance	0.010104			

Again, for the same reason, data from 1995 to 2012 was used for estimation so that we can use the estimation result for forecasting dependent variable for the period 2013-2016. Here, the estimated coefficients of GDP and TPI are significant while that of IR is not. This is because, the sign of the coefficient of IR is positive (0.0167) which is not according to our expectation. In fact, it should be negative. That is why, it is not significant. In other words, it does not affect money demand. For TPI, for instance, 1 percent increase in TPI causes money demand to increase by 0.24 percent. For GDP, the magnitude is almost three times higher meaning that 1 percent increase in GDP will increase money demand by 0.86 percent. The sign of the estimated coefficient of GDP is also according to the economic theory. Now, it is time to do forecasts based on these two different estimation methods.

Figure 3: Forecasting dependent variable based on DOLS estimation

Forecast: LMDF1	
Actual: LMD	
Forecast sample: 2013 2016	
Included observations: 4	
Root Mean Squared Error	0.140721
Mean Absolute Error	0.110484
Mean Abs. Percent Error	0.395094
Theil Inequality Coefficient	0.002508
Bias Proportion	0.616430
Variance Proportion	0.000059
Covariance Proportion	0.383511
Theil U2 Coefficient	2.325548
Symmetric MAPE	0.393832
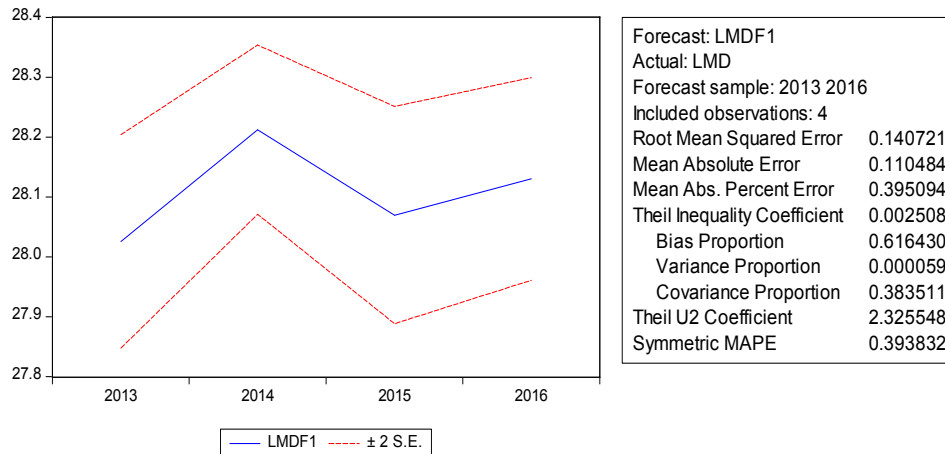
Figure 4: Forecasting dependent variable based on FMOLS estimation

Forecast: LMDF2	
Actual: LMD	
Forecast sample: 2013 2016	
Included observations: 4	
Root Mean Squared Error	0.134223
Mean Absolute Error	0.130063
Mean Abs. Percent Error	0.464250
Theil Inequality Coefficient	0.002402
Bias Proportion	0.938979
Variance Proportion	0.046402
Covariance Proportion	0.014619
Theil U2 Coefficient	2.324901
Symmetric MAPE	0.465399
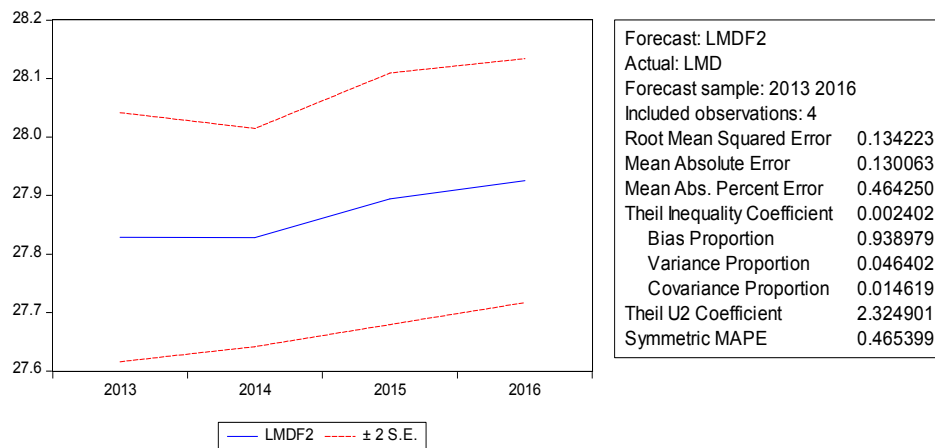
As can be seen, the forecasted dependent variable in both figures is passing through 95 percent confidence intervals or between two standard deviations. Now, we can compare the predictive power of these two estimation methods. Because all of data is known, we call it ex-post forecasting. Here, we focus on static forecasting, that is, a sequence of one-step ahead forecasts using the actual values not forecasted values of lagged dependent variable. First, we have to deal with forecasting error which is the gap between actual and forecasted dependent variable. The method with smaller forecasting error is superior.

For the purpose of forecast evaluation, first we choose "Root Mean Squared Error" (RMSE) as benchmark. This statistic refers to the gap between forecasted LMD and actual LMD. Smaller RMSE means better forecasting or more predictive power. By comparing the magnitude of this statistic for the two methods from figure 3 and figure 4 (0.1342 for FMOLS compared to 0.1407 for DOLS), we simply find out that FMOLS method is superior to DOLS for forecasting purpose. To see this better, we plot the forecasted LMD based on the two different estimation methods along with actual LMD.

It is clear that forecasted LMD using FMOLS is moving more closely to actual LMD compared to forecasted LMD using DOLS. Therefore, figure 5 is another evidence on the superiority of FMOLS over DMOLS. We may also consider Theil Inequality Coefficient (TIC) as another measure of the forecasting performance. If TIC = 0, there is a perfect fit meaning that forecasted LMD and actual LMD are the same. If TIC = 1, the predictive power of the model is worst. TIC is between 0 and 1. Again, TIC for FMOLS is less than that of DOLS certifying the fact that the forecasting performance of FMOLS is better than DOLS.

Figure 5: Comparison of the predictive power of the regression based on FMOLS and DOLS estimation
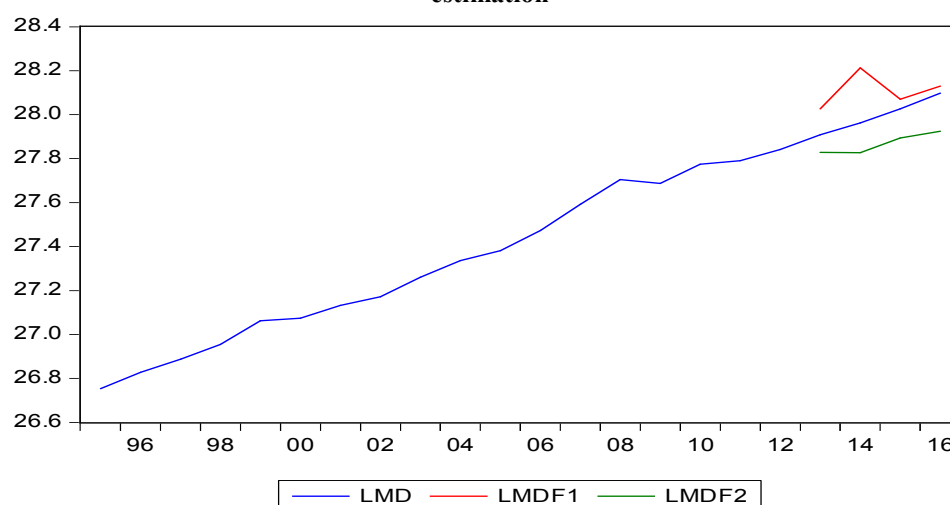
6. Conclusion

In this paper we applied two different estimation methods, namely DOLS and FMOLS to estimate real demand for money in Australia with the inclusion of financial innovations. We used a conventional money demand function that was enriched with a proxy for financial innovations. This sum of the number of cheques, credit cards, charge cards, ATM and direct entry payment was included in the regression model to proxy the effect of financial innovations on the money demand. Data (annually from 1995-2016) was collected from the official website of the World Bank and the official website of Reserve Bank of Australia. Our goal is to estimate the effect of financial innovations on the demand for money using two different methods (DOLS and FMOLS) and compare the predictive power of these methods.

DOLS and FMOLS are superior to the OLS for many reasons: (1) OLS estimates are super-consistent, but the t-statistic gotten without stationary or I(0) terms are only approximately normal. Even though, OLS is super-consistent , in the presence of "a large finite sample bias' convergence of OLS can be low in finite samples, (2) OLS estimates may suffer from serial correlation and heteroskedasticity since the omitted dynamics are captured by the residual so that inference using the normal tables will not be valid even asymptotically. Therefore, "t" statistics for the estimates OLS estimates are useless, (3) DOLS & FMOLS take care of endogeneity by adding the leads & lags. In addition, white heteroskedastic standard errors are used. FMOLS does the same using a nonparametric approach. FMOLS is a non-parametric approach used to dealing with serial correlation. Dynamic OLS (DOLS) is an alternative (parametric) approach in which lags and leads are introduced to cope with the problem irrespectively of the order of integration and the existence or absence of cointegration.

Before proceeding to estimation, we need to make sure that the all of the variables (including dependent variable) are non-stationary but when we convert them to first-differenced, they become stationary. In order to do so, we conduct unit root test using the Augmented Dickey-Fuller (ADF) test statistic. Then, we need to find out whether or not these variables cointegrated. Using Johansen Cointegration Test, we conclude that the variables are cointegrated or they have long-run associationship. Also, there are 3 cointegrated equations. After making sure that the variables are cointegrated, we can proceed to DOLS and FMOLS which both are very efficient and sophisticated estimation methods. By doing this, we obtain long-run estimates.

In both methods, GDP coefficient is significant and bears the expected sign (positive sign). However, the magnitude of the GDP coefficient using DOLS is higher than that of FMOLS. However, our focus is on TPI which represents the impact of financial innovations on money demand. The estimated coefficient of TPI using DOLS is not significant yet it is highly significant using FMOLS and it bears positive sign so that 1 percent increase in TPI causes money demand to increase by 0.24 percent.

Finally, we did forecast based on these estimation method. According to table 1, there are four different measure to evaluate the forecasting performance. Out of these, we selected "Root Mean Squared Error" as the benchmark and concluded that FMOLS is superior to DOLD when it comes to forecasting. Also, FMOLS method produced significant TPI meaning that financial innovation did in fact impact on the money demand.

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ANALYSIS OF THE IMPACT OF FOREIGN INVESTMENT ON THE COMPETITIVENESS OF RUSSIAN COMPANIES

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Abstract

The article analyzes the impact of foreign investment on the competitiveness of Russian companies. Capital mobility is growing rapidly in the 21st century owing to the processes in the world economy, such as globalization, internationalization, and also due to the established single market of goods and services. The enhancement in the competitiveness of companies becomes an essential requirement of the world market. Unfortunately, it is often impossible for many companies to reach a technological progress and increase the efficiency of corporate social responsibility using only its own funding without attracting a foreign capital. Based on the analysis, conclusions are reached and practical recommendations are offered.

Keywords: competitiveness, net outflows, FDI (foreign direct investment), portfolio investment, and volatility

JEL classification: M21, O11, R11

1. Introduction

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Competitive advantages are one of the main elements of successful activity in the global market. This is relevant for the economy of any country, which in modern conditions is involved in the globalization of the world economy. World economic relations between different countries provide opportunities that can be used with varying degrees of economic success. Modern Russian entrepreneurial structures are actively trying to integrate into the world economy. This is very difficult, because all the producers in the world economy today are in the conditions of hyper competition. These conditions impose additional requirements on business, such as high quality of labor, high technologies, quality of products and competitive prices for goods and services. Entrepreneurial structures have to go to additional costs in order to provide their goods and services with high competitiveness in the global market (Khryseva, Akimova, Dneprovskaya, 2017).

Capital mobility is growing rapidly in the 21st century owing to the processes in the world economy, such as globalization, internationalization, and also due to the established single market of goods and services. The enhancement in the competitiveness of companies becomes an essential requirement of the world market. Unfortunately, it is often impossible for many companies to reach a technological progress and increase the efficiency of corporate

social responsibility using only its own funding without attracting a foreign capital (Kizilova, 2014).

The main goal of the paper – to analyze the impact of foreign investment on the competitiveness of Russian companies.

2.   Analysis

Russia is characterized by commodity-based economy, as well as the underdeveloped manufacturing industry. Moreover, despite the obvious factors of competitiveness of Russian economy, such as a high level of human capital and its technological capabilities, which attract foreign investors, the economic growth of the country is still largely based on sales of energy resources. Besides, there is an unequal distribution of foreign investment in the regions of Russia. Thus, the leaders on the attractiveness of foreign investments in the country are Central and Volga-Vyatka regions. However, only 2,7 % of Russian companies with foreign capital are in Southern region despite the favorable economic climate (Investment, 2010).

In figure 1 is presented the number of Russian companies with foreign capital among regions, %

Image 1: Number of Russian companies with foreign capital among regions, %
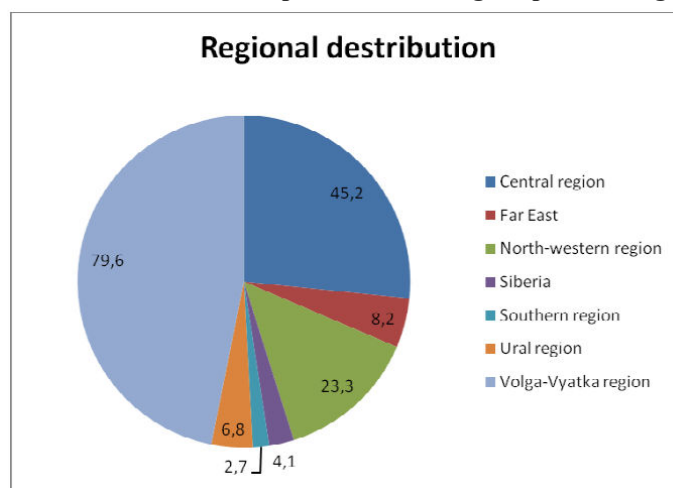
Source: Foreign direct investments in Russia, regional aspect, an analytical review. National rating agency (October 2015), 50. http://www.ra-national.ru/ru/node/55128

Net capital outflows from Russia are volatile, as shown in Figure 2, due to the decrease in the amount of external debt in 2015 and 2016. According to the analytical journal RBC, the debt of Russian companies and banks was 67 billion dollars in 2015, and it declined to 40 billion dollars in 2016. Decrease in the outflow of capital from Russia was affected by the same decline in the demand of the population for the currency (Astapovich, 2014).

The main articles of capital outflows (inflows) in the Russian Federation include: FDI, portfolio investment and trade loans. In figure 2 is presented the net capital outflows from Russia, billion dollars.

In 2012, Russia was included in the list of 25 attractive countries for foreign direct investment. The country took the ninth place in the list and the third place among the BRICS countries. Nevertheless, Russia has lost its position in the rating due to the economic sanctions. Thus in 2015, Russia did not get on this list at all.

We believe that FDI is the most appropriate investment for Russian economy in the modern conditions of global financial and economic crisis. The reasons of that are presented below (Balatsky, 2012).

Profitability of the project, preservation of the property and a payback period are necessary for foreign direct investors who provide not only financial resources for the development of the company, but also innovative technologies and administrative resources. In addition, foreign direct investors create a competitive environment in a specific region, whereas portfolio investors are motivated only by the factors of profitability and riskiness of investments, without offering any other factors for development of the company. Moreover,

portfolio investments are fundamentally more speculative and short-term (Balatsky, Pavlichenko, 2013).

Image 2: Net capital outflows from Russia, billion dollars
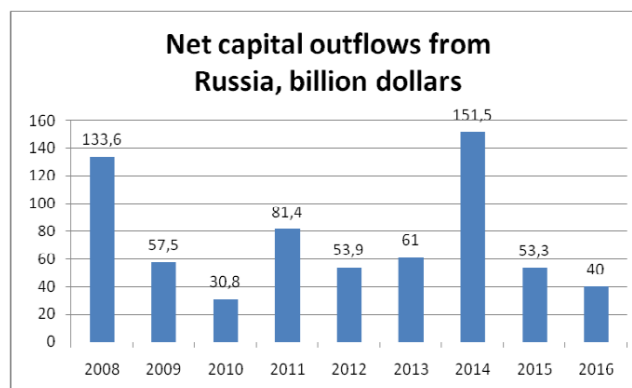
Source: Tomashuk I.O. 2015. "The influence of foreign investment on the activities of Russian companies – recipients". Higher School of Economics, report: 251-260

There are examples of positive and negative experience of absorption by a foreign company of Russian company.

• In December 2010, the American food company PepsiCo acquired the Russian dairy company Wimm-Bill-Dann. The Russian company was valued at 5,4 billion dollars which is 32% higher than its market value. This transaction was the largest takeover of a foreign company in a non-primary sector in Russia. As a result, Wimm-Bill-Dann acquired the status of a foreign subsidiary and became the first Russian company to conduct an IPO on New York Stock Exchange. During the placement of shares, the company valuation was 830 million dollars, and French company Danone was the largest buyer of shares.

• The largest manufacturer of cars JSC «AvtoVAZ» entered into a scientific and technological alliance with Renault. Later, in 2009, an agreement was signed between these companies, according to which Renault made an asset contribution, which included the transfer of production technologies, expertise and experience of experts in the amount of 240 million euros. However, this cooperation has become less profitable for the Russian company. In mid-2014, the alliance Renault-Nissan bought a controlling stake in AvtoVAZ, which meant inter-firm integration or takeover (Yaskova, 2013).

Therefore, it is necessary to outline the main advantages and disadvantages of the influence of foreign investment on the development of Russian companies and growth of their competitiveness.

There are some advantages:

• foreign investment is a source of innovation, modern technological equipment, which raises significantly labor productivity and production efficiency and which makes the quality of products higher;

• FDI is an additional source of capital. They help Russian companies become more prosperous in the world market;

• FDI provides jobs to employees and promotes skills development for employees;

• FDI is a substitute for foreign loans, but it does not raise the level of external debt.

The main disadvantage for domestic companies in attracting foreign investment is that FDI hinders the development of firms in the long term. This happens due to the fact that most of the income is transferred to foreign investors. Moreover, foreign companies also benefit from the usage of innovative technologies by Russian companies (Berzon, 2014).

The Central Bank of Russia noted the decrease in the volume of attracting foreign investments. A significant decline began after the collapse of the ruble in the second half of 2014, when the balance of investment operations became negative. This meant that foreign investors received their funds more than they invested. This trend continued in 2015 (Petrova, 2015).

Nevertheless, there are countries, which volume of investments has grown relatively. These are the Bahamas, Cyprus, and the Netherlands, which are offshore. Meanwhile the balance of direct investment from the Bahamas island was (+2328 million dollars), Cyprus

(+1156 million dollars). Obviously, such firms received revenue in currency, increasing the value in rubles.

Many Russian companies with foreign capital are being closed nowadays. This applies to industrial companies, companies of productive sector and service companies. In 2015 the production of Opel cars was stopped. Moreover, about 30 models of cars left the Russian market later. Official representatives of General Motors associated this fact with unclear market prospects.

Furthermore, some affiliated companies of information technology sector were closed such as Skype, Adobe Systems and Google. Besides, 3 Danone companies were closed in Smolensk, Novosibirsk and Togliatti (Tomashuk, 2015).

As for the sectors of foreign capital investment, according to the data of the Central Bank, most of it is invested in wholesale and retail trade, manufacturing, finance and mining. Figure 3 is presented ten sectors of the Russian economy with total leveraged investment.

Image 3: Ten sectors of the Russian economy with total leveraged investment, a first half of 2015, billion dollars
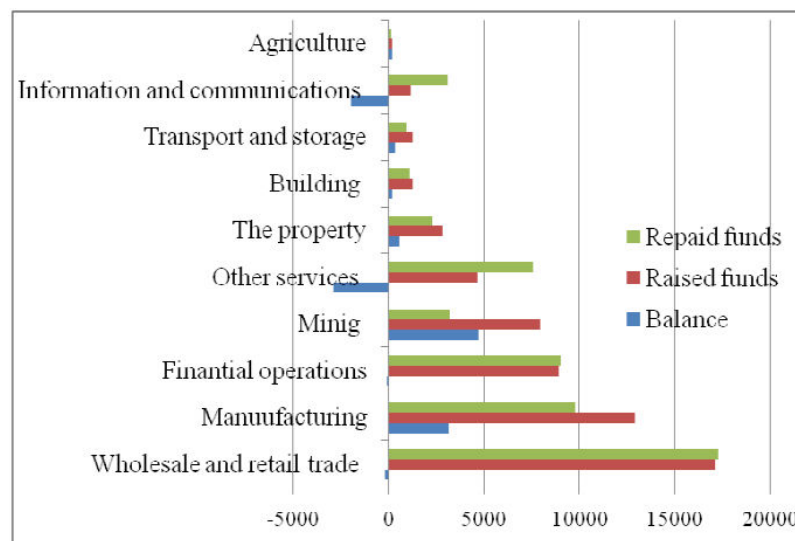
Source: Tomashuk I.O. 2015. "The influence of foreign investment on the activities of Russian companies – recipients". Higher School of Economics, report: 251-260

Over the past two years investment in the steel and metallurgical industries, building and information technology has fallen sharply. Moreover, the level of repayment investment has increased and as a result the balance has decreased and become negative. Thus, foreign investors withdraw their funds, which is not profitable for companies due to the fact that the local currency is devalued (Voronina, 2013).

UNCTAD reported that in 2016 FDI inflows into Russian companies declined due to the volatility of major currencies and the reduction in resource prices. Moreover, increased geopolitical risks are also an important factor which influence on decrease in FDI.

The main disadvantage of domestic companies in attracting foreign investment is that FDI hinders the development of firms in the long term. This is due to the fact that most of the income is transferred to foreign investors. Moreover, foreign companies also benefit from the use of innovative technologies by Russian companies.

Nevertheless Russian companies need FDI. It is necessary to increase the investment attractiveness of companies, which has decreased significantly due to the high volatility of ruble and the fragile Russian economy (Dzedzichek, 2016).

It is necessary to explain the term of investment attractiveness. It is a specific environment where investment processes take place. It contains investment conditions and potential risks for investors. Investment attractiveness create investment climate influenced by different factors, such as economic, social, political and others. A favorable investment climate attracts foreign capital, and as a result, investor confidence is growing (Savchenko, Khrysieva, 2016).

The features of the Russian investment climate are instability of economic and legal systems, insufficient level of development of market infrastructure elements, as well as incomplete information from foreign investors about the possibilities of capital investment.

According to UNCTAD study of 2015 on world investment trends, Russia lost its positions in the global investment market. The total volume of investment received in the country is 1.7 billion dollars, while in 2014 this figure was 20.95 billion dollars. UNCTAD explained this recession as a decrease in investors' confidence and the complication of the geopolitical situation.

The decrease in the investment attractiveness of Russian companies is indicated by the BDO International Business Compass rating, developed every year by the Hamburg Institute of World Economics. 2015 rating includes 174 countries, where Russia is the 100th in it. The countries which are above the Russian Federation in the ranking are Vietnam, Paraguay, Nicaragua and other developing countries. The rating compilers noted that the administrative barriers have significantly increased because of the sanctions and the development of transport infrastructure and manufacturing have become worse (Savchenko, Khrysieva, 2016).

International Financial Reporting Standards (IFRS) can be an instrument that increases the investment potential of Russian companies. The information contained in the reporting of companies in Russia will improve the investment climate significantly. It is necessary for companies to collect relevant, complete and objective information about the objects of investment.

Due to the sanctions, previously mentioned negative investment trends Russia cooperate closely with Asian countries such as China, which undoubtedly increases the competitiveness of Russian companies. In May 2014 about 40 bilateral agreements were concluded between Russia and China in different sectors of economy. They are energy, banking, telecommunications and others. The main factors of attractiveness of Russian companies for Chinese investors are presented below.

- A large environmental damage is caused by the usage of coal in China. Its share in the structure of energy consumption is 70%, while the share of gas is 5.9%. Therefore, China is interested in gas supplies. As a result, a contract was signed between Gazprom and CNPC companies valued at about 400 billion dollars for the supply of 1,032 trillion cubic meters gas within 30 years.

- Russia and China are geographically close and face similar geopolitical problems, which makes military cooperation within the SCO (Shanghai Cooperation Organization) attractive for both countries.

- Due to the fact that Western countries ceased to provide innovative equipment and technology to Russia, and companies began to close, there was an urgent need for high-tech equipment which China is successful at. Thanks to China, the threats of technological inferiority of Russian companies are prevented.

- The alliance of developing BRICS countries is also a factor in expanding cooperation between Russia and China, which led to the creation in 2014 of a financial institution called the New Development Bank BRICS. It was found for the implementation of joint investment projects and sustainable development" projects.

Here are examples of already implemented joint major projects created of Russia and China.

A good example of cooperation between private businesses of two countries is the gambling area «Primorje», which total investment is 2 billion dollars. By the end of this project, an international class resort will have been created. The goal of this resort is to provide jobs to the local people, which undoubtedly influence positively on economic development of the Far Eastern region.

In May 2014 an agreement was signed between RusHydro and PowerChina companies on the development and usage of small hydroelectric power stations in Russia with a capacity of 25 megawatts. 35 small hydropower plants in Russia will have been built by 2020. The total investments are estimated at 3.5-5 billion dollars (Center of Political Information, 2015).

On November 7 in 2016, an agreement was signed to establish a Russian-Chinese venture fund between the Russian-Chinese Investment Fund (RCIF) and Chinese company Tus-Holdings. The total investment is 100 million dollars. It is noted in the agreement that members of RKVF will look for Russian high-tech companies and start-ups with the prospects for further development in the markets of China. Attractive sectors include cloud technologies, biomedicine, information technology in the financial sector and others.

3. <u>Conclusion</u>

To sum up, the investment inflows to Russian companies will decrease until the world economic climate becomes favorable. Investor confidence in the Russian economy will be restored when the economic growth is achieved in the country. The goalposts are to improve its investment policy as well as to adopt international financial reporting standards. Nevertheless, Russia is developing cooperation with China and other countries of Asia-Pacific and Southeast Asia, which can increase the competitiveness of Russian companies in the long term.

The main aim of Russian business is the usage of one of the dominant competitive advantages of the country which is a large home market. It is necessary to fill it with top - quality goods produced by the real sectors of Russian economics. Another aim is maintaining the balance and stability in the market and in the whole economics of the country as well as caring about the consumers' needs.

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THE ASSESSMENT OF SOCIO-ECONOMIC POTENTIAL DENSITY OF ARCTIC TERRITORIES IN RUSSIA

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Abstract

The socio-economic potential is an important indicator that systematically characterizes a specific territory with its economic specifics, as well as the opportunities for its future development. The article presents a methodology for assessing the density of social and economic potential. The integral index of the socio-economic potential density of the territory takes into account the basic spatial characteristics (indicators): The density of the population concentrated on a given territory, the volume of fixed assets, as well as the level of economic development, defined as the accumulated volume of gross production per area of the economically developed space. On the basis of this method the estimation of the density of social and economic potential of Russian Arctic territories was carried out, a rating was obtained and a classification was made. Allocated 5 density types of socio-economic potential: metropolitan and industrial; urban and industrial; mixed, mainly West-Central; mixed, mainly Western; peripheral.

Keywords: socio-economic potential, arctic territories, index, classification
JEL classification:

1. Introduction

Up to the beginning of the present century, the economic potential of territories was put into the center of research on the regional economy. It was believed that the positive correlation between the population welfare and macroeconomic indexes was close to the one (Borodkin & Ajvazyan, 2006). It was enough to use the quantitative macroeconomic indexes of the system of national bills in its absolute expression or per capita to characterize the life quality. With the conversion to the new theories of the society development, the necessity of people's satisfaction assessment (both with the material and non-material conditions of their lives, such as environment condition, safety, political freedom) appeared. When saying 'the economic potential of territories' scientist started to mean the ability to accomplish not only economic but also social tasks.

The concept of socio-economic potential appeared, somehow or other, in all economic theories, including the classical and neoclassical directions, and modern schools. Herewith, during a long time, the main attention was paid to the resource potential (finance, mineral, land resources, etc.), and only recently – to the non-material types of potential (institutional, innovational potential, etc.). The concept of socio-economic potential is quite broad and generalizing, so it can include plenty of particular potentials of the territorial natural-

economic systems. They can involve natural, human, technical, industrial, financial, infrastructural, innovational, scientific, recreational, ecological, institutional, and other types of potential. Anyhow, presently there is no unified approach to its determination and formalization of components. In this work, we will determine the socio-economic potential as an ability of the territorial nature and economic system to realize its activity and to support the long-term balanced development with the use of all resources diversity, which is concentrated in it.

The socio-economic potential is not an economic category only. Its territorial belonging, its connection with the certain unique space, which forms it and transforms it subsequently, also has special importance. In Russia plenty of scientists, geographers and economists are engaged in the assessment of socio-economic potential and its various aspects. This concept became widespread in the 50s of 20 century in USSR (in 1954 the scientist S. G. Strumilin determined the socio-economic potential as a "synthetic index", which shows "the level of people's welfare" (Shulayeva, 2015)).

Now, development and application of socio-economic potential assessment techniques are made in leading research and analytical organizations. The technique of determination of investment attractiveness of regions, which was made by the rating agency "Expert RA" (considering two parameters – the level of potential and risk), can be regarded as an example. The essence is that the investment potential (in the proportion of the potential of the whole country) and the investment risk (the average level of risk among country is taken per unit) are calculated in each region of Russia. When saying "investment potential", the authors mean a quantitative characteristic, which considers the saturation of the countryside territory (nature resources, manpower, main funds, infrastructure, etc.), consumer demand and other indexes that impact on potential volumes of regional investment. The potential shows what part of the All-Russian market the region takes, and risk (what can be the problems like for investors in regions). The total potential consists of nine parts: labor, financial, industrial, consumer, institutional, infrastructural, nature and resource, touristic, innovational. The integral risk consists of six particular risks: financial, social, managerial, economic, ecological and criminal. The contribution of the each particular risk or potential to the final indicator is estimated basing on the quiz of the representatives of the expert, investment and bank communities ("Rating…", 2012).

The group of scientists from Independent Institute for Social Policy (IISP) developed typologies of regions for some goals of social politics. The level of economic development in region, the economic state of households (statistical indicators – GRP, ratio of income to living wage and level of poverty) and development of the territory (statistical indicators – population density, which represents the degree of auspiciousness of climate, the type of economic use, infrastructure, etc.) were taken as basic differentiating features. In accordance with the given results, all the Russian regions were divided into the four types:
- "rich" and developed;
- "rich" and low-developed;
- "poor" and developed;
- "poor" and low-developed.

In the typology of regions, made by Gaidar Institute for Economic Policy (Boots et al., 2002; Barinova, 2015), authors distinguished three characteristics of the economic situation for Russian regions. It is necessary to consider the interregional differences when studying the question of economic development: population welfare, investment activity, economic potential. One of the key indicators to classify the regions by economic potential, was the ratio of GRP and GDP's temps of development, which characterize current economic state in the region in comparison with the state of Russian economic in general.

Russian Ministry of Economic Development made an order to the Council of a study of the Productive Forces, that invented a methodical approach, which allows making a classification of Russian regions by the degree of auspiciousness of their socio-economic state, (Grishkina, 2012). The authors put 16 facts in the base of calculation of the integral index of the socio-economic state of the region, that can be divided into four blocks:

Reproductive process in a region;

Innovational and infrastructural potential in a region;

Investment and financial potential in a region;

State of social sphere in a region.

At the same time, authors suggest using the indicator of GRP's volume for one employee as the most representative assessment indicator of the general efficiency.

In the most cases the socio-economic potential, which is determined on the base of both particular and integral indexes, is calculated per capita. However, there is the range of society development and nature management problems that require some density characteristics, because its objective feature is unevenness of space spread.

The integral index of socio-economic potential density considers basic space characteristics (indicators): the density of concentrated population on the given territory, the volume of the main funds, and also the level of economic development, determined as accumulated volume of gross production per one of a figure of the economically developed area. The quantitative expression of "economically mastered space" is possible using the indicator of the area of built-up lands of the municipal formation. Thus, it is possible to obtain a real concentration of economic potential without considering weakly developed zones, which is especially important for the Arctic. In the work (Baburin et al., 2015) authors gave the unordinary technique of calculation of the density of socio-economic potential so that to realize the assessment of potential risks and natural disasters in the socio-economic area. This index allows estimating quantitatively the territory potential on the system mesolevel (if the region is regarded as a macro-system, then on a level of municipality). As a result of mathematical processing of chosen indicators, the ranking of municipalities was made according to the level of density of socio-economic potential of their territories, and the typology was made. If absolute values of index components allow estimating the economic scope in general, specific values demonstrate the features of their spread and degree of concentration, and also the interregional municipalities differentiation according to this characteristic.

2. <u>Materials and methods.</u>

As an information data source for the calculation of socio-economic potential's density index of the territory were used: databases of Russian Federal State Statistic Service (Rosstat) municipalities, databases of territorial organizations of federal statistic, multifunctional statistic portal "Multistat", annual reports about socio-economic development (from the websites of municipalities) and other resources. In Russian Federation municipal statistics is imperfect. That expressed by an absence of many important indicators, which are widely used on a regional level, by data incompleteness and by a low degree of objectivity for particular areas. All this limits the opportunities of municipal statistics application in researches and creates the necessity to introduce more assumptions. These circumstances were considered while developing the socio-economic potential density index of the territory. The population, value of main funds and gross product were chosen as main parameters.

Population involves consumers and workforce. Without any doubt, the population is inhomogeneous and the same population could possess different potential. It depends on many factors. Pitirim Sorokin had been writing about the importance of population quality. Assessing the population losses during the First World War in the article "Contemporary State of Russia", he noticed: "The system of any society, the perfection of its social life, the spiritual and material prosperity and, finally, its historical destinies, first of all, depend on the nature, features, and behavior of those who are the part of this society; careful research on the phenomena of rising and fall of entire nations shows that one of their causes was a sudden quality change of population contents in that or another direction" (Sorokin, 1992, p.188). Perhaps it would be more right to use the human capital instead of population, but today the calculation technique of this indicator is not perfect and could not give objective results. That is why the indicator of total population number on the 1st January of this year was chosen.

The cost of main funds can be considered as the indicator of the industrial potential as a material base for successful development of the regional economy. First of all, the main funds are a resource. I. M. Mayergoiz noticed that they are the measure of the economic strength and the base of current recreation process of the economic activity on the territory at the same time (Mayergoiz & Zhukov, 1973). The main funds are the productive assets, which are aimed to use them more than once or all the time during the long period (no less than one

year) for goods production, providing market and non-market services, for administrative needs or for transferring to other organizations for temporary possession and use or for temporary use for payment. For their assessment on the municipal level, it is reasonable to use the indicator of a cost of the municipal main funds (according to full reports value; millions of rubles).

As far as the indicator of gross product for the municipalities is not calculated by Rosstat, and, at the same time, there is no unified way to determine it, it is necessary to find other indicators that would demonstrate results of economic activity of territorial formation on the given territorial level. To these ends, it is suggested to use the indicator of municipalities gross production by the types of economic activity, provided with the statistic information and considered by Rosstat in sectoral structure of gross value added (GVA), and occupying the great part of it.

The gross production of municipalities is calculated as the sum of the next indicators:
1. Industrial production (the sum of three types of economic activity: electric energy, gas and water production and distribution; manufacturing activities and extraction of mineral resources);
2. Agricultural production;
3. The volume of paid services to the population;
4. Retail turnover (in actual prices).

To reduce the degree of the influence of municipalities main funds in a real socio-economic process, which make the part of 3-30 % of the total sum, it is necessary to introduce weight coefficients. Main funds can reach the higher-than-usual value in the most depressive subsidized areas and disfigure the final rating. In this regard, next weight coefficients were chosen: multiplying the 0,4 – for population and gross output and decreasing coefficient 0,2 – for main funds (according to experts' opinion).

Areas of economic activity, especially in Russian Arctic zone, have pronounced localization in space, that's why it is necessary to analyze the chosen economic indexes from the point of their connection with the land use of the particular territory. In this connection, while transferring parameters of the socio-economic potential index from the absolute to relative values, it is more reasonable to compare not per capita, but per area of municipalities. The statistical data about all the municipalities, made by Rosstat, allow to emphasize two categories of municipalities land: the land of agricultural appropriation (index "Area of farmland") and the land of residence (index "Total area of built-up land"), where the main socio-economic potential of these territories is concentrated. The indicators of the population and main funds should be referred to "Total area of built-up land", and the gross output – to the sum of indicators "Area of farmland" and "Total space of built-up land", if the part of agro-section in the economic structure of the region is high enough.

The next step is the conversion of index component specific value into dimensionless numbers. For this, we used the algorithm, suggested in the work (Tikunov, 1985). It involves the normalization of base values (1):

$$\hat{x}_{ij} = \frac{|x_{ij} - x_j^0|}{|_{max/min} x - x_j^0|} \qquad i=1, 2, 3,\dots,N; \ j=1, 2, 3,\dots, M \qquad (1)$$

where x - base values; x_j^0 – index values, fluctuations from which have the conceptual meaning of some optimum, this can be the worst or the best meanings or the best values of j index from the point of their influence (positive or negative) on the resulting integral estimation; $_{max/min} x$ - are the values of base values, which differs most from x_i^0; n – the amount of evaluating territorial units, m – amount of used for the calculation indexes.

This normalization is given for the conversion of non-comparable indexes into the fluctuation from the best or the worst base value. Received meanings, as a result of normalization, are limited by the interval (0;1).

By means of comparison of all the territorial units with the condition of "the best" or "the worst" territorial unit, which have the meaning x^{τ} for all indexes, the ranking is made. It is made with the use of Euclidian distance d^0 - as a remoteness degree of all territorial units

from the conditional unit. The application of this measure requires additional treatment of the data array according to the method of main components for index system orthogonalization.

Received values of evaluating column-vector characteristics d^0 are additionally normalized according to the formula (2) for the convenience of next use and analysis:

$$\hat{d}_i^o = \frac{d_i^0 - {}_{min}d^0}{{}_{max}d^0 - {}_{min}d^0}, \quad i = 1, 2, 3, \dots, n. \qquad (2)$$

After the normalization, the final values $\hat{d}^0$ vary in the limits from 0 (corresponds to the worst complex valuation) to 1 (corresponds to the best complex valuation).

Apart from the opportunity to rank the received index values, the used algorithm allows to emphasize the unified territory groups and to make their classification. It can be reached by dividing the Euclidian distances corresponding indexes into the one-type steps. Such procedure can have many variants, what allows to receive the whole range of territory grouping. The quality of dividing territories into groups should be estimated with the help of the coefficients of canonical correlation and also heterogeneity coefficients (Tikunov, 1997). This allows choosing one variant, final and the best from the statistical point of view.

3. Research results and discussion.

As a result of calculating procedures, the rating of the socio-economic potential density of Arctic territories was received. After that, the classification, consisting of 5 socio-economic potential types, was developed and mapped (Figure 1, Table 1).

Figure 1. Map of the types of economic exploration on the Arctic territories
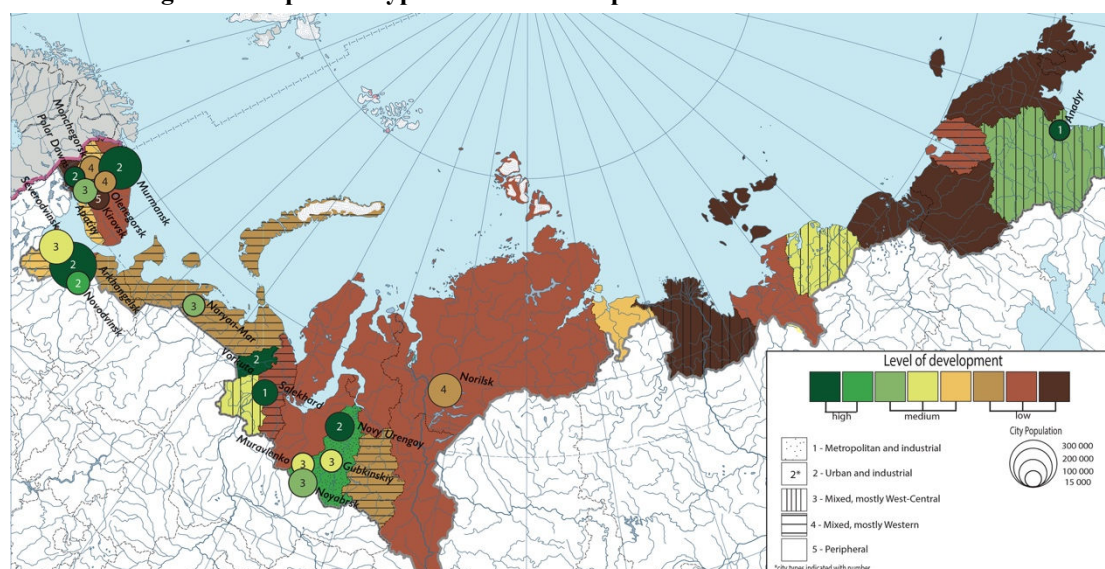
Table 1. The types of economic exploration on the Arctic territories.

The type and characteristics	Municipalities as parts of the type
Type 1: Metropolitan and industrial 1 subtype: metropolitan; 2 subtype: industrial	1 subtype: Salekhard city; Anadyr' city 2 subtype: Purovsky municipal area;
Type 2: Urban and industrial	Murmansk city; Polyarniye Zory city; Arkhangelsk city; Novodvinsk city; Vorkuta city; Novy Urengoy city
Type 3: Mixed, mostly West-Central 1 subtype: west-central, urban; 2 subtype: central-eastern	1 subtype: Apatity city; Severodvinsk city; Naryan-Mar city; Shuryshkarsky municipal area; Gubkinsky city; Labytanagy city; Muravlenko city; Noyabrsk city; 2 subtype: Shuryshkarsky municipal area; Allaihovsky area; Anabarsky national area; Anadyrsky municipal area; Chaunsky municipal area
Type 4: Mixed, mostly Western	Kolsky municipal area; Tersky municipal area; Kovdorsky municipal area; Monchegorsk city; Olenegorsk city; Mezensky municipal area; Onezhsky municipal area; Novaya Zemlya; Zapolyarny municipal area; Krasnoselkupsky municipal area; Priuralsky municipal area;
Type 5: peripheral 1 subtype: peripheral with low level of economic potential; 2 subtype: peripheral with high level of economic potential	1 subtype: Nizhnekolymsky municipal area; Ust-Yansky municipal area; Providensky municipal area; Khandalakshsky municipal area; Lovozersky municipal area; Pechengsky municipal area; Kirovsk city; Primorsky municipal area; Turukhansy municipal area; Taimyrsky Dolgano-Nenetsky municipal area; Bulunsky municipal area; Bilibinsky municipal area; Iultinsky municipal area; Chukotsky municipal area 2 subtype: Nadymsky municipal area; Tazovsky municipal area; Yamalsky municipal area;

Type 1: metropolitan and industrial (1 subtype: metropolitan; 2 subtype: industrial). Municipalities that are included in this type, head the rating of the socio-economic potential density of the territory. On the one hand, this type includes two regional capitals of the Asian part of Russian Arctic – Salekhard and Anadyr, due to two factors: high absolute potential value and a small area of economically developed territory, which determines the high degree of the space concentration. On the other hand, this type includes Purovsky municipal area, wich is the largest oil-and-gas-producing center of Yamalo-Nenetsky autonomous area (the part of gas-producing in the area makes 40 %, oil – about 90 %, gas-condensate – 66 %, from the total production in the area in 2015). It is important to notice that in industrial production volume Purovsky area almost doubles Norilsk, which follows it in the rating in this index.

Type 2: urban and industrial. This type is represented only by the cities, mostly of the European part of Russian Arctic zone. It includes regional capitals and largest (from the point of population and scale of the economy) cities: Murmansk, Arkhangelsk, Vorkuta, and also less crowded cities: Novodvinsk, Polyarniye Zory. Each of the three specific indicators in this taxon is higher than average; the population density per a unit of economically developed area reaches its maximum. It seems, for Norilsk it would be normal to belong to this category, however, it turned to be of another type (with lower density characteristics, type 4), because it has the spacious area of developed territory, namely – large industrial districts. The reason of Anadyr's non-inclusion is directly opposite: it turned to be in the category with maximal density characteristics because of low space).

Type 3: mixed, mostly West-Central (1 subtype: west-central, urban; 2 subtype: central-eastern). The most common for Russian Arctic zone municipalities are concentrated in this type because all aggregated indicators they have are close to average. In this type there are two sub-types, which are emphasized on the assumption of the features that cause each municipality inclusion in this type.

Concerning the first sub-type, the large and economically developed cities can be related to this group. They are Apatity, Severodvinsk, Naryan-Mar, Gubkinsky, Labytnangi, Muravlenko, Noyabrsk ("the second in importance" in its regions), that has quite high socio-economic potential.

On the contrary, the second sub-type is represented by less developed and most depressive rural areas. Their inclusion in this type of quite high-density values of socio-economic potential density can be explained mostly by the high values of main funds density. For instance, Shuryshansky area of Yamalo-Nenetsky autonomous area is one of the less urbanized and less economically developed in its region. The part of region's own income is the least among the area, what causes its dependence on subsidies. That's why the importance of municipal property funds is very high. The base values (population, gross production and main funds) in the Allaikhovsky area of Yakutiya have the lowest values among all the Arctic areas. Nevertheless, the degree of their concentration in space is quite high because of the absolute minimum of the built-up land space value. While calculating the specific indexes, this cause quite high (more than average) values. In Anabarsky area, where the main economic sphere is diamonds production, and in Anadyrsky municipal area, which specializes in the extraction of minerals and deer farming, the economic indicators are a bit higher, and low values of developed territory space make them closer to the average values.

Type 4: mixed, mostly Western. This type is represented mostly by the municipalities of the European part of Russian Arctic zone. In the most cases, typical density characteristics of the index components are lower than in average for the total number but higher than for type 5. On the one hand, this type includes the areas that possess quite high absolute values because of large industrial zones (Kovdorsky district of Murmanskaya area, Norilsk city, Zapolyarny district of Nenetsky autonomous area, etc.). On the other hand, there are less economically developed areas, where the minimal space of developed land provided high specific values of index components (Tersky district of Murmansk area, Arkhangelsky area's Novaya Zemlya, etc.).

Type 5: provincial (1 subtype: peripheral with low level of economic potential; 2 subtype: peripheral with high level of economic potential). The lowest density characteristics are common for this type (several times lower than in total number). Also, on the assumption of the main principle, which is based on the density method, we can emphasize 2 sub-types.

In the first sub-type there are the least developed peripheral municipal areas: Nizhnekolymsky, Ust-Yansky, Turuhansky, Chukotsky, Lovozersky, Iultinsky (make part of the last ten positions in the absolute value rating in the gross output value).

In the second sub-type, on the contrary, the most economically developed oil-and-gas-productive areas of Yamalo-Nenetsky autonomous area are concentrated. They are included in the first five municipalities in the absolute gross production: Nadymsky, Tazovsky, Yamalsky areas. Their inclusion in the group determined by the calculation specificity: zones of agricultural appropriation, whose space reaches 90 % in this areas, are included in the space of developed land; also the space of built-up land is high, so the specific values are low. The reason of inclusion of Kandalashsky area and the city of Kirovsk of Murmansk area is also determined by the high space of built-up land (because of the large industrial zones), and by the homogeneous potential spreading among the territory.

4. <u>Conclusion</u>

The socio-economic potential is an important indicator, which characterizes the certain territory with its economic specificity, and also the opportunities for its development. Besides, on the grounds of socio-economic potential data, it is possible to make the comparison of different territory systems, both according to particular parameters and integral indexes, depending on the aims of the certain research.

The micro-geographical analysis of socio-economic potential density characteristics among the territory, which was made in this research, has shown that the more severe nature conditions are and territory development level is lower, the higher the level of heterogeneity is. This means that opportunities of using statistic models based on the ATD net get worse for its assessment. In accordance with that, the special technique, allowing to rationalize the

density method of socio-economic potential assessment, was made, at the expense of its comparison with the certain areas of nature-management types.

The approbation of the given technique on the level of Russian Arctic zone municipalities, made as a pilot step, has shown, that the high density of socio-economic potential, could characterize two different variants at the same time:

- high absolute potential, equally spread on the large agricultural zone;
- low potential, concentrated on the little space.

This important conclusion demonstrates the specificity of arctic territories development, which supposes in all the cases, except the cases of mineral extraction with the space character, the realization of productive force concentration on the limited spaces. One of the aspects of this conclusion is the variant of nature risks assessment, where, in the case of theoretical disaster, the most attackable territory is the territory where the socio-economic potential reaches the highest point of concentration (with the condition that its absolute values are low).

This is the platform for making strategic decisions in the conditions of global changes in nature and society.

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PICTURING SPANISH FILMGOERS: MOTIVES, BARRIERS AND FILM THEATRES

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Abstract

Findings on European countries show non-uniform decreasing trends of film theatres' audiences, the decline being more severe in Spain. This research presents a multifaceted perspective of Spanish filmgoers focused on motives for and barriers to film theatres attendance. Two comprehensive scales (motives, barriers) are proposed. First, motives and barriers are optimally scaled with principal components analysis (PCA); and, second, we identify segments of filmgoers with latent class modelling (LC). PCA recommended a five-factor solution for motives (education, film popularity, film quality, social interaction, and mood) and a seven-factor solution for barriers (film offerings, venue's features, perception, preference and place, substitute activities, financial restrictions, recreation time disposability). LC analysis suggested three segments: mainstream filmgoers who watch films in multiplexes in shopping centers and in the center of the city; art-house filmgoers; and filmgoers who go to film theatres to watch films in original version. The socioeconomic and behavioral covariates complete the profile of the clusters, and the findings are consistent with the existing evidence on film audiences. Increasing cultural participation is the objective of many governments' cultural policies and a more comprehensive understanding of film audiences can contribute to this.

Keywords: filmgoers, motives, barriers, latent-class models, PCA
JEL classification: M310, Z11

1. Introduction

In a report for the EU, Paris (2014) has shown that the decrease in film theatres' audiences has reached its two lowest levels since the beginning of the century, the first in 2005 and the second in 2009, in spite of being a favorite way of spending spare time, especially among young people (De Bruyn and Cillessen, 2008). According to Paris (2014), this decreasing trend was not uniformly distributed, as some countries, such as Spain, have experienced a very severe decline in their cinema audiences (more than 46% in the period 2001-2013), while others have managed this trend more effectively. In Spain, this evolution was observed in the previous century too, with more than half of the film theaters being closed from the '60s to the early '90s (Cuadrado and Frasquet, 1999). This evidence invites the exploration of a deeper understanding of the filmgoers' behavior to help marketers and owners of film theatres design new marketing strategies meant to increase filmgoers' attendance.

From a consumer behavior perspective, motives are taken to be at the origin of the decision process which manifests itself in actions intended to satisfy needs (Crompton and McKay, 1997:425; see also Murray, 1964; Iso-Ahola, 1980). Jackson (1997) developed the 'constraints' paradigm, according to which the desire or need to participate is inherent in human condition, but individual choices are limited by constraints. Thus, "in order to fully understand leisure involvement we need to understand both facilitators and constraints, and how they work together to produce participation and non-participation and their accompanying experiences" (Raymore, 2002:38).

With respect to individuals' engagement with cultural activities, in general, and films, in particular, many studies have sought to explain the motives underlying filmgoers' behavior paying relatively less attention to the barriers. As a matter of fact, even motives have often been determined from a comparative analysis with the audiences of other media, such as television (Austin, 1986:117; Austin, 1983). Some authors have argued that the main reason why fewer studies have paid attention to the motives of cultural audiences (i.e., filmgoers) was that researchers (i.e., film reviewers) were interested in addressing a more general audience (Dyer, 1981). This could explain why "in the motion picture industry, the consumer is the great unknown" (Wierenga, 2006:674). In the case of films, audiences are particularly important because it is "through the existence of an audience that film acquires social and cultural importance" (Gripsrud and Lavik, 2008:455).

This research seeks to analyze the behavior of Spanish filmgoers, with a special focus on motives and barriers of attendance. With this research, we would like to contribute to the literature on cultural participation by providing a multifaceted characterization of filmgoers. The empirical analysis builds on data collected via a self-administered questionnaire to a sample of Spanish population, of 18 years of age and above, selected according to a non-probabilistic method, based on quotas of gender and age (INE, 2011). The methodological approach consists of two steps: first, motives and barriers are optimally scaled with principal components analysis (PCA) and, at a second stage, we employ exploratory latent class (LC) modelling, a method generally recommended for the study of hedonic products' consumption (Botet and Wedel, 1999), with the purpose of identifying specific patterns of film theatres' attendance. Thus, based on preferences for film theatres and their environmental characteristics, we identify three segments of filmgoers: one that prefers multiplexes in shopping centers and in the center of the city, a group for which going to the film theatres means leisure and entertainment; art-house filmgoers; and filmgoers that prefer multiplexes showing films in original version. Moreover, the method allows for considering additional restriction to segment the sample and we do so here by introducing an economic constraint (see also Swanson, Davis and Zhao, 2008). The key findings are intended to add to the literature on experiential goods consumption, such as films, for a better understanding of film audiences' behavior.

The article unfolds as follows: section 2 provides a brief review of the literature on filmgoers' consumption behavior, section 3 is dedicated to the methodology, section 4 presents the main results, and in section 5 we conclude.

2. A Consumer Behavior Perspective of Film Theatres' Audiences

The motives and barriers approach

While a significant bulk of the research on film audiences has focused on the type of films (i.e., 'mainstream' vs. 'art house' films), a particular stream of research has paid special attention to the motives underlying individuals' decisions to participate/not participate in leisure and cultural activities in general, film theatres attendance being one of them. In this line, Chuu, Chang and Zaichkowsky (2009) offer, for example, a comprehensive overview of the motives driving audiences for art versus commercial films. Several features of film consumption, consistent across various studies, were identified by these authors: 1) there is a higher frequency of attendance for art film audiences compared to those of commercial films (see also Faber, O'Guinn and Hardy, 1988); 2) socialization and/or entertainment are not the main motives for art filmgoers but the films per se (see also Vahemetsa, 1970; Austin, 1984); 3) art film audiences seem to be quite 'self-determined' (Chuu, Chang and Zaichkowsky, 2009:216), as their attendance behavior is less dependent on others' opinions or company (see also Faber, O'Guinn and Hardy, 1988); 4), commercial film audiences are more likely to watch films about which they know more, such as popular movies that are extensively advertised, while the audiences of art films go to film theatre to watch a film just because it is an art film (see also Chamberlin, 1960); 5) art film audiences appreciate the 'cultural value' transmitted by films (see also Vahemetsa, 1970,); 6), regarding venues' features, art film audiences were found to be less demanding than commercial film audiences with respect to location or facilities (i.e., sound, seats, parking, etc.), given their main interest in the quality

of the film (Adler, 1959; Austin, 1984); last, art filmgoers who prefer more drama and original version films, are also motivated to watch a director's work, and put more weight on reviewers' critiques than on advertising (see also Adler, 1984; Austin, 1984; Faber, O'Guinn and Hardy, 1988).

As for barriers, research on film theatres' attendance indicates the preference for other ways (digital TV, internet downloads, DVD discounts, etc.) of enjoying films (De Vany and Walls, 2007; Silver and McDonnell, 2007); the preference for film substitutes (videogames) or other viewing environment (mall entertainment) (Silver and McDonnell, 2007), or the existence of domestic constraints, such as lack of time, family obligations, etc. (Collins, Hand and Ryder, 2005). Hart, Kerrigan and Vom Lehn (2016), have analyzed film consumer's hedonic experience with an introspective (diary) research method and identified three dimensions of film consumer behavior that support existing evidence: film characteristics (artistic, commercial), viewing environment (home or film theatre) and situational environment (time, mood, companions, etc.). Their findings also confirm the importance of previous film experience on filmgoers "future sense making and film consumption experiences" (pp. 388).

Types of film theatre audiences

This stream of research distinguishes among various segments of filmgoers. Vahemetsa (1970) found, for example, four segments of art filmgoers: the 'cultural prestige type', for whom film is a specific cultural expression; the 'first cognitive type' (films are important information sources contributing to increasing life experiences); the 'second cognitive type' whose motive for art film attendance is to escape from reality; and the 'aesthetic type' who perceives art films as 'creative products'. Sedgwick and Pokorny (2012:329-330) worked with a historic micro-dataset (early 1940s) on 22 film theatres in Philadelphia, in the US, and identified three types of filmgoers: a non-selective segment, consuming films more as a generic commodity, but who go to the film theatre for various motives –film-viewing habits, the experience of viewing films in a movie theater rather that the film per se, or accompanying friends who want to see a specific film; the selective film consumers, whose preference for recommended films is directly related to their social status; and a small segment of filmgoers who based their choice on personal recommendations.

In Spain, Cuadrado and Frasquet (1999) found three segments of filmgoers –social viewers, apathetic viewers and filmgoers– and, the benefits of going to film theatre to watch films, ranged from having a good time and feeling emotions to having fun. García-Álvarez, Filimon and López-Sintas (2007) focused on filmgoers' choices of films by country of origin –US, Spain and other countries– and identified three typologies of film theatres audiences: a majority of filmgoers with a clear preference for US films, especially families and younger individuals; an audience for Spanish films, integrated mainly by middle-age and middle-class filmgoers; and a social and intellectual elite that preferred European films. The dominant preference for US films was explained by the fact that these were perceived by audiences as synonymous of familiar and reliable entertainment, and in Spanish language; in contrast, these qualities were not all met by Spanish and European film productions. In a research closer to the approach presented here, Fernández-Blanco, Orea and Prieto-Rodríguez (2009) worked with a 1998 Spanish dataset containing self-rated valuations of both US and Spanish films. The authors applied LC models and identified two groups of filmgoers, differentiated by variables such as income, ticket price, education, and age, among others. Overall, their results advocate in favor of introducing socioeconomic indicators and self-rated preferences in the analysis, for a more complete identification of the hidden consumer preferences.

Socioeconomic context and film audiences

From a temporal perspective, the research evidence seems to indicate that there has been a change in the social context surrounding the experience of going to the film theatre to watch a movie (Tudor, 2013), with a significant change in the age profile of the filmgoers over the last twenty years (1993-2012): while young people (11-14 and 15-19 age segments, in particular, and to a lesser extent, the 20-24 year-old segment) go to the film theatre less frequently, those above 50 years of age have increased their consumption of films (Paris, 2014:12-13). Other

demographics, such as gender, point to a rather even trend of film theatre attendance for men and women (Sedgwick and Pokorny, 2012; Tudor, 2013); and, the inverse correlation between film theatre attendance and filmgoers' social status, education level and income, has also weakened over time (Tudor, 2013).

In UK, Chan and Goldthorpe (2007) analyzed visual arts and found evidence for gender effects only in the cases of theater, cinema and dance, with women exhibiting a more omnivorous pattern of consumption than men. Chuu, Chang and Zaichkowsky (2009) found that art filmgoers, compared to commercial filmgoers, were, on average, more educated (high cultural capital), more likely to be single, and men, although gender differences have proven to be an inconsistent feature across the research on film audiences and elitist cultural consumption. From a cross-country perspective, Governo and Teixeira (2014) explored the determinants of the consumer demand for art house films vs. mainstream film theatres offerings and found no significant relationship between social and cultural status indicators, (the relative demand for art films was usually associated with higher income and education levels of film consumers). While these findings are in line with the cultural omnivorousness setting (Peterson and Kern, 1996), other authors (see Katz-Gerro, 1999; López-Sintas and García-Álvarez, 2006, etc.) did find evidence supporting cultural stratification thesis (Bourdieu [36]).

Finally but not lastly, according to Morley (1992:157-158), cited in Meers (2001:140), "picture palaces" and "domestic context" are considered to be different film watching experiences inviting to take into account the 'context' (place) of film consumption (see also Hart, Kerrigan and Vom Lehn, 2016). Richins (1997) also argues that in the case of goods embedding meanings (i.e., experiential goods like films), context is particularly important for emotions. The place was found important also in the case of music consumption: Roose and Vander Stichele (2010), differentiated among music listening and attending behavior in Flanders, through activities or practices that embed a socially visible status marker (i.e., a concert hall) and others that do not (i.e., home), among others.

Overall, existing research indicates that it is necessary to look into the relationship between the film theatre audiences and the role of motives/barriers, and socioeconomic variables to gain a more complete understanding of filmgoers' decision-making behavior.

3. Methodology

Data and variables

The data were gathered with a personal survey based on a structured questionnaire using a quota sampling method that yielded information from 516 individuals of both genders, aged 18 or older in 2013. The questionnaire was divided in three parts: filmgoers' consumption habits, motives/barriers and sociodemographic variables. A comprehensive number of self-rated items registered the motives for (17 items) and the barriers to film theatre attendance (28 items) (see Table 1).

Table 1. Motives for and barriers to film theatres attendance

Variable	Range	Mean	Median	SD
Motives for film theatre attendance				
I go to the film theatre …				
To feel emotions	1-5	3.17	3.0	1.177
To see a director's work	1-5	3.13	3.0	1.131
To achieve self-fulfilment	1-5	2.33	2.0	1.146
To reach educational development	1-5	2.71	3.0	1.130
To learn languages	1-5	2.13	2.0	1.207
To find out about other cultures	1-5	2.57	3.0	1.182
To watch my favourite actors films	1-5	3.21	3.0	1.158
To see successful box-office films	1-5	3.20	3.0	1.150
To see a film recommended by others	1-5	3.55	4.0	0.970
To watch prized films	1-5	3.01	3.0	1.168
To enjoy a film with good reviews	1-5	3.51	4.0	1.048
To see a film that has been intensively advertised	1-5	3.26	3.0	1.179
To socialize	1-5	3.14	3.0	1.294
To experience better sound and image quality	1-5	3.83	4.0	1.028
To relieve boredom	1-5	2.76	3.0	1.201
To share an experience	1-5	3.09	3.0	1.029
To look for relaxation	1-5	3.32	4.0	1.122
Barriers to film theatre attendance				
I do not go (more often) to film theatre because:				
Too many films to choose	1-5	2.28	2.0	1.014
I do not know what's on	1-5	2.49	2.0	1.116
Films are very similar	1-5	2.35	2.0	1.080
I'm not interested	1-5	2.29	2.0	1.147
It is difficult for me to understand films	1-5	1.75	1.0	0.907
Nobody to go with	1-5	1.77	1.0	0.933
Scarce information on what's on	1-5	2.17	2.0	0.949
Difficult to get tickets	1-5	1.85	2.0	0.941
They sell smelly food	1-5	1.92	2.0	1.080
People disturb by using their mobile phones	1-5	2.28	2.0	1.198
Timetables are inconvenient	1-5	2.31	2.0	1.132
Moviegoers make noise by eating food	1-5	2.23	2.0	1.137
I prefer watching movies in diff. media (TV, PC, etc.)	1-5	3.47	4.0	1.204
I prefer doing other act. (shopping, going out, etc.)	1-5	3.52	4.0	1.071
Watching movies at home is more comfortable	1-5	3.69	4.0	1.104
There are cheaper ways of watching films	1-5	3.64	4.0	1.226
I prefer social networking	1-5	2.00	2.0	1.127
I prefer videogames	1-5	1.76	1.0	1.086
It is not as pleasant as years ago	1-5	2.51	2.0	1.187
Current cinemas are not my type	1-5	2.34	2.0	1.186
Lack of time	1-5	3.08	3.0	1.315
I don't like the films that are on	1-5	2.70	3.0	1.093
Films are bad	1-5	2.30	2.0	1.069
I prefer other cultural events (concerts, theatre)	1-5	3.23	3.0	1.203
Cinema tickets are expensive	1-5	3.77	4.0	1.158
Not being able to go out (children, etc.)	1-5	2.49	2.0	1.382
Multiplexes are far away from home	1-5	2.46	2.0	1.164

1. Strongly disagree… 5. Strongly agree

Socioeconomic and behavioral characteristics of cinemagoers

The survey comprised information on several representative indicators of individuals' positions in the social hierarchy: socioeconomic status and education level, all informative with respect to the respondents' social, economic and cultural capital endowments. The occupational status, at the time of the survey, was used as a proxy for the socioeconomic status, as the survey did not elicit information on income level. The categories were as follows: 1) employed, 2) unemployed, 3) retired, 4) student, 5) house work, and 6) others. Educational attainment, recorded with four levels, was used to operationalize the cultural capital: 1) primary school, 2) secondary school, 3) technical college, 4) university studies. A special five-point Likert scale question was meant to measure whether the interviewees had enough disposable income to enjoy leisure pursuits. For calculation purposes, the five levels of responses were reduced to three: disagree, neutral, agree. The profile of the respondents was completed with sociodemographic indicators (see Table 2).

Table 2. Main demographics

Variable	Proportion (%)	Variable	Proportion (%)
Age		*Gender*	
18-35	35.7	Male	49.6
36-50	32.0	Female	50.4
>50 years	32.4	*Occupational status*	
Education level		Employed	43.2
Primary school	7.8	Unemployed	10.1
Secondary school	32.7	Retired	11.2
Technical college	18.8	Student	27.9
University	40.6	House works	5.0
Status		Others	2.5
Single no children	26.6	*Nationality*	
Single with children	6.2	Spanish	84.7
With partner no children	22.9	Other	15.3
With partner and children	44.4	*I have enough free time to enjoy leisure activities*	
Frequency of going to the film theatre		Disagree	29.6
Less than once per year	8.2	Neutral	25.2
Once a year	26.3	Agree	45.2
Once every 3 months	33.3	*I have enough disposable income to enjoy leisure pursuits*	
Twice every 3 months	18.6	Disagree	30.2
Twice a month	11.0	Neutral	31.4
Once a week	2.6	Agree	38.4

The frequency of cinema attendance was organized in four levels: 1) once a year or less, 2) once or twice every three months, 3) twice a month, 4) once a week or more. A five-level Likert type question –strongly disagree, disagree, neutral, agree, and strongly agree– asked the respondents to assess whether they had enough time to enjoy leisure activities (see Table 2).

Motives for cinema attendance

A set of 17 items (see Table 1) were dedicated to understanding the motives for cinema attendance. In order to determine the adequate number of components to retain in the analysis, we applied a principal components analysis (PCA). Basic assumptions on the suitability of the data for this type of analysis were checked with the Kaiser-Meyer-Olking (KMO) statistic, which should be greater than 0.600 (KMO=0.744) and the Bartlett's test, which was significant (Chi-squared=1382.486; df=136; p-value=0.000). The PCA procedure recommended a five-factor solution explaining 54.07% of the total variance (TVE). Table 3 shows the final five-factor solution (Varimax Procedure), consisting of 17 items selected based on eigenvalues, TVE, loadings and interpretability. Except for the 'mood' component, integrated by only two items –to relieve boredom and to look for relaxation– which returned high communalities (>0.500), the other components were determined by at least three items (see also Hager and Winkler, 2012, for similar reports of factors with only two items).

Table 3. Rotated factor structure of motives for film theatres attendance

Variable	Factor I	Factor II	Factor III	Factor IV	Factor V	Communality (h^2)
Education (mean=2.57)						
To reach educational development	0.737					0.590
To learn languages	0.730					0.540
To find out about other cultures	0.698					0.553
To see a director's work	0.627					0.417
To achieve self-fulfillment	0.575					0.507
Film's popularity (mean=3.5)						
To see successful box-office films		0.735				0.573
To see a film that has been intensively advertised		0.702				0.639
To watch my favorite actors		0.600				0.442
To watch prized films		0.509				0.529
Film's quality (mean=3.63)						
To experience better sound and image			0.736			0.640
To see a film recommended by others			0.613			0.480
To enjoy a film with good reviews			0.642			0.559
Social interaction (mean=3.13)						
To share an experience				0.720		0.551
To socialize				0.690		0.510
To feel emotions				0.555		0.488
Mood (mean=3.25)						
To relieve boredom					0.711	0.557
To look for relaxation					0.692	0.617
Eigenvalues	3.417	1.488	2.012	1.179	1.097	
Total variance explained (%)	15.823	10.598	10.943	9.167	7.538	**54.07**
Cronbach-α*	0.730	0.62	0.532	0.441	0.311	

*see Hager and Winkler (2012) for similar levels of Cronbach- α for performing arts attendance

For each factor extracted, the items were summated, and in order to reduce the sparseness of the data, the five-level Likert scale was collapsed into two levels, taking as reference the mean of each subscale (1-disagree/below the average; 2-agree/above the average).

Barriers to cinema attendance

In a similar fashion, the barriers were registered on a five-point Likert scale by a set of 28 items (see Table 1). The PCA procedure converged to a final seven-factor solution (see Table 5 below), explaining 58.2% of the total variance and retaining 26 items out of 28, based on eigenvalues, the items' loadings, TVE and interpretability. The tests of the initial hypotheses (KMO=0.859 and Chi-squared=3091.634; d.f.=190; p-value=0.000) confirmed that a PCA analysis could return significant factor structures. After a first PCA iteration, indicating a suitable seven-factor solution (TVE=56.52%), two items (nobody to go with and multiplexes are far away from home) with very low loadings were eliminated, and the final solution is presented hereafter. A similar procedure, as the one in the previous section, was applied to rescale the items and to reduce the sparseness of the data.

Table 4. Rotated final seven-factors solution for film theatres attendance barriers

Variable	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Factor VII	Communality (h²)
Film offerings (mean=2.19)								
Too many films to choose	0.565							0.435
I do not know what's on	0.494							0.475
It is not possible talking in cinemas	0.546							0.478
I'm not interested	0.619							0.540
It is difficult for me to understand films	0.682							0.514
Scarce information on what's on	0.541							0.519
Difficult to get tickets	0.703							0.588
Venue features (mean=2.27)								
They sell smelly food		0.592						0.535
People disturb by using mobile phones		0.757						0.640
Timetables are inconvenient		0.612						0.524
Moviegoers make noise by eating food		0.763						0.646
It is not as pleasant as years ago		0.634						0.683
Current cinemas are not my type		0.533						0.593
Perception (mean=2.45)								
I don't like films that are on			0.748					0.598
Films are very similar			0.651					0.573
Films are bad			0.733					0.598
Preference and place (mean=3.82)								
I prefer watching films in TV, PC, etc.				0.702				0.619
I prefer other cultural events				0.587				0.501
I prefer doing other act. (shopping, etc.)				0.637				0.615
Watching movies at home is more comfortable				0.745				0.664
Substitute act.(mean=2.05)								
I prefer social networking					0.760			0.627
I prefer videogames					0.751			0.627
Financial (mean=3.91)								
Cinema tickets are expensive						0.816		0.725
Cheaper ways of watching films						0.665		0.684
Recreation time (mean=3.01)								
Lack of time							0.789	0.678
Not being able to go out (children care)							0.692	0.613
Eigenvalues	5.763	2.424	1.914	1.479	1.336	1.234	1.143	
Total Variance Explained (%)	22.164	9.325	7.360	5.687	5.138	4.744	4.396	**58.82**
*Cronbach-α**	0.792	0.799	0.682	0.654	0.579	0.588	0.418	

*see Hager and Winkler (2012) for similar levels of Cronbach- α for performing arts attendance

Type of film theaters and audiences

Film theatre attendance was recorded for four types of venues: a) multiplexes in shopping centers, b) multiplexes in city centers, c) film theaters, and d) multiplexes showing films in original version. Each respondent was asked to rank the four types from 1 to 4, according to the frequency of attendance. A paired samples t-test was conducted to evaluate whether the respondents scored differently on these variables. The results indicated that there was not a significant difference in the scores for multiplexes in shopping centers (M=1.79; SD=0.932) and multiplexes in city centers (M=1.75; SD=0.728) at the 0.05 level of significance (t=0.564; df=447; p=0.573). In this case, we would not reject the null hypothesis that the scores for these two variables are the same, and a new variable –multiplexes in shopping and city centers– was calculated using the mean scores of these two variables. Finally, in order to

control for the sparseness of the data, the frequency ranks were re-coded in two levels: most preferred and less preferred film theatres, respectively (see Table 5).

Table 5. Descriptive statistics for film theatres ratings

Variable	Range	Mean	Median	SD	1st -most frequented	2nd -less frequented
Multiplexes shopping and city centres	1-2	1.274	1.00	0.446	72.5%	27.5%
Art houses	1-2	1.840	2.00	0.366	15.9%	84.1%
Multiplexes original version	1-2	1.838	2.00	0.368	16.1%	83.9%

Data analysis and parameters of the model

We are interested here in exploring the unobserved data heterogeneity associated to filmgoers' patterns of attendance emerging from the type of film theaters usually chosen to watch a film. These patterns are next analyzed in association with filmgoers' motives for and barrier of attendance, and other variables such as, socioeconomic indicators, behavior (frequency of film theatre attendance), generational patterns (age), film preferences, etc., with the purpose of showing that they respond to socioeconomic and generational structures and this applies also to filmgoers' motives/barriers of attendance (for a previous version of this research, without PCA analysis for motives and barriers see Cuadrado et al., 2013). To do this, we employed the latent class (LC) method (Lazarsfeld and Henry, 1968) to test the consumer behavior model according to which, individuals consume patterns of products (Boter and Wedel,1999). Intuitively, the LC method splits the sample in T clusters or latent classes and estimates, for each one, a set of parameters. In the LC model defined in the equation below (see Vermunt, 2010), Y stands for the whole set of indicators Y1, Y2, and Y3, corresponding to the three types of film theatres defined in Table 5, and Z, for the set of so-called active covariates (e.g., financial constraint) as they will condition the final number of clusters.

$$P(\boldsymbol{Y} = \boldsymbol{y}|Z) = \sum_{t=1}^{T} P(t|Z) \prod_{k=1}^{3} P(Y_k = y_k|t)$$

The model estimates, for each cluster, its size and the probabilities of the indicators (Y), conditioned to cluster membership. Once obtained the clusters and the parameters, each individual (observation) is assigned to a cluster only (Magidson and Vermunt, 2001) based on the calculated membership probabilities (see also Vermunt and Magidson, 2008).

Model selection

The parameters of the LC model are estimated by first fitting the null, or restricted, model (T=1), with one latent class and the unrestricted model (T=2) with two latent classes. A likelihood ratio test (L2) is performed, such that if the null model is rejected, the process continues by incrementing, each time, the number of latent classes by one. This process aims at finding the model that provides an adequate fit for the data and stops once we fail to reject a null model. Table 6 gives the statistics used to assess the goodness of fit of the LC model used in the analysis: the chi-squared likelihood-ratio statistic L2; the Bayesian information criterion (BIC) and the Consistent Akaike's Information Criterion (CAIC) are both based on L2 (see also Raftery, 1986; Fraley and Raftery, 1998). The L2 statistics indicate, for each model, the amount of unexplained association among the variables (hence, lower values are preferred). The data in Table 6 show that the addition of a latent class (from the model with one cluster to the model with two clusters) contributed to reduce the L2 statistic by 75.6%, while the contribution of the additional latent classes (the models with three to four classes) was much lower (22.5%; 1.2%). The p-value (>0.05), indicates that the model with three clusters provides an adequate fit for the data. Additional statistics (Dayton,1998), such as BIC (which takes parsimony into account) and CAIC, also suggest that the model with three clusters would be a better fit for the data (the lower their values, the better).

Table 6. Goodness of fit statistics for the latent class model

LCA model	LL	Npar	L²	BIC(L²)	CAIC(L²)	df	p-value	Class. Error
One-cluster	-657.686	3	520.8520	411.6205	393.6205	15	4.30E-99	0.000
Two-cluster	-440.7467	9	126.9735	54.1524	42.1524	12	2.50E-20	0.001
Three-cluster	-382.032	15	9.5443	-26.8663	-32.8663	6	0.15	0.001
Four-cluster	-378.9298	21	3.3398	3.3398	3.3398	0	.	0.024

4. Main Findings and Discussion

The parameters of the model

Table 7A presents the estimates of the parameters for the three-cluster model. The first row presents the proportion of how many individuals have been classified in each cluster, $P(t|Z)$ that is, the cluster's relative size, and the following rows indicate the probability of filmgoers' behavior (preference for a type of film theatre), given their classification in that cluster $P(Y_k|t)$ in percentages. If take, for example, a filmgoer classified in cluster 1, he or she has a probability of 99.97% of going very frequently to watch films in multiplexes in shopping and city centers, a probability of 99.96% of not going to multiplexes showing films in original version (OV) and a 32.78% probability of facing financial constraints on cultural and leisure activities. Thus, based on these conditional probabilities and mean values, we can characterize the probabilistic behavior of the Spanish filmgoers regarding the type of film theater preferred, constrained by the disposable income for cultural pursuits.

The parameters estimated suggest one big cluster (70.53% of the sample) of filmgoers that basically prefer multiplexes in shopping centers and in the center of the city (*mainstream filmgoers*). A second cluster (15.87% of the sample) stands for *art-house filmgoers*; according to Chuu, Chang and Zaichkowsky (2009:214), "[a]rt films are frequently selected to be shown at major film festivals and are often the winners of distinctive film awards. Many of these films are made in non-English speaking countries… In terms of the theatrical release of art films, they are screened primarily in art-house and repertoire theatres only". The third cluster (13.6%) represents filmgoers that prefer to watch films in original version (*OV filmgoers*).

Table 7A: Probabilistic patterns of film theatres attendance
(column profiles in %)

	Cluster 1	Cluster 2	Cluster 3	Sample
Cluster Size, P(t|Z)	70.53	15.87	13.6	100
(s.e.)	(0.0217)	(0.019)	(0.0179)	
Indicators of type of film theatre P(Y_k|t)				
Multiplexes shopping and city centres				
Most frequent (Yes)	99.97	0.35	3.71	72.5
	(0.001)	(0.0071)	(0.0256)	
Less frequent (No)	0.03	99.65	96.29	27.5
	(0.001)	(0.0071)	(0.0256)	
Art houses				
Most frequent (Yes)	0.02	99.52	1.2	15.9
	(0.0008)	(0.009)	(0.0549)	
Less frequent (No)	99.98	0.48	98.8	84.1
	(0.0008)	(0.009)	(0.0549)	
Multiplexes original version				
Most frequent (Yes)	0.04	13.75	99.5	16.1
	(0.0017)	(0.0575)	(0.0094)	
Less frequent (No)	99.96	86.25	0.5	83.9
	(0.0017)	(0.0575)	(0.0094)	
Financial constraint				
I have enough disposable income to enjoy leisure pursuits				
Disagree	32.78	22.92	22.76	30.2
Neutral	35.73	33.42	25.87	31.4
Agree	31.49	43.66	51.37	38.4

An alternative, and easier, interpretation of filmgoers' profiles is based on whether the individuals classified in cluster t, $P(Y_k|t)$, are over- or underrepresented among individuals with that behavior (similar to a row profile table, see bold values in Table 7B). Thus, filmgoers in cluster 1 (70.53%) are overrepresented among those choosing the *very frequent* level (Yes) of attendance for multiplexes in shopping and city centers (*mainstream filmgoers*),

and for whom film theatres mean leisure and entertainment, and the *less frequent* level (No) of attendance for venues showing films in original version (*OV filmgoers*). Cluster 2 (15.87%) is overrepresented among individuals who prefer film theaters, an elitist segment of filmgoers for whom watching films at the movie theatre is an experience *(art-house filmgoers)*; cluster 3 (13.6%) is overrepresented among filmgoers who have a clear preference for watching films in multiplexes showing them in original version (*OV filmgoers*).

Table 7B: Probabilistic patterns of film theatres attendance
(row profiles in %)

	Cluster 1	Cluster 2	Cluster 3	Sample
Cluster Size, P(t|Z)	70.53	15.87	13.6	100
(s.e.)	(0.0217)	(0.0.019)	(0.0179)	
Indicators of type of film theatre P(Y_k|t)				
Multiplexes shopping and city centers				
Most frequent (Yes)	99.36	0.00	0.64	72.5
Less frequent (No)	0.00	54.69	45.31	27.5
Art houses				
Most frequent (Yes)	0.00	99.05	0.95	15.9
Less frequent (No)	83.97	0.01	16.01	84.1
Multiplexes original version				
Most frequent (Yes)	0.09	13.81	86.10	16.1
Less frequent (No)	83.74	16.26	0.00	83.9
Financial constraint				
I have enough disposable income to enjoy leisure pursuits				
Disagree	77.44	12.19	10.37	30.2
Neutral	74.07	15.59	10.34	31.4
Agree	61.48	19.18	19.34	38.4

As already mentioned, the LC model estimated here also takes into consideration the income available for cultural pursuits (see i.e., Fernández-Blanco and Baños-Pino, 1997; Fernández-Blanco, Orea and Prieto-Rodríguez, 2009). The estimates show that while filmgoers in cluster 1 (mainstream filmgoers), who prefer multiplexes in shopping and city centers, are subject to financial constraints, those in the other two clusters (art-house and OV filmgoers) 'agree' with having enough income for cultural pursuits, as they are overrepresented in these indicators.

Motives for going to film theatres

According to the results presented in Table 8, for cluster 1 (mainstream filmgoers), films' popularity (i.e., prizes, intensive advertising, favorite actors and successful box-office records) and mood (to relieve boredom and to relax) are the main drivers of cinema attendance. They do not seem to be influenced by films' quality (good reviews, recommended by others, or better image and quality of the exhibition) or by educational purposes or socialization needs. All in all, on average, they seem to fit well in the profile of filmgoers who prefer commercial and popular films for entertainment. Cluster 2 (art-house filmgoers) exhibits a different motivational pattern: as expected, they are overrepresented in indicators related to motives of personal education achievements and social interaction (share emotions, experiences and socialize with filmgoers sharing common preferences for art films) (see Swanson, Davis and Zhao, 2008; Hager and Winkler, 2012); neither films' quality nor popularity seem to be strong motives for choosing film theatres, as they seem to be a well-informed and rather specialized film audience and go mainly for the movies alone. Cluster 3 (OV filmgoers) exhibits a pattern similar to cluster 2, except for the fact that these filmgoers do take into account films' quality (reviews, recommendations, better sound and image). It appears that film theatres allow them to benefit more from the impact of technical innovations on film releases. This result is consistent with the findings of Governo and Teixeira (2014) predicting, on average, a positive relationship between the countries' level of technological development and the domestic demand for art films.

Table 8. Motives for film theatres attendance (row profiles, %)

	Cluster 1	Cluster 2	Cluster 3
Cluster size	**70.53**	**15.87**	**13.6**
I go to the film theatre...			
Education (mean=2.57)			
Agree (>=2.57)	66.16	**16.53**	**17.31**
Disagree (<2.57)	**75.41**	15.14	9.45
Film's quality (mean=3.63)			
Agree	69.5	13.89	**16.61**
Disagree	**72.12**	**18.96**	8.92
Film's popularity (mean=3.5)			
Agree	**70.75**	15.82	13.42
Disagree	70.26	**15.93**	**13.81**
Social interaction (mean=3.13)			
Agree	65.68	**18.47**	**15.85**
Disagree	**75.8**	13.05	11.15
Mood (mean=3.25)			
Agree	**76.25**	11.70	12.04
Disagree	66.85	**18.55**	**14.60**

Barriers for attending film theatres

The results in Table 9 indicate that clusters 1 and 2 (mainstream and art-house filmgoers) are, on average, the most affected by the barriers analyzed. Thus, the mainstream segment is sensitive to factors such as: film offerings (too many films to choose, difficult to get tickets, etc.), perception about the films released (very similar or bad films), their preference for other cultural activities and places; for this audience, the distinction between home and film theatre 'contexts' is important (see Morley, 1992; Sedgwick and Pokorny, 2012); while financial resources act as a constraint (see Fernández-Blanco, Orea and Prieto-Rodríguez, 2009), they face no leisure time restrictions. Overall, these barriers seem to fit well with this profile of filmgoers, looking mainly for entertainment, and that exhibits features similar to the commercial films' audiences (see also Chuu, Chang and Zaichkowsky, 2009). Cluster 2 (art-house filmgoers) shares some of the barriers of cluster 1 (film offerings, perception, preference and place), but in contrast, they are not affected by financial restrictions. They do not face leisure time restrictions either, and as expected, are sensitive to film theatres' features (i.e., smelly food, mobile phone noise, nostalgia for former type of film theatres, etc.). In this respect, Tudor (2013) argues, for example, that an important part of social life in the past century was closely related to 'going to the movies' ritual, and the change in this social context surrounding the experience of going to the film theatre eventually affected attendance. Finally, cluster 3 (OV filmgoers) is affected by two barriers only, that is, leisure time restrictions and the preference for other substitute activities (social networking, videogames).

Table 9. Film theatres attendance barriers (row profiles, %)

	Cluster 1	Cluster 2	Cluster 3
Cluster size	70.53	15.87	13.6
I do not go (more often) to the film theatre because...			
Film offerings (mean=2.19)			
Agree (>=2.19)	71.91	16.99	11.1
Disagree (<2.19)	69.33	14.91	15.76
Venue features (mean=2.27)			
Agree	68.98	19.14	11.88
Disagree	71.03	13.13	15.84
Perception (mean=2.45)			
Agree	72.59	18.52	8.89
Disagree	69.01	13.93	17.06
Preference and place (mean=3.82)			
Agree	71.16	17.13	11.71
Disagree	69.08	13.53	17.39
Substitute activities (mean=2.85)			
Agree	67.37	16.96	15.67
Disagree	71.87	15.41	12.72
Financial (mean=3.91)			
Agree	72.94	15.65	11.41
Disagree	64.79	16.40	18.81
Recreation time (mean=3.91)			
Agree	65.83	15.81	18.37
Disagree	72.46	15.90	11.64

Socioeconomic and behavioral profile of cinemagoers in clusters

The estimates for the socioeconomic context presented in Table 10 indicate that individuals in cluster 1 (mainstream filmgoers) are, on average, more likely to be men below 50 years of age, some unemployed and with a low education level (primary and secondary school), and single with or without children; they are not affected by leisure time restrictions, as they are either unemployed or students (most of this group being foreigners residents in Spain at the moment of the interview); they are also very frequent filmgoers. Cluster 2 (art-house filmgoers.) is overrepresented among women, who are more likely to be unemployed or retired, but with a higher cultural level (technical and university studies) than the mainstream filmgoers, and some dedicated to housework, with a partner and children; in contrast to cluster 1, they are above fifty years of age and mainly Spanish. They do not go very often to the film theatre, also due to leisure time constraints. Cluster 3 (OV filmgoers) exhibits a different socioeconomic profile: mainly foreign women, above 50 years of age, highly educated (university studies), employed or with another occupational status, and with partner and no children. They are frequent filmgoers and have enough time for leisure pursuits (see also Fernández-Blanco et al., 2009, for the significant impact of socioeconomic indicators on film theatres' audiences). These findings are also in line with the cultural stratification framework (Bourdieu, 1979) confirming previous research evidence on cultural consumption (see López-Sintas and García-Álvarez, 2006).

Table 10: Socioeconomic and behavioral patterns of filmgoers (row profiles, %)

	Cluster 1	Cluster 2	Cluster 3	Sample
Cluster size	70.53	15.87	13.6	100
Education				
Primary School	**83.94**	12.04	4.02	7.8
Secondary School	**75.29**	12.58	12.13	32.7
Technical college	69.68	**18.66**	11.66	18.9
University studies	65.13	**17.48**	**17.39**	40.6
Personal status				
Single no children	**76.47**	11.18	12.35	26.5
Single with children	**80.70**	7.42	11.88	6.2
Partner no children	64.74	15.50	**19.76**	22.9
Partner with children	68.76	**20.24**	11.00	44.4
Occupational Status				
Employed	68.89	13.67	**17.45**	43.2
Unemployed	**73.73**	**25.47**	0.80	10.1
Retired	66.57	**20.06**	13.37	11.2
Student	**75.73**	12.04	12.23	27.9
House works	57.79	**31.24**	10.96	5.0
Others	66.57	**16.72**	**16.71**	2.5
Age				
18-35 years	**73.67**	12.98	13.35	35.7
36-50 years	**72.83**	14.39	12.78	32.0
>50 years	64.01	**21.15**	**14.83**	32.4
Citizenship				
Spanish	70.48	**17.04**	12.47	84.7
Other	**70.77**	9.27	**19.96**	15.3
Gender				
Male	**74.00**	13.11	12.89	49.6
Female	67.18	**18.54**	**14.29**	50.4
I have enough free time to enjoy leisure activities				
D	67.1	**18.7**	14.21	29.6
N	**75.36**	14.73	9.91	25.2
A	69.94	14.65	**15.41**	45.2
Frequency of film theatre attendance				
Once a year or less	70.88	**20.86**	8.26	34.6
1-2 every 3 months	70.91	15.53	13.57	51.8
Twice a month	67.24	4.01	**28.75**	11.0
Once a week or more	**72.64**	8.65	**18.71**	2.6

5. **Conclusions**

This research explored the behavior of Spanish filmgoers in order to disentangle their tastes and habits, with a special interest in the motives and barriers of going to film theatres. The empirical results suggest three clusters of filmgoers with the following probabilistic patterns of behavior: a segment of mainstream filmgoers, for whom going to film theatres to watch a film means leisure and entertainment; a segment of art-house filmgoers, and a segment that enjoys watching films in their original version (OV filmgoers). The segmentation of the data set in three clusters was conditioned by filmgoers' financial constraints showing that they may affect filmgoers' behavior.

The PCA findings identify five groups of motives –educational purposes, film popularity, film quality, socialization and mood– and seven groups of barriers: film offerings, venue features, perception, preference and place, substitute activities, financial barriers and recreation time disposability. The socioeconomic and behavioral (frequency) indicators complete the profile of the filmgoers. These findings add to the existing research evidence in favor of using self-rated preferences and socioeconomic variables to determine (film) consumer groups. This paper illustrates the different filmgoers segments, and in doing so, illustrates the specific barriers and motivations for each of these groups. These insights can assist cultural policy makers and film theatres' managers in designing specific actions and market strategies to better meet the needs and preferences of each of these distinct segments. Finally but not lastly, these findings invite to expanding filmgoers' analysis to other national contexts, to allow for further cross-country comparisons.

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DETERMINANTS OF EMPLOYMENT SITUATION IN LARGE AGGLOMERATIONS IN INDIA: A CROSS-SECTIONAL STUDY

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Abstract
The present paper analyzes the employment situation in different class of cities in urban India. By focussing on 52 large urban agglomerations in India and using latest unit level National Sample Survey data for the year of 2011-12 on employment and unemployment, it investigates the relevant city specific determinants of city-wise work-force participation rate (WPR). Finally, it reviews the current and past employment policies in India. The analyses show that though urban India has been witnessing an increase in the number of total job opportunities, WPR in the large cities have declined over the years. The regression results show that indicators like city-wise average land owned by a person, city-wise percentage of persons receiving any vocational training, percentage of persons currently registered with any placement agency, city size population and city output growth have a positive effect on city-wise WPR. Finally, the paper suggests that education of the worker, vocational training, and placement agencies are needed for successful job creation in the large agglomerations in India.
Keywords: Urban Agglomeration, employment, urban India
JEL classification: R1, J21

1. Introduction

India is on the threshold of becoming one of the world's fastest growing economies due to the policy reforms adopted in the recent decades. Among the various policy reforms, promotion of urban agglomeration is one of the most important and acclaimed ones. It is also considered unavoidable for the country's future development by the government presently in power. Recently, government of India has embarked on the mission of "Make in India" to encourage multinational and domestic companies to manufacture their products in India which is meant to attract a huge amount of Foreign Direct Investment (FDI). The main objective behind this mission is to increase job opportunities and skill development in the economy by adopting industry friendly policies. In fact, one of his lectures, Hon'ble Prime Minister Mr. Narendra Modi has said that "Young Indian are not seeking high paying jobs, they prefer becoming entrepreneurs".

Concurrently, Government is promoting urban agglomeration in a big way by making 100 smart cities in India, which is under implementation on priority basis. The proposed investment in the smart city project is about Rs. 48 thousand crore in the coming years. The main features of the smart city development include promotion of mixed land use in area based developments; urban housing and inclusiveness; creation of walk- able localities; making governance citizen-friendly and cost effective; preserving and developing open spaces; promoting variety of transport options; and applying smart solutions to infrastructure and services in area-based development.

On the whole, it is clear that India is currently undergoing a transformation and promotion of urban agglomeration and industrialization is an inevitable part of this process. This transformation will make India as one the fastest growing countries in the world in the days to come. In this backdrop, the present paper tries to see what factors actually contribute to higher employment generation in large agglomerations in India. In addition, the paper evaluates the past and current policies of government of India intended to enhance job opportunities and also impart the necessary skills to make the population employable in the emerging high-tech industries.

Now let us discuss in more detail about economic growth and employment situation in urban India, in the context of the present emphasis on urban agglomerations. Urban development in India is characterised by higher urbanization rate and higher economic growth. Annual exponential growth rate of urban population increased from 2.75 percent

during 1991-2001 to 2.76 percent during 2001- 2011. Consequently, the share of urban population in the total increased from 27.86 percent in 2001 to 31.16 percent in 2011. As per 2011 Census, the absolute increase in population was more in urban areas than in rural areas. A McKinsey Global Institute study "India's Urban Awakening: Building inclusive cities, Sustaining Economic Growth" (MGI, 2010) projected that nearly 590 million Indians will be living in cities by 2030. This clearly points to the increasing trend in India's urbanization in the recent decades as also the decades to come. The draft report of "Regional Plan 2021: National Capital Region" (GOI, 2013) estimated that about 42.6% of India's urban population is concentrated in 53 metropolitan cities (cities with a million plus population as per the Census definition). The four major metropolitan cities in India, namely, Mumbai, Kolkata, Chennai and Delhi together account for 15.4% of the total urban population of India. As per the Census data, 42.6 (or 70.24) percent of urban population lived in 53 metropolitan cities (or 468 Class I cities) in India in the census decade 2001-2011. Most importantly, the 2014 revision of the World Urbanization Prospects found that Delhi with a population about 25 million has become the world's second most populous city in 2014 after Tokyo which has an agglomeration of 38 million inhabitants (UN, 2014). These facts and figures clearly show that India's increasing urban population is mainly getting concentrated in and around large or class I cities.

Urban India contributes over 50% of the national Gross Domestic Product (GDP). The share of urban economy in the total increased from 37.65% in 1970–1971 to 52.02% in 2004–2005. The growth rate of urban NDP at constant prices (1999–2000) was about 6.2 % in the period from1970–1971 to 2004–2005, which is much higher than the growth rate of India's national NDP which was about 4.87 % during the same period. Mid-Term Appraisal of the Eleventh Five Year Plan shows the urban share of GDP was about 63 per cent for 2009-10, and this share is projected to increase to 75 percent by 2030. A study by Indian Institute for Human Settlement (IIHS), "Urban India 2011: Evidence" (IIHS, 2012) estimated that India's top 100 largest cities are currently producing about 43% of the GDP, with 16 % of the population and just 0.24% of the land area .

Urban India also has experienced an increase in total employment in different periods of time. As per the latest rounds of the National Sample Survey (NSS), The total workforce (as per Current Daily Status basis) in urban India increased from 82 milion in 1993-94 to 136.5 million in 2011-12, an increase of about 66 % (See Table 1 for details). Among the different periods of time, percentage increase in total employment was the highest (i.e., 22 %) from 1999-00 to 2004-05 and it was the lowest (i.e., 7 %) from 2004-05 to 2009-10.

The Compound Annual Growth Rate (CAGR) of total urban employment was about 2.87% in the period of 1993-94 to 2011-12. Most importantly, CAGR of total urban employment was the highest (i.e., 5.52 %) in the period from 2009-10 to 2011-12 and the lowest (i.e., 1.29 %) in the period from 2004-05 to 2009-10. Growth rate of male (or female) employment was about 2.92 % (or 2.67 %) in the period of 1993-94 to 2011-12. Within this entire time period, the annual growth rate of male employment was the highest (or i.e., 4.6 %) during the period 2009-10 to 2011-12 and the lowest (i.e., 2 %) in the period 2004-05 to 2009-10. On the other hand, the growth rate for female employment was the highest (or 9.42 %) in the period 2009-10 to 2011-12 and the lowest (i.e., -1.51 %) in the period 2004-05 to 2009-10.

Table 1: Employment situation in urban India

NSS Survey Year	Total urban employment (million)			CAGR of total urban employment (%)		
	Male	Female	Total	Male	Female	Total
1993-94	65	17	82	-	-	-
1999-00	76	18	94	2.64	0.96	2.30
2004-05	90.4	24.6	115	3.53	6.45	4.12
2009-10	99.8	22.8	122.6	2.00	-1.51	1.29
2011-12	109.2	27.3	136.5	4.60	9.42	5.52

Source: Author' calculation based on Employment and Unemployment Surveys by National Sample Survey Office, various rounds.

On the whole, the statistical data indicate an increasing trend in India's urbanization process (measured by the demographic approach), higher urban economic growth and also employment situation. However, detailed analysis by Bhalla and Kaur (2011) found that percentage of labour-population in the age group 15-19 in urban areas declined from 61.8 % in 1983 to 52.2 % in 2007-08. Most importantly, male (or female) labour population in age group 15-19 in urban areas declined from 88.6 % (or 23 %) in 1983 to 82.5 % (or 19.7 %) in 2007-08. According to International Labour Organisation (ILO) data, the worker (15 years and above) to population ratio was 53.6% in India in 2011, while it was 64.8% in Brazil and 70.9% in China. This indicates that labour participation rate in the Indian economy is nowhere near that in other developing countries [Shaw, 2013]. The report on Global Employment Patterns 2012 published by the International Labour Organisation (ILO) states that robust growth in India has been mostly associated with a rapid rise in labour productivity, rather than an expansion in employment.

World Urbanization prospects 2014 projected that India will add 404 million urban dwellers, between 2014 and 2050. In fact, it is estimated that between 2010 and 2030, an additional 250 million persons – many migrants from rural areas – will join the urban population in India (McKinsey Global Institute, 2010). It is also projected that an increasing number of large agglomerations in India will provide higher employment opportunities to absorb the new additions to the labour force in this period. This would happen only if urban planners and local governments implement job friendly environment in urban India.

Now the question arises about how India can improve actual employment prospects for its fast-expanding urban population. In this perspective, the present paper tries to analyse the recent employment situation in urban India by focusing on large cities in the different periods of time. In addition, using the latest (i.e., 68th Round) unit level data of the National Sample Survey in 2011-12 on Employment and Unemployment, it tries to find the relevant economic determinants of WPR by considering 52 large cities in India. Finally, it discusses the major policies which need to be considered by urban planners for increasing work participation rate in urban India. To the best of our knowledge, this paper is the first study that evaluates the determinants of city level employment in India by considering availability of limited unit or individual level urban employment data.

Rest of the paper is organized as follows. Section 2 presents the review of literature. Employment situation in different size/class of cities in urban India is discussed in section 3. Section 4 explains the empirical framework and results for estimation of determinants of city-wise work-force participation rate. Evaluation of past and current policies is summarized in section 5. Finally, conclusions and discussions are highlighted in sections 6 and 7 respectively.

2.   Select review of literature

There are several studies (e.g., Mehrotra et al. 2014; Maiti, 2015; IHD, 2014; Bhalla and Kaur, 2011; Papola and Sahu, 2012) that have tried to understand the trends and patterns of employment and unemployment in India. Mehrotra et al (2014) make a detailed review of these studies, in the context of the situation in India. The study found that India experienced an absolute fall in agricultural employment and a rise in non-agricultural employment for the period of 1993-94 to 2011-12. On the other hand, a fall in demand for manufacturing exports and increasing capital intensity resulted in a decline in manufacturing employment in the years 2004-05 to 2009-10. Bhalla and Kaur (2011) found that India has been witnessing one of the lowest labour force participation rates for women in the world, especially, urban women. Maiti (2015), using Behavior over Time Graph (BOT) variables such as economic growth, education and labour force, finds that unemployment is decreasing over time, and employment in India is challenged by major factors like economic crisis, gap between curriculum and industry demand, and jobless growth. Most importantly, India Labour and Employment Report (IHD, 2014), states that while India is counted as one of the most important emerging economies of the world, its employment scenario is abysmal. Overall, labour-force to population ratio (age group 15 years and above) at 56 per cent is low in India compared to nearly 64 per cent for the rest of the world. In India, a large proportion of workers (i.e., 49 %) are engaged in agriculture; in contrast, employment share in service

sector (or industry) is just 27 % (or 13 %). About 92 % of workers are engaged in informal employment with low earning with limited or no social protection. Papola and Sahu (2012), using NSS data for the period of 1993-94 to 2009-10, have provided a detailed explanation of the trends and patterns of employment across different sectors in India. The study argues that there is need for creation of new jobs and improvement of quality of the existing jobs in order to achieve faster economic growth.

However, there are few studies that statistically measure urban employment in the specific context of India. Chen and Raveendran (2012) explore the trends in urban employment in India, with special focus on urban informal employment, by considering three rounds of National Sample Survey data for the year of 1999-00, 2004-2005 and 2009-10, respectively. The descriptive analysis shows that though the proportion of urban self-employment increased between 1999-00 and 2004-05, it decreased between 2004-05 and 2011-12. However, between 2004-05 and 2009-10, the combined share of urban employment of different informal groups grew from 12 per cent to 41 per cent. A study by Shaw (2013) using NSS Employment and Unemployment Survey data for the year of 1999-00, 2004-05, 2009-10, and 2011-12 pertaining to both urban and rural employment scenario found that   the proportion of workforce moving towards to non-farm activities has increased over the years along with a fall in the proportion of workforce engaged in casual wage-employment. Chowdhury's (2011) analysis reveals the grim employment situation in India. Author cites the drastic reduction seen in total employment in India during the years 2004-05 to 2009-210 due both to the widespread withdrawal of population from the labour force (especially women) and the and slow growth of employment in the non-agricultural sector in support of his argument. The paper also finds that the spread of education among the youth is a positive development but does not by itself explain the decline of labour force participation rate. Ramaswamy and Agrawal (2012) found that manufacturing employment in urban India grew at a faster rate (2.8 per cent) relative to all-India (1.8 per cent) over the period 1999–2000 and 2009–10. Its growth rate was higher relative to the earlier period of 1993–99. A little less than 50 per cent of the employment created in India was accounted for by the urban sector in the 2000s. More than 85 per cent of the jobs created in business services and more than 80 per cent of the jobs in total manufacturing were in the urban sector. Most importantly, IIHS (2012) using data from Economic Census, found that workforce participation rates are highest in the "major metros" (population 4 million plus), and employment in "high-tech" sector (ICT, high technology manufacturing, and fast growing exports) is also highly concentrated in the large cities. Further, the pattern of employment growth around the India's largest cities shows that manufacturing activity is shifting outwards from the city core. Manufacturing activities in general are spreading outward within 10-100 km radius from the city centre, with high-tech manufacturing   spreading to 10-50 km radius from the city centre, and medium high tech manufacturing and fast growing export manufacturing moving to a 50-100 km radius from the city centre. Finally, the report suggests that the spread of manufacturing and other employments away from the city core raises the issue of sprawl and links between land use and transportation.

3.   Employment situation in different class of cities in urban India

Table 2 shows the percentage increase in employment situation in urban India in terms of difference in size/class of cities/towns form 1993-94 to 2011-12. As can be seen from Table 1, there exists in urban India, a stark difference in the pattern of employment between male and female. In this regards, Table 2 presents the disparities in employment scenario in urban India by considering usually employed (principal activity status -ps+ subsidiary activity status -ss-) male and female workers in different categories separately, rather than at aggregate level.

As can be seen from Table 2, the percentage of WPR declined during the years 1993-94 to 2011-12 for both male and female worker in all the all size/class of cities/towns in India, except for female workers in class 1 cities whose share increased by 9.94 %. [1] In contrast,

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[1] It is important to note here that in this paper we have used Census data and National Sample Survey (NSS) data for the analysis. Census defines class 1 cities which have *population 100,000 or*

the percentage of WPR increased during the years 1999-00 to 2004-05 for both male and female worker in all the size/class of cities/towns of India. During this period, the percentage increase (i.e., 21.79%) was higher for female workers in class 2 cities/towns than others. In addition, the percentage of WPR marginally increased in the period from 2009-10 to 2011-12, except for male workers in class 2 cities. However, it is seen that the percentage of WPR for all categories of urban workers registered decline during the years from 1993-94 to 1999-00 and 2004-05 to 2009-10.

Table 2: % increase of per 1000 distribution of usually employed (ps+ss) persons aged 15 years and above by status of employment for different size/class of cities/towns in different periods of time.

Different Category	Time span	all class 1 cities	size class 2	size class 3	Urban India	all class 1 cities	size class 2	size class 3	Urban India
		Male				*Female*			
WPR	1993-94 to 1999-00	-2.87	-1.97	-1.92	-2.08	-2.76	-11.82	-13.17	-11.66
	1999-00 to 2004-05	2.28	1.34	1.44	1.46	12.50	21.79	13.11	15.23
	2004-05 to 2009-10	-3.81	-2.65	-2.83	-3.01	-15.66	-18.35	-25.36	-19.38
	2009-10 to 2011-12	1.77	-1.09	0.40	0.14	19.16	0.56	5.34	6.56
	1993-94 to 2011-12	-2.74	-4.34	-2.94	-3.52	9.94	-11.82	-22.78	-12.56
Self-employed	1993-94 to 1999-00	4.25	-2.63	2.83	0.00	24.82	-3.46	4.58	1.35
	1999-00 to 2004-05	7.34	12.75	3.17	8.19	8.52	5.59	4.19	4.20
	2004-05 to 2009-10	-2.03	-12.83	-7.79	-8.69	-13.35	-13.14	-14.81	-13.38
	2009-10 to 2011-12	-2.07	6.48	-0.22	1.95	7.85	3.66	8.37	4.41
	1993-94 to 2011-12	7.37	1.91	-2.39	0.72	26.60	-8.21	0.60	-4.48
Regular wage/ salaried	1993-94 to 1999-00	-5.56	0.00	-3.65	-1.65	-8.08	11.30	33.13	14.33
	1999-00 to 2004-05	0.39	-8.45	-0.32	-2.63	0.96	8.06	3.76	7.76
	2004-05 to 2009-10	0.78	10.00	-1.90	3.19	9.47	14.92	5.43	9.97
	2009-10 to 2011-12	5.81	-3.73	9.35	3.57	0.00	3.37	17.17	8.56
	1993-94 to 2011-12	1.11	-3.05	3.04	2.35	1.58	42.86	70.63	47.10
Casual labour	1993-94 to 1999-00	14.02	7.10	-0.47	3.75	-16.11	-7.63	-22.49	-18.39
	1999-00 to 2004-05	-23.77	-10.24	-6.67	-13.25	-28.00	-24.31	-11.45	-21.60
	2004-05 to 2009-10	4.30	14.09	22.45	18.06	0.00	5.45	29.74	17.37
	2009-10 to 2011-12	-22.68	-6.47	-11.67	-13.53	-27.78	-16.67	-26.25	-26.53
	1993-94 to 2011-12	-29.91	2.58	0.47	-8.13	-56.38	-38.56	-34.32	-44.83

Note: Class 1 cities (with a population of one million or more), class 2 towns (with a population 50,000 to less than one million) and class 3 towns (with population less than 50,000) as per the National Sample Survey definition.

Source: Author's calculation based on Employment and Unemployment Surveys by National Sample Survey Office, various rounds.

Analyses also show that while the period 1993-94 to 2011-12 witnessed a marginal increase in the percentage of self employed male but it has decreased in the percentage of self employed female in all India urban area. During same period of time, the proportion of female self-employed workers of class 1 cities in India registered a higher increase (i.e., 26.6 %) than other groups in different size/class of cities and towns in India. Most importantly, the percentage of self-employed increased during the period 1999-00 to 2004-05 but decreased during the period 2004-05 to 2009-10 in all categories of size/class of cities in India irrespective of any gender differences. In the period of 2009-10 to 2011-12, the percentage of self employment rate increased for all categories of cities and towns except for the male working in class 1 and 3 cities/towns in India.

In the case of regular wage/salaried workers, except female working in class 2 cities, other all categories of both male and female in different size/class of cities/towns in India experienced a positive percentage change in the period 1993-94 to 2011-12. Most importantly, the percentage of female wage/salaried workers registered a higher percentage

more. At the Census 2011, there are 468 such cities. On the other hand, NSS defines class 1 cities which have population of one million or more. We have mentioned it clearly whenever we have used these two different definitions throughout this paper.

increase than the male wage/salaried workers during the same period of time. In overall, there was an increase in the percentage of female wage/salaried workers in different periods of time in different size/class of cities/towns excepting the percentage of female wage/salaried workers in class1 cities during the period of 1993-94 to 1999-00. In contrast, the percentage of male wage/salaried workers decreased or remained constant during the years 1993-94 to 1999-00 for all class/size cities/towns in India. In addition, the results also show that the percentage of male wage/salaried workers in class 3 cities declined in different periods of time except 2009-10 to 2011-12. On the other hand, the percentage of male wage/salaried workers in class 1 cities increased in different periods of time except the period of 1993-94 to 1999-00 in different size/class cities in India.

Finally, the figures show that the percentage of casual labour declined for both male and female in different size/class of cities/towns in India except for male casual labourer working in class 2 and 3 cities and towns in India during the years 1993-94 to 2011-12. Overall, there was a decline in the percentage of casual labour in different class/size of cities/towns in India except during the period of 2004-05 to 2009-10 for both male and female categories.

In general, Table 2 clearly shows that the decline in the percentage of WPR from 1993-94 to 2011-12 for both urban male and female in India is associated with the percentage increase in male self employed persons and regular wage earners among both male and female workers and the percentage decline in casual labourer among both male and female workers along with percentage decline in the percentage of self employed female workers.

4. Empirical framework for the Estimation of Determinants of WPR in large cities in India

The basic econometrics model for the estimation of the determinants of WPR is stated as follows:

$$WPR_i = \alpha_0 + \sum_{i=1}^{11} \alpha_i x_i + e_i$$ .... (1)

WPR_i refers to city-wise work-force participation rate, X_1 refers to city-wise average land owned by a person, X_2 refers to percentage of persons currently registered with any placement agency, X_3 refers to city-wise percentage of persons receiving/received any vocational training, X_4 refers to city population, X_5 refers to city-wise percentage of people literate without formal schooling, X_6 refers to city output growth rate, X_7 refers to city inequality level, X_8 refers to city-wise percentage of not literate persons, X_9 refers to city-wise percentage of city slum population, X_{10} refers to city-wise percentage of persons literate up to middle , X_{11} refers to CAGR of city population from 2001 to 2011. Equation (1) has been estimated by the technique of OLS.

For the analysis, we have selected 52 large cities (or agglomerations) in India. [2] There are several reasons behind the selection of these large agglomerations as units of analysis. First, because of non-availability of city- specific data for a large number of variables used in this study (e.g. city level income and employment data), city district (where the sample city in located) is used as a proxy of a city. Larger cities are good proxies for city districts as they cover large portions of the respective districts compared to smaller cities. Second, as India's urbanization (i.e. share of urban population) is mainly based on Class I cities (with a population of more than 100,000 as per Census definition), these cities are also taken as Class I cities.

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[2] A total of 58 cities are listed in the World Urbanization Prospects 2011. We also consider Bhiwandi city, which is not listed in the World Urbanization Prospects 2011 but was listed in World Urbanization Prospects 2009. Due to unavailability of district domestic product (DDP), we consider only 52 cities (with population 750,000 or more) out of these 59 cities for our analysis. It is important to note here is that, as per the 2011 Census, there were 53 metropolitan cities (cities with a million plus population as per the Census definition) in India and 42 cities among these 53 metropolitan cities are included in our analysis.

Measurement of variables, data sources, and description of data

Appendix Table A.1 lists the cities used in the analysis. Appendix Table 2 summarizes the descriptions, measurements, and data sources of all the variables used in the estimation Equation 1. Table 3 elucidates the means, standard deviations, minimum, and maximum values for the variables used for the regression estimation. Dispersion about the mean is higher for city population size, percent of persons currently registered with any placement agency of the age 15 to 45 years, percent of persons literate without formal schooling, CAGR of city population from 2001 to 2011, and city-wise average land owned by a person. On the other hand, dispersion about the mean is lower for city-wise percent of persons literate up to middle school, workforce participation rate, city level inequality, and city output growth rate from 2001 to 2005. Table 4 shows the raw correlation of the variables. The values of the correlation coefficient (r^2) shows that workforce participation rate is positively associated with the city-wise percent of persons receiving/received any vocational training (i.e. r^2 is 0.52) and % of persons currently registered with any placement agency (i.e. r^2 is 0.46). On the other hand, workforce participation rate is negatively associated with persons literate without formal schooling (i.e. r^2 is -0.33) and city-wise percent of persons not literate (i.e. r^2 is -0.22).

Table 3: Description of data

Variable	Mean	Std. Dev.	Min	Max	Coefficie-nt of Variation
Workforce Participation Rate (WPR) in 2011-12 (in %)	37.43	6.12	22.91	50.69	16.3
City-wise average land owned by a person in 2011-12 (in hector)	194.88	204.55	8.44	975.88	105
% of persons currently registered with any placement agency of the age 15 to 45 years in 2011-12	10.52	10.70	0.00	42.48	101.7
City-wise % of persons receiving/received any vocational training in 2011-12	15.80	11.13	0.98	47.58	70.5
Literate without formal schooling in 2011-12 (%)	0.70	0.70	0.00	2.74	101.2
City population in 2011 (in lakh)	27.63	38.35	7.11	184.00	138.8
City output growth rate from 2001 to 2005	5.08	2.75	0.01	13.29	54.2
City level inequality in 2011-12	0.32	0.06	0.18	0.51	18.9
City-wise % of not literate persons in 2011-12	20.49	7.79	7.08	42.49	38
% of city slum population in 2011	18.75	11.98	0.20	48.56	63.9
City-wise % of persons literate up to middle in 2011-12	40.03	5.29	26.17	54.49	13.2
CAGR of city population from 2001 to 2011 (in %)	4.83	3.98	0.87	19.62	82.5

Source: Author

Table 4: Correlation Coefficient of determinants WPR in large cities

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Workforce Participation Rate (a)	1.00											
City-wise average land owned by a person (b)	0.12	1.00										
% of persons currently registered with any placement agency of the age 15 to 45 years (c)	0.46	-0.19	1.00									
City-wise % of persons receiving/received any vocational training (d)	0.52	0.06	0.15	1.00								
Literate without formal schooling (e)	-0.33	0.02	-0.21	-0.11	1.00							
City population (f)	0.18	-0.21	0.06	-0.02	0.01	1.00						
City output growth rate (g)	0.11	-0.05	0.09	-0.10	0.06	0.14	1.00					
City inequality level (h)	0.16	-0.13	0.29	0.18	-0.11	0.21	-0.12	1.00				
City-wise % of not literate persons (i)	-0.22	0.13	-0.45	-0.18	0.26	-0.22	-0.21	-0.33	1.00			
City-wise % of city slum population (j)	0.04	0.03	-0.10	0.19	-0.10	-0.07	-0.22	-0.04	0.13	1.00		
City-wise % of persons literate up to middle (k)	0.10	0.14	0.03	0.27	-0.01	-0.18	0.09	-0.26	-0.18	0.08	1.00	
CAGR of city population (l)	-0.03	-0.32	0.22	-0.10	0.01	0.20	0.37	0.09	-0.16	-0.46	0.11	1.00

Note: The correlation coefficients are based on 52 observations.

Source: Author

Results of the estimated OLS model

Table 5 summarizes the regression results of size models of the determinants of city WPR based on Equation 1 by employing the OLS method. City Workforce Participation Rate (per1000) for persons of age 15 years and above, according to usual status (ps+ss) in 2011-2012 is considered as dependent variable in the estimation. Regression analysis includes the set of controls of the best fit model for 52 large cities in India.[3] The regression explains 58% of the total variation in the dependent variable. A non-graphical test has been done by considering the Shapiro–Wilk test for normality. The statistically insignificant Z values do not reject the null hypothesis that the distribution of the residuals is normal.

The results show that city-wise average land owned by a person has positive and significant (at 10 % level) effect on city WPR. In particular, a 100% increase in city-wise average land owned by a person is associated with 0.5% increase in city WPR. This may be the case that average land holding increasing WPR by increasing self employment rate. City-wise percent of persons currently registered with any placement agency and receiving/received any vocational training has statistically strong significant effect (at 1 % level) on city WPR. The results show that a 10 % increase in the number of persons registered in any placement agency (or persons received vocational training) leads to 2.6 % increase in city WPR. This indicates that these two variables are very important factors for increasing city WPR in India. Size of city population has a robust statistically significant (at 1 % level) effect on city WPR. The results indicate that a 100% increase in city size population leads to 3.8% increase in city WPR. This is quite obvious as large urban agglomerations have a strong positive effect on employment opportunities, higher productivity per worker, and wages

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[3] Other variables which did not show any impact on city WPR are city population density 2001, city-wise % of persons having diploma or certificate (below graduate level), city-wise % of persons having diploma or certificate (graduate and above level), City-wise % of persons literate and upper middle, poverty head count ratio, poverty gap ratio, squared poverty gap ratio, and mean per capita consumption measured by Modified Mixed Reference Period (MMRP).

through realization of higher economies of scale. However, city-wise percent of people literate without formal schooling has a statistically significant (at 1 % level) negative effect on city WPR. An increase of 10% in the percentage of people literate without formal schooling leads to 21.4 % reduction in city WPR. This indicates that lower level of education is one of the negative factors which decrease WPR in urban India. Finally, city output growth rate also has a very strong positive effect on city WPR. The coefficient 0.376 indicates that a 10% increase in city output growth rate increases city WPR by 3.8%. This indicates that higher economic growth is required for increasing city WPR in India. However, other variables that have statistically insignificant effect on city WPR are city inequality level, city-wise percent of not literate persons, city-wise percent of city slum population, city-wise percent of persons literate up to middle school, and CAGR of city population during years 2001 to 2011.

Table 5: Determinants of Workforce Participation Rate for large agglomerations in India

	Dependent variable: City-wise Workforce Participation Rate (per1000) for persons of age 15 years and above according to usual status (ps+ss) in 2011-2012
City-wise average land owned by a person in 2011-2012	0.005* (0.003)
City-wise % of persons currently registered with any placement agency of the age of 15 to 45 years in 2011-2012	0.26*** (0.061)
City-wise % of persons receiving/received any vocational training in 2011-2012	0.26*** (0.051)
City population in 2011	0.038*** (0.012)
City-wise % of people literate without formal schooling in 2011-2012	-2.14*** (0.694)
City output growth rate from 2001 to 2005	0.376** (0.172)
City inequality level in 2011-2012	-3.093 (12.33)
City-wise % of not literate persons in 2011-2012	0.136 (0.128)
City-wise % of city slum population 2011	-0.034 (0.063)
City-wise % of persons literate up to middle (up to class VIII) in 2011-12	0.002 (0.152)
CAGR of city population from 2001 to 2011	-0.210 (0.179)
Intercept	27.9*** (8.3)
R^2	0.58
Adjusted R^2	0.46
F statistics	9.36***
Mean VIF	1.39
Shapiro-Wilk test for normality (Prob>z)	0.76
No. of Observation	52

Source: Estimated using equation (1).

5. Evaluation of past and current policies on employment generation in India with focusing on urban employment

Table 6: Evaluation of past and current policies on employment generation taken in different Planning Period in India by focusing on urban areas

	Major employment challenges	**Policy consideration**
First Five Year Plan (1951-56)	Statistical measurement of employment and un- employment situation. Insufficient employment opportunities	Provision of better employment opportunities in rural sector. Reduction of unemployment or underemployment in urban sector.
Second Five Year Plan (1956-61)	Creation of employment opportunities Measurement of employment situation by considering the urban and rural sectors in different regions of the country Need of adequate data on the extent and nature of unemployment	1. Creation of labour opportunities by considering labour intensive policy (such as, construction work, railways, industries and Minerals, etc) in urban area.
Third Five Year Plan (1961-66)	Incorporation of urban employment with business, transport and industry. Inadequacy of data for building up a sufficiently detailed picture of the state of employment in the country as a whole and in its regional, urban and rural aspects.	Promote industrial development and enhancement of employment opportunities in urban area by considering different sectors. Establishment of skill and vocational or technical training centres to enhance the skill of the labourer for specific jobs of work.
Fourth Five Year Plan (1969-974)	Refinement of data for measuring employment and unemployment situation in rural and urban areas. Increase of employment opportunities.	Considerable emphasis on labour-intensive schemes such as roads, minor irrigation, soil conservation, rural electrification, village and small scale industries, housing and urban development. The industrial safety for the workers was considered by considering insurance scheme. Expansion of the intake capacity of the industrial training institutes
Fifth Five Year Plan (1974-79)	Enhancement of employment opportunities.	Reduction of urban unemployment by increasing employment situation in rural areas through improving agricultural productivity.
Sixth Five Year Plan (1980-85)	Progressive reduction of unemployment in the country Examination in some detail the main aspects of employment and unemployment in rural and urban areas based on the latest available data of N.S.S. surveys on employment and unemployment during 1972-73 (27th Round) and 1977-78 (32nd Round)	1. Increase scope for urban self-employment by providing work sheds within industrial estates, providing capital or institutional marketing support and by providing industrial home work.
Seventh Five Year Plan (1985-90)	Increase of productivity of the labour intensive informal urban sector through better urbanisation and introduction of modern technology.	Provision of housing is a highly employment intensive activity. The step-up of investment in housing envisaged during Plan Periods provided employment on a large scale, especially in urban and semi-urban areas. Provisioning for the welfare and working and living conditions of unorganised labour not only in the rural sector, but also in the urban areas. Regulation of Employment and Conditions of Services, Act, 1979, greatly improved matters for the unorganised urban workers.
Eight Five Year Plan (1992-97)	The higher incidence of urban unemployment which is much higher in urban than in rural areas. The improvement of quality of existing services which were lacking of inputs like credit and raw materials, facilities for skill development and space for carrying on such activities	Consideration of the importance of absorption of extra rural workers in urban area for increasing productivity and higher income opportunities. Creation of a favourable policy environment for the growth of entrepreneur-ship and self- employment in medium and large towns and cities were created.

Ninth Five Year Plan (1997-02)	To provide employment not only for the additions to the labour force during the Plan period, but also to reduce the back-log of unemployment accumulated from the past. Examination of both the consistency of the work opportunities with the skill attributes of the labour force and the quality of employment in terms of providing an adequate level of income for the workers.	Diversification of rural economy into non-farm activities to provide productive employment to the growing rural labour force in arresting migration from rural areas to urban areas. Promotion of infrastructural development in rural towns for expansion of activities with a high employment potential for rural workers. Reduction of the mismatch between the skill requirements of employment opportunities and the skill base of the unemployed.
Tenth Five Year Plan (2002-07)	Requirement of employment opportunities for the backlog of unemployment for the provision of gainful employment in excess of the addition to the labour force.	Promotion of urban sector development by converting rural land for urban use, reduction of stamp duty on transfer of property and laws facilitating private development of township – to increase the real estate growth, and thereby generate increased demand for construction and employment opportunities.
Eleventh Five Year Plan (2007-12)	Need to increase the volume of good quality employment along with higher rate of growth. Generation of productive and gainful employment, with decent working conditions, on a sufficient scale to absorb the growing labour force for achieving inclusive growth. Increase of female urban employment rate.	Increase of employment rate in manufacturing, construction and transport and communication sector. Taken up programmes for skill development and ensure of wider provision of social security for welfare of unorganized workers, particularly in sectors such as construction and transport. Encouragement of the corporate sector to move into more labour-intensive sectors. Encouragement of higher employment of women workers by providing various incentives. The creation of a formal relationship between the worker and the hiring establishment. To increase the volume of formal or regular employment
Twelfth Five Year Plan (202-17)	Concern of the negative employment elasticities in manufacturing sector. Problem of re-skilling the unskilled informal labour force.	Expansion of employment Opportunities. Simplification of regulatory framework for higher level of quality of employment. Skill development of the laborer including unorganized informal sector for achieving faster, sustainable and inclusive growth and for providing decent employment opportunities to the growing young population. Increase of female employment Improvement of educational qualification and vocational training of workers.

Source: Author's compilation from various Planning Period documents, GoI.

Table 6 shows that past and current government policies and programmes have tried the following: First, generation of substantial data on employment and unemployment in India by considering different categories; second, creation of employment opportunities in rural and urban sectors; third, enhancement of skill of the labourer by establishing skill, vocational and technical training centres; fourth, consideration of industrial safety for the workers by considering insurance scheme; fifth, increase of productivity of the labour intensive informal urban sector through organized urban development and introduction of modern technology; sixth, improvement of the welfare, working and living conditions of unorganised labour; seventh, absorption of extra rural workers in urban areas; eight, increase the volume of formal or regular employment; ninth, encouragement of employment for women worker by providing various incentives; and tenth, promotion of a formal relationship between the worker and the hiring establishment.

6. Conclusions

The paper has tried to explore the following three important issues. First, it presents the employment situation in different size/class of cities in urban India; second, using NSS 68th Round unit level data for the year of 2011-12 on employment and unemployment and by employing OLS regression model, it has tried to find out the most relevant economic determinants of workforce participation rate in large agglomerations in India; and third, it proposes major policies which need to be considered by urban planners in order to improve the employment situation in urban India through reviewing current and past government policies in this regard.

The paper finds that though urban India has experienced an increase in the number of total employment slots, work-force participation rate (WPR) in the large cities has shown decline

over the different periods of time. The decline in the percentage of WPR from 1993-94 to 2011-12 for both male and female for all India urban level is associated with the percentage decline in the number of both male and female casual labourers as also female self employed workers in all urban areas in India. The regression results show that city-wise average land owned by a person, city-wise percentage of persons receiving any vocational training, percentage of persons currently registered with any placement agency of the age of 15 to 45 years, city size population and city output growth have positive and statistically significant effect on city-wise work participation rate. On the other hand, city wise percentage of literate people without formal schooling has a negative and statistically significant effect on city-wise work-force participation rate. In addition, we did not find any impact of city inequality level, city-wise slum population and growth rate of slum population on city-wise work participation rate. Review of current and past policies on employment show that government of India has tried to produce substantial amounts of data on employment and unemployment situation in India. Policies are also being formulated to improve employment situation in India along with improving productivity through providing skills, safety, and welfare of the labourer. Finally, higher women employment generation is one of the main issues which are under consideration by the government of India.

7. Discussion

The study finds that city-wise percentage of persons receiving any vocational training has a significant impact on city-wise work participation rate. In this perspective, India Labour and Employment Report 2014 (IHD, 2014) reports that the levels of education and professional and vocational skills of the Indian workers are extremely low. Less than 30 per cent of the workforce has completed secondary education or higher, and less than one-tenth have had vocational training, either formal or informal. Therefore, in context of India, skill development and vocational education are critical areas of concern. In vocational training courses, India's net enrollment is about 3.5 million persons per year whereas the relevant figure for China is about 90 million and for the U.S. about 11 million. Therefore, India needs to ensure much higher enrollment rate in vocational training progremmes of its labour force in order to increase the work participation rate in urban areas. In addition, city-wise average land owned by a person has a positive impact on city-wise work participation rate. This indicates that land ownership by a person increases chance of self employment. The NSS survey estimates that half of all urban households are landless. [4] Our results suggest that landless people have less chance to participate in the workforce. Therefore, appropriate urban land reform policy is needed to increase urban work-force participation rate in India.

Results also suggest that there is a significant correlation between the percentage of people registered with any placement agency and the rate of workforce participation in urban India. As per the available information, here we consider potential laborers as those registered 'only in government employment agencies', 'only in private placement agencies', and in both government employment exchanges and private placement agencies. This indicates that those registering with placement agencies as seeking work or available for work (or unemployed) have better information regarding their job opportunities not only in different places but also their preferred places. Therefore, government needs to motivate workers to register themselves with placement agency for reducing the mismatch between labour demand (employer) and labour supply (employee).

Our results suggest that level of education of the worker is an important factor in increasing work-force participation rate. Recent census data on workers and their educational levels clearly indicate that a large share of the total Indian workforce is either illiterate or educated only up to the secondary level, which is indicative of the poor level of their competence. Most importantly, data reveals that out of about 55.5 million marginal workers seeking work in India, 21.9 million are illiterates and 20.9 million have studied below secondary level. In fact, recently Prof. Amartya Sen has argued that "India is the only

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[4]http://www.livemint.com/Opinion/PUzqHSs3xejXk4hm2djTPM/How-many-Indians-are-landless.html, accessed on 3rd December, 2015.

country trying to become a global economic power with an uneducated and unhealthy labour force". [5] In line with Prof. Sen's views, this paper highlights the influence of education of the labourer on work-force participation rate.

Both population size of large cities and output growth rate in large cities have significant effect on work-force participation rate in India. In searching for reasons behind the formation of large cities we need to take note of the New Economic Geographic models (NEG) pioneered by Krugman (1991). NEG models explain that the agglomeration forces mainly come from pecuniary externalities by interacting among increasing returns, transportation costs, and movement of production factors. These factors not only increase employment opportunities in large cities but also allow selling the produced commodities at cheaper prices in cities than in rural areas, which in turn increases the real wage of the worker. But the main assumption behind this phenomenon is that the production process of the commodities should have taken place in the city as well so that we can have advantage of lower transport costs. Most importantly, Duraton and Puga (2004) argue that sharing the local infrastructure, matching between employers and employees, and learning new technologies are the major factors behind increasing returns to investment which mainly happens in the large cities. Recent empirical studies clearly show that large agglomerations have a positive impact on economic growth (e.g., Tripathi (2013) – in the Indian context) by creating better opportunities to workers. Therefore, promotion of large agglomeration will not only lead to higher economic growth but also creation of higher opportunities for workers. Finally, this paper supports the current government policies such as 'Make in India' and 'creation of 100 smart cities project' for its emphasis on better organized and industrialized urban agglomerations as also its potential to achieve higher and sustainable economic growth through providing best workable environment to workforce in India. [6]

Appendix

Table A1. Names of Cities Used in Regression Analysis

Agra (Agra), Aligarh (Aligarh), Allahabad (Allahabad), Amritsar (Amritsar), Asansol (Barddhaman), Aurangabad (Aurangabad), Bangalore (Bangalore Urban), Bareilly (Bareilly), Bhiwandi (Thane), Bhopal (Bhopal), Bhubaneswar (Khordha), Chandigarh@, Chennai (Chennai). Coimbatore (Coimbatore), Delhi@, Dhanbad (Dhanbad), Durg-Bhilainagar (Durg), Guwahati (Kamrup), Gwalior (Gwalior), Hubli-Dharwad (Dharward), Hyderabad (Hyderabad), Indore (Indore), Jabalpur (Jabalpur), Jaipur (Jaipur), Jalandhar (Jalandhar), Jamshedpur (Purbi- Singhbhum), Jodhpur (Jodhpur), Kanpur (Kanpur Nagar), Kochi (Eranakulam), Kolkata (Kolkata), Kota (Kota), Kozhikode (Kozhikode), Lucknow (Lucknow), Ludhiana (Ludhina), Madurai (Madurai), Meerut (Meerut), Moradabad (Moradabad), Mumbai (Mumbai), Mysore (Mysore), Nagpur (Nagpur), Nashik (Nashik),

Patna (Patna), Pune (Pune), Raipur (Raipur), Ranchi (Ranchi), Salem (Salem), Solapur (Solapur), Thiruvananthapuram (Thiruvananthapuram), Tiruchirappalli (Tiruchirappalli), Varanasi (Varanasi),Vijayawada (Krishna), Visakhapatnam (Visakhapatnam).

Note: City district (where the sample city in located) is used as a proxy of a city to measure all the variables (except population data) used in estimation of OLS regression of Equation

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[5] http://www.indiandefensenews.in/2015/11/india-is-only-country-trying-to-become.html, accessed on 2nd December, 2015.

[6] Though there are many other government policies (e.g., Prime Ministers Employment Generation Programme (PMEGP), Mahatma Gandhi National Rural Employment Guarantee Act, Swaranjayanti Gram Swarozgar Yojana (SGSY), and Swarna Jayanti Shahari Rojgar Yojana (SJSRY)) which were formulated in past Planning periods , we mainly emphasize on 'Make in India' and 'creation of 100 smart cities project' as these policies are new and very much important for promotion of urbanization which will lead to higher economic growth and higher employment in urban India.

1 by considering urban sample persons (if data available for rural and urban separately) of that district. Name in parentheses indicates the name of the district in which the city is located.@Delhi and Chandigarh were considered as a whole proxy of a city district.

Appendix A2: Variable sources and definitions

Work-force participation rate (WPR)(As given in NSSO): The number of persons employed in *usual status* (ps+ss) per 1000 persons is referred to as work force participation rate (WFPR) or worker population ratio (WPR) in *usual status* (ps+ss). *Usual principal activity status*: The usual activity status relates to the activity status of a person during the reference period of 365 days preceding the date of survey. *Usual subsidiary economic activity status*: A person whose usual principal status was determined on the basis of the major time criterion could have pursued some economic activity for a shorter time throughout the reference year of 365 days preceding the date of survey or for a minor period, which is not less than 30 days, during the reference year. *Usual activity status considering principal and subsidiary status taken together*: The usual status, determined on the basis of the usual principal activity and usual subsidiary economic activity of a person taken together, is considered as the usual activity status of the person and is written as usual status (ps+ss). According to the usual status (ps+ss), workers are those who perform some work activity either in the principal status or in the subsidiary status. Thus, a person who is not a worker in the usual principal status is considered as worker according to the usual status (ps+ss), if the person pursues some subsidiary economic activity for 30 days or more during 365 days preceding the date of survey.

Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

City-wise average land owned by a person: This includes the following:

First, land owned by the household i.e., land on which the household has the right of permanent heritable possession with or without the right to transfer the title e.g., Pattadars, Bhumidars, Jenmons, Bhumiswamis, Rayat, Sithibans etc.

Second, land held under special conditions such as the holder does not possess the title of ownership but the right for long-term possession of the land (for example, land possessed under perpetual lease, hereditary tenure and long-term lease for 30 years or more).

Third, sometimes a plot may be possessed by a tribal in accordance with traditional tribal rights from local chieftains or village/district council. Again a plot may be occupied by a tenant for which the right of ownership vests in the community. In both the cases the tribal or other individual (tenant) will be taken as owner; for in all such cases, the holder has owner-like possession of the land in question.

Fourth, frequently, the land possessed by the household is *owned by the head of the family, who stays in a different town or village and therefore is not a member of the household*. In such cases the land should be regarded as not owned but *leased in* by the household.

Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

Persons currently registered with any placement agency: This includes persons registered only in government employment exchanges, only in private placement agencies, in both government employment exchanges and private placement agencies. Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

Persons receiving/received any vocational training : This includes persons who were receiving formal vocational training, received formal vocational training, and received non-formal vocational training through hereditary, self-learning, learning on the job, and others. Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

Literate without formal schooling: Persons who has got lower level education without formal schooling. Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

Large city population and its growth rate: 52 urban agglomerations 750,000 or more inhabitants in 2011 and growth rate of urban agglomerations over the period 2001 to 2011. Source: Census of India 2011, GoI.

City output growth rate: Growth rate of per capita non-primary District Domestic Product (DDP) over the period 2000-01 to 2004-05 at 1999-2000; constant prices are taken as

a measure of urban economic growth. Source: Directorate of Economics and Statistics (DES), various State Governments, GoI.

City inequality level: Gini coefficient of the large city districts by considering urban sample persons of that district. Source: Unit level data of NSS 2011-12 on consumer expenditure.

City-wise percentage of not literate persons: Percentage of people those are not literate. Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

City-wise percentage of persons literate up to middle: Percentage of people those have education up to class VIII. Source: Unit level data of NSS 68th Round on Employment and Unemployment in 2011-12.

Percentage of city slum population: Ratio of city slum population to total city population in 2011. *Source*: Census of India 2011, GOI.

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FIRMS' ENIRONMENTAL PERFORMANCE AND REGIONAL RESIDENTS

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Abstract

As the scale of economic activities continue to grow, the burden on the environment for the surrounding region increases, so it has become necessary for firms and the regional community to have bilateral negotiations taking economic activities and environmental issues into consideration in order to find an efficient solution. This paper attempts to use the Nash bargaining solution concept between firms and the surrounding residents to analyse the optimal solution when considering the firms' economic activity and environmental performance. It includes a model to analyse the impact that a firm's environmental performance has on improving its economic performance. It also takes into consideration the effects that an improved environmental performance will have on the regional residents, through reduced pollution, employment opportunities and tax revenue. The results for both cases, when environmental regulations are absent and when they are enforced, find that the party that receives the greater benefit will transfer income to the other party which supports the benefits principle. Thus, in order to examine the mechanism of income transfer between firms and the regional residents, it will be important to comprehensively consider the affect that firms' environmental performance have on their economic performance, the environmental cost for firms to improve their environmental performance and the benefits to regional residents from environmental regulations.

Keywords: Environmental performance, Economic performance, Bargaining game, Income transfer

JEL classification: M2, Q5, R1

1. Introduction

Firms have always had a close relationship with the local community and the region it resides in. The role firms have played in stimulating the region is important and there are a number of previous empirical studies on this (e.g. Karlsson and Dahlberg, 2003; Sternberg, 2009; Leigh and Blakely, 2013; Rypestol, 2017). However, firms have also had a negative impact on the regional residents causing environmental problems such as air and water pollution and damage to the natural environment. This leads to a need for both economic activities and environmental issues to be taken into consideration and firms and regional residents work towards a solution through bilateral negotiations. It has been identified that the game theory is an effective method in such situations (Karlin, 1992). This paper, will apply the concept from the Nash bargaining solution for this analysis (Nash, 1950).

If we observe past studies in this area that applies the game theory, there are past studies on the relationship between environmental regulations by the government and the firms' progress in environmental technology (Chew et al, 2011; Zhao et al., 2013). However, they do not mention the relationship that the environmental regulations by the government and the firms' environmental considerations have on the regional residents. Therefore, this paper attempts to analyse the income transfer from firms to the residents as a result of the impact the government's environmental regulations have on the firms' environmental performance.

The following points are considered in the model. First, the model takes into consideration how a firm's environmental performance affects its economic performance. According to the Porter Hypothesis, firms are able to adapt environmental management systems and develop their environmental performance which in turn can be effective in developing their economic performance (Porter, 1991; Porter and Linde, 1995). This relationship between environmental performance and economic performance may affect the negotiations between the firm and the regional residents. For example, a firm may gain recognition as a brand that is environmentally friendly which provides a competitive advantage over the competition which

may be achieved through the development of green technology/products and by actively taking part in environmental activities (Hart, 1995). Evidence to support that environmental performance can improve economic performance is provided in numerous past empirical studies (e.g. Hart and Ahuja, 1996; DeSimone and Popoff, 1997; Russo and Fouts, 1997; King and Lenox, 2001; Konar and Cohen, 2001; Thomas, 2001; King and Lenox, 2002; Schaltegger and Synnestvedt, 2002; Al-Tuwaijri et al., 2004). Furthermore, in this study, the model factors in the value firms place on improved environmental performance. The positive impact from improved environmental performance will not only mean improved economic performance but may also lead to improved brand image and help fulfil corporate social responsibilities. This could affect the income transfer from firms to the regional residents. Secondly, since firms will have an impact on the regional residents, this model includes the following three effects. The first is the pollution reduction effect which will benefit the regional residents from the improved environment with the reduction in pollution by the firm. The second is the employment effect. It can be assumed that the improved economic performance can stimulate a further demand in labour by the firm which will lead to an increase in employment opportunities for the regional residents. There are various empirical research that studies this effect (e.g. Ayyagari et al., 2014; Inekwe, 2014; Masso et al., 2008). The third is the tax revenue effect. The public services of the region can be enhanced with the increase in taxes paid by the firms to the region. For example, in Japan, the individual and corporation enterprise tax imposed by the prefecture is a general tax which can be used in a wide number of public services for the region. However, the residents' subjective value of these three effects, which are the benefit to the residents from the pollution reduction effect; the employment effect; and the tax revenue effect, could differ widely. Hence, this paper attempts to include in its model consideration of the size of these subjective values.

The next section applies Nash's bargaining solution concept between firms and the regional residents, followed by a summary of the results and discussions on the implications provided by the results.

2. **Environmental Issues and the Bargaining Game**

An assumption will be made that the main cause of environmental damage will come from a firm and the regional residents R based in the neighbouring region will receive damages. Through its production activity, firm C will gain *I(x)*, but will also have a negative impact on the local environment. This could lead to multiple ecological and economic damages to the region as well as cause the residents ill health and may affect their food supply. If the rate for firm C to improve its environmental performance is $x(0 \leq x \leq 1)$, then the cost incurred for the improvement will be $f(x)(f(x) \geq 0)$ and the benefits to the regional residents R from the reduction in pollution will be $g(x)(g(x) \geq 0)$. As a result of the improved environmental performance by the firm, the benefit to residents R from the employment effect will be $e(x)(e(x) \geq 0)$ and the benefits to residents R from the tax revenue effect will be $t(x)(t(x) \geq 0)$. Firm C, the polluter and residents R, will enter a negotiation to determine the improvement rate the firm will need to achieve for their environmental performance and to determine the income transfer for the damages that the residents will receive, taking the benefits created by the firm's activities into account.

The payoff for firm C can be represented as follows.

$$u_C(x) = \alpha I(x) - f(x) \qquad (1)$$

In this case, the value the firm places on the improved economic performance from its environmental performance is *α*.

The following represents the payoff to residents.

$$u_R(x) = \beta g(x) + \gamma e(x) + t(x) \qquad (2)$$

β denotes the value residents place on the benefit from the improved environment. *γ* is the value residents place on the benefit from the employment effect born from the firm's improved environmental performance.

Assuming that income transfer from firm C to residents R is possible, then the Pareto optimum improvement rate of environmental performance to achieve Pareto optimum, x^*, can be obtained by maximizing the following total social benefits.

$$u_C(x) + u_R(x) = \alpha I(x) - f(x) + \beta g(x) + \gamma e(x) + t(x) \quad (3)$$

In other words, $x = x^*$, which satisfies $f'(x) - \alpha I'(x) = \beta g'(x) + \gamma e'(x) + t'(x)$. Under these conditions, the payoff to firm C and residents R is as follows.

$$(\alpha I(x^*) - f(x^*), \beta g(x^*) + \gamma e(x^*) + t(x^*)) \quad (4)$$

With the possibility of income transfer between firm C and residents R, the Pareto optimal payoff set can be represented as
$$u_C + u_R = \alpha I(x^*) - f(x^*) + \beta g(x^*) + \gamma e(x^*) + t(x^*).$$
The bargaining disagreement point can inform us of how the set of regulations can affect how the point is established. This leads us to examine two different conditions concerning environmental regulations.

Condition I: The absence of environmental regulations

Without any regulations, firms are able to make their own decisions concerning their environmental performance.

Condition II: The adoption of environmental regulations

With environmental regulations in place, environmental impact will be governed. Furthermore, under the absence of an agreement between the firm and the regional residents, firms will need to set their rate to improve their environmental performance as 1.

In Condition I, when the rate of improvement of the environmental performance is 0, the bargaining disagreement point will be the Nash bargaining solution, $d_1 = (\alpha I(0) - f(0), \beta g(0) + \gamma e(0) + t(0))$. The payoff distribution for firm C will be as follows.

$$u_C = \frac{1}{2}\left(\alpha(I(x^*) + I(0)) - f(x^*) - f(0) + \beta(g(x^*) - g(0)) + \gamma(e(x^*) - e(0)) + t(x^*) - t(0)\right) \quad (5)$$

The payoff to local resident R will be as below.
$$u_R = \frac{1}{2}\left(\alpha(I(x^*) - I(0)) - f(x^*) + f(0) + \beta(g(x^*) + g(0)) + \gamma(e(x^*) + e(0)) + t(x^*) + t(0))\right) \quad (6)$$

In other words, the payoff for each under the absence of environmental regulations are as follows.

$$\begin{aligned} &\left(\frac{1}{2}\left(\alpha(I(x^*) + I(0)) - f(x^*) - f(0) + \beta(g(x^*) - g(0))\right.\right. \\ &\left. + \gamma(e(x^*) - e(0)) + t(x^*) - t(0)\right), \frac{1}{2}(\alpha(I(x^*) - I(0)) \\ &\left. - f(x^*) + f(0) + \beta(g(x^*) + g(0)) + \gamma(e(x^*) + e(0))\right. \\ &\left.\left. + t(x^*) + t(0)\right)\right) \end{aligned}$$

The process of achieving Pareto optimal, the agreement point, will be examined. With the possibility of income transfer between firm C and residents R, the amount of income transfer from firm C can be obtained as follows.

$$D_{1,C} = (I(x^*) - f(x^*)) - \frac{1}{2}(\alpha(I(x^*) + I(0)) - f(x^*) - f(0) + \beta(g(x^*) - g(0)) + \gamma(e(x^*) - e(0)) + t(x^*) - t(x))$$
(7)

Thus,

$$D_{1,C} = \frac{1}{2}(\alpha(I(x^*) - I(0)) - (f(x^*) - f(0)) - \beta(g(x^*) - g(0)) - \gamma(e(x^*) - e(0)) - (t(x^*) - t(0))$$
(8)

Since the environmental performance improvement rate is set to achieve Pareto optimal, when the environmental cost to the firm is higher in this case than the environmental cost to the firm with the absence of environmental regulations; and the benefit to the residents when the firm achieves Pareto optimal is higher than the benefit to the residents with the absence of regulations, from

$$(0 < f(0) < f(x^*)) \cap (0 < g(0) < g(x^*)) \cap (0 < e(0) < e(x^*)) \cap (0 < t(0) < t(x^*))$$

the following relationship can be achieved.

$$D_{1,C} > 0 \; if \; \alpha \left(I(x^*) - I(0)\right) > \left(f(x^*) - f(0)\right) - \beta\left(g(x^*) - g(0)\right) - \gamma\left(e(x^*) - e(0)\right) - \left(t(x^*) - t(0)\right)$$
(9)

$$D_{1,C} < 0 \; if \; \alpha \left(I(x^*) - I(0)\right) < \left(f(x^*) - f(0)\right) - \beta\left(g(x^*) - g(0)\right) - \gamma\left(e(x^*) - e(0)\right) - \left(t(x^*) - t(0)\right)$$
(10)

Furthermore, for residents R, the amount of income transfer is as follows.

$$D_{1,R} = g(x^*) - \frac{1}{2}(\alpha(I(x^*) - I(0)) - f(x^*) + f(0) + \beta(g(x^*) - g(0)) + \gamma(e(x^*) - e(0)) + t(x^*) - t(0))$$
(11)

Hence,

$$D_{1,R} = -\frac{1}{2}\left(\alpha\left(I(x^*) - I(0)\right) - \left(f(x^*) - f(0)\right) - \beta\left(g(x^*) - g(0)\right) - \gamma\left(e(x^*) - e(0)\right) - \left(t(x^*) - t(0)\right)\right)$$
(12)

and in the same way, from

$$(0 < f(0) < f(x^*)) \cap (0 < g(0) < g(x^*)) \cap (0 < e(0) < e(x^*)) \cap (0 < t(0) < t(x^*))$$

the following is obtained.

$$D_{1,R} < 0 \; if \; \alpha \left(I(x^*) - I(0)\right) - \left(f(x^*) - f(0)\right) > \beta\left(g(x^*) - g(0)\right) + \gamma\left(e(x^*) - e(0)\right) + \left(t(x^*) - t(0)\right)$$
(13)

$$D_{1,R} > 0 \; if \; \alpha \left(I(x^*) - I(0)\right) - \left(f(x^*) - f(0)\right) < \beta\left(g(x^*) - g(0)\right) + \gamma\left(e(x^*) - e(0)\right) + \left(t(x^*) - t(0)\right)$$
(14)

From (9), (10), (13) and (14) the following proposition can be achieved.

Proposition 1:

$$(D_{1,C} > 0) \cap (D_{1,R} < 0) \; if \; \alpha \left(I(x^*) - I(0)\right) - \left(f(x^*) - f(0)\right) > \beta\left(g(x^*) - g(0)\right) + \gamma\left(e(x^*) - e(0)\right) + \left(t(x^*) - t(0)\right)$$
(15)

$$\left(D_{1,C} < 0\right) \cap \left(D_{1,R} > 0\right) if \left(I(x^*) - I(0)\right) - \left(f(x^*) - f(0)\right) < \beta\left(g(x^*) - g(0)\right) +$$
$$\gamma\left(e(x^*) - e(0)\right) + \left(t(x^*) - t(0)\right) \qquad (16)$$

Taking into consideration the value firms place on addressing environmental concerns and the economic performance gained from the improved environmental performance (the difference in economic performance to the firm under the absence of environmental regulations and the economic performance to the firm under pareto optimal environmental consideration) and subtracting the increase in cost for the environmental consideration (the difference in cost to the firm under pareto optimal environmental consideration to the cost to the firm under the absence of environmental regulations) is greater than the total benefit to the residents, in other words the benefits from the three effects, which are the pollution reduction effect, employment effect and tax revenue effect; and the subjective value residents place on these effects (the difference in benefit to the residents when firms are performing at their pareto optimal environmental consideration to the benefit to the residents when firms are performing under the absence of environmental regulations), there will be a transfer of income from the firms to the residents.

On the other hand, the increase in economic performance by firms proactively addressing environmental issues taking into consideration the value firms place on such performance (the difference in the firm's economic performance under the absence of environmental regulations and the economic performance when environmental consideration is at the firm's pareto optimal) subtracted by the increase in cost from the environmental considerations (the difference in cost to the firm when environmental consideration is at the firm's pareto optimal to the cost to the firm under the absence of environmental regulations) is less than the total benefit to the residents, which is the benefits from the three effects and the subjective value residents place on these effects (the difference in benefit to the residents when firms are performing at their pareto optimal environmental consideration to the benefit to the residents when firms are performing under the absence of environmental regulations), there will be an income transfer from the residents to the firms.

As indicated in (15), a transfer of income occurs from the firm to the residents when the difference in economic performance to the firm at the Pareto optimal environmental performance improvement rate to the economic performance under the absence of environmental regulations is greater than the difference in benefit to the residents at the firm's Pareto optimal environmental consideration to the benefit under the absence of regulations. However, a transfer of income from residents to the firm is suggested from (16), when the difference between the economic performance to firms when addressing environmental concerns to achieve Pareto optimal and the economic performance under the absence of environmental regulations is less than the difference between the benefits to the residents at the firm's Pareto optimal environmental consideration and under the absence of environmental regulations.

If we observe a situation where firms achieve positive growth from their brand recognition as a result of their improved environmental performance compared to when there was an absence of environmental regulations and the economic performance from this growth is greater than the benefit the residents receive from the improved environment, then there is an income transfer from the firm to the residents. However, compared to when there is an absence of environmental regulations, there is a transfer of income from the residents to the firm, if the improved environmental performance has a positive impact on the environment which the residents benefit from and if the increase in benefit is greater than the difference between the economic performance to the firm under the absence of environmental regulations and the economic performance when they improve their environmental performance to achieve Pareto optimal.

In Condition II, where environmental regulations are enforced, the bargaining disagreement point is the Nash bargaining solution, $d_2 = \left(\alpha I(1) - f(1), \beta g(1) + \gamma e(1) + t(1)\right)$, when the rate of improvement of environmental performance is 1. In this situation, firm C's payoff distribution is as follows.

$$u_C = \frac{1}{2}(\alpha(I(x^*) + I(1)) - f(x^*) - f(1) + \beta(g(x^*) - g(1)) + \gamma(e(x^*) - e(1)) + t(x^*) - t(1)) \tag{17}$$

Moreover, resident R's payoff is the following.

$$u_R = \frac{1}{2}(\alpha(I(x^*) - I(1)) - f(x^*) + f(1) + \beta(g(x^*) + g(1)) + \gamma(e(x^*) + e(1)) + t(x^*) + t(1)) \tag{18}$$

In other words, the following payoff for each is achieved when regulations are enforced.

$$\Big(\frac{1}{2}\big(\alpha(I(x^*) + I(1)) - f(x^*) - f(1) + \beta\big(g(x^*) - g(1)\big) + \gamma\big(e(x^*) - e(1)\big)$$
$$+ t(x^*) - t(1)\big), \frac{1}{2}\big(\alpha(I(x^*) - I(1)) - f(x^*) + f(1)$$
$$+ \beta\big(g(x^*) + g(1)\big) + \gamma\big(e(x^*) + e(1)\big) + t(x^*) + t(1)\big)\Big)$$

Using the same method as in the case of the absence of environmental regulations with the enforcement of regulations, the process that achieved the bargaining agreement point, which is the Pareto optimal point will be examined. The income transfer amount for firm C will be obtained as follows.

$$D_{2,C} = (I(x^*) - f(x^*)) - \frac{1}{2}(\alpha(I(x^*) + I(1)) - f(x^*) - f(1) + \beta(g(x^*) - g(1)) + \gamma(e(x^*) - e(1)) + t(x^*) - t(1)) \tag{19}$$

Hence,

$$D_{2,C} = -\frac{1}{2}\Big(\alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) - \beta\big(g(1) - g(x^*)\big) - \gamma\big(e(1) - e(x^*)\big) - \big(t(1) - t(x^*)\big)\Big) \tag{20}$$

In the situation where the environmental cost to the firm when environmental regulations are enforced is higher than the environmental cost to achieve Pareto optimal, and the benefit to the residents when environmental regulations are enforced is greater than the benefit at the firm's Pareto optimal, then from

$$(0 < f(x^*) < f(1)) \cap (0 < g(x^*) < g(1)) \cap (0 < e(x^*) < e(1)) \cap (0 < t(x^*) < t(1))$$

the following relationship is achieved.

$$D_{2,C} < 0 \; if \; \alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) > \beta\big(g(1) - g(x^*)\big) + \gamma\big(e(1) - e(x^*)\big) + \big(t(1) - t(x^*)\big) \tag{21}$$

$$D_{2,C} > 0 \; if \; \alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) < \beta\big(g(1) - g(x^*)\big) + \gamma\big(e(1) - e(x^*)\big) + \big(t(1) - t(x^*)\big) \tag{22}$$

The income transfer amount for local resident R will be as follows.

$$D_{2,R} = g(x^*) - \frac{1}{2}(\alpha(I(x^*) - I(1)) - f(x^*) + f(1) + \beta(g(x^*) - g(1)) + \gamma(e(x^*) - e(1)) + t(x^*) - t(1)) \tag{23}$$

Hence,

$$D_{2,R} = \frac{1}{2}\left(\alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) - \beta\big(g(1) - g(x^*)\big) - \gamma\big(e(1) - e(x^*)\big) - \big(t(1) - t(x^*)\big)\right) \quad (24)$$

In the same way, from
$$(0 < f(x^*) < f(1)) \cap (0 < g(x^*) < g(1)) \cap (0 < e(x^*) < e(1)) \cap (0 < t(x^*) < t(1))$$

the following relationship is achieved.

$$D_{2,R} > 0 \; if \; \alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) > \beta\big(g(1) - g(x^*)\big) + \gamma\big(e(1) - e(x^*)\big) + \big(t(1) - t(x^*)\big) \quad (25)$$

$$D_{2,R} < 0 \; if \; \alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) < \beta\big(g(1) - g(x^*)\big) + \gamma\big(e(1) - e(x^*)\big) + \big(t(1) - t(x^*)\big) \quad (26)$$

From (21), (22), (25) and (26) the proposition below can be obtained.

Proposition 2:

$$(D_{2,C} < 0) \cap (D_{2,R} > 0) \; if \; \alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) > \beta\big(g(1) - g(x^*)\big) + \gamma\big(e(1) - e(x^*)\big) + \big(t(1) - t(x^*)\big) \quad (27)$$

$$(D_{2,C} > 0) \cap (D_{2,R} < 0) \; if \; \alpha\big(I(1) - I(x^*)\big) - \big(f(1) - f(x^*)\big) < \beta\big(g(1) - g(x^*)\big) + \gamma\big(e(1) - e(x^*)\big) + \big(t(1) - t(x^*)\big) \quad (28)$$

When the economic performance gained by the firms' actively addressing environmental concerns taking the value firms place on addressing environmental issues into consideration (the difference in economic performance to the firm under stringent environmental regulations and the economic performance when environmental consideration is at the firm's Pareto optimal) subtracted by the increase in cost for the environmental consideration (the difference in cost to the firm when environmental regulations are enforced to the cost to the firm when environmental consideration is at the firm's Pareto optimal), is greater than the total benefit to the residents, in other words the three effects which are the pollution reduction effect, employment effect and tax revenue effect and taking into account the subjective value residents place on these effects (the difference in benefit to the residents when firms need to adhere to environmental regulations, to the benefit to the residents when the firm's environmental consideration is at the firm's Pareto optimal), there will be a transfer of income from the firms to the residents.

On the other hand, the value firms place on their environmental performance and the increase in economic performance gained by firms proactively addressing environmental issues (the difference in economic performance to the firm when environmental consideration is at the firm's pareto optimal and the economic performance to the firm under the enforcement of environmental regulations) subtracted by the increase in cost from the environmental considerations (the difference in cost to the firm under the enforcement of environmental regulations to the cost to the firm when environmental consideration is at the firm's pareto optimal) is less than the total benefit to the residents from the three effects, which are the pollution reduction effect, employment effect and tax revenue effect and the subjective value residents place on these effects (the difference in benefit to the residents when firms are performing at their pareto optimal situation for environmental consideration to the benefit to the residents when firms are performing under the enforcement of environmental regulations), there will be an income transfer from the residents to the firms.

A transfer of income from the firm to the residents will occur as depicted in (27), if the difference between the economic performance to the firm when environmental regulations are enforced and the economic performance when the environmental consideration is to achieve Pareto optimal is greater than the difference in the benefit to the residents under the enforcement of environmental regulations and the benefit when the firm is at Pareto optimal

environmental consideration. However, (28) identifies a transfer of income from the residents to the firm if the difference in economic performance to the firm under the enforcement of environmental regulations and the economic performance when the firm is at Pareto optimal is less that the difference in benefit to the residents under the enforcement of environmental regulation and the benefit when the firm is at Pareto optimal environmental consideration.

These results suggest that when environmental regulations are enforced and firms improve their environmental performance, they may be able to enjoy an improved brand awareness and increase in productivity which can lead to positive growth compared to when firms are running at their Pareto optimal rate of environmental consideration. If the economic performance obtained from this growth is greater than the benefit achieved by the residents from the improved environment, then there is an income transfer from the firm to the residents. However, the improved environment from the enforced environmental regulations could provide an increased benefit to the residents compared to when firms perform at their Pareto optimal environmental performance. If this benefit is greater than the difference in economic performance to the firm under environmental regulation and the economic performance at Pareto optimal, then there is an income transfer from the residents to the firm.

These results suggest that when environmental regulations are introduced, there will be a transfer of income from the party that achieves the greater benefit to the other party. This would support the benefits principle, as in the case of when there is an absence of environmental regulations.

3. Conclusions

Firms' economic activities are known to have positive impact on the neighbouring region, but also having negative impact such as on the environment. Hence, it is necessary for firms and the region to undergo discussions to achieve an efficient solution with consideration for both economic activities and environmental issues. This paper analyses the total benefit to society comprising both firms and regional residents; the process for firms to achieve an optimal condition concerning their environmental endeavours; and the transfer of income between firms and regional residents, applying the bargaining game.

In the examination, the impact that a firm's environmental performance has on its economic performance is considered in the model as well as the firm's subjective value concerning improved environmental performance. For the impact firms have on the surrounding region, there are the benefits achieved from the improvements to the regional residents' environment from the reduction in pollution; the impact on employment opportunities for the local residents; and the impact on tax revenue. Furthermore, the residents' subjective values of these benefits are taken into consideration. Hence, these factors are also examined in the model.

As a result, under the absence of environmental regulations, when firms' rate of environmental improvement is to achieve Pareto optimal, the economic performance gained which takes into consideration the value firms place on addressing environmental performance is greater than the total benefit to the residents at the firms' Pareto optimal rate of environmental consideration which includes the pollution reduction effect, employment effect and tax revenue effect and the subjective value residents place on these effects, there will be an income transfer from the firms to the residents. On the other hand, under the absence of environmental regulations, when the total benefits to the residents which includes the three effects and the subjective value placed on these effects at the Pareto optimal environmental performance is greater than the difference in economic performance for firms performing under the absence of regulations and performing at the Pareto optimal rate of environmental improvement which takes into consideration the firms' subjective value of improved environmental performance, there will be an income transfer from the residents to the firms. Under the enforcement of environmental regulations, compared to firms performing at the Pareto optimal rate of environmental improvement, if the economic performance gained by the firms from the improved environmental performance such as through enhanced brand awareness and increased productivity, taking into consideration the value firms place on the improved environmental performance is greater than the total benefit to the residents under the enforcement of environmental regulations which includes the three effects and the subjective value residents place on the impact of these effects, then there will be an income

transfer from the firm to the residents. However, if the total benefits to the residents which includes the three effects and the subjective value of the three effects is greater than the difference in economic performance to firms under the enforcement of environmental regulations and the economic performance under Pareto optimal environmental performance taking into account the firm's subjective value placed on the improved environmental performance, there will an income transfer from the residents to the firm.

In this way, for both conditions where there is an absence of environmental regulations and when they are enforced, the party that has the greater benefit transfers income to the other party which supports the benefits principle.

Under these conditions, it is important to note that even when there is an absence of regulations, if there is an improvement to economic performance due to the effect of environmental regulations and the value firms place on the improved environmental performance, then there is a transfer of income from firms to the regional residents. Hence, even under the absence of regulations, if the economic performance gained due to firms proactively responding to the environment with the added subjective value firms place on the improved environmental performance is greater than the total benefit to the regional residents due to this proactive response, which includes the pollution reduction effect, employment effect and the tax revenue effect and the subjective value residents place on these effects, then there is a transfer of income from the firms to the regional residents. Moreover, even under the enforcement of environmental regulations, if we consider the possibility of improved economic performance due to adapting to the regulations, there are situations where there is a transfer of income from the residents to the firms. In other words, even under the enforcement of environmental regulations, if the increased economic performance including the subjective value firms place on environmental performance is less than the total benefit to the regional residents from the three effects and their subjective value placed on these effects, then there is a transfer of income from the regional residents to the firms.

From these results, in order to examine the mechanism of income transfer between firms and regional residents, it will be important to comprehensively consider the impact that firms' environmental performance has on its economic performance, the subjective value firms place on its environmental performance, the environmental cost for firms to improve their environmental performance and the total benefits to regional residents from the environmental regulations which includes the reduced pollution, increased employment opportunities and increased tax revenue and the subjective value residents place on these effects .

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METHODOLOGICAL AND PRACTICAL ASPECTS OF HUMAN POTENTIAL MANAGEMENT IN THE REGION

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Abstract

Human potential is the main factor, a key aspect of the socio-economic development of the region. The article presents a systematic approach to the management of the human potential of the region, which is distinguished by its novelty and based on modern methods of system analysis, management and regional economy. In the course of the study, a model for managing the human potential of the region is formed, based on a system with a closed loop, consisting of a number of simpler functional subsystems. The structure and the mechanism for managing the human potential of the region based on the proposed conceptual model are substantiated. The scientifically grounded proposals and recommendations on the formation, use of the system at the regional level are presented. A system of indicators for the integrated assessment of the human potential of the region has been developed in linking them to strategic development guidelines. In total, eight fundamental quantitative indicators have been identified. Based on these indicators, the integral indicator (the level of the human potential of the region) is calculated. Using the formed system of indicators makes it possible to assess the magnitude of human potential, the effectiveness of the proposed management model. In addition, it is planned to monitor the dynamics of indicators, conduct interregional comparisons. Approbation of methodological tools was carried out on the example of Oryol region, Russia (2010-2015). Priority directions of development of human potential in Oryol region are determined and some recommendations for their implementation are given.

Keywords: human potential, structural components, Oryol region, priority directions

JEL classification:

1. Introduction

Human potential of the region (HPR) is described as a set of development expectations and opportunities related to individuals, companies and other regional economy entities and pointed towards achieving desired development goals for the regional society [1]. It represents a complicated scientific category that includes both economic and social aspects and requires and overall, multifaceted review.

Research findings dealing with human potential, its separate components, various approaches to the qualitative and quantitative assessment of the human potential magnitude are introduced in several papers by Russian and foreign scientists .

Foreign researchers who substantially contributed to the studies on this topic are represented by E. Denison, A. Toffler, R. Layard, W. Petty, A. Smith, K. Marx, A. Sen. S Bowles et al.

Such Russian scientists as T.I. Zaslavskaya, K.A. Kotomnova, Ye.V. Chuchulina, O.I. Ivanov, N.N. Morozova, S.N. Sakharovsky, A.O. Verenikin, S.Ye. Yolkin, A.B. Doktorovich, et al, have investigated human potential.

These days it seems reasonable that major tasks in this area include   development of the integrated model for managing the HPR, methodological framework and regional human

potential management mechanism. It is extremely important for implementation of regional development strategies, system-based coordination of regional management constituents.

2. **Modern Approaches to HPR Management and Assessment**

The research papers highlight various human potential features called as elements, components and opportunities. These components constitute HP complicated structure. The analysis completed on the previously conducted research suggests that the most significant HP components include health, industrial/organizational, social, educational and demographic components [2-3]. Some papers also describe such HP (in, particular, HPR) components as innovation, competitiveness, labor, activity, etc.

In addition to specific components highlighted, researchers denote HP levels. Thus, micro-, macro- and meso-levels of HP implementation have been identified. Besides, human potential features basic and active, individual and collective levels [4].

Along with investigating human potential structural components, its features and indicators, researchers give much attention to HP assessment. Since "human potential" notion implies versatility and diversity, this task is rather difficult. It is very difficult to give a qualitative assessment to the components like cultural, moral and spiritual [5].

However, the current situation suggests some quite mature approaches to calculation of HP quantitative indicators. Thus Human Development Index (HDI), calculated using living standards, education and health (life expectancy at birth) data, has proved to be the most widespread. Ye.V. Chuchulina highlights the following indices (indicators) of the regional HP full assessment: stock of human potential in regions (SHP), flow of human potential in regions (FHP), quality of human potential in regions (QHP), investment into human potential in regions (IHP).

Referring to sustainable management of human potential in regions, it is important to indicate fragmentary nature of studies dedicated to this topic and lack of an integrated model for managing human potential of the region. A similar model shall be developed taking into account various external and internal factors (with respect to the regional system) and shall provide for forecasting human potential status and development.

3. **Structure and Quantitative Indicators of Regional Human Potential Assessment**

With regard to the analysis of the current techniques, we propose a hierarchically structured model of the human potential (so called, hierarchy model that has some similarities with the hierarchy of needs). The first basic level features the following components: *health (physical and psychic), demography, socio-economic components*. This level is called fundamental since it forms the basis serving to establish and develop other components. In case, the basic level is not in proper condition other components can hardly exist.

The second human potential structure level (with consideration of a particular region) includes the following components: *education, profession and labor, competition and entrepreneurship*. The second level correlates and interacts with the first one. For example, total health and income standards have a significant impact on the education quality and further actualization of the potential in the labor market.

The third top level is formed by *research, scientific and technical, innovative and creative* components. This level involves great intellectual capital, striving for maximum self-actualization, generation of new knowledge and innovative products. Intensive personal growth in diverse respects is the case in point [6].

The authors of this research have developed a system of indicators for the integrated assessment of the human potential in the region based on the components identified in the hierarchy structure. In total nine basic quantitative indicators have been identified:

1. Health indicator – IH.
2. Demographic indictor – ID.
3. Socio-economic indicator – ISE.
4. Educational indicator – IE.
5. Professional and labor indicator – IPL.
6. Competition and entrepreneurship indicator – ICE.

7. Research indicator – IR.

8. Scientific and technical indicator – IST.

9. Integrated indicator (HPR level) – HPI (UHP).

Let us discuss in more detail the calculation method used for these indicators, their interpretation and importance for developing and functioning of the HPR management system.

The first estimate indicator engaged in the proposed method is a health indicator (IH):

$$IH = \frac{TRP - (MR + DN)}{TRP} \quad (1)$$

TRP – total regional population;

MR – population morbidity rate per major categories of diseases (number of patients diagnosed with the condition for the first time);

DN – number of individuals aged 18 and over recognized as disabled persons for the first time.

This indicator represents the regional population share not falling into the categories designated as MR and DN in the total population. The IH health indicator shall grow; in this context, it is important to conduct a factor analysis, i.e study which indicators trigger changes in the indicator total value. Thus, it is evident that a component to (MR + DN) sum shall go down, in this respect, it is necessary to achieve a sustainable increase in TRP and healthy population share.

The next indicator reflects the quantitative aspect of the ID (HPR) demographic component:

$$ID = \frac{(AB - DI) + MP}{TRP} \quad (2)$$TRP – total regional population;

AB – annual births in the region;

DI – deaths of infants aged under one year in the region;

MP – number of people moved into the region (in particular – from Russian regions, CIS countries, from other foreign countries).

The introduced indicator is mainly descriptive of MP inflow to the region resulting from natural and migratory population mobility. AB is adjusted for DI value that designates the number of people who will never become human potential bearers and will not participate in regional socio-economic processes.

The third developed indicator (ISE) serves as a quantitative feature of the HPR component:

$$ISE = \frac{TRP - RPLI}{TRP} \quad (3)$$

TRP – total regional population;

RPLI – number of regional population with money income lower than a subsistence wage.

The provided indicator represents the population share in the total TRP with incomes higher than a subsistence wage. The proposed indicator is important on the ground that in case money incomes are lower than the SW value HP (HPR) reproduction and development is not only extremely complicated but practically not possible (let alone, high quality and continuously improved human potential). Generally, ISE indicator value shall tend to one. As the formula shows (3), ISE = 1 provided the region has no individuals whose incomes are lower than the subsistence wage (RPLI = 0).

The fourth indicator (IE) is necessary for quantification and assessment of the HPR educational component:

$$IE = \frac{CPE + SGS + SVT + SHE}{TRP} \quad (4)$$TRP – total regional population;

CPE – number of children in preschool educational institutions;

SGS – number of students in general education schools;

SVT – number of students in vocational education and training institutions;

SHE – number of students in higher education institutions.

The above indicator describes the share of individuals in the total regional population who are going through an educational process. The higher the IE indicator is the higher HPR quality and the wider the range of strategic benchmarks of the innovative development are, etc. This indicator represents a potential that may be actualized in the future labor market, including the market outside a particular region, it also reflects opportunities for replenishment and saturation of the professional and labor component [7].

The next indicator (IPL) may be applied to quantitative assessment of the professional and labor component:

$$IPL = \frac{WFS}{TRP}$$ (5)TRP – total regional population;

WFS – work force size in the region.

This indicator represents the work force share in the total regional population. It is known that WFS indicator covers both economically active and unemployed population. When calculating the IPL indicator we consider the unemployed to be bearers of human potential that will be actualized at some time in the labor market and in various society life spheres. The indicator value should grow but for the purposes of factor analysis, principally, due to the growing number of economically active people.

In accordance with the proprietary method, the competition and entrepreneurship indicator (ICE) is calculated as follows:

$$ICE = \frac{SME}{ERE}$$ (6)SME – number of small business employees (including, micro enterprises);

ERE – number of people engaged in the regional economy.

The indicator represents the share of small business employees in the total number of people engaged in the regional economy. This formula indicates the quantitative status of small business in the region. It is advisable to underscore that the full-fledged description of the competition and entrepreneurship component requires reviewing competitive environment status, etc. [8].

Besides, for the research purposes this indicator may undergo further modification. For example, active private entrepreneur rate in the region (PER) may replace SWE indicator in the numerator, the SME indicator may omit regional micro enterprises, etc. In order to avoid repeat count, it is not recommended that SME and PER be used in the same formula (for example, if private entrepreneurs are also small business employees).

The seventh indicator is the indicator corresponding to the research indicator (IR) and is calculated as per the following formula:

$$IR = \frac{PST + DST}{PS + DS}$$ (7)PST – number of postgraduate students with PhD thesis Viva Voce;

DST – number of doctoral students with doctoral thesis Viva Voce;
PS – number of postgraduate students;
DS – number of doctoral students.

The provided indicator describes the reserve pool of research staff as well as productivity in terms of thesis Viva Voce (logical and successful completion of postgraduate and doctoral studies, respectively). Empirically this indicator presents the level of desire, experienced by the regional population, for generation of new knowledge, plunging into new areas, discoveries, very high level of self-development and self-actualization [9].

The eighth indicator is descriptive of two components – scientific and technical; innovative and creative (IST):

$$IST = \frac{RN}{RDP}$$ (8)

RN – number of researchers (along with technicians, auxiliary and other staff, which are also classified as RDP by the official statistics);
RDP – number of personnel involved in research and development.

The above indicator shows the share of individuals directly involved in researches (persons who are engaged in developments and bring in a greater creative portion to the research) in

total RDP. This indicator differs from the previous indicator– formula (7) – mainly by the fact that it takes into account the researchers employed by particular enterprises whose job is more applied (than theoretical) in nature as compared with researchers in educational institutions. Scientific and technical achievements in this case are sufficiently closer to their actual practical use and commercialization.

We combine the feature of both above components in this indicator, as innovative products may be invented and used and technology transfer implemented (in particular, through specialized technology transfer centers (TTC) in regions, etc.) in the course of research conducted at enterprises [10].

Finally, based on eight relative indicators obtained, we may calculate the ninth summarizing indicator (integral) that describes the HPR – HPI (UHP) level. It is calculated as a geometric mean value of eight above indicators:

$$HPI(UHP) = \sqrt[8]{IH * ID * ISE * IE * IPL * ICE * IR * IST} \qquad (9)$$

HPI (UHP) indicator may be used to monitor the status and dynamics of the human potential in the region in order to conduct inter-regional comparisons, HP analysis within separate federal districts.

It is worth noting that integral indicators may be calculated at each HP structural level as well (basic, medium and top level). In this case, they will represent geometric mean values related to the indicators of the components that comprise each level. This procedure may be convenient for differentiated approach to management [11] to ensure detailed research and assessment of HPR structural components.

4. HPR Management System

Based on the identified components, considering all the above elements we have developed the model for human potential management system in the region. The HPR management system model is shown in Fig.1.

Fig.1. Regional model of the human potential management system
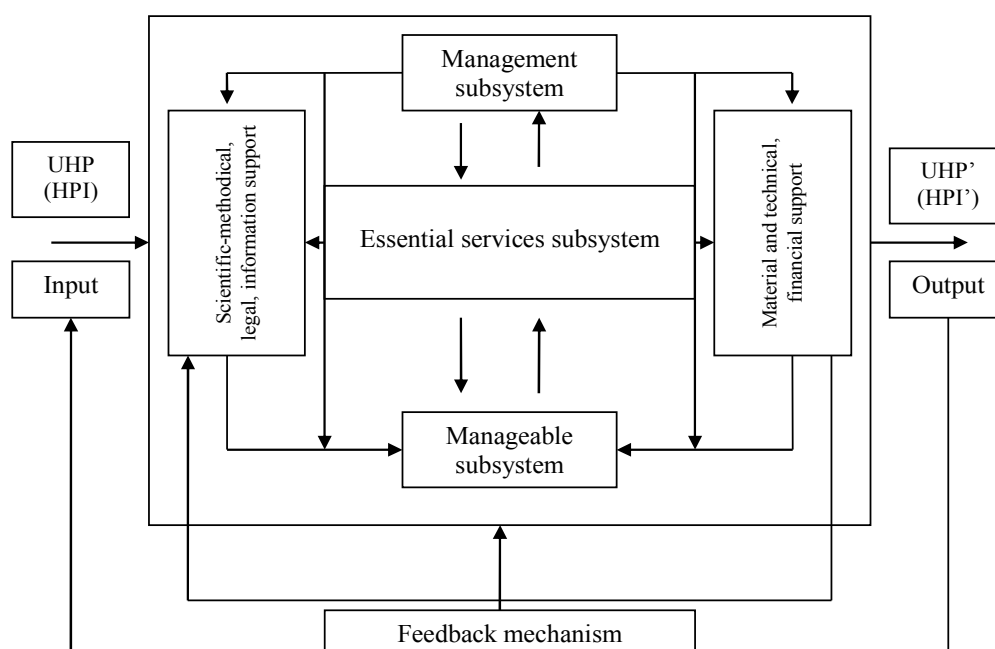
Source: compiled by the authors.

The model formed in this research encompasses the closed loop which interior part comprises continuously interacting simpler functional subsystems, thus ensuring HPR formation, development and actualization.

The system places the central emphasis on the essential services in the region   (housing and utility services, transport, communications, etc.), since not only do they participate in the human potential dynamics, but also create proper environment in order to support operation of

the management mechanism. Essential services subsystem in the region also serves as a link (and a "conductor") between a management and manageable subsystem.

The level of human potential in the region - HPI (UHP) is an input indicator; its calculation method has been provided above – formula (9). In this instance, the provided indicator represents the expected and forecasted HPR level, which can be achieved through orchestrated and efficient operation of the system management mechanism. As it has been noted previously, separate or integral indicators at each HPR structural level (1-3) may be also reviewed for the research purposes.

The achieved and formed regional human potential - HPI' (UHP') - is located at the output end. It is evident that given proper operation of the system and its components, the HPI' (UHP') indicator actual (real) value shall be equal to HPI (UHP) indicator value or exceed it. Otherwise (in case the output value is lower than an input one) we may expect management or operational problems associated with the entire regional complex and thorough analysis of the current situation is required. In this instance, the adjusted feedback mechanism is of great importance.

The presented model also contains two important subsystems that ensure smooth implementation of the management process. We would like to note that each of such subsystems is strongly linked to the economic sectors, which, largely, supply required resources to them (then resources are redistributed in the identified subsystems deliberately for management purposes).

The proposed HPR management system model allows:

1. Implement HPR complicated management process more effectively and consistently.
2. Form and develop new and still more balanced interrelation among HPR fundamental components and its structural levels.
3. Perform goal-oriented activities on HPR recovery, development and accumulation, verified by qualitative and quantitative indicators.
4. Motivate the regional complex and socio-economic system to improve HP indicators, enhance its quality and take leading positions among other regions (based on interregional comparison results).

It is necessary to notice the importance of observing the following system formation (establishment) principles that ensure successful operation of the management system:

1. Harmonious integration into the regional government authority system (lack of contradictions, in particular, regarding implementation of priority projects dedicated to HP development).
2. Efficient interaction of the proposed management system with budgetary and investment sources (including, additional budgets, various funds, etc.).
3. Differentiated approach to management that features focus on separate regional population categories and various age groups in order to make more targeted and relevant regulatory impact using varied tools.
4. System flexibility, ability to adapt management mechanism to changeable environment (it is most important to respond actively and timely to changes in HPR separate components as well as to the impact of exogenous and endogenous factors).

We will demonstrate the managerial decision-making algorithm in the context of the described system-based approach and HPR management mechanism (for convenient visualization shown in Fig.2). This chart presents major stages in the regional human potential management process. Compliance with a specific requirement (fulfilment of a condition) acts as a basic efficiency criterion. Certainly, the rate of change of HPR qualitative characteristics during management process is also important [12]. Should failure to comply with the requirements occur, it is recommended that a systematic analysis be conducted to reveal factors, causes, etc, contributed to HPR level decrease (in particular, to identify HP deformation and degradation up to its disappearance).

Fig.2. Generalized scheme for the implementation of HPR control mechanism concept
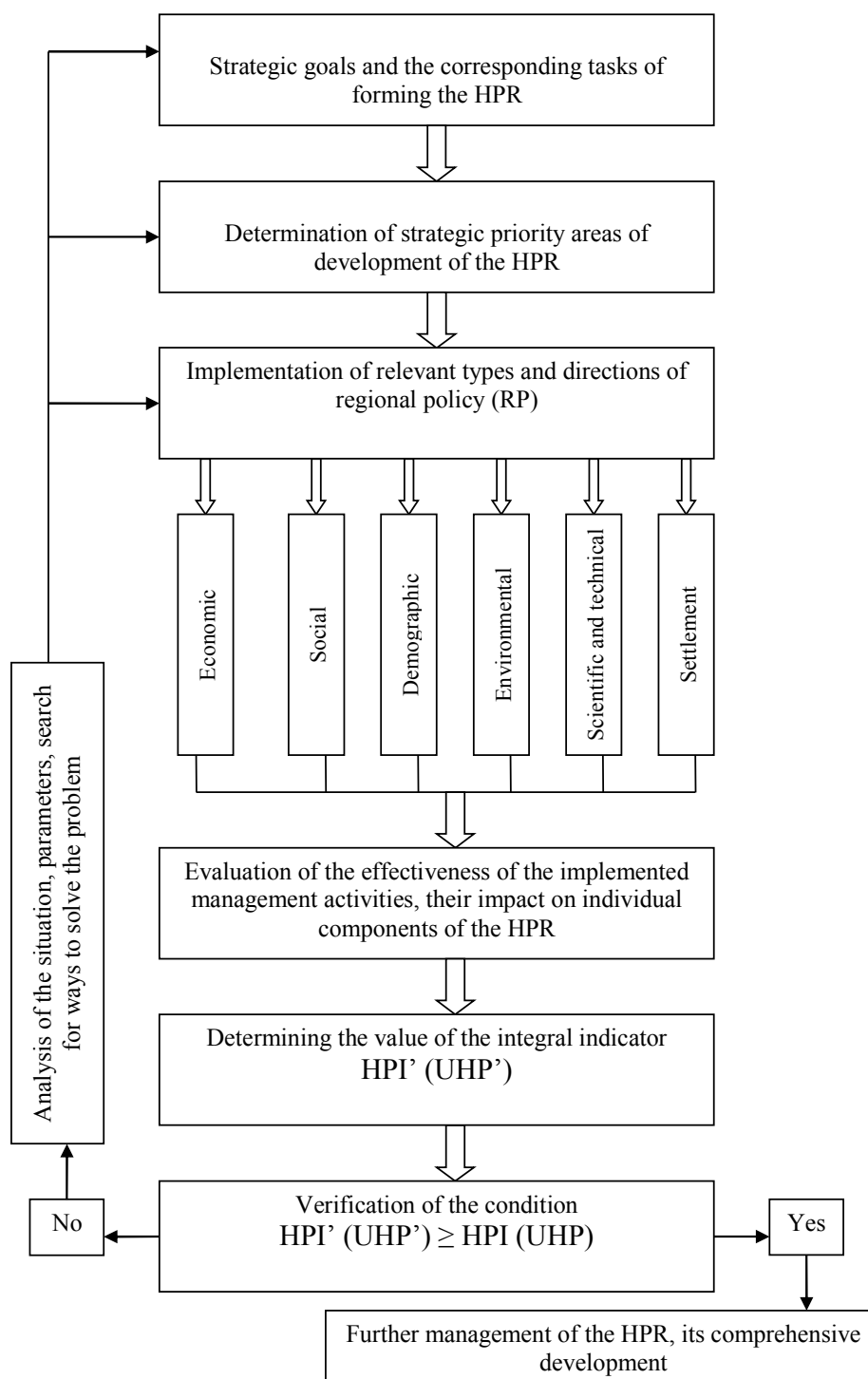
Source: compiled by the authors.

It is appropriate to note that return to any initial stage of the algorithm logic chain is possible (depending on revealed problems, their depth, complexity, etc.)   The algorithm is available for repetition with respect to all stages and then summarized assessment of the obtained results follows. It is objectively needed to identify new goals and tasks, type and form of HP development in the region, etc. at specified intervals, even if there are no severe problems encountered.

However, it is recommended that the strategy be updated in whole only if it is not viable to adjust parameters and improve situation at separate stages [13] (i.e. strategic goals, priorities

can be changed last of all after all other tools and methods have been applied and a comprehensive analysis completed).

4. <u>Findings of approbation of the Proposed Evaluation Methodology and Model</u>

It is advisable that the indicators developed for HPR integrated assessment, the management system model and a number of other identified provisions and elements be tested using a region (or a group of regions) as an example. As for this study, Oryol region was taken as an example. The eight main quantitative characteristics of the HPR components and the level of the region's HP for the period 2010-2015 have been calculated. The results are shown in the table.

Table № 1. The indicators of the HPR in Oryol region in 2010-2015

Indicator	2010	2011	2012	2013	2014	2015
IH	0.111262729	0.1003827	0.0474568	0.0806039	0.0602444	0.0218981
ID	0.024035132	0.0342391	0.0387613	0.038326	0.0378581	0.0385955
ISE	0.851832994	0.8540893	0.8865687	0.872987	0.8715369	0.8594182
IE	0.197347251	0.1958211	0.1962929	0.1954766	0.1953803	0.1967987
IPL	0.506364562	0.4981441	0.5041248	0.5118182	0.507449	0.5071739
ICE	0.134388628	0.131313	0.1331145	0.1321746	0.1273391	0.124477
IR	0.08282476	0.0713115	0.0971625	0.1177665	0.0564042	0.0509383
IST	0.484316186	0.4277251	0.4301607	0.5258493	0.4638109	0.4820359
UHP (HPI)	0.182436653	0.1809012	0.175449	0.1963416	0.1687159	0.1472965

Source: compiled by the authors.

Based on the results obtained, it is possible to conclude that three components have made the largest contribution to formation of the integral index value: socio-economic (ISE), vocational (IPL) and scientific and technical, combined in the calculation with innovative and creative (IST). In general, the values for each indicator differ in dynamics over the years only insignificantly.

It is evident that the values of the health component indicators and the cognitive-research component have been decreasing during the latest three years of the period under review. There has been a decrease in the number of postgraduate and doctoral students, as well as the number of defended graduates of post-graduate and doctoral studies, respectively. While analyzing the IH index dynamics, we have observed an increase in all major classes of illnesses against declining total population of the region.

The indicator of the demographic component (ID) has begun to increase since 2015. Referring to the structure of this indicator, we can note an increase in the number of deaths under the age of 1 year and increased number of arrivals in Oryol region. Nevertheless, the registered changes are local in nature and do not have a pronounced tendency (were recorded from 2014 to 2015).

The indicator that describes "critical state" of the HPR social and economic component (ISE) tends to its maximum value - one. However, based on the recommended factor analysis, it has been determined that this indicator is growing in Oryol region mainly due to reduction of the total population in the region, while the population with incomes below the subsistence level is increasing (in general, the indicator of the regional socioeconomic component has been decreasing after 2012). In this regard, as for Oryol region, it is not possible to deem the contribution of this component as positive in terms of quality.

The value of the integral indicator - HPI (UHP) – has been decreasing (also after 2012). This is a strong reason for an in-depth analysis, recognizing, in particular, the fact that the important health component, belonging to HPR basic structural level, is deteriorating significantly. In addition, other components of this level are also hard-pressed. Consequently, in the long run, further development of other regional HP components is under risk.

It should be noted that the obtained HPI (UHP) value can be used both as the output (actual value) - HPI '(UHP') and input HPI indicator (UHP) to assess HP of Oryol region in a year. That is, for example, in 2016 the obtained value of the indicator is transferred to the input, and then compared with the value achieved by the end of the year, etc. On the other hand, it is also possible to forecast the input indicator.

As for application of the developed HPR management system to Oryol region, it is important to emphasize the need for its harmonious implementation in the structure of the authorities. These include: Government of Oryol region, territorial bodies of federal authorities, state executive authorities of special competence, and other state bodies of Oryol region. The Youth Government of Oryol region, as well as non-profit organizations, firms (as subjects of the region's emergency management) have a great influence on the HP formation and development in this region.

Regional HP development and improvement of its quality should occur owing to the synergetic effect that results from interaction of the actual authorities [14] and other subjects related to regional HP management and the special structures (represented in the proposed model), which should have direct effect on certain HPR parameters.

Based on this study we are introducing some proposals on HP development in Oryol region using the developed methodology. First, it is necessary to devote special attention to the health, fertility and mortality of the population in order to reduce morbidity and overcome the decline in the total population of the region [15]. Second, it is necessary to pursue a balanced social policy, strive to minimize the number of people with incomes below the subsistence minimum, purposefully implement the measures necessary to improve the standard of living of the population. Third, it is important to develop a competitive environment and implement measures to support entrepreneurship (including individual entrepreneurial initiatives) - based on the analysis of the ICE indicator.

In order to facilitate more successful implementation of priorities, the authors recommend that an "objective tree" be derived to include definition of the main objective (objectives) of the priority direction, followed by sub-objectives of the first, second, third levels, etc. It is also advisable to identify entities assigned to certain directions on each tree branch (particular departments, etc.). Finally, we can determine indicators on the share and relevance of each direction needed to achieve the main objective (for example, so that the sum of the values at each level be equal to one, etc.).

5. <u>Conclusion</u>

The findings and recommendations provided in this study could be used in the work of expert groups, as well as by regional authorities and the regional community to improve effectiveness of human resource management. It is possible to use the model and system of indicators in order to forecast and assess the status and dynamics of the regional human potential taking into account the system-forming factors of the internal and external environment.

Further development of the methodology involves the following studies: develop various methods for HPI (UHP) forecast and describe them; carry out correlation-regression analysis in order to establish particular relationships, dependencies among the HP components (their direction, strength, etc.) as well as assess the contribution of various factors; carry out a comprehensive study of the HP level in various regions (presumably - in the context of federal districts), implement interregional comparison and factor analysis.

<u>Acknowledgements</u>

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METHODOLOGY OF INVESTMENT CYCLE ANALYSIS IN THE REGIONAL ECONOMY: TERRITORIAL AND INDUSTRIAL ASPECTS

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Abstract

The paper gives a brief description of the recurrent approach to the study of modern macroeconomic processes. It defines the role of investment processes in the modern macroeconomic cycle. The authors' interpretation of the investment cycle as a structural component of progressive macroeconomic development is characterized by repeatability in time (periodicity); sequential change of stages; the presence of recurrent dependencies, determination character (determines the current basic trends). The justification of the investment cycle features on the basis of the recurrent approach made it possible to determine the features of the statistical analysis of the current investment cycle within the framework of the modern macrocycle. Such an analysis is a multi-level and multi-spectral study of the dynamics of investment activity indicators in the regional economy. It is based on a process approach that involves the systematization of relevant indicators and their phase-by-phase characteristics, including the territorial aspect of the study, which allows to identify general and particular dependencies within investment processes in each group of regions and/or in a specific region, as well as the sectoral aspect of the study, aimed at assessing the quality and efficiency of investment in the economy of the region on the basis of comparison of dynamics of real investment in foreign trade. A variety of different approaches and aspects of statistical analysis can contribute to a comprehensive study of the features of the current investment cycle.

Keywords: Macroeconomic cycle, recurrent approach, investment cycle, process approach
JEL classification: D51

1. Introduction

The processes taking place in the economic systems of different levels at the present stage do not have an unambiguous interpretation. Many authors note the systemic nature of the crisis, objectivity and regularity, which are determined by changes in the essential principles of the functioning of the economy (Sushkova, 2017). In general, researchers note the accumulation of negative trends in all areas: serious problems arose in the real sector of the economy, in the financial sector, exacerbating the industrial recession, disrupting technological and investment processes, which became the basis for the formation of a "cumulative loop", indicating the closure of negative (regressive) trends in economics. At the same time, low investment activity makes technological modernization, contributing to the growth of productivity and efficiency of social production, almost impossible, as a consequence it leads to a decrease in social and political tensions in society.

Such "cumulative loops" are not a unique characteristic of only the current stage of the development of the economy, they were particularly clearly observed throughout the twentieth century, forming the basis for protracted deep structural crises (the crisis of the

1920s and 1930s, the crisis of the 1970s in the XX century). Their systematic, scale and duration contributed to a surge of scientific and applied interest in the problems of cyclicity: the emergence of new approaches to its analysis, contributed to the development of effective anti-crisis policies implemented in different countries at different stages with varying degrees of effectiveness.

A special place in such policies due to its providing nature was occupied by investment regulation. At the same time, direct state participation in investment processes is seen as compensating participation: with a decrease in investment activity of the private sector, direct public investment begins to play the role of an "accelerator" (A.Attalion) of economic progressive dynamics that forms an animating multiplier effect. At the same time, issues related to the study of general directions of investment regulation and its impact on economic processes were widely discussed by the scientific community. Thus, R. Frisch considered it important to provide the state with a progressive dynamic relationship between primary investment and reinvestment, which causes the effect of acceleration. P. Samuelson explored the peculiarities of investment by the role of the multiplier and accelerator, taking into account the delay and slowing down of the revitalizing effect of investments. R. Solow singled out the dependencies between the constant rates of increase in investment activity that provides economic growth, and the increase in the savings share of households. F.Modiliani in his developed model has proved the existence of regular relationships between the formation of personal savings and changes in income levels as a result of the difference between desired and real consumption. At the same time, the activation of fiscal policy to regulate the level of profit, which can become a basis for overcoming crisis trends, could become the source for increasing the pace of investment activity and eliminating structural imbalances and imbalances in industrial production. G.Tobin, J.Debre, G.Markovitz, U.Sharp, D.North, G.Bekker, R.Lukas, B.Ulin emphasized the importance of regulation of supply and demand in the financial market, and M.Fridman determined the priority of financial regulation to ensure a high level of investment activity of all participants (Kazakova, 2008).

Based on the presented provisions, it can be argued that the investment component is a catalyst for economic development and provides technological, innovative, and industrial progress. The quality (efficiency) and quantity (availability and accessibility) of investment resources determine the overall rhythm, duration and amplitude of the respective cycles and simultaneously obey their general rhythm.

Investigations of the problems of managing investment processes in systems of different levels, in spite of their multiplicity, have a number of limitations: there is insufficient theoretical and methodological justification for the interdependence between cycles within a modern macrocycle; there is no uniform interpretation of the concept of "investment cycle" and the methodology of its analysis with increasing relevance of the assessment of the current state and forecasting the development of investment processes, determining the direction and methods of managing investment cycles in systems at different levels. Proceeding from this, the purpose of this work is to develop a methodology for analyzing the current investment cycle within the current macrocycle in the region's economy. This goal required the following tasks: to identify features of the modern macroeconomic cycle; to develop a general algorithm with a subsequent step-by-step characterization of the investment cycle analysis in the regional economy on the basis of a combination of the territorial and sectoral aspects of the analysis.

2. Methods of research

Modern macroeconomic processes, which are characterized by the predominance of regressive trends in all spheres of social development, have actualized the solution of existed problems related to the investigation of the essence, cause-effect dependencies, amplitude, depth and scale of the current crisis by domestic and world science.

A definitive analysis of the most common interpretations of modern economic development presented in the works of domestic and foreign authors, such as: innovation economy (*Levin, 2008*; *Markevich & Fomina, 2014*), information economy (*Levin, 2008*; *Mirolyubova, 2012; Nobel laureates of the twentieth century, 2001*), the neo-industrial economy (*Kazakova, 2006*; *Pakhomova & Tkachenko, 2014; The Perm region, 2016*), the digital economy and the virtual economy (*Peres, 2011*; *Porubova, 2015, Porubova, 2014*),

the neo-economy (*Alekseev et.al., 2012*; *Butorina, 2016*; *Gitman & Jank, 1997*; *Pakhomova & Tkachenko, 2014*; *Sibirskaya et.al., 2017*; *Sushkova, 2017*; *Baranichev, et.al., 2011*) was carried out to identify its distinctive features. They fully reflect the nature of modern macroeconomic development. At the same time, each researcher focuses on identifying the distinctive characteristics, without affecting the issues of their interconnection and interdependence, identifying the integrating process that forms the general vector of modern macroeconomic development.

The summarizing Table 1 identifies the types of economy, presents their definitions, systematizes the distinctive features, identifies targets that reflect the effectiveness of each type of economy. The creation of this table was subordinated to a specific goal - to identify the basic processes that reflect the nature of modern macroeconomic processes, and to determine their interrelationships. When the goal is changed, the table can be supplemented by the signs of comparison, and by types of economy. Based on the generalizing table, the authors made a number of principal conclusions. First, that the types of economy can be considered as stages of modern macroeconomic development (Figure 1).

Figure 1. Interrelation of the basic forms of modern economy development
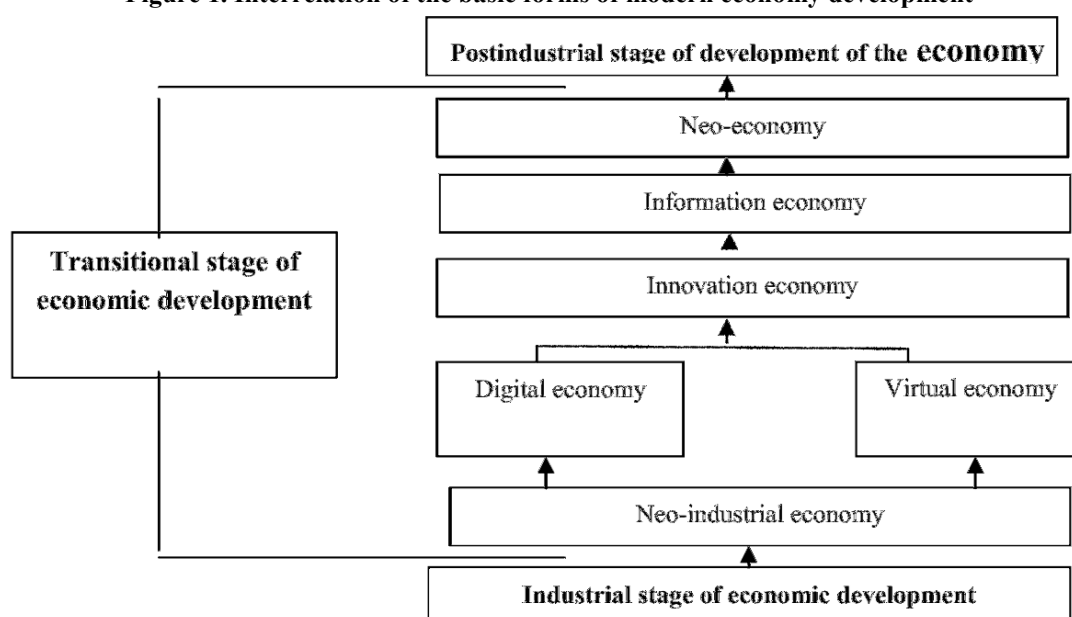
The dependencies depicted in Fig. 1 reflect the essence of the present stage of development. It has a transitional character from the industrial to the postindustrial stage of the public in general and economic development in particular. In this case, the transition period is not homogeneous, it is a complex of intra-stage transitions from industrial to neo-industrial, from neo-industrial to information, from information to neo-economics, which can be viewed in accordance with the characteristics as the initial stage of the post-industrial development.

Table 1 - Comparisons of interpretations of the main types of the economy at the current stage of development

Distinctive features	Dominated process, transformations	Targets	Quantitative assessment parameters
The digital economy is "a system of economic, social, cultural relations based on the use of information and communication technologies" [6; 10; 14]			
-high level of automation; -electronic document management; -electronic accounting systems; -electronic data warehouses; -use of GRM; -creation of corporate social networks;	-digitalization; -computerization as the initial stage of digitalization	-creating innovations; -increasing competitiveness; -increase in labor productivity; -cost reduction;	-the number of people connected to the Internet; - the share of the IT segment in the country's GNP; -volumes of

Distinctive features	Dominated process, transformations	Targets	Quantitative assessment parameters
-use of ICT in production, management, communication, entertainment; -electronic payment systems in the framework of electronic commerce.		-creatiing new business models, new markets, new products; -improving the quality of life; -creating new sources of income.	electronic commerce; -IT companies ahead of market capitalization indicators; -volumes of electronic payments
The virtual economy is the "stage of the development of the information society", the stage of development of the information economy, the result of the scientific and technological revolution of the second half of the 20th century, connecting the genius of the human mind and the passion for profit "(V.F. Paulman) (end of 90s XX century) [7; 11]			
- modeling of real life and economy on the basis of on-line games; - formation and development of the virtual stock market; -part of the monetary circulation acquires forms of fictitious capital; -formation of a new on-line sector; -the emergence and development of electronic commerce both by real and virtual goods; -formation of information thinking; -prevalence of services	-virtualization of society and the economy as a whole (virtual economy replaces part of the already established economy)	-satisfaction of virtual needs	System of organizational features: -globalization of resource, commodity, stock markets; -unified management culture based on international holdings and TNCs
Information economy is a modern stage of civilizational development, characterized by the predominant role of normative products and creative work (M. Porat, 1976, M. Castells)			
-an economy based on R & D; -formation of the monetary and information form of capital; -increasing the share of intellectual property; - formation of a single human capital with a high share of professional intellectual property; -commercialization and socialization of information; -individualization of the labor market; -structural changes in production based on implementation of information processes; -formation of a global management system	informatization of society and economy	-formation of a new economy, focused on knowledge, extracted from information; -accelerating the pace of economic development in a geometric progression	- volumes of electronic commerce; - volumes of remote banking services; - volumes of remote exchange services; - volumes of electronic transactions
Neo-industrial economy – type of economy, which is peculiar to the new stage of industrial economy development			
-based on the new knowledge and innovations created in the country, not borrowed from other countries, connected with the creation of new critical branches of economy; -increase the share of state participation in financing corporate research and development	-a high-tech technotronic industrialization of the economy; -comprehensive updating and transformation of productive forces on the basis of breakthrough technologies	-growth of country's competitiveness based on using innovation technologies; -growth of labor productivity; -growth of social and economic effectiveness of national production	- investments in R&D; -research development rate; -innovation clusters; -state programs for R&D implementation in priority fields
Innovative economy is a type of economy based on the flow of innovations, on constant technological improvement, on the production and export of high-tech products with high added value and the			

Distinctive features	Dominated process, transformations	Targets	Quantitative assessment parameters
technologies themselves			
- mass generation of innovations; -venturization of business; -high level of education and science development, -domination of 4-6 technological order; -constant increase of innovation efficiency on the basis of their excess and growing level of competition; -formation of the developed knowledge industry and their export; -a constant stream of borrowed and self-created innovations	-innovatization of the economy and society in general	-growth of the country's competitiveness-life quality growth; - rowth of value and quality of human capital, its stable acumulation	-innovative enterprises share; -innovative products share; -economic freedom index
Post-industrial economy – economy of the post-industrial society			
- priority of production of services; -information becomes the main production resource; -profit is formed mainly not in production, but in intellectual and managerial activities; -strengthening the role and importance of the human factor; -formation of a new type of business -venture business	-servicization of production (creation of tertiary sector of the economy); -"transition to a knowledge society"	-substantial growth in income; -significant increase in the quality of life	-50% of the country's GDP is created in the service sector
Neo-economy is an economy based on the application of information to the generation of knowledge; it is a dynamically developing internationalized system of economic relations based on ICT, network models of management of the processes occurring in it [20]			
-information becomes an independent resource; -informatization and IT-sector become a generator of development; - informational social wealth; - completion of the formation of a global society; -virtualization of economic processes; - multiplying of human capital; -quantitative and qualitative leap of TNC development	-informatization, generation of knowledge and innovations, forming a "cumulative loop" of feedback between innovations and directions of their use	-significant revenue growth; -significant growth of life quality	

Distinctive features of each type of modern economy allow us to identify the basic processes of the transition stage as a whole, as well as to identify their interrelations. The basic authors include processes that have a nonlinear character of development and thus form the basis of the cyclical development:

- informatization as a process of formation, dissemination, commercialization of new knowledge embodied in material and material means and objects of labor, having accumulative character, transforming social production, and also ensuring the formation and dissemination of innovative and technological progress (information cycle);

- structural transformation, involving structural changes in production and the economy as a whole, based on the creation and implementation of information processes, the emergence of new critical industries (structural cycle);

- innovation as a process of mass generation of innovations, constant increase of their efficiency on the basis of excess and growing level of competition in the innovation environment in the domestic and foreign markets (innovation cycle);

- significant changes in labor resources, involving the qualitative growth of human capital with a high share of professional intellectual property on the basis of commercialization and industrialization of knowledge (social cycle);

- "servicization" of production (production cycle);

- knowledge-intensive and technotronic improvement of production technologies, constant updating and transformation of productive forces on the basis of breakthrough technologies (technological cycle);

- search and introduction of new forms of investment support for economic development (investment cycle).

Dedicated processes, as it seems to us, are characterized by direct and inverse relationships. Thus, in modern conditions and throughout the transition phase, information becomes a universal productive force, and scientific research is the basic factor of the production process, forming the so-called "Zero cycle". The commercialization of scientific information in the means of production that change the content, nature, conditions and functions of labor presupposes significant shifts in production technologies (the technological cycle), which is impossible without innovative transformations (the innovation cycle) and free capital flow (investment cycle). Under the influence of these processes, the efficiency of material production increases, manifested in the growth of labor and capital productivity, in reducing the time of the production cycle, in optimizing production costs. The nonlinear nature of change determines the direction of structural shifts (structural cycle) and forms the vector of the individual's development (social cycle).

The processes described above are universally recognized as having a cyclic nature, which we consider as an objective form of development of economic phenomena and processes, of systems at different levels and its structural components.

Based on the above, modern macroeconomic processes represent a transitional stage from the industrial to the postindustrial stage of social development in general and economic development in particular, characterized by universal informatization, structural transformation, innovation, labor capitalization, production services, science intensive and technotronic renewal and transformation of productive forces , the introduction of new forms of investment support for economic development, directed on systemic transformation (changing not only the shape but also the very essence of the system), which has the objective cyclic nature.

Proceeding from that, the modern macroeconomic cycle is a special kind of cycle that has a transformational character, within the framework of which the information cycle as an independent kind of cycle can be viewed as a conjunctural cycle, where technological, innovation and investment cycles overlap it and have a supporting character, a production cycle is a characterizing cycle, social and structural cycles are the resultant ones.

In accordance with the essence of cyclicity as a form of development, it has: 1) its own time duration, 2) successive change of states (phases); 3) interphase and intercyclic recurrence, determined by its accumulating nature.

Within the framework of the stated goal of this article, the greatest attention will be paid to the investment component of the modern macroeconomic cycle, which also has a cyclic nature. However, the very concept of the investment cycle in modern theory is poorly researched.

Interpretation of the concept of the cycle and the scope of its use in foreign publications is wide: it is used by portfolio investors, managers of investment funds and consulting organizations, securities market dealers and other structures. Russian scientists are trying to form an idea of the nature and content of the concept of the investment cycle, relying on the structure of the dynamic series ("phases", "stages", "operations", etc.) *(Markevich S.V. & Fomina, 2014, p 5,13,150); Levin, 2008; Mirolubova, 2012; Porubova, 2014; Porubova, 2015; Sibirskaya et. al. 2017)*. Most often, researchers consider the cyclical nature of investment activity in relation to the enterprise's economy (within the framework of investment design).

To determine the character of the investment cycle it is purposeful to use recurrent approach, the essence of which could be stated as a multilevel, multifactorial and multicriterial characteristic of the specific relations and specific dependencies between different cycles and stages. Key issues of the recurrent approach are studied rather thoroughly

in works (*Butorina, 2016; Butorina & Osipova, 2015*) and others. In conjunction with the basic principles of recurrent approach investment cycle can be determined as a structural component of the modern macroeconomic cycle, manifested in fluctuations of tendencies over a certain periods of time, reflecting investment activity in systems of different levels, where its providing character determines its basic trends. It is characterized by: intrinsic recurrence in time (periodicity); sequential change of states; recurrent dependencies with information, innovation, technological, production, social and structural processes.

3. <u>Interpretation and analysis of research results</u>

Dedicated features of the investment cycle, as it seems to us, should be taken into account when developing a general algorithm for the analysis of investment processes in the regional economy (the second of the tasks set). In its most general form, it is presented in Fig. 2.

Let's analyze each of the presented blocks of the general algorithm of the methodology for analysis of investment processes in the regional economy. The purpose of the analysis is to determine the current phase of the modern investment cycle based on the use of different approaches to research.

Figure 2. A general algorithm for developing a methodology for analyzing the current investment cycle

The goal is to determine the current phase of the modern investment cycle based on the use of different approaches to analysis

Step-by-step "blocks" and their content

I "block" - selection and grouping of indicators of investment activity depending on the object of research

II "block" - construction of a theoretical model reflecting the cause-effect relationships between the indicators of dynamics and the structure of investment resources, including their phase-by-phase characteristics

III "block" - collection and processing of statistical data within the territorial approach, identification of general trends and patterns in the dynamics of investment activity of economic entities of a particular region and / or a group of regions

IV "block" - further study of the investment cycle on the basis of sectoral analysis within a specific region / group of regions, reflecting recurrent dependencies of the structure of real investment in foreign economic activity with indicators of innovative, technological and production processes

The resulting block is the identification of sectoral imbalances in investment provision in the regional economy, the definition of progressive and regressive areas of sector investment in accordance with regional targets

The 1st and 2nd "blocks" have a theoretical and methodological basis, they are related to the choice and systematization of indicators. To identify the features of the investment cycle, we consider it expedient to use the capital structure proposed by K. Perez *(2011)*. In her opinion, the process of real creation of wealth presupposes the division of capital into two main types: the so-called "productive capital", which combines the behavior of agents that create new wealth through the production of goods and services, realizing the ability to profit through investment in innovation and expansion of capacity. The second type of capital is based on the ability in general or a specific mechanism for ensuring the realization of productive capital by its basic functions. Financial capital (the essence of the second type of capital) combines the behavior of agents who possess wealth in the form of money and all their behavior is

somehow reduced to obtaining and increasing their monetary wealth, thereby affecting the possibilities of the process of real wealth creation and the final distribution of financial resources in economic systems, including in the regional economy.

It should be especially noted that these indicators: 1) are designed to reflect the general trends in the investment process as a whole; 2) are weakly related to the available statistical base, therefore they require appropriate specification; 3) do not allow to determine the phase within the framework of the modern investment cycle.

In this case, according to Kazakova N.A. analysis of investment processes in the region's economy should also include the study of real investment (investment in fixed assets) and investment in intangible assets, while at the present stage the first directions of investment are priority ones (*Kazakova, 2006; Kazakova, 2008)*.

A theoretical model has been constructed taking into account the specific features of investment processes in the economy of the region. The indicators of the investment cycle are systematized in it, taking into account the interfacial recurrence as an objective dependence of the flow of each phase from the previous one and the formation of the prerequisites for the subsequent one (Table 2). Their phase-by-phase characteristics are differentially represented for each of the selected indicators on the basis of it, in other words, in each phase, the basic directions of indicator dynamics were determined on the basis of generalizations of modern theory and practice of macroeconomic cyclic processes management in general and investment development in particular.

Table 2 The phase characterization of the indicators of the current investment cycle

Indicators	Crisis	Depression	Revitalization	Rise
I group of indicators characterizing industrial investment				
Investments in fixed assets, mln rub	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Investments in fixed assets of Russian investors, mln rub	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
State national investments in fixed assets, mln rub	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Private national investment in fixed assets, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Mixed national investments in fixed assets, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Investments in fixed capital of foreign investors, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Joint investments in fixed assets of foreign and Russian investors, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
II group of indicators that form the dynamics of industrial investment				
Investments in fixed assets due to own funds, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Investments in fixed assets due to borrowed funds, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Attracted investments due to bank loans, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Attracted investments due to borrowed funds of other organizations, mln rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing

Indicators	Crisis	Depression	Revitalization	Rise
Attracted investments from budgetary funds, mln. rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Financial investments of organizations (millions of rubles), total	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Balanced financial result (profit minus loss) of organizations' activities, mln. Rub.	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Amortization funds, mln rub	steadily decline	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Total debt of organizations for liabilities, mln. rub.	steadily increases	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily declining
Debt of organizations on loans to banks, mln rub.	steadily increases	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily declining
Offer loans	steadily declining	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily increasing
Interest rate	steadily increases	uneven increase while maintaining negative trends	uneven increase while maintaining positive trends	steadily declining

(Source: The Perm region. A brief statistical compilation. 2016)

The proposed indicators are conditionally divided into the corresponding groups: the first group includes indicators that directly characterize industrial investment; the second group consists of the indicators that form the investment activity in the region.

This systematization of indicators can be used to assess the current level of investment activity of economic systems at different levels, primarily regional ones.

The proposed methodology for analyzing the current investment cycle assumes: 1) the complexity of the analysis; 2) the objectivity and accessibility of the statistical base used, reflected in official statistical yearbooks, as well as in specialized information sites; 3) use of the process approach, which allows considering the investment cycle of the economy as a dynamic process.

At the same time, the essence of the process approach to statistical analysis can be defined by us as a specific approach to the analysis of phenomena and processes based on the identification of numerous relationships, their identification and interdependence at the interface of individual processes within their system, as well as their combination and interaction at higher levels of economic systems. Therefore, it involves the allocation of groups of indicators related to each other, focusing on the nature of their recurrence links, the study of indicators in the dynamics of absolute values to determine the current phase of the cycle.

Based on the existing dependencies between indicators described in the literature that reflect the essence of investing in the economy of the region, priority ones can be singled out, i.e. those that fully describe the investment activity of economic entities.

It seems to us that such indicators as investing in fixed assets of Russian investors, state national investments in fixed assets, private national investments in fixed assets, mixed national investments in fixed assets, investments in fixed capital of foreign investors reflect not only the overall level of investment activity, but also give an idea of the importance of each participant in the investment process (organizations, public authorities, foreign investors).

In this case, as it is noted by Alekseev, Fomina, Markevich *(2012)* among the subjects of investment at the present stage, the crucial importance is acquired by firms as owners of the financial resources formed and accumulated in various budgets and funds of organizations

(depreciation, accumulation, etc.), by the state implementing all types and forms of public financing, including the formation of infrastructure, federal targeted programs, tax (etc.) benefits, direct financing, and investment funds, by investors placing funds in assets on formal criteria for financial efficiency (equity, securities, etc.), by the banks and credit institutions that offer financial resources for liquid collateral (low financing risks) or secured third-party liabilities with relatively low margin profitability, by the venture funds that invest funds in innovative and risky projects not secured by liquid assets (high financing risks) with the prospect of superprofits, as well as by the special funds providing basis for development of ideas and results of R & D, transfer of technologies in the pre-investment phase of projects (*Alekseev et. al., 2012, The Perm region. A brief statistical compilation., 2016*).

Therefore, the following indicators, such as investments in fixed assets from own funds, investments in fixed assets due to borrowed funds, attracted investments from bank loans, attracted investments from borrowed funds of other organizations, attracted investments from budget funds, balanced financial the result (profit minus loss) of organizations' activities, depreciation funds as indicators can fully reflect the ability of enterprises and organizations to build up investment component activity, and to identify the priorities in the formation and attraction of investment resources. According to Rastvortseva (2017) Russia's regions have the largest degree of concentration by index of fixed capital expenditures.

Such indicators as the total debt of organizations for liabilities, arrears of organizations on bank loans and loans, can fully characterize the general conditions and possibilities for raising funds, so they have a formative character.

To the same formative indicators, the indicators of the second group can be assigned, which allow estimating the financial capital available in the country as the foundation for the formation of real investments. Reserves of commercial banks, the supply of loans and their value may indicate the availability of investment resources, the possibility of their involvement by enterprises and organizations.

The 3rd "block" of the algorithm for analysis of the investment cycle is analytical one. It involves the collection and processing of statistical data. The most significant for this stage of the investment cycle study is the territorial aspect of the study.

As it seems to us, the comparison of the indicators selected in the theoretical model at the level of the subjects of the Russian Federation will allow:

- to reveal territorial differences in investment activity of economic entities;
- to unite the regions into groups: the first group - the regions in which regressive trends predominate (by the number of indicators in the phases of crisis and depression), the second group - the regions in which progressive trends predominate (by the number of indicators in the phases of recovery and recovery);
- to determine the general trends for each group of the region, then for each region in the group;
- to highlight the particular features of the investment process on the basis of an analysis of the cause-effect relationships between the first group of indicators that characterize industrial investment and the second group that form the dynamics of industrial investment.

The 4th "block" implies further exploration of the investment cycle within a specific group of regions and / or a specific territorial unit based on industry analysis. In its framework, we consider it expedient to study in more depth the interrelationships between the dynamics of real investments in foreign economic activity (with a similar phase-by-phase characteristic) with indicators of innovative, technological and production processes in the region's economy. This aspect of the analysis also required the specification of the relevant indicators.

Let us consider how this concept can be realized by the example of regions with different economic specialization. Let's characterize features of an investment cycle on an example of various branches (Fig. 3).

The greatest effect and long terms of the investment cycle can be identified for the manufacturing industries and similar industries associated with material production.

Enterprises-leaders of the industry constantly invest in production in order to maintain market share, so in this case the problem of cyclicality is to identify the periodicity of the economic effect, assess the impact on the activities of the business entity in general, the industry. The duration of the effect is that the implemented innovations can be spread not only

at one enterprise, but also on the participants in the network, the industrial cluster, and can be borrowed by the related industries.

Figure 3. Peculiarities of branches' investment cycle [17]
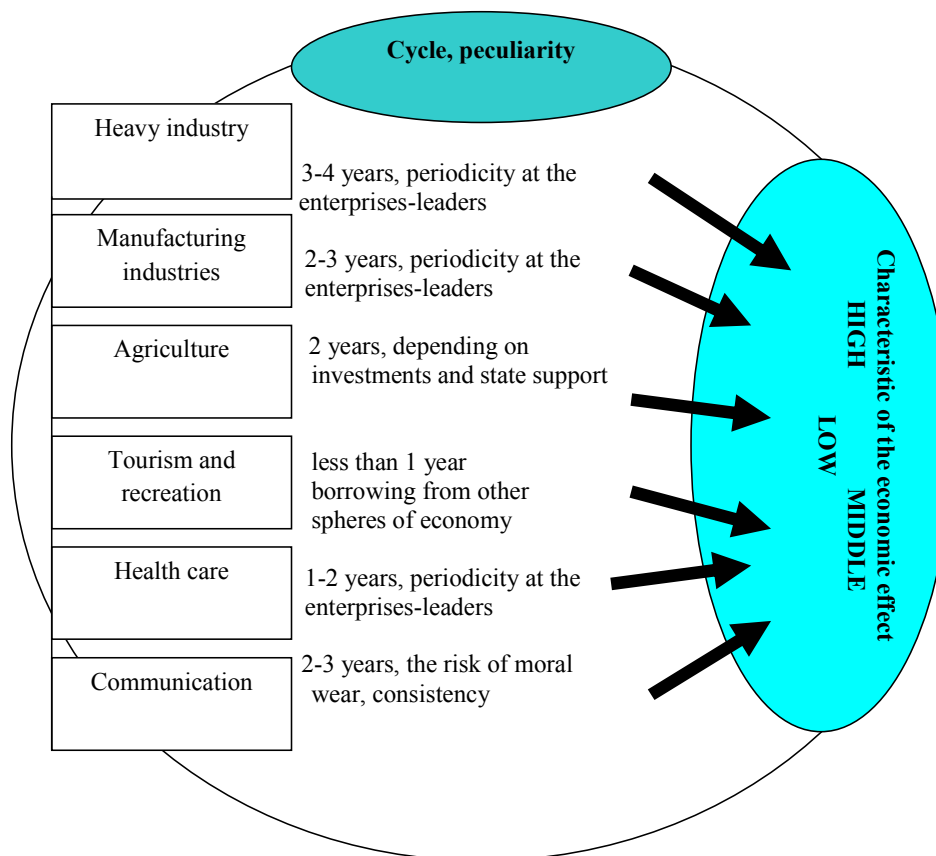
Communication is one of the most dynamically developing industries, as there is a continuous process of increasing the quality of services and products aimed at the consumer. The investment process is associated with significant risks of obsolescence of investments in projects at various stages of investment. The problem of cyclicity in this case is directly related to strategic planning and optimization of resources, the choice of one or several lines of business in order to rationalize the activities of scientific and technical units.

The tourist and recreational sphere is characterized by the fact that innovations are mainly borrowed from related industries: communication, standards and service technologies in the hospitality industry. The obvious advantages are the absence of the need for significant financial resources, fast implementation speed at the enterprises of the industry – sometimes it equals to several months. The shortcomings include accessibility for copying by competitors, and therefore the economic effect is lower and short-term. At enterprises that provide specialized services for treatment and rehabilitation the investment cycle can also be quite long, because it is associated with new technologies of treatment, the introduction of diagnostic and medical equipment. In this case, the investment cycle in terms of parameters will coincide with the branches of material production. A significant difference is the problem of calculating the integrated economic effect, which will be the costs that consumers of services will produce in a certain territory, contributing to the development of transport, catering, leisure and entertainment (*Oborin et.al., 2017).*

It should be borne in mind that the cyclicity of investments can be observed on the example of large enterprises: the leading enterprises of the industry or territory, therefore the system of indicators should take into account the specifics of the existing types of economic activity, the attractiveness of the territory for investment, the development strategy of the region, the state of the infrastructure of the main enterprises, social and economic tendencies of development, which can affect the investment cycle (outflow of population, high unemployment, the presence of depression production) (*Oborin et.al., 2016),* the growth of

productivity causes labor reduction and consequently a fall in employment (*Cutrini & Enzo, 2017)*.

The investment cycle implies economic feasibility, the effect for an enterprise or a group of enterprises, an increase in the performance of a business entity, industry, or region. For economically developed territories or regions with a high level of state support, the economic cycle is presented in the form of many projects with different completion times and efficiency (Fig. 4).

In order to simplify the initial level, the non-optimal use of the potential of the region was adopted, which allows increasing social and economic indicators on the basis of investment cycles. Despite the completion of the cycles, the investment scenario for regional development is a priority one, despite the risks.

Figure 4. Model of investment cycle of regions with developed financial and economic potential
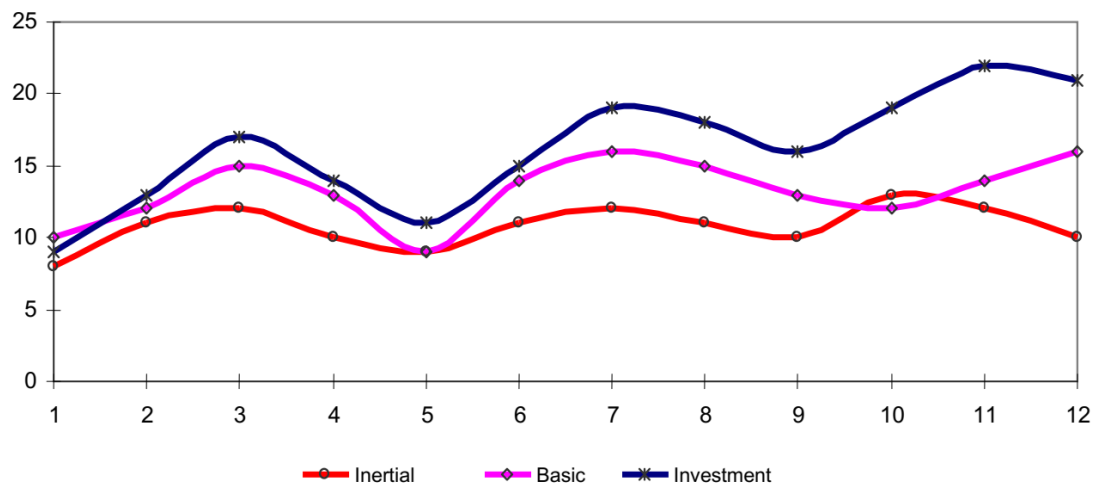
As it was noted by many researchers *(Kazakova, 2008; Levin,2008; Mirolyubova,2012; Porubova, 2015)*, the evaluation of the quality of capital investments and their effectiveness should be "tied" to real economic processes because of their supporting nature. In this case, the choice of the resulting indicators cannot be accidental. The recurrent dependencies of the investment cycle and innovative, technological and production processes described above determined the directions of the branch analysis (Table 3).

Table 3 - The main directions of the branch analysis of the investment cycle

Indicators of innovation processes	Indicators of technological processes	Indicators of production processes
- internal costs of organizations of the business sector for innovative research and development	- the average annual cost of productive fixed capital assets; - depreciation of productive fixed capital assets; - investments in buildings (except for residential buildings) and structures; - investments in machinery, equipment, vehicles	- gross output; - profitability of production

Sectoral comparisons of the dynamics of real investment with the final indicators of innovative, technological, production processes in the economy of the region, as it seems to us, will allow:
   - to identify the recurrence of the investment cycle within the current macrocycle;
   - to evaluate the quality and efficiency of investment;
   - to identify sectoral imbalances in investment provision in the regional economy, identify progressive and regressive areas of sector investment in accordance with regional targets (the resulting algorithm unit).

4. Conclusions

Based on the research carried out, general conclusions can be drawn:

- "investment cycle" within the framework of the recurrent approach can be interpreted as a structural component of progressive macroeconomic development, characterized by: repeatability in time (periodicity); sequential change of states; the presence of recurrent dependencies, which provides the character of which is determined by current basic trends;

- statistical analysis of the current investment cycle within the framework of the modern macrocycle is a multi-level and multi-spectral study of the dynamics of investment activity indicators in the regional economy. Within the framework of the process approach it is the systematization of the respective indicators and their phase-by-phase characteristics; within the territorial aspect of the study, the identification of general and particular dependencies within investment processes in each group of regions and / or in a specific region, and the sectoral aspect of the study - assumes an assessment of quality and efficiency on the basis of a comparison of the dynamics of real investment in foreign economic activity with indicators characterizing innovative, technological, production processes in the economy of different territorial entities;

- a combination of different methods of statistical analysis will make it possible to conduct a comprehensive study of the features of the current investment cycle, the results of which can form the basis for the development of a common investment policy aimed at leveling the sectoral imbalances in the investment provision of the regional economy, identifying investment directions in accordance with regional targets.

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SCOTTISH INDEPENDENCE: HOW WOULD IT AFFECT THE COUNTRY'S FOREIGN TRADE?

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Abstract

The aim of this paper is to identify the main determinants of Scotland's foreign trade and, above all, the EU's role in the volume of the country's exports, as its EU membership is one of the key arguments in the political discourse about independence. The article highlights the results of opinion polls in the country, as well as the relationship between economic integration and political disintegration. The methodological approach adopted is the gravity model of international trade. Given the large number of zero flows present in the data sample, the Tobit model proved to be a more suitable technique for the estimation. The Random effects model estimates are also provided in order to prove the robustness of the estimates. The results of the study allow for more substantiated conclusions about the main determinants of Scotland's foreign trade, as well as they provide arguments for discussing the implications of Scottish independence.

Keywords: Scotland, independence, European Union, international trade, gravity model
JEL classification: F13, F47, F15, R15

1. Introduction

In recent years, Europe has experienced another wave of separatism. The Basques, Catalans, Scots, Flemings, Venetians, and the residents of North Italian regions all strive to promote their own interests. The strongest voices calling for independence can be heard in Catalonia and Scotland. While the former has to challenge the categorical rejection by the central government in Madrid, the Scots were allowed to organize a referendum to decide whether they would stay in the United Kingdom. Although the advocates of independence were in the minority, the subsequent development of preferences, and above all expectations associated with Brexit show that those who want to separate from the UK have definitely not been silenced. Brexit has become one of the central arguments by which the secessionists are trying to gain the right to organize another referendum, mainly because the Scots voted differently than the rest of the UK. Possible negative impacts associated with Scotland's departure from the European Union thus highlight once more the importance of the EU market for Scottish exporters. The aim of this paper is to identify the main determinants of Scotland's foreign trade and, above all, the EU's role in the volume of the country's exports, as its EU membership is one of the key arguments in the political discourse about independence.

The analysis is based on an econometric approach, using the well-known gravity model of international trade. The data were provided by the Scottish Government and cover exports of the country over the 2007-2016 period. The sample contains a large number of zero flows, as the Scottish government reports the given values only when exports are worth at least £50 million. For this reason, the Tobit model is used to estimate the effects. To assess the robustness of the results, the data are also estimated using the GLS Random effects model.

The paper is organized as follows. The first part serves as introduction to the current Scottish independence movement. The following part discusses the role the European Union plays in it. Subsequently, attention is paid to a descriptive analysis of Scottish exports. This creates the ground for the following econometric analysis, which starts with a brief literature review and introduction to the methodology used, followed by the description of the data sample and the variables included in the model. Results and discussion are the content of the penultimate part and the last section concludes.

2. **Support for Independence in Scotland**

As well as other European separatist regions, Scotland is also characterized by evident discrepancy between central and regional preferences. In elections, the Scots have traditionally shown preferences different from those in the rest of Great Britain (Dvořáková & Ferrarová 2014). Although the modern Scottish nationalism originated only in the 20th century, its representatives achieved considerable success in talks with the central government in London. The failure of the Scottish referendum, in which Scotland received only 44.7% of the votes for the secession (BBC 2017), will not soothe the voices calling for the independence of the country, especially not after the decision of the UK to start the Brexit process. Public opinion polls show that preferences for staying in the UK are at present only slightly higher than the share of votes calling for secession. Moreover, Figure 1 shows that the support for the later continues to grow and the quantitative difference between support for staying in the UK and that for secession is currently more than modest.

Figure 1: Opinions on how Scotland should be governed.
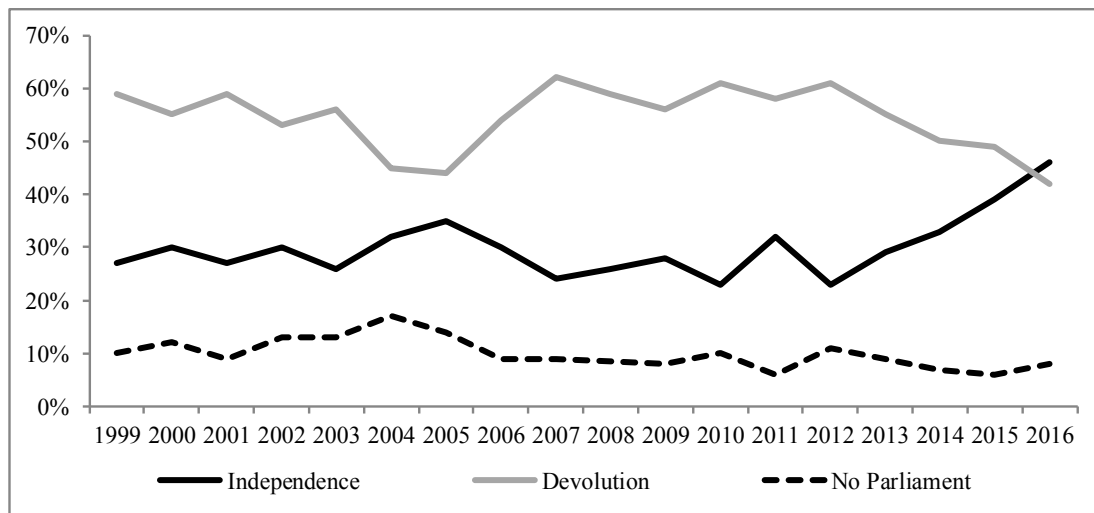
Source: Scottish Social Attitudes (SSA 2018)

The traditional argument of the secessionists is that an independent Scotland would be one of the richest countries in Europe, with GDP per capita higher than that of France or Italy, but above all higher than that of the rest of the United Kingdom. For example, in 2014, Scottish GDP per capita (in PPP), including a geographic share of offshore oil and gas output, reached $41,239, which was the 15th highest GDP per capita of all the OECD countries. GDP per capita in the United Kingdom accounted for $40,188, two places below the figure for Scotland (Scottish Government 2016). However, in 2015, the panorama changed and Scotland, for the first time in 35 years, had a per capita income slightly lower than the rest of the UK (Gardham 2015).

Indeed, the political discourse of the Scottish National Party (SNP), headed by Alex Salmond, was primarily driven by higher oil revenues to the Scottish budget after the independence (Macnab & Barnes 2013). Their huge decline as a result of the fall in prices, led to a fall in support for independence in mid-2014, when the "Yes" answer to the question "Should Scotland be an independent country?" fell from 37% in April to 28% in August, probably reflecting the fear that an independent Scotland would be significantly more vulnerable to these fluctuations. Nevertheless, in October of the same year, the independence movement reached its maximum support with 49% of the interviewees answering "Yes" (YouGov 2015) and as Figure 1 shows, the year-on-year change in the support for independence was positive.

It seems that the 2014 Scottish referendum, rather than calming down separatism, led to far more support for secession. This was further exacerbated by the fact that Britain in the national referendum decided to leave the European Union. While at the national level, 52% of voters preferred leaving the Union, only 38% did so in the case of Scotland (The Electoral Commission 2018). Majority of the Scots therefore wanted to remain in the EU. Hence, the

Brexit process may be an important argument for convening a new referendum, nevertheless, according to SSA (2018) with uncertain result.

3. Scotland and Europe

The influence of the European Union, and the economic integration in general, on the disintegration of national states has been widely studied by scholars all over the world. It was a quarter of a century ago when Bob Davis (1994) used the term *global paradox*, pointing to the fact that, with the increasing interconnection of individual nations through the global market and technology, the call for national disintegration may increase. The author also stressed the importance of the fall of the Soviet Union, which made Europe no longer in a military threat. As a result, the separatists changed from chauvinists looking only to the domestic economy to internationalists and free trade advocates. This issue was further developed, for example, by Alesina et al. (1997), who agree with the idea that at that time the world was already safe for separatism, mainly because of the growing openness and interdependence of economies.

Given that Scotland would be one of the smallest European countries, makes the possibility to participate in the European Union's common market a crucial concern. In general, separatist regions tend to be positively inclined to create international trade agreements (e.g. Davis 1994, Dvořáková & Ferrarová 2014). In the field of political economics, Alesina et al. (1997) argued that the free market leads to secession mainly because openness reduces the costs associated with the small size of the country and thus the small domestic market. For this reason, the size of the country in the integrated world is not decisive and has no negative effect on the level of income. Instead, the heterogeneity in local preferences leads to the creation of smaller jurisdictions.

This theory was further developed by a great number of authors. Daumal (2008) focuses attention on countries with a federal arrangement. She claims that only federated regions can benefit from free market participation. Regions in a unionist state are, with some exceptions like Canada or Switzerland, inherently denied the possibility of secession by the constitution. Brancati (2014), on the other hand, considers that the relationship between European integration and electoral support for separatism is generally very weak, which contrasts considerably with Dvořáková & Ferrarová (2014), according to whom regions with pronounced separatist tendencies generally tend to be pro-European.

From my point of view, the European Union has an ambivalent impact on separatism. On the one hand, separatists may be threatened by the fact that a newly created independent state would, at least temporarily, find itself outside the Union. On the other, European integration generally facilitates foreign trade and thus also leads to a decrease in dependence on the domestic economy and at least partially offsets the costs associated with the limited size of the domestic market. Dvořáková & Ferrarová (2014) further point out that the EU disturbs the direct link between voters and local decision-makers, participating in the decision-making process. This is a consequence of the fact that the EU weakens the links between the national state and its individual regions and promotes the national identity of the regions.

In the case of Scotland, the voters' attitudes to the Union are also unclear. Muro & Vlaskamp (2016) have already empirically explored this issue. The authors carried out an electronic questionnaire survey in Scotland and Catalonia, with the aim of determining what impact the prospects for EU membership have on the support of separatism. Relying on the so-called Linz typology, they asked a question whether the respondents feel "Scots only", "Scots rather than British", "Scots and British", "Brits rather than Scots" or "British only". Subsequently, they divided the interviewees into three groups. The first one was faced with a situation where the region would remain a member of the EU after becoming independent; the second with the opposite scenario; and the third group is left as a control one. Unlike Catalonia, there were no statistically significant results in any of the above-mentioned cases in Scotland, which is, according to the authors, a consequence of the predominant Scottish Euroscepticism. However, the Scots, in contrast with the inhabitants of the region in the Iberian Peninsula, did not experience a violent negative propaganda from the center, which would in principle reject their membership in the Union in case of secession.

When evaluating responses, Muro & Vlaskamp (2016) emphasize the answer to the above-mentioned question concerning the degree of nationalism. The authors conclude that the preference of strongly nationalistic voters was not influenced by any of the scenarios in any of the regions. In a case of secession, the subsequent membership in the European Union is important especially for dual-choice voters, i.e. those belonging to the middle three groups. In the case of Scotland, the relationship of respondents to the European Union has often been misleading. A negative scenario has frequently led to the promotion of separatism, especially for Eurosceptic voters, for whom secession offers the chance to escape the EU's influence. Hence, from this point of view, Brexit should rather reduce the support for separatism, but in reality this did not happen.

Contrary to Muro and Vlaskamp, Dardanelli a Mitchell state that "[i]dentity is important, but does not explain everything" (2014, 93). They highlight that in 2011 Scottish Parliament, the SNP gained more votes that the Conservative Party among those who called themselves "British not Scottish". Indeed, the reason of the victory of the SNP in these elections seems to be its high competence in government, especially in comparison with its direct rivals, rather than purely its commitment to the independence issue.

Indeed, the SNP was in its origins not in favour of the British membership in the Union. In the 1975 referendum on whether to continue being part of the EU, the SNP opposed it. But later, following the public opinion, it emphasized its opposition to the Euroscepticism of England. Dardanelli and Mitchell (2014) even use the term 'Europhilia' when referring to the most important Scottish party. Nevertheless, despite the SNP's advocacy of an independent Scotland within Europe, nowadays, there is no consensus about the Scottish membership in the EU amongst those who are in favour of independence. Indeed, according to the SSA (2018) opinion poll from 2016, 36% of those who were in favour of independence said they had voted in favour of leaving the Union, almost the same percentage share as that of the unionists that wanted to leave it (35%). The long-term tendency of the inhabitants of the region towards the Union according to the opinion polls realized from 1999 to 2016 can be seen in Table 1.

Table 1: Answers to the question "Do you think Britain's long-term policy should be…"

	1999	2000	2003	2004	2005	2013	2014	2015	2016
Leave the EU	10	11	11	13	14	19	17	17	25
Stay in EU but reduce its powers	30	27	25	23	39	29	36	43	42
Leave things as are	16	22	20	20	19	18	23	20	21
Stay in EU and increase its powers	28	22	28	28	8	16	9	11	5
Work for single European government	10	9	8	8	6	7	8	6	3

Source: SSA (2018)

Hence, at present, most Scots would either leave the European Union or severely restrict its powers. However, the outlook of Scotland outside the EU necessarily leads to concerns relating to the impact of the loss of membership on the country's foreign trade.

4. Scottish exports

Figure 2 presents the grouped destinations of Scotland's exports. It shows that two thirds of the exports (excluding oil and gas extracted from the UK Continental Shell) are absorbed by the rest of the United Kingdom. The share of exports going to EU countries is currently lower than that of those going to non-EU ones. Given the membership of Scotland in the Union, one would expect the Scottish trade to be distributed in a different way. Moreover, there can be observed a decreasing trend in the share of the EU countries in the total exports.

Figure 2: Volume of Scottish exports (£ million, left axis) and their percentage share (right axis).
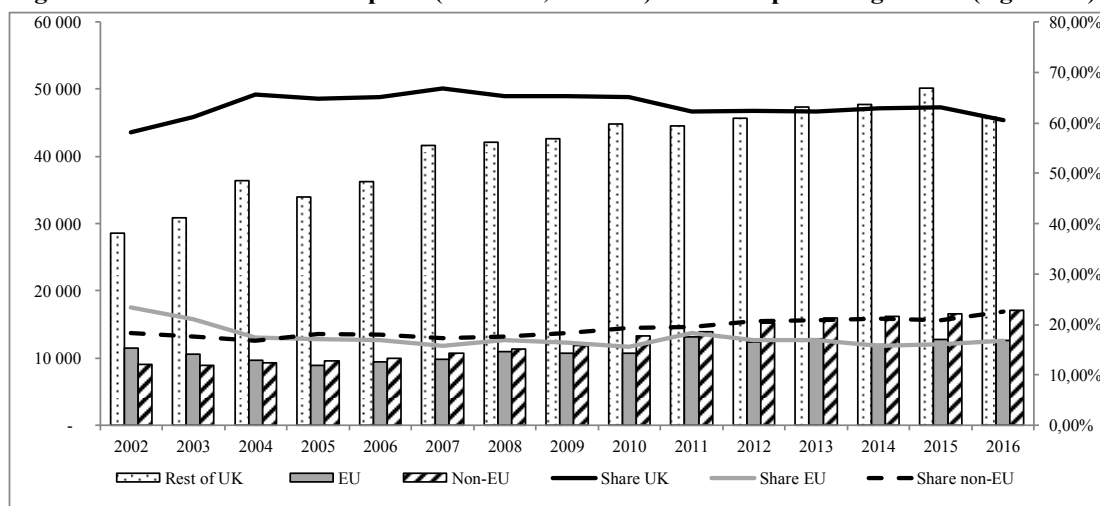
Source: Scottish Government (2018b)

The most important export trading partners of Scotland are featured in Table 2. With the exception of the UK, by far the most important trading partner is the United States economy, whose importance has even increased in the period under review. The top 10 partners were, with the exception of Brazil in 2016, formed by European states. Nevertheless, Scotland exports considerable volumes also to quite remote non-European countries, which is rather surprising. Therefore, the determinants of the country's exports are worth analysing.

Table 2: Scotland's major trading partners (£ millions)

2007				2016			
1 USA	2 980	**11** Switzerland	480	**1** USA	4 775	**11** Belgium	760
2 Netherlands	1 925	**12** Singapore	475	**2** Netherlands	2 115	**12** Italy	715
3 France	1 385	**13** Sweden	430	**3** France	1 960	**13** UAE	705
4 Germany	1 325	**14** Japan	405	**4** Germany	1 910	**14** Australia	650
5 Spain	875	**15** UAE	345	**5** Norway	1 365	**15** Canada	610
6 Ireland	815	**16** Canada	345	**6** Eire	1 025	**16** Sweden	565
7 Belgium	685	**17** South Korea	290	**7** Denmark	995	**17** China	555
8 Norway	675	**18** China	290	**8** Spain	855	**18** Singapore	525
9 Italy	670	**19** Malaysia	285	**9** Switzerland	795	**19** Japan	460
10 Denmark	645	**20** India	240	**10** Brazil	770	**20** South Korea	435

Source: Scottish Government (2018b)

5. Econometric analysis of the main determinants of the Scottish exports

Review and methodology

It has become a common practice in the economic literature to estimate the factors influencing the volume of the exchange of goods and services of some country or region using the gravity model of international trade. It was first used by Jan Tinbergen (1962), who was followed by a great number of economists (e.g. Linneman 1966, Anderson 1979, Deardorff 1984, Bergstrand 1985 or Frankel 1997). This method became extremely popular among those who focus on the magnitude of trade among different countries, as well as migration flows or the effects of currency unions. Empirically, the model was very successful. On the theoretical level, however, there were a great number of studies aiming to address its correct specification (see, for example, the well-known paper by Anderson and Van Wincoop 2003). Notwithstanding, there is still no consensus on the inclusion of individual variables in

the model, nor on the choice of an appropriate estimation techniques. Therefore, the election of both should be based on a concrete dataset.

In this specific case, the data provided by the Scottish government include the country's exports that reached in the corresponding year at least £50 million. Subsequently, those years when the volume of exports was lower than the given value, are not reported in the dataset. For this reason, the sample includes many zero flows (almost 19%). This is a common problem related to the gravity models, regardless of whether they are a consequence of measurement errors, rounding or simply missing data (Grančay et al. 2015).

In the presence of zero flows, the OLS estimates become inconsistent. There is, however, no consensus among scholars about how to solve this problem. It has become a common practice to substitute the zero values by a small number close to zero. Nevertheless, in the absence of knowledge whether the reported zero flows are caused by no trade at all, or more probably, are a consequence of the methodology adopted by the Scottish government, this analysis cannot proceed in this way.

Among the most commonly used estimation techniques prevail the Heckman correction model (Linders & de Groot 2006, Martin & Pham 2008, Gómez-Herrera 2013), the Poisson method (Santos Silva & Tenreyro 2006, Martínez-Zarzoso et al. 2013), the Gamma Pseudo Maximum Likelihood (GPML, Martínez-Zarzoso 2013), the Feasible Generalized Least Squares (FGLS, *idem.*) and the Tobit model (Saloaga & Winters 2001, Rose 2004, Linders & de Groot 2006, Babecká Kucharčuková et al. 2012, Grančay et al. 2015). Despite the advantages of these methods, all of them also suffer from some shortcomings. The problem with the Heckit model arises when there is heterogeneity in the dataset. Another drawback may be in finding the appropriate selection equation. The Poisson method is not suitable when the number of zeros is very abundant (Martin & Pham 2008). The GPML is less prone to measurement error and last, but not least, the FGLS method requires the variance covariance matrix to be estimated first (Gómez-Herrera 2013). In consequence, I have opted for the Tobit model, which is often used for data set analysis with a substantial number of zero flows (see e.g. Linders & de Groot 2006).

In this procedure, the unobserved part of the explained variable is continuous and censored to some specific value. Hence, it is applied primarily to cases when some important rounding happens (*idem.*). In this case all the trade volumes lower than £50 million are censored to zero, regardless of whether the flows are really zero, or they only do not reach the given value. Certainly, the Tobit model does not explain the reason why there are missing trade flows (*idem.*). Nevertheless, this is not my concern and hence this procedure appears to be suitable for this estimation.

In order to check the robustness of the estimates, I also provide the estimates of the GLS Random effects model, which allows for time varying intercepts. Allow the intercept to be different in different moments reflects a fact that all the things equal, some countries may trade more, or less, in different time periods. Although some authors prefer the Fixed effects (FE) model (Soloaga & Winters 2001, Egger 2002, Baier & Bergstrand 2006), this method ignores the time-invariant variable effects and therefore the RE should be preferred if one is interested in estimating influences that do not change over time.

Neither this commonly used method (e.g. Egger 2002 or Carrére 2006) is perfect and suffers from many drawbacks. First, it assumes that there is no correlation between the individual effects and the regressors included in the gravity equation. Not meeting this assumption results in inconsistent estimates (Egger 2005). In the opposite case, the RE model is more efficient than the FE one (Gómez-Herrera 2013). Another drawback is that the estimates provided by this method usually have lower statistical significance. Nevertheless, the signs of the estimates remain the same (Grančay et al. 2015).

The standard Hausman test (p-value = 0.79319) did not reject the hypothesis of the appropriateness of the RE method, implying that this procedure may be correct.

Variables and data

Two different equations have been specified in order to find out the principal factors determining the volume of Scottish exports. The first one corresponds to the Tobit model:

$$\ln \text{EXP}_i^t = \beta_0 + \beta_1 \ln GDP_i^t + \beta_2 \ln distance_i + \beta_3 sea_i + \beta_4 UK\_currency_i + \beta_5 Language_i$$
$$+ \beta_6 EU_i^t + \varepsilon_i^t \tag{1}$$

$$\ln EXP_i = \ln EXP_i^* \qquad \text{if } \ln EXP_i^* > \ln \alpha$$
$$\ln EXP_i = \ln \alpha \qquad \text{if } \ln EXP_i^* \leq \ln \alpha$$

In this case, α refers to £49.9 million, the larger number that would be even censored to 0.

The GLS RE model then looks as follows:

$$\ln \text{EXP}_i^t = \beta_0 + \beta_t + \beta_1 \ln GDP_i^t + \beta_2 \ln distance_i + \beta_3 sea_i + \beta_4 UK\_currency_i$$
$$+ \beta_5 Language_i + \beta_6 EU_i^t + \varepsilon_i^t \tag{2}$$

The dependent variable $\ln\_EXP_i^t$ reflects the volume of exports from Scotland to the i-th trading partner. This volume of exports is expected to be positively influenced by the size of the demand of the receiving country. To approximate it, I have included the $\ln\_GDP_i^t$ variable. The data was retrieved from the the World Economic Outlook Database provided by the International Monetary Fund (2018). GDP for the rest of the UK was calculated by subtracting Scotland's GDP (Scottish Government 2018a) converted to dollars (OFX 2018).

In the opposite direction should work the $\ln\_distance_i$ term, which is traditionally included in order to approximate the transaction costs. I use the great circle approach based on the distance between the capital cities of the states (Geobytes 2018). In this case it is the distance between Edinburgh and the capital city of the corresponding country, with the exception of Germany, in which case Frankfurt is traditionally used as the capital of the country's trade. The larger the distance, the greater the transaction costs may be. These costs are also expected to be influenced by the possibility of the country to access to the sea (Sea_i), which is expected to influence positively the volume of trade. Including both variables may lead to more accurate approximation of the transaction costs, which may be lower for countries with access to the sea and vice versa for the landlocked ones (Grančay et al. 2015, Glick and Rose 2015, Hanousek & Kočenda 2015).

I also include additional dummy variables that reflect other characteristics of Scotland's trading partners. The $UK\_currency_i$ variable accounts only for the UK and hence is 0 for the rest of the trading partners. The interpretation of this variable is a little bit confusing. On the one hand, it refers the to the McCallum's (1995) well-known *border effect*. McCallum introduces the term *home bias*, which expresses the fact that the volume of intra-national exchange greatly exceeds its level predicted by the gravity model. This is a kind of bias towards the domestic market. According to the author, the main culprit is the existence of the physical border that gave the name to the given phenomena. For this reason, I expect the parameter to be positive, which means that, all the things equal, Scotland should trade proportionately more with the rest of the UK than with the other countries. This may be because both trading partners pertain to the same country, share history or language. Nevertheless, some role should also be attributed to the fact that Scotland shares the currency with the rest of the Kingdom, which is also expected to influence the export volumes positively (see e.g. Glick & Rose 2015). There is no other country in the sample that uses the British pound. Therefore, it is not possible to differentiate between these two influences and the issue requires a careful interpretation.

The Scotland's export volume is also supposed to be influenced by the term $language_i$, which is 1 for those countries were the official language is English and 0 otherwise. Egger and Lassmann (2012) state that, other things equal, a common language determines positively the trade between two countries and increases it by 44%. The data concerning this information were retrieved from the CEPII database provided by Mayer and Zignago (2011).

Last, but not least, I include the dummy EU_i^t, which is supposed to have a positive effect on trade between the Union member states (Fidrmuc & Fidrmuc 2003, Egger 2004 and 2005, Baier & Bergstrand 2009, Glick & Rose 2015, or Grančay et al. 2015). The dummy takes the value of 1 if the country is part of the Union and 0 otherwise.

β_0 is an intercept and β_t is a year-specific intercept included only in the RE model, which accounts for a significant year-to-year changes in the world trade patterns. ε_i^t is the error term.

Results and discussion

As can be seen from Table 3, all the variables predicted by the Tobit model have the expected sign, with the exception of the EU_i^F and Sea_i terms, which are neither significant, nor on the lowest level of significance.

Table 3: Results of the econometric analysis.

	Tobit model (QML standard errors)		GLS RE model	
const	2.30602	***	4.32606	***
l_GDP	0.647151	***	0.479724	***
l_distance	-0.626003	***	-0.612145	***
UK_currency	2.46713	***	2.87082	***
Language	0.798443	***	0.60427	***
EU	0.0748641		-0.121816	
Sea	-0.0692591		0.281289	
	Left-censored observations: 132			
The *, ** and *** indicate significance on 10, 5 and 1% level.				

Although countless studies (see above) predict a positive effect of free trade areas on the volume of exchange, as has been mentioned before (Figure 1), in the case of Scotland, the share of the EU in the international exports of the country is very small. Leaving the Union may, therefore, not be as dramatically harmful to an independent Scottish economy as one would expect. A more important factor to be considered is the currency union with the UK. The model predicts a considerably high border effect ($e^{2.46713}= 11.79$). Nevertheless, there are no physical borders inside the European Union. This variable probably includes also the effect of the same currency. Hence, an independent Scotland should seek to maintain the monetary union with the UK.

Indeed, it seems that the secessionists are aware of the importance of the same currency. In the *Scotland's Future*, the Scottish government (2013) defended the option of retaining the pound sterling in the case of independence. The answer from the Bank of England was that this solution could be possible. However, it would limit Scottish autonomy. On the other hand, the Treasury's Permanent Secretary strongly opposed the single currency option (Dardanelli & Mitchell 2014).

As expected, Scottish exports are also positively influenced by the possibility of speaking the same language with the partner in the receiving country. This factor probably includes also cultural and historical ties with some of the partners.

The GLS RE model provides with the same results. The signs of the statistically significant variables are the same as in the previous model and the magnitudes of the effects similar. The estimates may be therefore robust.

6. Conclusion

The last referendum on independence in Scotland seems to have triggered out some kind of boom in the Scottish support for independence. This is to be added to the fact that the British have decided to leave the European Union. This situation leads to speculations about another Scottish referendum on independence. While its advocates use the EU in their discourses as an important argument for a new referendum, the position of Scottish voters towards the Union is far from clear. In fact, currently, the Scots seem to be closer to Euroscepticism than the rest of the UK.

Nevertheless, the econometric analysis provided in this paper confirms the relatively lower importance of the EU's markets for Scottish exporters than expected. In comparison with Catalonia, which exports around 40% of its production to the rest of the EU (C-intereg. CEPREDE 2017) and which is expected to be much more severely damaged if forced outside the Union, other factors seem to be of more importance in the case of Scotland. Future

arrangements with the rest of the UK, concerning some free trade area, or retaining the British pound, would be especially important for an independent Scotland.

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SMEs' CREDIT DEMAND AND ECONOMIC GROWTH IN INDONESIA

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Abstract
This study aims at empirically exploring the short- and long-run relationships between economic growth, non-performing loans, interest rates and the credit demand by the small and medium enterprises (SMEs) in Aceh province, Indonesia. The quarterly data for the period 1995 to 2015 were analyzed by the cointegration and vector error correction model (VECM). The study documented that there was a cointegration among the economic growth, non-performing loans, interest rates and the credit demand, implying the existence of long-run equilibrium among the variables. In addition, in short-run, the study found a unidirectional causality from economic growth to credit demand, a bidirectional causality between interest rates and credit demand, while no causality existed between non-performance loan and credit demand by the SMEs in Aceh, Indonesia. Thus, to enhance the SMEs, the government should focus on promoting the economic growth by managing the stability of interest rates in the province.
Keywords: Credit demand, Economic growth, Non-performing loan, SMEs.
JEL classification: C22, E59, O49, H81

1. Introduction

Various economic policies aimed at resolving the economic problems such as uplift poverty, reduce the unemployment rate, minimize the unequal distribution of income, and in turns, promote economic growth. One of the government's efforts to combat poverty and reduce unemployment in Indonesia is through the acceleration of the real sector and the empowerment of small and medium enterprises (SMEs), as stated in the Presidential Instruction No. 6 of 2007. The main objective of this policy is to promote the SMEs and enhance its contribution to the economic development.

The role of SMEs in improving the welfare of the community can be seen in their involvements in the economy and development. According to the thesis of flexible specialization (Piore and Sabel, 1984), the presence of the SMEs has been increasingly important to the development of the national economy. The thesis stated that the SMEs grow fast and even faster than the large enterprises in the ongoing development process. The emergence of this thesis has rejected the classical theory, which was introduced by Hoselitz (1959) and Anderson (1982) on the role of SMEs in the economy. The classical theory stated that the role of the SMEs in the economy has been getting smaller as it had been taken over by the large businesses. From a macroeconomic perspective, the contribution of SMEs to the national economic development could, at least, be in three following ways. Firstly, their involvements in the formation of income per capita. Secondly, their involvements in the gross domestic product (GDP) formation. Finally, their involvements in the formation of regional

economic growth (Kusnandar, 2012). This further implies that the SMEs play a pivotal role in eradicating the poverty by promoting the welfare of the society.

In Indonesia, the SMEs continues to show their significant roles in enhancing the level of economic activity in almost all economic sectors, except for the oil and natural gas sector, which was handled by the large-scale companies. The SMEs have been showing a positive growth in the last few decades, while the role of large-scale enterprises in the Indonesian economy has been declining (Aceh in Figures, 2011). Due to their contribution to the national economy, the presence of the SMEs has been very much supported by the government, hoping to further continue their contribution to reducing the poverty rate in the country. In 2015, the poverty rate in Indonesia was 11.2% or equivalent to 28.5 million people was living under the poverty line.

As one of 34-province in Indonesia, although Aceh has experienced positive economic growth by 6.06% annually after the political conflict (1989 - 2004) and tsunami (2004) hit hardly the province, many poor people have been living in Aceh (Aceh in Figures, 2015). The poverty rate of the province has been relatively higher than its national level. According to the Central Statistics Agency (BPS) of Aceh (2016), there was 20.98% of Aceh's population were living under the poverty line in 2010, 19.57% in 2011, 19.468% in 2012, 17.60% in 2013, 18.05% in 2014, and 17.11% in 2015.

Recognizing the important role of the SMEs in alleviating poverty, the provincial government of Aceh has supported their presence and continuation to further contribute to improving the provincial economy. The SMEs could offer opportunities for new jobs, boost investment and enhance exports. This is in line with the statement by Holcombe (1998) that the SMEs have been the engine of economic growth. However, in reality, it has been not an easy task to manage the SMEs sustainably, thus positively and continuously contributing to the economic growth. The SMEs have been facing a variety of problems and obstacles both internally and externally. The internal problems faced by the SMEs including mismanagement, lack of human resource capacity, lack of mastery of technology, lack of capital accessibility, non-performing loan, and marketing of a product. Meanwhile, the external problem faced by the SMEs including the economic slowdown, higher level of interest rates, inflation, tax rate, and so on.

Of the above-mentioned problems, lack of capital has been recognized as one of the dominant problem faced by the SMEs in Indonesia (Bank Indonesia Survey 2009). The SME always seeks the financial supports from the financial institutions, particularly banks. A total of 49.3% of the SMEs in Indonesia has demanded additional capital to increase their capacity. In this context, as the intermediary institutions, banks should grant sufficient micro-credit to support the SMES, and in turns, need to promote the national economic growth. In Indonesia, the bank is the most dominant financial system in the country. At least, about 77% of the total financing for the real sector comes from the banking industry. The important role of banking institutions has been recognized since 1933 by Fisher (1933). Stiglizt and Greenwald (2003) and Khemraj and Pasha (2009) stated that the bank was the most superior intermediary institutions, especially in handling asymmetric information and resolving transaction cost of credit. If we look at the figures of loans provided by the banks to the SMEs, it showed an increasing trend in Indonesia, including Aceh (Bank of Indonesia 2013). However, the loans provided by the banks to the SMEs have been still far from expected.

According to Agénor et al. (2004), the number of loans provided by the banking institution to the SMEs was dependent on the factors of demand- and supply-side. Harmanta and Ekananda (2005) documented that after a period of twin national banking crises during the 1997-2000 periods (Kasri, 2011), there was an excess supply of loans due to weak demand for credit. According to Soekarni et al. (2009), this was partly due to the slowing progress of businesses that was characterized by a decrease in their turnover, the constraints of banking access, and the expectations of the business community to changes in the credit priority given by the banks to selected economic sectors.

There have been many factors affecting the demand for banks' credit, for example, non-performing loan (NPL), interest rate, and level of economic activity. In their study on the US economy, Berrospide and Edge (2010) found that economic growth significantly affected the provision of credit. Additionally, Das and Ghosh (2007) documented that the emergence of credit risk has associated with macroeconomic changes, such as price instability, interest

rates, and growth of the economy (Bonfim, 2009; Figlewski et al., 2012). The increase in economic growth, which is measured by the increase in the value of all goods and services produced indicate the increase in income level that, in turns, significantly affected the ability of borrowers to repay their loans (Thiagajaran et al., 2011). Therefore, the improvement in economic performance that is characterized by an increase in GDP would increase the level of demand for credit by the SMEs (Simaremare and Hidayat, 2013).

Apart from the level of economic activity, the stability of monetary policy also provides a conducive environment for the banking institutions to expand their credit and portfolios (Indarti and Langenberg, 2004). With an affordable interest rate policy would lead the SMEs to absorb a higher level of credit offered by the banks and reduce the credit risk. This is in line with the finding by Naqvi (2011) and Fiore and Tristani (2013) who stated that financial frictions affect aggregate dynamics mainly through their impact on firms' financing costs, which increase in both the deposit rate and in the spread between lending and deposit rates.

In the Indonesian context, there have been many studies conducted on the credit demand by the SMEs and its determinants (Anggrahini, 2002; Soedarto, 2004; Siregar, 2006; and Andriani, 2008). In these studies, both the supply- and demand- side factors affecting credit demand were investigated. Generally, the studies documented that the absorption of loans by the SMEs was significantly influenced by the economic growth, interest rates, inflation, deposit, adequacy capital ratio and non-performing loan. However, these studies only utilized the multiple linear regression analysis based on the ordinary least squares (OLS). This technique of analysis is proper to estimate the time series data, and not for the panel data. Additionally, this technique is only able to measure the long-run effects of the independent variables on the credit demand by the SMEs, while the short-run relationships and long-run equilibrium among the variables could not be explored by this model of estimation. Finally, the multiple regression based on the OLS estimation could not be used to identify the causalities among the variables. Thus, this study tries to fill up the existing gaps in the literature by using the standardized time series analysis, comprising the cointegration and vector error correction model (VECM) to explore the existence of long-run equilibrium and dynamic multivariate causalities among the credit demand, economic growth, interest rate and non-performing loan, taking the SMEs in Aceh, Indonesia as the case of study.

In addition, to the best of our knowledge, there has been no study investigated this issue in Indonesia, particularly in the Province of Aceh. Thus, this study is the first attempt to empirically explore the short-and long-run relationships and dynamic multivariate causalities among the economic growth, interest rate, non-performing loan, and the credit demand by the SMEs in Aceh, Indonesia.

The findings of this study are hoped to shed some lights on the SMEs' management, policy makers, and banking industry in designing a proper strategy to ensure the sustainability of the SMEs and enhance their contribution to the economy, particularly by offering new job opportunities and alleviating poverty in the region. This study is indeed timely to be conducted since the level of poverty of the Aceh's province was higher than the national level. Enhancement of the existing SMEs is hoped to contribute to poverty reduction in the province.

The rest of the study is organized as follows. Section 2 provides a brief overview of the SMEs in Aceh, Indonesia. Section 3 highlights the empirical framework and data on which the analysis of the study is based. The discussion of the findings and its implication were presented in Section 4, followed by the conclusion and recommendations in the last section.

2. The SMEs in Aceh, Indonesia: A Brief Overview

Aceh is a province in Indonesia, which is located at the north-western tip of Sumatra (00'00"- 60 04'30" of the northern latitude and 940 58'34 "-980 15'03" of the eastern longitude), with a capital city of Banda Aceh. Aceh has an area of 56,758.85 km2 or 5.68 million ha (12.26% of the size of the Sumatra Island), 12-mile territorial sea with the size of 7,479,802 ha, and with a coastline of 2,666.27 km2. Administratively, in 2015, the province has 23 districts/cities, consisting of 276 sub-districts, 6,423 villages. The province has a strategic position as the gateway for national and international trade traffic, connecting the eastern and western part of the world' borders. In the north, Aceh is bordering the Malacca

Strait and the Bengal Bay; in the south, it is bordering the province of North Sumatra and the Indian Ocean; in the west, it is bordering the Indian Ocean; while in the east, it is bordering the Strait of Malacca and North Sumatra province.

Similar to the other 33 provinces of Indonesia, the SMEs in Aceh has been understood as the SMEs in Indonesia nationwide. According to the Law No. 20 of 2008, the SMEs is stand-alone of productive economic enterprise, run by an individual or business entity that is not a subsidiary or branch of the company owned, controlled, or be a part either directly or indirectly by the medium- or large-enterprises. In Indonesia, the SMEs are categorized into three groups. The first one is the micro-sized enterprises, which have the following criteria: (i) it has a net wealth of less than IDR50 million, excluding land and buildings; and (ii) its annual total sales amounting of more than IDR300 million. The second one is the small-sized enterprises, which have the following criteria: (i) its net wealth assets are ranging from IDR50 million to IDR500 million, excluding land and buildings; and (ii) its annual total sales are between IDR300 million to IDR2.5 billion. The last one is the medium-sized enterprise, which has the following criteria: (i) its net wealth is ranging from IDR500 million to IDR10 billion, excluding land and buildings; and (ii) its annual total sales are ranging from IDR2.5 to IDR50 billion.

According to the Central Bureau of Statistics of Indonesia, the micro-, small-, and medium-sized enterprises have less than 5 employees, 5 to 19 employees, and 19 to 99 employees, respectively. In Indonesia, the SMEs have been defined on different bases by the governmental bodies. For example, the Department of Trade and Industry of Indonesia categorized the SMEs based on the value of the initial investment, while the Central Bureau of Statistics of Indonesia grouped them based on the number of workers.

Hitherto, there have been millions of the SMEs in Indonesia had been enjoying credit facilities from the financial institutions either investment credit scheme or working capital loan. Investment credit granted for a long-term period of more than 10-year to the debtor to purchase capital goods such as machinery, vehicles, and equipment. Meanwhile, the working capital loans granted for the purpose of adding the debtor in liquid instruments, such as the procurement of inventory, to pay short-term debts, to buy raw materials as well as other purposes, usually for shorter loan period with a maximum of 3 years. Table 1 reports the figures for credit demand by the SMEs in Aceh, Indonesia during the period 2005-2014.

Table 1: Credit supplied by the banking institutions to the SMEs in Aceh, Indonesia

Year	Number of the SMEs	Growth (%)	Credit Supplied (IDR000)	Growth (%)
2005	29,457	2.00	4,431,320	45.75
2006	30,046	2.00	4,452,603	0.48
2007	44.975	49.69	6,276,115	40.95
2008	48,679	8.24	8,844,664	40.93
2009	50,384	3.50	5,354,003	-39.47
2010	42,106	-16.43	5,310,418	-0.81
2011	53,373	26.76	6,651,031	25.24
2012	55,783	4.52	7,279,633	9.45
2013	54,238	-2.95	7,791,009	7.02
2014	54,224	0.16	7,090,786	-8.99
Mean	46,317	7.74	6.348.158	12.06

Source: Office of Industry, Trade, Cooperative, and the SMEs, Aceh, and Bank of Indonesia (2015).

As observed from Table 1, the number of the SMEs in Aceh has increased with the average of 7.74% during the period 2005-2014. In 2005-2006, the number of the SMEs only increased by 2.00% amounting to 30,046. The small increase of the SMEs during these years was simply due to the impact of earthquake and tsunami incident hardly hit the province in late 2004. However, in 2007, the number of the SMEs tremendously increased by 49.69% due to the presence and involvement of many foreign institutions and non-governmental organizations (NGOs) both locally and internationally in the province in the recovery, reconstruction and rehabilitation program from the devastated earthquake and tsunami hit Aceh in 2004. Three- year later, in 2010, the number of the SMEs has decreased by 16.43% was simply due to lack of interest of the people who had received financial assistances from

the foreign and local organizations during the emergency relief and post-disaster recovery of rehabilitation and reconstruction program.

Additionally, Table 1 also showed the number of credit offered by the banking institution in Aceh to the SMEs. The number of credit offered by the banks was very much depending on the number of the SMEs existed across the years. On average, the number of credit provided by the banks to the SMEs has increased by 12.06%, amounting to IDR6,3 billion. Thus, it is interesting to explore whether the credit offered by the banks has improved the performance of the SMEs, or vice versa. In other words, whether the banks' credit has improved the SMEs' performance or growth of the SMEs had led the demand for credit to increase. Section 4 of this paper would discuss this issue.

3. Empirical framework

This study empirically explores the short-and long-run relationships between the economic growth, interest rate, non-performing loan and the credit demand by the SMEs in the province of Aceh, Indonesia. It also attempts to investigate both bivariate and multivariate causalities among the variables. For this purposes, the study uses a quarterly data for the period 1995 to 2015, sourced from the *Badan Pusat Statistik* (Central Statistics Bureau) of Aceh, Aceh in Figures, the *Jasa Otoritas Keuangan* (Financial Services Authority), Office of Industry, Trade, Cooperative, and the SMEs of Aceh, and Bank of Indonesia.

Three independent variables investigated in this study, comprising the economic growth, interest rate, and non-performing loan, while the credit demand by the SMEs is the dependent variable. In this study, economic growth is measured by changes in real gross domestic product per capita (2000 = 100), interest rate is measured by interest charged by banks to the SMEs, non-performing loan is measured by the sum of credit upon which the SMEs have not made their scheduled payments for at least 90 days, and credit demand is measured by the sum of money borrowed by the SMEs from the banking institutions. With the exception of interest rate, all other variables were transformed into the natural logarithm.

In this study, the standardized time series technique of cointegration and vector error correction model (VECM) are adopted to explore both short- and long-run relationships among the variables as well as their bivariate and multivariate dynamic causalities. Thus, the following main model, comprising the dependent variable of credit demand (CD) by the SMEs and the independent variables of economic growth (GDP), interest rate (INT), and non-performing loan (NPL), was estimated in this study.

$$CD_t = \beta_0 + \beta_1 GDP_t + \beta_2 NPL_t + \beta_3 INT_t + \pi_t \qquad (1)$$

In estimating the model, the following standardized procedures for the time series analysis were occupied. The first step is to conduct the unit root test to ensure the stationarity of each variable using the following Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) tests.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_i^m \Delta Y_{t-1} + \varepsilon_t \qquad (2)$$

$$\Delta Y_t = \eta_0 + \eta_1 t + \delta Y_{t-1} + v_t \qquad (3)$$

After ensuring all variables were non-stationarity and having the same order of integration, the Granger bivariate causality (Engle and Granger, 1987) test was conducted in the second step. To test the null hypothesis that X does not Granger-cause Y, one first finds the proper lagged values of Y to include in a univariate autoregression of Y, as follows:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_1 Y_{t-2} + ... + \alpha_i Y_{t-m} + \xi_t \qquad (4)$$

Next, the Equation (3.4) is augmented by incorporating the lagged values of X, as follows:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_1 Y_{t-2} + ... + \alpha_i Y_{t-m} + \delta_p X_{t-p} + ... + \delta_q X_{t-q} + \xi_t \qquad (5)$$

Since the Equations (4) and (5) incorporated the possibility of the lagged values to influence the changes in other variables, thus the third step of estimation was to determine the

lag-length of the variables included in the model based on the Akaike (1974) Information Criterion (AIC).

The next step was to examine the existence of long-run equilibrium among the variables using the Johansen and Juselius (1990) approach. In this study, tests of the Likelihood Ratio Trace (LRT) and the Maximum Eigenvalue (ME) were used to determine the number of cointegrating vectors, as follows:

$$LRT = -T \sum_{i-i+1}^{n} In(1 - \mu i) \qquad (6)$$

$$ME = -T \ In \ (1 - \mu_r) \qquad (7)$$

Finally, the multivariate causalities among the variables based on the VECM were conducted. In so doing, the estimated model of the Equation (3.1) could be re-formulated as follows:

$$
\begin{bmatrix} \Delta CD \\ \Delta GDP \\ \Delta NPL \\ \Delta INT \end{bmatrix} = \begin{bmatrix} \delta_0 \\ \delta_1 \\ \delta_2 \\ \delta_3 \end{bmatrix} + \sum_{i=1}^{k} \Gamma_i \begin{bmatrix} \Delta CD \\ \Delta GDP \\ \Delta NPL \\ \Delta INT \end{bmatrix}_{t-k} + \Pi \begin{bmatrix} CD \\ GDP \\ NPL \\ INT \end{bmatrix}_{t-1} + \begin{bmatrix} \varepsilon_{t0} \\ \varepsilon_{t1} \\ \varepsilon_{t2} \\ \varepsilon_{t3} \end{bmatrix} \qquad (8)
$$

From the Equation (8), two channels of causalities could be observed, namely: (i) the standard Granger tests to examine the joint significance of the coefficients of the lagged independent variables; and (ii) the adjustment of the dependent variable to the lagged deviations from the long-run equilibrium path, represented by the error correction term (ECT). From these tests, four patterns of causal interactions among pairs of the variables could be identified, that is: (i) a unidirectional causality from X to Y; (ii) a unidirectional causality from Y to X; (iii) bidirectional causality; and (iv) an independent causality between variables (Majid, 2008; and Majid and Kassim, 2015).

4. Empirical findings and discussion

Preliminary findings

Before the study discusses main findings on the short- and long-run relationships between economic growth (GDP), non-performing loans (NPL), interest rates (INT) and credit demand (CD) by the SMEs in Aceh province, Indonesia, the descriptive statistics and coefficients of correlation would be firstly presented. Table 2 portrayed the descriptive statistics for all investigated variables during the 1995 to 2015 (83 observations). On the average, the number of CD by the SMEs, GDP, NPL, and INT in the province was IDR3.98 trillion, IDR28.54 trillion, IDR3.52 billion, and 15.03% percent, respectively. The maximum value for CD was IDR8.84 trillion, while the minimum value was IDR6.59 trillion. The maximum value for GDP was IDR44.68 trillion, while the minimum value was IDR2.78 trillion. The maximum value for NPL was IDR3.63 billion, whereas the minimum value was IDR1.01 billion. Finally, the maximum level of INT was 58.76%, while the minimum value was 10.5%. The table also showed that on the average the number of NPL was 8.84% out of the total CD by the SMEs in Aceh, Indonesia. These figures showed that the banking institutions in Aceh were unhealthy since their NPLs were above 3%. According to Heffernan (2015), for the banks to be healthy, they should have NPL ranging from 1% to 3%.

Table 2. Descriptive statistics

	CD	GDP	NPL	INT
Mean	3,985,887	28,544,091	352,459.0	15.039
Median	3,480,000	32,646.010	246,751.4	12.510
Maximum	8,844,664	44,677.163	362,560.0	58.760
Minimum	6,594,880	2,781.620	101,186.6	10.500
Std. Dev.	2,795,659	11,783,877	301,027.5	9.010
Skewness	0.253	-0.875	0.908	4.362
Kurtosis	1.439	2.673	2.480	23.113
Jarque-Bera	9.305	10.963	12.344	1662.221
Probability	0.009	0.004	0.002	0.000

Table 3 showed the correlation coefficients between the variables. With the exception of correlation between the NPL and GDP, all other variables have correlated with one to another. The highest positive correlation existed between the CD and NPL, whereas the lowest one was between the NPL and GDP. On the other hand, the negative correlations were found between the INT and other variables, i.e., CD, GDP, and NPL. This finding implied that the higher level of interest rate associated with the lower credit demand, non-performing loan and lower level of economic growth. The expansionary monetary policy could be used to promote the development of the SMEs in Aceh, Indonesia and it, in turns, positively contribute to the provincial economic growth.

Table 3. Results for coefficients of correlation test

Variables	CD	GDP	NPL	INT
CD	1.000	-	-	-
GDP	0.202** [0.034]	1.000	-	-
NPL	0.773*** [0.000]	0.109 [0.163]	1.000	-
INT	-0.321*** [0.002]	-0.299*** [0.003]	-0.245** [0.013]	1.000

Note: *** and ** indicate significant at the 1% and 5% levels, respectively. Figures in the squared bracket [.] show the p-value.

Unit root tests

Before the study further investigated the causalities among variables as well as their short- and long-run relationships, the stationarity test would be firstly conducted. Table 4 reported the unit root tests based on the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). Based on the tests, the study found that all variables were not stationary at the level, I(0), but became stationary after taking the first difference, I(1) at the 1% level of significance. Thus, this finding allows us to further proceed to the next step of estimation, namely to conduct the cointegration test. This test is aimed at exploring the existence of long-run equilibrium among the variables.

Tabel 4. Results of the unit root tests

Variables	Level		First Difference	
	ADF	PP	ADF	PP
CD	-1.317 [0.618]	-1.114 [0.707]	-10.994*** [0.000]	-11.016*** [0,000]
GDP	-2.608 [0.278]	-2.941 [0.156]	-5.126*** [0.000]	-8.164*** [0.000]
NPL	-0.376 [0.907]	-1.851 [0.354]	-9.332*** [0.000]	-14.374*** [0.000]
INT	-1.438 [0.139]	-1.438 [0.139]	-7.690*** [0.000]	-7.704*** [0.000]

Note: *** indicates significant at the 1% level. Figures in the squared bracket [.] show the p-value.

Cointegration tests

Table 5 provided the findings for the cointegration test based on the Johansen and Juselius (1990) approach. The study found that there was a cointegration among the CD, GDP, NPL and INT, both using Trace statistics and Max-Eigen statistics. Only one cointegrating vector was found among the variables using the Trace statistics test at the 1% level of significance, while two cointegrating vectors were found among the variables using the Max-Eigen statistics at the 5% level of significance. This finding indicated that there was an existence of long-run equilibrium among the variables. In other words, the credit demand by the SMEs in Aceh, Indonesia has a tendency to move together in the long-run with other variables, i.e., non-performing loan, economic growth, and interest rates. Understanding the movement

of one variable in the system could be used to predict the movement of other variables in the long-run.

Table 5. Results for the cointegration tests

Null Hypothesis	Trace Test			Max-Eigen (ME) Test		
	Trace Statistic	Critical Value		ME Statistic	Critical Value	
		1 %	5 %		1 %	5 %
$r \leq 0$	57.67***	47.21	54.46	30.66**	27.07	32.24
$r \leq 1$	27.00	29.68	35.65	20.20	20.97	25.52
$r \leq 2$	4.79	15.41	20.04	3.84	14.07	18.63
$r \leq 3$	0.94	3.76	6.65	0.94	3.76	6.65

Note: *** and ** indicate significant at the 1% and 5% levels, respectively

Bivariate granger causality

Since the investigated variables were stationarity at the first difference and cointegrated, thus it fulfilled both necessary and sufficient conditions for the Vector Error Correction Model (VECM) to be adopted in this study to empirically estimate the short- and long-run relationships among the variables. However, before the results from the VECM would be presented, the study firstly investigated the bivariate Granger causality between the variables. In so doing, the model incorporated lagged values of the variables, where the optimal lag-length to be included in the model was determined based on the Akaike (1974) Information Criteria (AIC). In this study, based on the smallest final prediction error of the AIC, the lag-length to be included was 5.

Table 6 provided the findings for the bivariate Granger causality test between variables. The study documented that there was a unidirectional Granger causality existed from the GDP to CD, and from the INT to GDP at the 10% and 5% levels of significance, respectively. These findings implied that when the economy grows, the demand for credit by the SMEs increases. This is partly due to the higher income of the citizens that led them to demand more the output and services produced by the SMEs, which in turns, caused an increase in the profits earned by the SMEs. Having higher profit, the SMEs tended to increase their credit demand. The credit supplied to the SMEs would promote the economy to grow, especially for countries or regions in which their financial system was dominated by the banking institutions. The role of the banks as the financial intermediary institutions becomes more important due to their channels of funds to the SMEs that, in turns, triggered an economic growth (Berger and Udell, 2006,). The loan provided to the SMEs with the aim of improving local communities to develop would contribute to the growth of both regional and national economies.

Table 6. Results for the bivariate granger causality test

Null Hypothesis	F-Statistics	Prob.
GDP does not Granger Cause CD	2.029*	0.085
CD does not Granger Cause GDP	0.855	0.515
NPL does not Granger Cause CD	1.082	0.378
CD does not Granger Cause NPL	1.567	0.181
INT does not Granger Cause CD	2.242**	0.050
CD does not Granger Cause INT	4.072***	0.002
NPL does not Granger Cause GDP	0.828	0.533
GDP does not Granger Cause NPL	0.888	0.494
INT does not Granger Cause GDP	2.696**	0.028
GDP does not Granger Cause INT	1.667	0.154
INT does not Granger Cause NPL	0.409	0.840
NPL does not Granger Cause INT	0.321	0.898

Note: ***, ** and * indicate significant at the 1%, 5% and 10% levels, respectively. The lag-length included in the model was equal to 5 based on the AIC.

Furthermore, the study also found the unidirectional Granger causality from the INT to GDP at the 5% level of significance, showing the importance of interest rate as the monetary

policy tool to stabilize economic growth. Meanwhile, the bidirectional Granger causality only existed between the NPL and CD, at least at the 5% level of significance. These two variables Granger caused each other when the CD increased, the NPL tended to be higher, and vice versa. However, if the credit offered by the banks to the SMEs were not productively utilized, it would increase the credit risk (Thiagarajan et al., 2011). In this context, the credit risk was defined as the potential failure of the SMEs to repay back their obligations in accordance with their agreement with the credit providers, which was reflected in the level of NPL (Ahmad and Arif, 2007). During the higher level of interest rates, the SMEs tended to reduce their credit demand, thus lowering the potentiality of having higher NPL (Bonifirm, 2003).

Multivariate causality test

Having provided an insight into the bivariate Granger causality between the variables, the findings from the multivariate analysis based on the VECM framework would be reported in this section. This model of estimation permits us to identify both short- and long-run patterns of causality. If the variables were found to be cointegrated, thus any deviations from the long-run equilibrium would, in the short run, restore back to its long-run equilibrium.

Table 7 presented findings for the short- and long-run relationships among the credit demand (CD), economic growth (GDP), non-performing loan (NPL), and interest rates (INT) based on the VECM. The study documented that at least one channel of Granger causality was active, either in the short-run through joint tests of lagged differences or in the long-run via statistically significant error correction terms (ECTs). This further implied that when there was a deviation from equilibrium cointegrating relationships as measured by the ECTs, it was mainly the changes in these variables that adjust to clear the disequilibrium. However, it is important to note, at this juncture, that the finding of cointegration among the variables merely implied their long-run relationship, while it implied causality, but it was unable to discover the causational directions among the variables.

Table 7. Results for the multivariate causality analysis based on the VECM

Model	Dependent Variables	Independent Variables					Diagnostic test
		[F-statistics]				(t-statistics)	
		ΔCD	ΔGDP	ΔNPL	ΔINT	ECT_{t-1}	
1	ΔCD	-	3.461** [0.006]	1.853* [0.097]	7.429*** [0,000]	-0.528** (-1.721)	Adj-R^2 = 0.634 F = 3.461**
2	ΔGDP	7.731*** [0.000]	-	0.555 [0.788]	7.204*** [0.000]	-0.706*** (-3.082)	Adj-R^2 = 0.743 F = 7.732***
3	ΔNPL	1.853* [0.097]	0.515 [0.819]	-	0.513 [0.795]	-0.284 (-0.466)	Adj-R^2 = 0.622 F = 1.851*
4	ΔINT	3.009* [0.013]	7.045*** [0.000]	0.675 [0.905]	-	-0.625*** (-3.758)	Adj-R^2 = 0,50 F = 2.57**

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

Figures in the squared parentheses [.] and parentheses (.) are the probabilities for the F-statistics and t-statistics, respectively. The lag-length included in the model was equal to 5, based on the AIC.

The study documented that the ECTs for Models 1, 2, and 4 confirmed the presence of long-run relationships among the variables. Particularly, this implied that any deviations from the long-run equilibrium relationships among variables were mainly due to the changes in credit demand, economic growth, and interest rates. Differently put, these variables bore the brunt of short-run adjustment to the long-run equilibrium with the fast speed of adjustment, ranging from -0.528 to -0.706. This indicated that the last period disequilibrium, on the average, corrected by 52.8 -70.6 percent in the following quarter. The summary of findings from Table 7 is summarized in Figure 1, as follows.

Figure 1: Multivariate causalities based on the VECMs
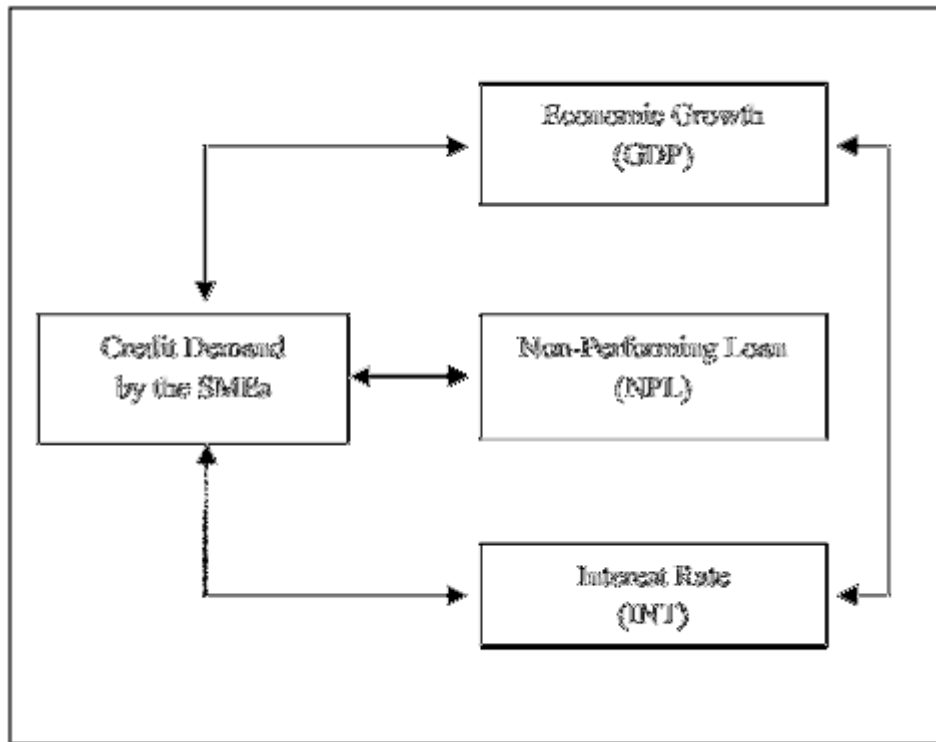
Furthermore, by having acceptable of non-performing loan offered to the SMEs by the banks in the province via the expansionary monetary policy (low-interest rates) would promote the provincial economic growth (Fiore and Tristani, 2013). These findings highlighted the important role of the banking institutions in offering loans to enhance the SMEs (Distinguin et al., 2016), and in turns, their positive contribution to the economic growth. These findings further supported the finding by Pasha (2009) on the significant role of the banks in promoting the level of economic activity in the region. In enhancing the SMEs as one of the pivotal contributors to regional income and as one of the pillars of economic growth, the government should design a proper strategy for the banks to offer sufficient amount of loans to the SMEs (Distinguin et al., 2016). By having an easy access to the banks, the SMEs would get sufficient funds as one of the necessary requirements for them to increase their levels of productivity and competitiveness (Ahmedova, 2015). Nuryakin and Warjiyo (2006) opined that conducive business environment characterized by higher levels of economic growth and lower level of interest rates would increase the demand for credit by the SMEs with the acceptable level of the non-performing loan.

Based on the above findings, several policy recommendations could be provided in order to ensure the sustainability of the SMEs and to further enhance their contribution to the provincial economic growth. Firstly, due to the higher level of NPLs of the banking loans to the SMEs, a proper strategy need also be implemented. Otherwise, the number of loans provided by the banking institutions to the SMEs would be restricted. The government should encourage the banks to offer their loans to the SMEs by determining the minimum level of the loans to be channelled to the SMEs and providing them with tax incentives. The government should also initiate to establish the SMEs Bank in the near future. Besides, in giving their credits, the banks should carefully select the SMEs by using good credit management principles. The Public Enterprise Credit Guarantee of Indonesia, a State-Owned Company that provided credit guarantee for the SMEs at the national level in Indonesia should further be enhanced. At the provincial level, the government of Aceh should also take imitative to establish credit guarantee institutions to ensure the repayment of the bank loans taken by the SMEs, especially if the loans provided to risky economic sectors. As a result, the banks would not hesitate to have the higher level of the NPLs since the loans have been guaranteed by the local government.

Secondly, since the interest rates were bidirectionally caused the NPLs, thus the government should implement a proper expansionary monetary policy by controlling the level

of interest. Higher interest rates caused difficulty for the SMEs to apply for the new bank loans and to repay back their existing bank loans. The government might provide interest subsidy facility for the SMEs to borrow from the banks and for the banks to channel their loans to the SMEs. The central bank of Indonesia, Bank Indonesia should adjust the lending rate for the SMEs become more attractively and competitively. For this purpose, the bank should also lower their cost of funds by implementing financial soundness and prudent management. At the national level, the lending rate for the SMEs was 10.7 percent, which was higher than the lending rates in other ASEAN markets. Consequently, the SMEs in Indonesia have been less competitive compared to the SMEs in other ASEAN markets. It is suggested here that the lending rate for the SMEs should be no higher than two digits.

Thirdly, the government should design a proper strategy to enhance the productivity and competitiveness of the SMEs by stabilizing the interest rates with the aim to reduce the NPL and, in turns, to promote the economic growth. Additionally, the government should also maintain the stability of input prices by regulating and controlling the distribution channels for raw materials needed by the SMEs. Having stability of input prices, the SMEs could easily increase their efficiency, productivity and penetrate their product and services into the markets at the competitive prices. Remarkably, we found that growth paths that are most commonly used by SMEs (market penetration and increasing efficiency) hardly lead to growth. An increase in efficiency and market penetration would hardly boost the SMEs to growth (Wakkee et al., 2015) and lead the economy to growth. As a result, it might attract the banking institutions to offer more loans to the SMEs due to an increased demand for working capital needed by the SMEs to expand their business activities in meeting an increased market demand due to the higher level of people's income.

Finally, the government should design various incentives for the SMEs in the forms of providing: lower cost and shorter time for the new SMEs in applying for their business licenses; tax relief; technical and business assistances; marketing their product to foreign markets; and business assurance and protection. In addition, the government should also provide infrastructures to support business activities and enhance market access for the SMEs, such as establishing roads, ports, and transportation facilities connecting the SMEs to marketplaces.

5. <u>Conclusion</u>

This study empirically explored the short- and long-run relationships between economic growth, non-performing loans, interest rates and the credit demand by the small and medium enterprises (SMEs) in Aceh province, Indonesia. It also attempted to investigate the existence of long-run equilibrium and dynamic multivariate causalities among the variables. The quarterly data for the period 1995 to 2015 were utilized and analyzed by the standardized times series analyses of cointegration and vector error correction model (VECM). The study documented that there was a cointegration among the economic growth, non-performing loans, interest rates and the credit demand, implying the existence of long-run equilibrium among the variables. In addition, the study found the existence of dynamic causalities among the variables. Particularly, in short-run, the study found a unidirectional causality from economic growth to credit demand, a bidirectional causality between interest rates and credit demand, while no causality existed between non-performance loan and credit demand by the SME in Aceh, Indonesia. These findings implied that in order to enhance the SMEs, the government should focus on promoting the economic growth by managing the interest rates in the province.

To further enhance the contribution of the SMEs to the Aceh's economic growth, the government should encourage the banks to offer more loans to the SMEs by determining the minimum level of the loans to be channelled to the SMEs and providing them with tax incentives. It is also suggested for the government to provide interest subsidy facility for the SMEs to borrow from the banks and for the banks to channel their loans to the SMEs. The central bank of Indonesia, Bank Indonesia should adjust the lending rate for the SMEs become more attractively and competitively. Finally, the government should design various incentives for the SMEs in the forms of providing tax relief, technical and business assistances, and business assurance.

While this study has provided clear evidence on the importance of the credit demand by the SMEs to the economic growth of Aceh, Indonesia, there are few areas for extensions that can further contribute toward refining the literature in this area. This includes undertaking a more robust analysis using a more extended period of study. More detailed aspects of the SMEs could be explored by examining the contribution of the SMEs by economic sectors. This would allow the identification of the specific sectors of the SMES that are contributing more to the economic growth. Future researches should consider a wider aspect of macroeconomic determinants in affecting the contribution of the SMEs to the economy, which could perhaps provide a clearer picture for the policy recommendations. Additionally, the enrichment of the findings could also be done by including the SMEs across the ASEAN countries into the analysis to enable comparison across countries in the region for more enriching policy recommendations, particularly on enhancing their productivity and competitiveness as well as their contribution to promoting the national economies.

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CHARACTERIZATION OF AGRICULTURAL SYSTEMS IN THE EUROPEAN UNION REGIONS: A FARM DIMENSION-COMPETITIVENESS-TECHNOLOGY INDEX AS BASE

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Abstract

The agricultural realities across the several regions belonging to the European Union (EU) present some significant differences, in terms of the socioeconomics, cultural, structural and environmental dimensions. In general, because it is difficult to consider all the realities, within each country, sometimes the public decision makers, in Europe, need to design common approaches for all countries and regions, despite there being some decentralization of decisions. In this scenario, this study aims to identify and characterize the main agricultural systems in the European Union, using statistical information available in the FADN (2017), for the periods 2007-2009 and 2012-2013. This was done, considering the utilized agricultural area (farm dimension), the machinery (farm technology and innovation) and the farm net value added (farm competitiveness) as principal indicators. From these variables the European Union countries and regions were grouped into agricultural systems through cluster approaches and based on a farm dimension-competitiveness-technology index obtained with factor analysis. This approach was complemented by spatial analysis, through the observation of spatial autocorrelation between European Union countries, as determining the farming characteristics in neighboring countries. Of stressing, the relevant differences in the farm characteristics, not only, among European countries, but also, inside each member state between regions. On the other hand, of highlighting the adequacy of the index considered as representative of the farming particularities.

Keywords: European Union regions, Farm Accountancy Data Network (FADN), Spatial approaches, Factor and clusters analysis

JEL classification: C21, C38, O13, O52, Q10

1. Introduction

The diversity observed in the agriculture for European Union regions, in terms of structure, production, management, soil and climate, among other aspects, whether are good for biodiversity and allow for some specialization, can sometimes create some difficulties when it is necessary to design a common strategy.

Indeed, the greatest challenge for institutions in the European Union, in the future, concerning agricultural sector interventions, will be to deal with the huge differences across the several countries and regions. The European Union countries have, also, various economic, social, cultural and environmental contexts with implications upon the dynamics for the agricultural sector.

In this framework, all contributions for the identification and characterization of farming systems in Europe may bring interesting insights, because this allows to identify and organize the countries and regions into sets where the farms have similar characteristics. These organizations facilitate all the decision-making processes in terms of strategical design for the agricultural sector in each dimension, private or public, local or regional, regional or national and national or supranational.

Considering what has been referred to before, the objective of the current study is the identification and characterization of agricultural systems across the European Union countries and regions, considering the statistical information available in the FADN (2017), for the periods 2007-2009 and 2012-2013. The reasons for considering these years are mainly related to the availability of data, the several changes across the years in the regions names, to take into account the effects of the Common Agricultural Policy modifications around 2007

and the adherence of Bulgaria and Romania to the European Union. The Farm Accountancy Data Network is an interesting database with data at farm level, allowing microeconomic analysis fundamental to support policies design (Marta-Costa, Martinho, and Santos 2017).

With this data the farms of the former 27 European Member States, and respective NUTs 2, were grouped into sets of countries and regions through cluster analysis and based on a farm dimension-competitiveness-technology index. This index was obtained through factor analysis with the farm utilized agricultural area (ha), machinery (euro) and farm net value added (euro). As showed in the following sections, this index is an adjusted factor, because the base variables capture a relevant part of the European Union farm characteristics.

In this process of grouping the farms other indicators were also observed, such as spatial autocorrelation, analyzed through the GeoDa (2015) software. The spatial autocorrelation is related with the possibility of a certain variable in a specific local, region or country may be autocorrelated with the same variable in the neighboring regions. The spatial autocorrelation is a statistical infraction, so dealing with this question increases the robustness of the results, but, also, helps in the decision-making process.

Considering the Food and Agriculture Organization of the United Nations (FAO) agricultural systems are a set of mechanisms that operate together within a limit to attain certain goals and objectives (http://www.fao.org/docrep/w7365e/w7365e04.htm#1.1 system definition and hierarchy). However, the objective in this work is a little broader and it is pretended to identify and characterize agricultural systems through representative farms with similar features, not necessarily inside the same boundary and with any explicit interactions. In fact, the main goal is to present a contribution that help in the definition of adjusted policies and decisions.

2. Literature review

The characterization of European Union farms, to try identifying homogeneous farming systems in European countries is crucial to facilitate the process of design and planning agricultural strategies and plans (D'Amico et al. 2013). The differences are, in many cases, not only a reality among countries, but also inside the countries between the several regions (Glauben, Tietje, and Weiss 2006).

Unadjusted strategies for the agriculture can promote reductions in the agricultural system's sustainability, with significant socioeconomic and cultural impacts (Dominguez Gomez and Relinque 2014), compromising the diverse dynamics that can be developed in rural zones, usually, with several weaknesses. In fact, the agricultural policies, namely those which come from the Common Agricultural Policy, have an influence upon farming systems, specifically in agricultural production, income, prices and biodiversity (Overmars et al. 2013). For example, Trubins (2013) found that the Common Agricultural Policy, namely after 2000, had significant implications upon Swedish agricultural systems, inducing the farmers´ production options for areas with higher quality.

On the other hand, the socioeconomics, climate, soil and conditions for innovation are, also, determinants in the way the rural territories and land are structured and organized (Audsley et al. 2008). In this way, Bacon et al. (2012), for instance, stressed the importance of considering the social aspects in the analysis related to agriculture. Dono et al. (2013), in its turn, analyzed the implications of climate change on water irrigation availability, namely in Mediterranean agricultural systems. The concerns with the climate encouraged several authors to develop new tools to analyze the exposures of the agricultural systems to the future changes, as the work presented by Eza et al. (2015).

Another aspect, as referred before, is about the soil. The questions related with the implications in the soil conditions, namely in terms of phosphorus were, also, studied by Senthilkumar et al. (2012). Mastrocicco et al. (2013), in its turn, analyzed aspects associated with the implications of drainage and soil nitrogen presence. The implications in the water pollution were, too, investigated by Gorton, Lowe, and Zellei (2005) in Lithuania, Poland and Slovakia. The relationship between the land utilization and the soil quality is an important question (Salvati and Colantoni 2015), considering the influence of the soil, as well the climate, in the choices and decisions of the farmers.

To identify and characterize the farming systems it is determinant to analyze the several practices developed by the producers in farms. For example, the agricultural practices

associated with environmental preservations and with the related production pathways influence the characterization of farming systems in olive groves (Santos et al. 2007), but also in another crop productions and in livestock activities. Animal production, often, has problems with soil pollution, but, also, with air contamination. The efficiency in livestock production is fundamental for sustainability, reducing inputs and costs and to preserve the environment (Gaspar et al. 2009).

There are some production pathways which are characteristic of certain countries and regions, defining specific agricultural systems. A typical farming system in Portugal, namely in the South, is the "Montado", where is produced cork, wood and animal production in extensive farming conditions (Borges et al. 2010). In Southern Spain, several agricultural systems are characterized by the use of brassicas as cover crops in orchards. These practices improve the sustainability and preserve the environment, through the biomass production, reduction in the use of fertilizers and increasing the soil porosity (Alcántara et al. 2009).

In general, the sustainable development will be the big challenge for many countries, regions and places. In fact, it is not easy to find a balance between the economic and the environmental dynamics (Almeida et al. 2017).

In the Northern and in Southern Italy, Ghisellini et al. (2014) found that the land use and the labor productivity are two determining factors in the dynamics of the agricultural systems in the Italian regions Emilia Romagna and Campania. The evolution of the farming systems in France, and in almost all countries in the European Union, experienced several transformations, due to various reasons (including political). In many European countries, such as France, the farms changed from diversified productions for the subsistence of the farmers´ family to farms which were more specialized and market-driven (Choisis et al. 2010). These authors found that the farm size is determined by the spatial and organizational agricultural systems.

Using cluster techniques Palma Lampreia dos Santos (2013) segmented the farms of the 27 European Union countries, identifying four types of farming systems based on the structural aspects (utilized agricultural area and others), financial questions and the relevant subsidies. The clusters found are: Germany, Austria, Belgium, Cyprus, Finland, France, Lithuania, Malta and Sweden; Bulgaria, Estonia, Slovenia, Greece, Hungary, Latvia, Poland, Portugal and Romania; Slovakia, the Czech Republic; Ireland, Luxembourg and the UK. López, Valiño, and Pérez (2008) classified and characterized agricultural systems in Spain considering the following variables: land utilization; farm dimension; and production systems.

Another aspect is about the multifunctionality/diversity in the farming systems. Indeed, the multifunctionality may improve the farmers' income, preserve the biodiversity and reduce the farm's risks (Nikolova and Linkova 2011). Namely, in the zones where agriculture is not profitable alone, the consideration of other non-agricultural activities that can be developed in rural regions may be an interesting complement for the return obtained in these lower profit agricultural systems. The multifunctionality of the farming systems and multidisciplinary approaches in the agricultural researches were highlighted, also, by Kragt et al. (2016).

Of stressing, also, that in general, factors such as the economic conditions, innovation and organizational orientations are more considered in literature, rather than factors related with social, cultural and demographic characteristics (van Vliet et al. 2015).

3. **European agricultural systems**

In this section, the agricultural systems (in a perspective of representative farms with similar characteristics) existent in the European Union countries will first be identified and then characterized. The European countries and regions will be grouped considering their structural, technological, competitiveness characteristics, through cluster analysis based on the farm index obtained by factor analysis. It was used data in average from the database available in the FADN (2017), over the periods 2007-2009 (disaggregated at country and regional level) and 2012-2013 (disaggregated at regional level), considered for the spatial analyses the procedures from the GeoDa (2015) software and followed for the factor and cluster analysis the procedures proposed by Stata (2017). The several methodologies related with the cluster and spatial approaches have diverse applications in the regional analysis (Leonidovich 2017; Yalyalieva and Napolskikh 2017).

The adequacy of the farm index proposed

To improve the analysis it was built a farm dimension-competitiveness-technology index obtained through factor analysis and based on the utilized agricultural (dimension), machinery (technology) and farm net valued added (competitiveness). In fact, as showed in the table 1, these three variables are linearly correlated, in the two periods, what claims for a factor exploration before using these indicators in the cluster analysis. The linear correlation is ever stronger between the technology (machinery) and the competitiveness (farm net valued added) in the two periods and among countries or regions. On the other hand, the several correlations are slightly stronger in the second period, sign that the interrelationships between the dimension-competitiveness-technology improved.

Table 1. Pairwise correlation matrix among the European Union countries and regions over the period 2007-2009 and 2012-2013, between the farm dimension, net valued added and machinery

	Total Utilised Agricultural Area	Farm Net Value Added	Machinery
By countries over the period 2007-2009			
Total Utilised Agricultural Area	1.000		
Farm Net Value Added	0.588*	1.000	
	(0.001)		
Machinery	0.588*	0.889*	1.000
	(0.001)	(0.000)	
By regions over the period 2007-2009			
Total Utilised Agricultural Area	1.000		
Farm Net Value Added	0.833*	1.000	
	(0.000)		
Machinery	0.850*	0.919*	1.000
	(0.000)	(0.000)	
By regions over the period 2012-2013			
Total Utilised Agricultural Area	1.000		
Farm Net Value Added	0.847*	1.000	
	(0.000)		
Machinery	0.851*	0.938*	1.000
	(0.000)	(0.000)	

Note: *, statistically significant at 5%.

On the other hand, the consideration of these variables to obtain the index proposed follows the literature review that shows that the farm structures, innovation and performance are interesting factors to characterize the farming systems (Choisis et al. 2010; López, Valiño, and Pérez 2008; Palma Lampreia dos Santos 2013; van Vliet et al. 2015).

To explore the adequacy of the farm index obtained, the table 2 provides the summary statistics for the European Union countries and regions over the periods considered and the table 3 presents a pairwise correlation matrix among this index and other relevant variables of the farm characteristics.

Table 2. Summary statistics for the farm dimension-technology-competitiveness index obtained for the European Union countries and regions over the period 2007-2009 and 2012-2013

Variable	Number of observations	Mean	Standard Deviation	Min	Max
Farm index (first period at country level)	27	2.070e-09	0.949	-1.014	1.997
Farm index (first period at regional level)	135	8.380e-10	0.970	-0.810	5.033
Farm index (second period at regional level)	134	-1.150e-09	0.976	-0.725	5.319

Table 3. Pairwise correlation matrix among the European Union countries and regions over the period 2007-2009 and 2012-2013, between the farm index and other farm variables

	Farm index	Labour input	Total Utilised Agricultural Area	Total livestock units	Total output	Total Inputs	Farm Net Value Added	Total assets	Total current subsidies
By countries over the period 2007-2009									
Farm index	1.000								
Labour input	0.606*	1.000							
	(0.000)								
Total Utilised Agricultural Area	0.661*	0.944*	1.000						
	(0.000)	(0.000)							
Total livestock units	0.939*	0.602*	0.690*	1.000					
	(0.000)	(0.000)	(0.000)						
Total output	0.952*	0.688*	0.717*	0.942*	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)					
Total Inputs	0.917*	0.792*	0.825*	0.916*	0.978*	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Farm Net Value Added	0.969*	0.539*	0.588*	0.938*	0.952*	0.885*	1.000		
	(0.000)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)			
Total assets	0.795*	0.206	0.308	0.822*	0.784*	0.717*	0.799*	1.000	
	(0.000)	(0.300)	(0.117)	(0.000)	(0.000)	(0.000)	(0.000)		
Total current subsidies	0.750*	0.892*	0.956*	0.756*	0.768*	0.864*	0.670*	0.404*	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.036)	
By regions over the period 2007-2009									
Farm index	1.000								
Labour input	0.758*	1.000							
	(0.000)								
Total Utilised Agricultural Area	0.902*	0.847*	1.000						
	(0.000)	(0.000)							
Total livestock units	0.845*	0.634*	0.800*	1.000					
	(0.000)	(0.000)	(0.000)						
Total output	0.980*	0.775*	0.875*	0.859*	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)					
Total Inputs	0.978*	0.821*	0.910*	0.855*	0.990*	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Farm Net Value Added	0.969*	0.700*	0.833*	0.791*	0.970*	0.945*	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
Total assets	0.804*	0.509*	0.654*	0.815*	0.815*	0.786*	0.783*	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Total current subsidies	0.952*	0.810*	0.952*	0.816*	0.920*	0.952*	0.895*	0.690*	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
By regions over the period 2012-2013									
Farm index	1.000								
Labour input	0.809*	1.000							
	(0.000)								
Total Utilised Agricultural Area	0.896*	0.863*	1.000						
	(0.000)	(0.000)							
Total livestock units	0.857*	0.669*	0.809*	1.000					
	(0.000)	(0.000)	(0.000)						
Total output	0.984*	0.814*	0.873*	0.876*	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)					
Total Inputs	0.983*	0.851*	0.903*	0.876*	0.994*	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Farm Net Value Added	0.980*	0.795*	0.847*	0.816*	0.984*	0.972*	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
Total assets	0.819*	0.587*	0.701*	0.820*	0.824*	0.806*	0.792*	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Total current subsidies	0.936*	0.849*	0.931*	0.804*	0.910*	0.942*	0.898*	0.701*	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Note: *, statistically significant at 5%.

As relevant and representative variables it were considered, from the FADN (2017) database, despite the farm index built, the total labour (hours), the total utilized agricultural area (ha), the total livestock units (LU), total output (euros), total inputs (euros), farm net value added (euros), total assets (euros) and total current subsidies (euros). The table 3 reveals that there are a strong and significant relationship among the farm index obtained and the main characteristics of the European Union farms. In fact, the farm dimension is interrelated with the possibility of using new technologies and innovation, what have implications in the competitiveness of the agricultural sector. Considering the particularities of the agri-food sector, the competitiveness is an important indicator to take into account (Dovgal et al. 2017).

Identifying farming systems

Exploring the farm dimension-competitiveness-technology index with cluster analysis, the several countries and regions were grouped, over the periods considered, into four clusters in each case (taking into account the dendrograms showed in the figure 1) as presented in the tables 4, 5 and 6.

The table 4 shows that the results found with cluster analysis for the former twenty seven European Union countries, over the period 2007-2009, have some similarities with those obtained by Palma Lampreia dos Santos (2013). The clusters presented in the table 4 are: Belgium, Germany, Estonia, France, Austria, Finland and Sweden; Czech Republic, Netherland and Slovakia; Denmark, Luxembourg and United Kingdom; Bulgaria, Cyprus, Greece, Spain, Hungary, Ireland, Italy, Lithuania, Latvia, Malta, Poland, Portugal, Romania and Slovenia. In the cluster 1 the Estonia is the country with greater average (over the period) utilized agricultural area, but with lower technology and competitiveness. On the other hand, Belgium and Germany have the better competitiveness and Germany and Sweden the higher average values for the machinery. In the cluster 2, the Netherlands has the lower area, but the better competitiveness. In the cluster 3, United Kingdom has the greater average area and competitiveness and Luxembourg the higher values for the mean machinery. For the cluster 4, Latvia has the greater area, Italy the best average competitiveness and Malta the best values for the machinery.

The results presented in the table 4 for the cluster found seems to reveal that there are not spatial linkage inside each group of countries, indicating that the farms with similar characteristics inside the European Union area not within a European zone with a spatial limit or border. To explore these findings and to explore this analysis, it was observed for the period 2007-2009, and for the variables used to obtain the farm index built, the global and local spatial autocorrelation, at country level, through cross-section analysis, using georeferenced methodologies (Martinho 2015). The results are presented in figures 2 and 3.

Figure 2 shows the global spatial autocorrelation, considering the statistics from Moran´s I. The global spatial autocorrelation analyzes the hypothesis of the values of a variable being correlated across all the countries analyzed. Positive values for Moran´s I signify that there is positive spatial autocorrelation (the values of a variable are correlated in all the countries and evolve in the same way and vice-versa). In fact, Anselin (1995) referred that the local indicator for local association (LISA) for each observation provides the dimension of significant spatial grouping of similar values close to that observation and the sum of that LISAs for all observations gives the global indicator for spatial association. On the other hand, the Moran´s I can assume values among -1 and 1, where values close to 1 represent positive spatial autocorrelation (tendency to clustering) and close to -1 indicate negative spatial autocorrelation (tendency to dispersion), as referred, for example by the ESRI (http://resources.esri.com/help/9.3/arcgisengine/java/gp_toolref/spatial_statistics_tools/spatial _autocorrelation_morans_i_spatial_statistics_.htm).

On the other hand, the local spatial autocorrelation analyzes the possibility that the values of a determinate variable in a country be correlated with the values of the same variable in the neighboring countries (figure 3). In figure 3, the values high-high means positive local spatial autocorrelation for high values, and the values low-low signify positive autocorrelation for low values. The values low-high and high-low represent negative autocorrelation. All the results for the high-high, low-low, low-high and high-low represent spatial autocorrelation (positive or negative) with statistical significance (GeoDa 2015).

Figure 2 shows that the values of Moran´s I are close to 0 for the three indicators considered (negative and closer to 0 relative to the utilized agricultural area and positive for the farm net value added and the machinery value). These facts demonstrate that the global spatial autocorrelation, for the variables analyzed, is weak, so these indicators are not correlated among the neighboring countries.

The values in figure 3 confirm this description and the local spatial autocorrelation is, also, weak. However, there are some signs of negative spatial autocorrelation for Poland (and neighbors), in the three variables, and positive low-low autocorrelation in Bulgaria (and neighbors) for the farm net value added (showing signs of low competitiveness in these countries).

These results for the global and local spatial autocorrelation confirms that there are few spatial linkage among the European Union farms with similar characteristics, what reinforce the propose presented in this work to consider the concept of agricultural systems in a broader approach for the European context.

Figure 1. Dendrograms for cluster analysis over the European Union countries and regions over the periods 2007-2009 and 2012-2013

By countries over the period 2007-2009

By regions over the period 2007-2009

By regions over the period 2012-2013
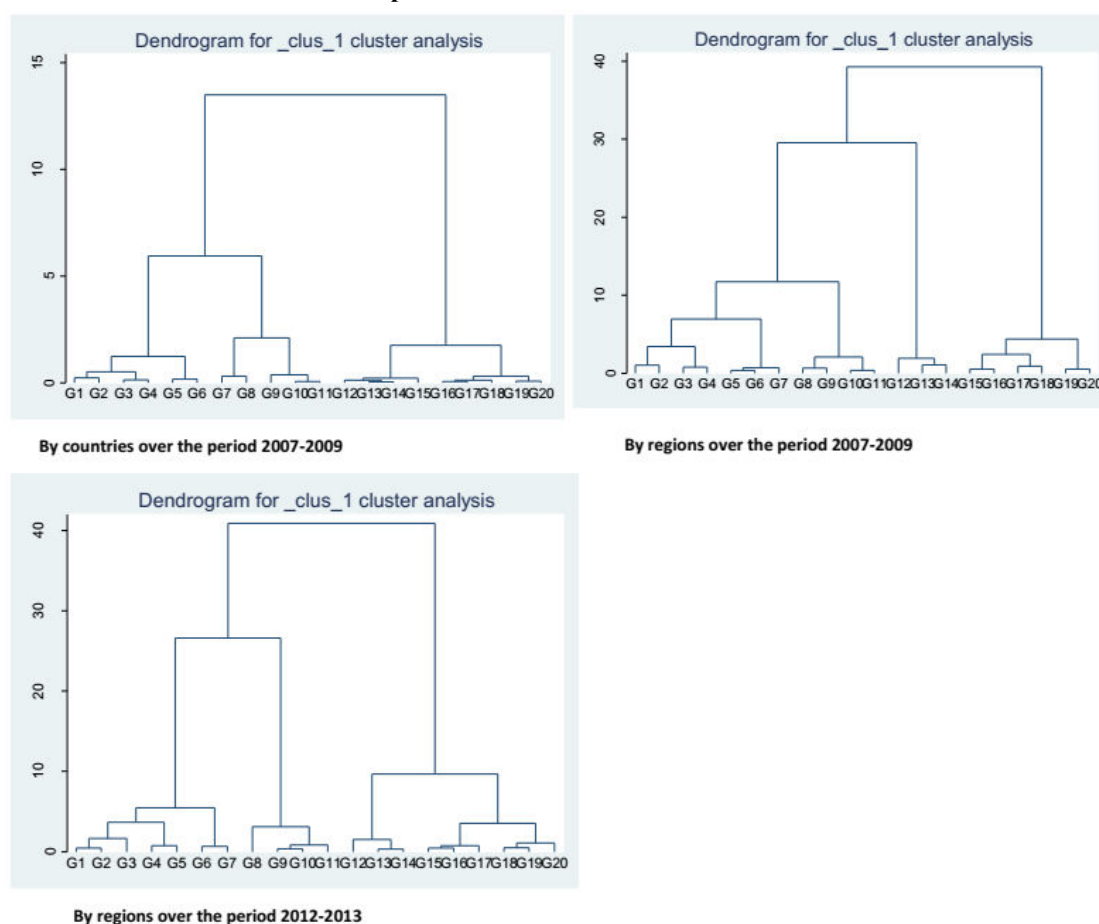
Figure 2. Global spatial autocorrelation for the indicators used (Utilized agricultural area – ha, farm net value added – euro, machinery value – euro)
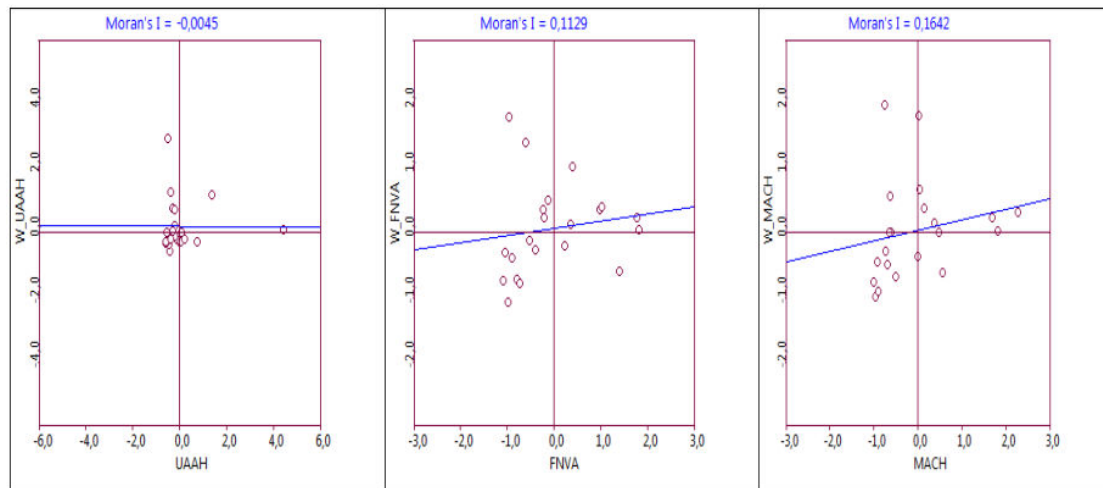
Figure 3. Local spatial autocorrelation for the indicators used (Utilized agricultural area – ha, farm net value added – euro, machinery value – euro)

Table 4. Identification of agricultural systems through the farm index obtained for the European Union countries, over the period 2007-2009

Country	Cluster
Belgium	
Germany	
Estonia	
France	1
Austria	
Finland	
Sweden	
Czech Republic	
Netherlands	2
Slovakia	
Denmark	
Luxembourg	3
United Kingdom	
Bulgaria	
Cyprus	
Greece	
Spain	
Hungary	
Ireland	
Italy	
Lithuania	4
Latvia	
Malta	
Poland	
Portugal	
Romania	
Slovenia	

Table 5. Identification of agricultural systems through the farm index obtained for the European Union regions, over the period 2007-2009

Country	Region	Cluster
Germany	Schleswig-Holstein	1
Germany	Hamburg	
Germany	Niedersachsen	
Germany	Nordrhein-Westfalen	
Germany	Hessen	
Germany	Rheinland-Pfalz	
Germany	Baden-Württemberg	
Germany	Bayern	
Germany	Saarland	
France	Champagne-Ardenne	
France	Haute-Normandie	
France	Centre	
France	Basse-Normandie	
France	Bourgogne	
France	Nord-Pas-de-Calais	
France	Lorraine	
France	Alsace	
France	Franche-Comté	
France	Pays de la Loire	
France	Bretagne	
France	Poitou-Charentes	
France	Aquitaine	
France	Midi-Pyrénées	
France	Limousin	
France	Rhône-Alpes	
France	Auvergne	
France	Provence-Alpes-Côte d'Azur	
France	Corse	
Italy	Aosta	
Italy	Piemonte	
Italy	Lombardia	
Italy	Veneto	
Italy	Friuli-Venezia	

Italy	Toscana	
Belgium	Vlaanderen	
Belgium	Wallonie	
United Kingdom	England-North	
United Kingdom	England-West	
United Kingdom	Wales	
United Kingdom	Northern Ireland	
Austria	Austria	
Finland	Etela-Suomi	
Finland	Sisa-Suomi	
Finland	Pohjanmaa	
Finland	Pohjois-Suomi	
Sweden	Slattbygdslan	
Sweden	Skogs-och mellanbygdslan	
Sweden	Lan i norra	
Estonia	Estonia	
Hungary	Közép-Dunántúl	
Hungary	Nyugat-Dunántúl	
Hungary	Dél-Dunántúl	
France	Île-de-France	
France	Picardie	
Luxembourg	Luxembourg	
Netherlands	The Netherlands	
Denmark	Denmark	2
United Kingdom	England-East	
United Kingdom	Scotland	
Czech Republic	Czech Republic	
(SVK) Slovakia	Slovakia	
Germany	Brandenburg	
Germany	Mecklenburg-Vorpommern	
Germany	Sachsen	3
Germany	Sachsen-Anhalt	
Germany	Thueringen	
France	Languedoc-Roussillon	4
Italy	Trentino	
Italy	Alto-Adige	
Italy	Liguria	
Italy	Emilia-Romagna	
Italy	Marche	
Italy	Umbria	
Italy	Lazio	
Italy	Abruzzo	
Italy	Molise	
Italy	Campania	
Italy	Calabria	
Italy	Puglia	
Italy	Basilicata	
Italy	Sicilia	
Italy	Sardegna	
Ireland	Ireland	
Greece	Makedonia-Thraki	
Greece	Ipiros-Peloponissos-Nissi Ioniou	
Greece	Thessalia	
Greece	Sterea Ellas-Nissi Egaeou-Kriti	
Spain	Galicia	
Spain	Asturias	
Spain	Cantabria	
Spain	Pais Vasco	
Spain	Navarra	
Spain	La Rioja	
Spain	Aragón	
Spain	Cataluna	
Spain	Baleares	
Spain	Castilla-León	
Spain	Madrid	
Spain	Castilla-La Mancha	
Spain	Comunidad Valenciana	
Spain	Murcia	
Spain	Extremadura	
Spain	Andalucia	
Spain	Canarias	
Portugal	Norte e Centro	
Portugal	Ribatejo e Oeste	
Portugal	Alentejo e do Algarve	
Portugal	Açores e Madeira	

Cyprus	Cyprus
Hungary	Közép-Magyarország
Hungary	Észak-Magyarország
Hungary	Észak-Alföld
Hungary	Dél-Alföld
Latvia	Latvia
Lithuania	Lithuania
Malta	Malta
Poland	Pomorze and Mazury
Poland	Wielkopolska and Slask
Poland	Mazowsze and Podlasie
Poland	Małopolska and Pogórze
Slovenia	Slovenia
Bulgaria	Severozapaden
Bulgaria	Severen tsentralen
Bulgaria	Severoiztochen
Bulgaria	Yugozapaden
Bulgaria	Yuzhen tsentralen
Bulgaria	Yugoiztochen
Romania	Nord-Est
Romania	Sud-Est
Romania	Sud-Muntenia
Romania	Sud-Vest-Oltenia
Romania	Vest
Romania	Nord-Vest
Romania	Centru
Romania	Bucuresti-Ilfov

From the table 5 it is possible to observe that the majority of the Germanic, French and British regions are grouped in the cluster 1, as well some regions from Italy and Hungary. In turn, all regions from Belgium, Austria, Finland, Sweden and Estonia are here clustered. In the cluster 2 are some regions from France (Île-de-France and Picardie) and from United Kingdom (England-East and Scotland). Countries with only 1 region as Netherlands, Denmark, Luxembourg, Czech Republic and Slovakia area also part of this cluster 2. The Germanic regions of Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt and Thueringen constitute the cluster 3. The cluster 4 has the majority of the Italian regions, all regions from Greece, Spain, Portugal, Poland, Bulgaria and Romania and other countries with only 1 region as Cyprus, Malta, Latvia, Lithuania and Slovenia. There are here some similarities with the analysis made before at country level, however, this analyses at region level shows that inside each country there are significant differences.

The results showed in the table 6 (at region level and for the period 2012-2013), in general, are similar with those presented in the table 5, however the differences evidenced reveal that the year among the period 2007-2009 and 2012-2013 promoted changes in the European Union farming dynamics.

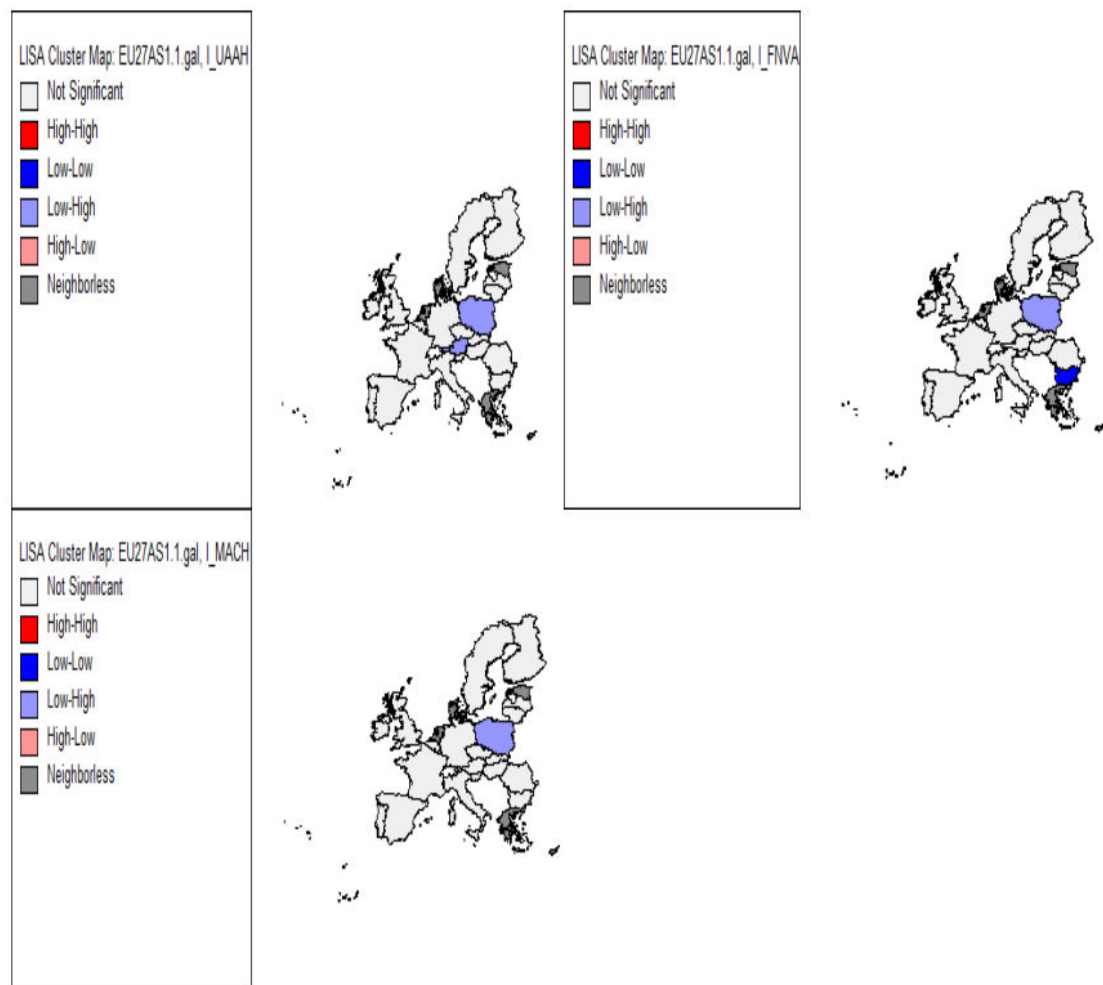**Table 6. Identification of agricultural systems through the farm index obtained for the European Union regions, over the period 2012-2013**

Country	Region	Cluster
Germany	Schleswig-Holstein	1
Germany	Niedersachsen	
Germany	Nordrhein-Westfalen	
Germany	Hessen	
Germany	Rheinland-Pfalz	
Germany	Saarland	
France	Île-de-France	
France	Champagne-Ardenne	
France	Picardie	
France	Haute-Normandie	
France	Centre	
France	Basse-Normandie	
France	Bourgogne	
France	Nord-Pas-de-Calais	
France	Lorraine	
France	Alsace	
France	Franche-Comté	
France	Pays de la Loire	
France	Bretagne	
France	Poitou-Charentes	
Belgium	Vlaanderen	
Belgium	Wallonie	
Luxembourg	Luxembourg	

Netherlands	The Netherlands	
Denmark	Denmark	
United Kingdom	England-North	
United Kingdom	England-East	
United Kingdom	England-West	
United Kingdom	Wales	
United Kingdom	Scotland	
Sweden	Slattbygdslan	
Sweden	Skogs-och mellanbygdslan	
Sweden	Lan i norra	
Czech Republic	Czech Republic	
Slovakia	Slovakia	

Germany	Brandenburg	
Germany	Mecklenburg-Vorpommern	
Germany	Sachsen	2
Germany	Sachsen-Anhalt	
Germany	Thueringen	

Germany	Hamburg	
Germany	Baden-Württemberg	
Germany	Bayern	
France	Aquitaine	
France	Midi-Pyrénées	
France	Limousin	
France	Rhône-Alpes	
France	(0193) Auvergne	
France	Languedoc-Roussillon	
France	Provence-Alpes-Côte d'Azur	
France	Corse	
France	Martinique	3
Italy	Lombardia	
Italy	Friuli-Venezia	
United Kingdom	Northern Ireland	
Spain	Navarra	
Austria	Austria	
Finland	Etela-Suomi	
Finland	Sisa-Suomi	
Finland	Pohjanmaa	
Finland	Pohjois-Suomi	
Estonia	Estonia	
Hungary	Dunántúl	

France	Guadeloupe	4
France	La Réunion	
Italy	Aosta	
Italy	Piemonte	
Italy	Trentino	
Italy	Alto-Adige	
Italy	Veneto	
Italy	Liguria	
Italy	Emilia-Romagna	
Italy	Toscana	
Italy	Marche	
Italy	Umbria	
Italy	Lazio	
Italy	Abruzzo	
Italy	Molise	
Italy	Campania	
Italy	Calabria	
Italy	Puglia	
Italy	Basilicata	
Italy	Sicilia	
Italy	Sardegna	
Ireland	Ireland	
Greece	Makedonia-Thraki	
Greece	Ipiros-Peloponissos-Nissi Ioniou	
Greece	Thessalia	
Greece	Sterea Ellas-Nissi Egaeou-Kriti	
Spain	Galicia	
Spain	Asturias	
Spain	Cantabria	
Spain	Pais Vasco	
Spain	La Rioja	
Spain	Aragón	
Spain	Cataluna	
Spain	Baleares	

Spain	Castilla-León
Spain	Madrid
Spain	Castilla-La Mancha
Spain	Comunidad Valenciana
Spain	Murcia
Spain	Extremadura
Spain	Andalucia
Spain	Canarias
Portugal	Norte e Centro
Portugal	Ribatejo e Oeste
Portugal	Alentejo e do Algarve
Portugal	Açores e Madeira
Cyprus	Cyprus
Hungary	Észak-Magyarország
Hungary	Alföld
Latvia	Latvia
Lithuania	Lithuania
Malta	Malta
Poland	Pomorze and Mazury
Poland	Wielkopolska and Slask
Poland	Mazowsze and Podlasie
Poland	Małopolska and Pogórze
Slovenia	Slovenia
Bulgaria	Severozapaden
Bulgaria	Severen tsentralen
Bulgaria	Severoiztochen
Bulgaria	Yugozapaden
Bulgaria	Yuzhen tsentralen
Bulgaria	Yugoiztochen
Romania	Nord-Est
Romania	Sud-Est
Romania	Sud-Muntenia
Romania	Sud-Vest-Oltenia
Romania	Vest
Romania	Nord-Vest
Romania	Centru
Romania	Bucuresti-Ilfov

Characterizing agricultural systems

Considering the differences found in the characteristics of the European Union farms between the two periods analyzed, it was considered only the clusters obtained at regional level in the more recent period (2012-2013). With the results for the four clusters obtained for this second period it was obtained means for the variables available in the FADN (2017) database across the regions inside each cluster, getting one agricultural system for each cluster (AS1 for the cluster 1 and so on). The results are those presented in tables 7 to 12 and are considered to characterize the European agricultural systems.

From the table 7 (with values for the economic size, labour, area and land occupation) it is possible to observe that the agricultural system 2 (AS2) for the Germanic regions of Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt and Thueringen has the larger economic size (710.33 euros), labour input (17164.18 hours), utilized agricultural area (440.99 ha), namely for cereals (207.34 ha) and forage crops (138.62 ha). In turn the AS4 is the agricultural system with, in general, lower values for the variables considered in this table, exception for the permanent crops.

The table 8 for the values related with the livestock units and with the crops output confirms the tendency referred before for the values presented in the table 7, however, there are some relevant differences. In fact, the AS2 shows the greater values for the livestock units, exception for the sheep and goats (higher in the AS1). The lower values are again verified in the AS4 for the animal activities dimensions. About the crops output, the AS2 does not reveals the greater performance in the total crops output by ha (area productivity), where presents the lower values, in the fruits output (including citrus fruit), wine and grapes and olive and olive oils. The AS4 has the best values for the olive and olive oils. About the livestock outputs (table 9) the results confirm the high performance in the AS2 (exception again in the sheep and goat productions) and the low dynamics in the AS4.

The AS2 in line with the higher values for the area and agricultural outputs has too the greater indicators for the inputs and respective costs (table 10), exception for specific crop

costs by ha that presents the lower value (AS3 is the agricultural systems with more specific crop costs/ha), what are in consonance with the findings in the table 8 for the area productivity in the AS2.

Table 7. Characterization of agricultural system through the economic size, labor and agricultural area occupation

	Economic size (euro)	Labour input (hours)	Paid labour Input (hours)	Unpaid labour input (hours)	Total Utilised Agricultural Area (ha)	Rented U.A.A. (ha)	Cereals (ha)	Energy crops (ha)
AS1	198.81	4820.21	2098.66	2721.55	122.50	89.54	42.28	0.76
AS2	710.33	17164.18	14994.76	2169.42	440.99	334.26	207.34	5.23
AS3	107.12	3537.41	1142.10	2395.30	56.67	35.58	16.49	0.08
AS4	39.73	3108.01	744.66	2363.35	25.60	13.06	8.41	0.01

	Vegetables and flowers (ha)	Vineyards (ha)	Permanent crops (ha)	Olive groves (ha)	Orchards (ha)	Forage crops (ha)	Total agricultural area out of production (ha)	Woodland area (ha)
AS1	0.83	0.64	0.35	0.00	0.27	60.83	1.82	1.07
AS2	1.24	0.01	1.31	0.00	0.73	138.62	5.28	5.18
AS3	0.39	1.80	1.05	0.08	0.89	31.37	1.70	1.96
AS4	0.27	0.73	1.88	0.92	0.94	10.06	1.56	1.61

Table 8. Characterization of agricultural system through the livestock units, total output and crops output

	Total livestock units (LU)	Dairy cows (LU)	Other cattle (LU)	Sheep and goats (LU)	Pigs (LU)	Poultry (LU)	Milk yield (Kg/cow)	Total output (euro)	Total output crops & crop production (euro)	Total crops output / ha (euro)	Cereals (euro)
AS1	96.62	20.16	38.89	7.29	20.78	9.12	7407.26	261774.33	127216.83	1373.94	52543.69
AS2	251.96	62.71	74.73	3.63	97.28	12.80	8777.22	1029078.20	498802.80	1137.65	259904.20
AS3	42.42	7.74	19.00	3.87	8.36	3.27	7059.50	126827.43	69521.98	3620.85	15960.83
AS4	15.51	2.59	4.71	2.47	3.53	2.08	5341.20	42717.31	25985.71	2029.21	6561.50

	Potatoes (euro)	Sugar beet (euro)	Oil-seed crops (euro)	Industrial crops (euro)	Vegetables & flowers (euro)	Fruit (euro)	Citrus fruit (euro)	Wine and grapes (euro)	Olives & olive oil (euro)	Forage crops (euro)
AS1	7911.00	6039.23	12583.04	1040.57	16138.56	2185.06	0.00	12165.67	1.00	10662.59
AS2	12178.20	23690.10	113694.00	1053.20	31073.00	5487.90	0.00	158.40	0.00	41456.80
AS3	945.59	487.72	2735.63	579.35	18576.22	7937.33	1254.11	13800.07	287.50	5094.65
AS4	661.84	153.06	1455.70	794.41	4331.50	3350.84	643.01	3248.90	1471.20	2042.02

Table 9. Characterization of agricultural system through the livestock and others outputs

	Total output livestock & livestock products (euro)	Total livestock output / LU (euro)	Cows' milk & milk products (euro)	Beef and veal (euro)	Pigmeat (euro)	Sheep and goats (euro)
AS1	116626.96	1223.36	52584.49	24839.79	21056.94	3383.34
AS2	393024.70	1567.45	193143.00	42181.10	131424.10	1546.70
AS3	49222.28	1176.27	21366.80	12385.52	7555.04	1930.50
AS4	15316.77	1049.45	5110.38	2870.00	2533.63	990.86

	Poultrymeat (euro)	Eggs (euro)	Ewes' and goats' milk (euro)	Other output (euro)	Farmhouse consumption (euro)	Farm use (euro)
AS1	5225.33	3529.99	1004.64	17930.50	423.24	14931.94
AS2	12309.10	6883.20	543.50	137250.60	117.00	41749.20
AS3	1766.46	623.13	1794.72	8083.28	283.65	7391.09
AS4	1010.79	669.15	1251.58	1414.84	380.43	1975.63

Table 10. Characterization of agricultural system through the several inputs

	Total Inputs (euro)	Total specific costs (euro)	Specific crop costs / ha (euro)	Seeds and plants (euro)	Fertilisers (euro)	Crop protection (euro)	Specific livestock output / LU (euro)	Feed for grazing livestock (euro)	Feed for pigs & poultry (euro)
AS1	256257.14	107139.87	440.16	11054.70	17336.99	11265.26	640.95	33449.73	20405.97
AS2	1070433.60	407224.40	406.52	36705.90	72830.00	50149.20	897.74	92639.70	95778.50
AS3	127557.35	45455.63	1077.79	5822.54	7316.50	3755.67	637.31	15634.98	6290.41
AS4	34797.35	15009.44	434.42	1630.94	2521.98	1455.39	566.99	5128.05	2723.37

	Forestry specific costs (euro)	Machinery & building current costs (euro)	Energy (euro)	Contract work (euro)	Depreciation (euro)	Wages paid (euro)	Rent paid (euro)	Interest paid (euro)	Taxes (euro)
AS1	42.00	15917.16	18341.76	14889.77	37323.66	20458.17	14364.49	8267.31	2171.07
AS2	350.40	67981.60	87287.40	39378.10	106611.40	183758.90	60379.60	26249.90	8300.20
AS3	18.70	10355.52	10001.87	7494.22	20728.57	12133.78	5294.13	2455.83	1530.37
AS4	3.28	1820.32	3460.53	1332.54	5168.09	3628.95	1593.40	384.41	646.62

Table 11. Characterization of agricultural system through the economic results and financial indicators

	VAT on investment (euro)	Gross Farm Income (euro)	Farm Net Value Added (euro)	Total assets (euro)	Total fixed assets (euro)	Land, permanent crops & quotas (euro)	Buildings (euro)	Machinery (euro)	Breeding livestock (euro)
AS1	1109.33	126037.83	88714.13	920140.71	722903.79	437790.37	120732.63	120433.06	43947.70
AS2	463.40	500150.50	393539.20	2146017.80	1475276.40	660947.20	293575.50	420171.30	100582.60
AS3	417.87	67741.46	47012.76	456180.89	343155.70	196055.28	66436.39	59439.63	21224.30
AS4	146.18	26449.30	21281.15	231066.30	178280.92	124378.13	27163.76	19868.19	6870.86

	Total current assets (euro)	Non-breeding livestock (euro)	Stock of agricultural products (euro)	Total liabilities (euro)	Long & medium-term loans (euro)	Short-term loans (euro)	Net worth (euro)	Gross Investment (euro)	Net Investment (euro)	Cash Flow (euro)
AS1	197237.00	35884.66	37570.26	252427.29	192161.01	60266.19	667713.47	46022.63	8699.03	81817.91
AS2	670741.10	75598.30	50420.70	767290.50	521448.50	245842.10	1378727.20	197713.10	91101.80	230665.30
AS3	113025.17	14752.15	21033.30	89698.63	60476.93	29221.63	366482.39	22645.59	1916.98	49012.57
AS4	52785.36	3989.57	3693.08	8785.49	5842.25	2943.28	222280.77	6706.42	1538.30	20455.11

Table 12. Characterization of agricultural system through the several subsidies

	Total subsidies - excluding on investment (euro)	Total subsidies on crops (euro)	Set aside premiums (euro)	Total subsidies on livestock (euro)	Subsidies dairying (euro)	Subsidies other cattle (euro)	Subsidies sheep & goats (euro)	Other livestock subsidies (euro)	Environment subsidies (euro)
AS1	41146.24	338.89	0.00	1748.13	498.29	1032.94	91.33	125.59	4160.27
AS2	172115.10	782.70	0.00	1040.90	-90.70	0.00	0.00	1131.80	15508.50
AS3	28792.00	3297.20	0.00	4138.89	1427.04	1950.39	360.00	401.43	3787.57
AS4	8135.91	977.53	0.00	663.29	121.69	331.94	94.61	115.06	819.82

	LFA subsidies (euro)	Total support for rural development (euro)	Other rural development payments (euro)	Subsidies on intermediate consumption (euro)	Subsidies on external factors (euro)	Decoupled payments (euro)	Single Farm payment (euro)	Single Area payment (euro)	Subsidies on investment (euro)
AS1	2478.80	6766.40	127.29	766.40	275.49	30120.49	25879.07	4241.41	1710.11
AS2	6010.30	21601.00	82.20	13019.50	1651.30	130917.00	130917.00	0.00	4669.40
AS3	4491.48	8457.76	178.70	331.59	31.65	11531.15	10429.87	1101.28	1832.26
AS4	541.28	1515.35	154.26	78.89	4.84	4452.05	3133.05	1319.00	492.50

About the economic results and financial indicators (table 11) the tendencies for the greater values in the AS2 and lower indicators for the AS4 are again observed, however for the several subsidies (table 12) there are relevant differences. In fact, the AS2 evidences the higher values (and the AS4 the lower results) for the total subsidies (excluding on the investments), other livestock subsidies, environment subsidies, LFA subsidies, total support for rural development, subsidies on intermediate consumption, subsidies on external factors, decoupled payments, single farm payment and subsidies on investments. The total subsidies on crops, total subsidies on livestock, subsidies dairying, subsidies other cattle, subsidies sheep and goats and other rural development payments are higher in the AS3.

4. <u>Conclusions</u>

The work developed here intends to identify and characterize the agricultural systems (in a broader perspective considering representative farms) in European Union countries and regions, grouping the several countries, through cluster analysis, in sets where the respective farms have similarities in variables related with the structural, economic, policy and financial questions. It was considered as main indicators the utilized agricultural area (for the size of the farms), the farm net value added (competitiveness) and machinery (innovation and technology). These indicators represent the main aspects referred to in literature as being the principal factors that characterize the farming system. Considering the linear correlation among these indicators it was obtained through factor analyze a farm dimension-competitiveness-machinery index whose adequacy as representing the main European farming characteristics was confirmed. The cluster analysis was complemented with spatial autocorrelation observation, to examine the spatial linkage in the European farm characteristics.

The literature review revealed the diversity of farming systems in several European countries, with specifics in each country, and sometimes in each region or local, and showed the need in trying to find homogeneous sets for the European farms in order to better design and plan the strategies for the sector which are intended to be adjusted for the reality in each case and each particularity. But at the least adjusted for each country, what is not always easy when it is necessary to define common policies.

With the farm index obtained they were obtained four clusters for period 2007-2009 (at country and regional level) and four clusters for the period 2012-2013 (at regional level). Considering that the farm index taken into account represents the main characteristics of the European farms, these clusters were considered as agricultural systems. The results, for the period 2007-2009 at country level, from the cluster and spatial data analysis show that the spatial autocorrelation is weak for the indicators considered, signaling that the neighboring countries have not, in general, great agricultural similarities and are not strongly spatially auto correlated. This was verified for the global, but also for the local spatial autocorrelation. There is some evidence of negative local autocorrelation in Poland (and neighbors) and positive low-low in Romania (and neighbors), namely for the farm net value added. The results at regional level for the two periods considered (2007-2009 and 2012-2013) reveal that there are some similarities with the results obtained at country level, however there are significant differences inside each country and the differences among the two periods.

For each agricultural system found it were calculated means with the values for the several variables available in the FADN (2017) database and across the different regions. About the characterization of the agricultural systems with the data for the period 2012-2013 (the more recent period and considering that there are differences between the two considered) of stressing the greater values, in general, for the agricultural system constituted by the Germanic regions Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt and Thueringen. In general, the lower indicators are observed in the agricultural system that integrate the all regions from Greece, Portugal, Poland, Bulgaria and Romania, countries with only one region as Cyprus, Malta, Latvia, Lithuania and Slovenia, the majority of the regions from Spain (exception for Navarra) and Italy (exception for Lombardia and Friuli-Venezia) and some regions from France (Guadeloupe and La Réunion) and from Hungary (Észak-Magyarország and Alföld).

These found may be an interesting contribution for the policymakers helping in the design of more adjusted strategies and for the agricultural operators supporting in the structural

decisions. In future research it will be important to complement these results with information obtained through surveys to complement information available in public databases.

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PATTERNS OF SPATIAL DEVELOPMENT: EVIDENCE FROM RUSSIA

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Abstract

The aim of the paper is to analyze the trends of spatial inequality in Russia in 1994-2015 based on the convergence concepts. Russia faced the problem of inter-regional inequality as well as most countries. The situation is aggravated by the external economic and domestic factors in recent years. The fall in energy prices and Western sanctions had a negative impact on the country's economic development. Russia is compelled to take into account geopolitical interests in the implementation regional policies in some regions (the Far East, the Crimea, the Kaliningrad region, the republics of the North Caucasus, the Arctic). Many regional budgets have budget deficit, highly debt load. They optimize spending on the social sphere and reduce investments in the real economy. Russia is emerging from the crisis despite the difficult situation. A review of the theoretical positions of the four types of convergence concepts (σ-, β-, γ-, ρ-convergence) was made. The spatial inequality evaluation was carried out on the basis of σ-convergence and absolute β-convergence concepts. The Williamson coefficient, the Hoover index, the Theil index and the Atkinson index were used to analyze spatial inequality based on the σ-concept. Differentiation has increased over the analyzed period, but gap decreased after 2005. The convergence speed is 1.79% in Russia. Regions with a low initial level of development have higher growth rates than regions with a higher initial level of development

Keywords: spatial inequality, spatial development, β-convergence, σ-convergence, Russia
JEL classification: D63, O52, R1, R58

1. <u>Introduction</u>

Most countries consider the problem of spatial inequality to be a priority when developing regional policy. For example, the EU countries pursue a regional cohesion policy to catch up Central and Eastern Europe countries' level with the Western European countries' level.

In applied research, both the inequality between countries and the inequality between regions within one country are studied. Research methods used to measure inequality between countries can be used when measuring interregional inequality. Linkage between economic growth and the level of interregional inequality is always a key issue when studying interregional disparity. According to Williamson (1965), countries in the initial period of development are characterized by economic growth, which is accompanied by an increase in inequality. This conclusion is confirmed by European data on the growth of spatial inequality within the 12 "new" EU countries, which by the level of economic development lagged far behind the "old" Eurozone members. Interregional inequality in the "new" countries increases at first and then decreases somewhat due to a faster growth of regions within countries that have advantages in the context of globalization. At the same time the general inequality between all EU countries and 15 "old" ones decreases (Crescenzi, Percoco, 2013). The level of spatial inequality in Russia is rather high: disproportions are formed under the influence of several strong regions, such as Moscow and Moscow region, St. Petersburg, oil and gas production regions. Inequality is influenced by many factors, including economic growth.

For Russia, high interregional differentiation is typical. Interregional disparity is revealed when comparing the main relative sub-federal level indicators per capita: GRP, incomes, investment volume, industrial output, fixed assets and other indicators, as well as the rate of their growth. Russia is not a unique country in this sense. All countries face the problem of interregional differentiation and are forced to pursue an inequality mitigation policy. For example, inequality in the developed Western European countries (Germany, France, and England) is moderate. Europe has faced new challenges after German reunification and the

EU accession of the former socialist countries, which had a lower level of economic development. Given the division of the Eurozone into NUTS 2 level regions, the magnitude of interregional inequality within the EU has increased significantly. The EU consistently pursues a policy of regional cohesion in order to equalize interregional disproportions. Russian partners in the BRICS such as China, India and Brazil pursue a state policy to mitigate differentiation. Russia also implements measures of state regulation of regional development conducting inter-budgetary equalization.

Lagging regions always carry the risk of a social explosion or aggravation of ethnic conflicts, which sometimes threatens the integrity of the country. However, interregional differentiation does not always act as "a necessary evil." Disproportions in the regions development force the regions to compete for resources: federal aid, investments, human capital, etc., ie. act as a source of development. It is important to limit interregional differentiation within certain limits for sustainable development of Russia and its regions, considering that high differentiation threatens to increase the level of the potential for conflict in certain regions, and very low differentiation excludes competition between regions for resources and eliminates incentives for development.

Russia has been pursuing an active state policy to mitigate interregional inequality. It conducting interbudgetary leveling and creating conditions for the development of growth poles since the beginning of the 2000s. However, Russia has faced difficulties due to external economic and domestic factors in recent years. The fall in energy prices and Western sanctions had a negative impact on the country's economic development. Russia is compelled to take into account geopolitical interests in the implementation regional policies in some regions (the Far East, the Crimea, the Kaliningrad region, the republics of the North Caucasus, the Arctic). Many regional budgets have budget deficit, highly debt load. They optimize spending on the social sphere and reduce investments in the real economy. Russia is emerging from the crisis despite the difficult situation. It's making serious efforts to support depressed regions by providing them with interbudgetary transfers from the federal budget and government loans with a low interest rate. Regions form a favorable business environment. Russia ranks 35th in the Doing business ranking in 2017. Russia creates an integrated system of strategic planning for regional development. Each region (subject of the Russian Federation) has its own strategy for social and economic development, implements targeted programs within the framework of the 'management by objectives' principle. The strategy of spatial development of the Russian Federation will be adopted in the near future. Undoubtedly, state regional policy contributes to solving the problem of spatial inequality and is characterized by certain successes.

2. Theoretical background

The convergence of development levels of countries or regions can occur on income, growth rates of the economy, employment, investment, economic structure, living standards and other key indicators.

As a rule, the process of convergence-divergence is estimated by the productivity indicators of economies, for example, per capita GDP or per capita GRP. Most studies on economic growth and convergence are based on the Solow Growth Model (1956).

There are two types of convergence: σ-convergence and β-convergence. σ-convergence refers to a change in the distribution of income characteristics over a certain period, and β-convergence refers to a mobility of income characteristics within the same distribution to determine whether the growth rate of poor territorial units outpaces the growth rate of rich territorial units (Sala-i-Martin,1996).

σ-convergence eventually leads to a decrease in the differences between countries. Existence of σ-convergence can be detected by a simple comparison of the countries differentiation indicators when the indicator at the final moment of time is smaller than the indicator at the initial moment of time ($\sigma(t+n) < \sigma(t)$, where σ is the differentiation indicator, t is initial moment of time, t+n is the final moment of time). It is the most convenient to trace the dynamic changes in the differentiation indicators using a diagram.

Kuznets (1955) believed that income inequality depends on the development level of the country. In countries at the first stages of development inequality will grow as the national economy grows. Williamson (1965) has developed this theory in relation to regional

economies and has empirically shown that interregional inequality increases in the early stages of economic growth and decreases when the country achieves a certain economic level. σ-convergence dynamics is described graphically by a U-shaped inverted curve (figure 1).

Figure 1: Williamson Curve

Source: Williamson (1965)

β-convergence suggests faster growth of countries with a low level of economic development in comparison with highly developed countries. β-convergence can be absolute and conditional. Absolute β-convergence is explained by the fact that economically weak regions with a higher marginal product, compared to rich regions with a low marginal product, will have a high capital inflow. For this reason, lagging regions will develop more rapidly than developed regions. In the case of absolute β-convergence, all countries converge to the same long-term sustainable rate of growth. The study of absolute β-convergence is based on the determination of the Barro regression coefficients (1)-(4). Conditional convergence in this case takes place when b coefficient has negative values. Complete convergence is achieved when b=-1 (Romer, 1996). According to Barro and Sala-i-Martin (1992), convergence speed β is calculated according to the formula 3. β is positive if b is negative. High positive convergence speed provide faster convergence, i.e. regions with a low initial level of development show higher growth rates than regions with a higher initial level of development.

$$\frac{1}{T} ln \left(\frac{Y_{it}}{Y_{i1}} \right) = a + b \cdot lnY_{i1} + \varepsilon \; (1)$$

$$b = -(1 - e^{\beta T}) \; (2)$$

$$\beta = - \frac{ln(b \cdot T + 1)}{T} \; (3)$$

$$t = \frac{ln2}{\beta} \; (4)$$

where $\quad$ Y_{it} – indicator of the ith region at the point of time T;
$\qquad\qquad$ Y_{i1} – indicator of the ith region at the initial moment of time;
$\qquad\qquad$ ε – random deviation;
$\qquad\qquad$ β – convergence speed;
$\qquad\qquad$ t - half-period of convergence.

The dependent variable in the equation reflects the growth rate and the independent variable is the initial level of economic development. In the case of conditional β-convergence, it is assumed that the territorial units have structural differences and the convergence process is different, i.e. the countries converge to their own long-term stationary state due to a significantly different economic base. Additional variables are incorporated in the equation (5) in order to account for the influence of endogenous and exogenous regional factors.

$$\frac{1}{T} ln \left(\frac{Y_{it}}{Y_{i1}} \right) = a + b \cdot lnY_{i1} + \gamma Z_i + \varepsilon \; (5)$$

where $\quad$ Y_{it} – indicator of the ith region at the point of time T;
$\qquad\qquad$ Y_{i1} – indicator of the ith region at the initial moment of time;
$\qquad\qquad$ Z_i – regional factors;
$\qquad\qquad$ ε – random deviation.

Existence of β-convergence is a necessary but insufficient condition of σ-convergence, since β-convergence is theoretically possible without σ-convergence. Indeed, the mobility of territorial units can happen in accordance with economic growth rates in case of constant σ-

convergence. At the same time σ-convergence is sufficient but not necessary condition of β-convergence.

Friedman (1992) and Cheshire and Magrini (2000) noted that the income characteristics average values of territorial units do not provide a complete picture of the convergence as regression is practically constructed based on mean values. The observed decrease in inequality can be accompanied by a process of polarization into homogeneous groups of regions with the same development path. Groups of territorial units that share the same development path are characterized by club convergence. Such groups of regions have similar initial conditions and structural characteristics.

In this regard Boyle and McCarthy (1997, 1999) suggested defining γ-convergence using Kendall's coefficient of concordance in conjunction with measurement of σ-convergence. The value of the γ-convergence index varies from zero to one. The closer the index to zero, the greater the degree of mobility in the distribution of regions. With stable σ-convergence or even σ-divergence, it is possible to detect significant changes in the distribution of regions due to the high mobility of regions and the γ-convergence process.

β-convergence can be in the forward and backward direction (Wodon, Yitzhaki, 2006), which causes problems in the analysis. To solve this problem, the concept of ρ-convergence is proposed (Lucke, 2008). ρ-convergence is considered as an inverse β-divergence in time. On the basis of the covariance matrix, where the variances of the indicators the initial and final instants of time are on the main diagonal, and the off-diagonal elements are the covariance between the indicators at the initial and final instants of time $\begin{vmatrix} \sigma_1^2 & \sigma_{1n} \\ \sigma_{1n} & \sigma_n^2 \end{vmatrix}$, ρ is calculated by the formula (6). ρ varies from -1 to 1.

$$\rho = \frac{\sigma_{1n}}{\sigma_1 \sigma_n} \quad (6)$$

where σ_{1n}- off-diagonal element covariance matrix;

σ_1^2, σ_n^2 – the variance of the inequality indicator at the initial moment t_1 and at the final moment t_n.

Then   β-convergence will be detected for $|\beta| < 1$,

σ–convergence for $|\beta| < |\rho|$,

ρ-convergence for $|\beta| < \rho^2$ (figure 2).

Figure 2 - Types of convergence (B. Lucke, 2008)
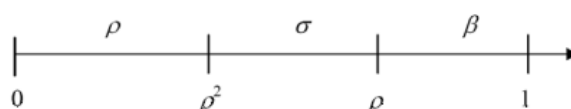
Source: B. Lucke (2008)

Groups of territorial units that share the same development path are characterized by club convergence. Such groups of regions have similar initial conditions and structural characteristics. It can be assumed that countries with similar determinants of economic growth converge to the same long-term sustainable rate of economic growth. If some countries have similar factors of economic growth, then club convergence can occur in the course of time. However, club convergence can eventually turn into an absolute convergence under the influence of exogenous factors. There are two models of club convergence: quadratic model of absolute club convergence (Baumol and Wolff, 1988) and disparity model between the leading region and all the others (Chatterji and Dewhurst, 1996).

There are many methods used to research spatial inequality: the Markov chains, developed by Quah (1993), were used to evaluate the change in income characteristics and their distribution; and the model of convergence with spatial autocorrelation (Rey and Montouri, 1999).

The purpose of the paper is to research dynamics of spatial inequality in Russia on the basis of σ-convergence analysis and to determine the presence or absence of outstripping development of the poorest regions in comparison with the developed regions on the basis of β-convergence analysis.

3. Data and research methods

The information basis of the research constituted the statistical data of Russian Federal State Statistics Service for the period of 1994-2015. The analysis on the basis of σ-convergence concept includes 83 Russian subjects (statistics on the Chechen Republic were included since 2005, Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug – Yugra, Yamalo-Nenets Autonomous Okrug were included since 2011). The analysis on the basis of β- convergence concept includes 79 subjects (with the exception of the Chechen Republic, Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug – Yugra, Yamalo-Nenets Autonomous Okrug, the Republic of Crimea and the city of Sevastopol due to the lack of statistical data in the initial period in 1994).

The Williamson coefficient, the Hoover, Theil and Atkinson indices (Williamson, 1965; Hoover, 1936; Theil, 1967; Atkinson, 1970) (7)-(10) were used to analyze spatial inequality based on the σ-concept. Все индикаторы неравенства учитывают размер региона посредством численности населения региона.

$$V_w = \frac{\sqrt{\sum_i^N (y_i - \overline{Y})^2 \cdot \frac{P_i}{P}}}{\overline{Y}} \cdot 100\% \quad (7)$$

where V_W – the Williamson coefficient;
y_i– GRP per capita of the ith region;
$\overline{Y}$ – average Russian GRP per capita;

$$I_H = \frac{1}{2} \sum_{i=1}^N |\alpha_i - \beta_i| \quad (8)$$

where I_H – the Hoover index;
N – number of the regions;
α_i – a share of the ith region indicator in the total indicator across all the totality of the regions;
β_i– a share population of the ith region in the total population.

For the first Theil index (Theil, 1967) and the Hoover index, the absolute equality will be fixed at zero, positive index values for the first Theil index correspond to inequality, unit index values for the Atkinson index correspond to the maximum inequality (9), (10).

$$I_T = \sum_{i=1}^N \frac{y_i}{y} ln\left(\frac{y_i/p_i}{y/p}\right) \quad (9)$$

$$I_A = 1 - e^{-I_T} \quad (10)$$

where I_T – the first Theil index;
I_A – the Atkinson index;
N – number of the regions;
y_i – GRP of the ith region;
y – the aggregate GRP of the country;
p_i – population of the ith region;
p – population of the country.

Real indicators. which were adjusted taking into account the cost of living in the regions, were used instead of indicators nominal rates, to eliminate the effect of price differentiation across the regions. Minimum subsistence level (11) were used to calculate real indicators throughout the interval under study.

$$Y_{ikor} = Y_i \cdot \frac{MSL}{MSL_i} \quad (11)$$

where Y_{ikor} - real value of the indicator of the ith region;
Y_i– the nominal value of the indicator of ith region;
MSL – the average Russian minimum subsistence level;
MSL_i - minimum subsistence level of the ith region.

4. Research results interpretation and its analysis

A dynamics analysis of interregional inequality has showed a strongly pronounced divergence before 2005 with small periods of its decline and convergence after 2005, which has recently slowed down (Figure 3-6). The maximum value of the inequality was recorded in 2005; it is 2 times higher than the original level of 1994. Throughout the studied period,

spatial inequality has increased by 1.5 times that characterizes process of σ-divergence. The findings are consistent with Williamson's idea about inequality increasing in the early stages of development and reducing over time as the territorial unit achieves a certain level of development. However, after 2005 it is possible to speak about σ-convergence, since the level of spatial inequality in 2015 has decreased by 20 % compared to 2005.

The graphs of the four indices of inequality have a same dynamics. In general, interregional inequality is increasing during the period under study. The first Theil and Atkinson indices grow 1.4 times, the Hoover index increases 1.1 times, the Williamson coefficient increases 1.2 times.
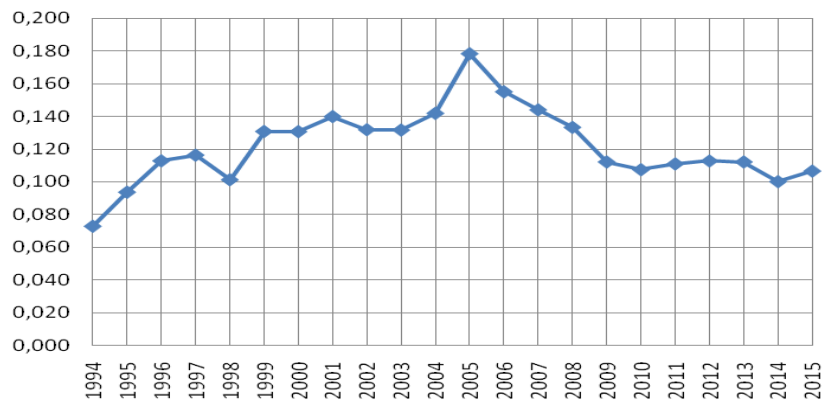
Figure 3: The First Theil index

Figure 4: The Atkinson index
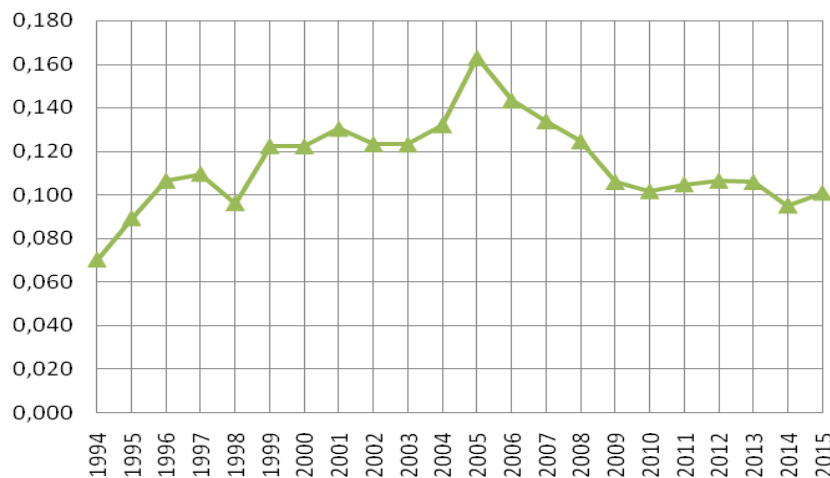
Figure 5: The Hoover index
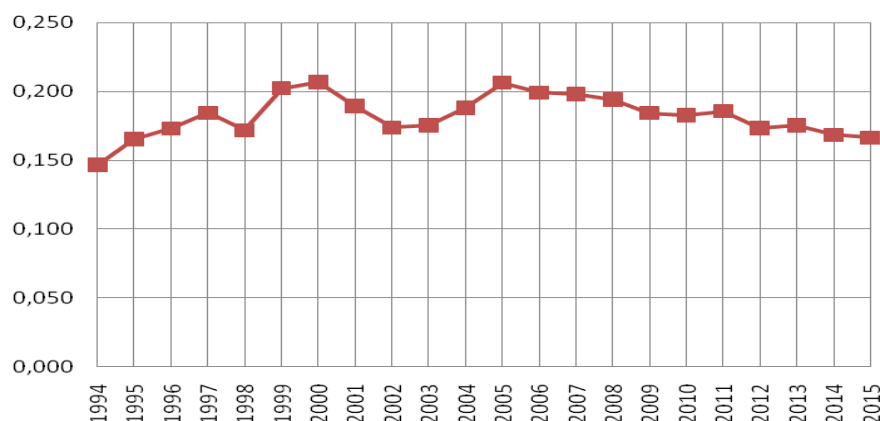
Figure 6: The Williamson coefficient, %
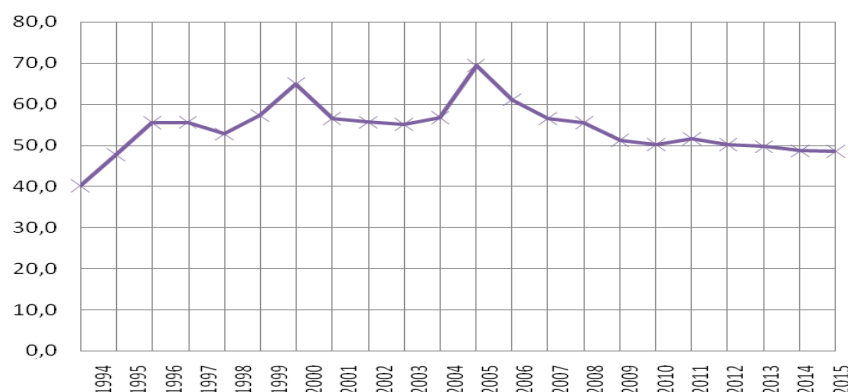
An analysis of the dynamics of inter-regional inequality showed divergence until 2005 with small periods of its decline and convergence after 2005, which has recently slowed. In 2000-2001, the Nenets Autonomous Okrug, the Khanty-Mansi Autonomous Okrug – Yugraand the Yamal-Nenets Autonomous Okrug began to be counted separately from the regions to which they relate. In this regard, the inequality has slightly increased. First, the three autonomous okrugs considered are hydrocarbon production regions and have very high average per capita GRP. The maximum value of the inequality is fixed in 2005, when statistics on the Chechen Republic appear. The Chechen Republic had extremely low rates of economic development, which affected the magnitude of inequality. Secondly, the differentiation of the budget revenues of the regions also reached its peak at that time (Kolomak, 2008). The consistent reduction of spatial inequality after 2005 we can be explained by an effective policy of equalizing the budgetary security of the regions, which began after 2004. It is proved that the convergence of tax revenues is accompanied by the convergence of regional economies. Both processes have the same speed of convergence (Skuli, 1991). Kolomak (2008) shows a decrease in the coefficients of variation for total incomes and tax revenues of the regions' budgets after 2004. Spatial inequality and economic growth in Russia have unidirectional dynamics: high rates of economic growth are accompanied by an increase in inequality. The correlation coefficients are positive and equal to 0.68 between the first Theil index and the increase in aggregate GRP and between the Atkinson index and the increase in aggregate GRP. The findings are consistent with Williamson's idea of increasing inequality in the early stages of development and of reducing it over time as the territorial unit achieves a certain level of development.

The distribution of regions has a positive skewness. This means that the distribution is skewed to the right (figure 7, 8).

Figure 7: The distribution of regions on per capita GRP at 1994

Figure 8: The distribution of regions on per capita GRP at 2015
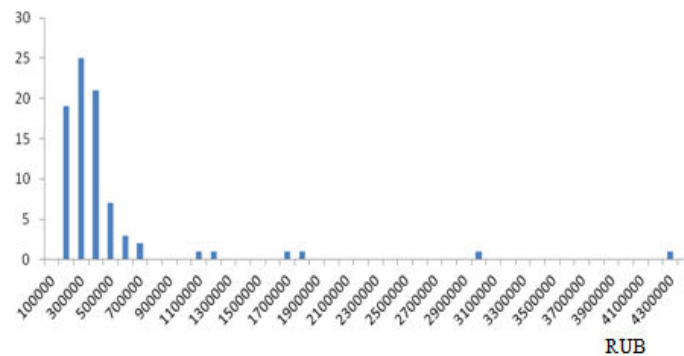
A Barro regression equation was constructed to verify the existence of absolute β-convergence throughout the whole investigated interval. The hypothesis of β-convergence existence was confirmed (tabl. 1). The Barro regression is based on the average annual growth rate relative to the initial level. It does not refl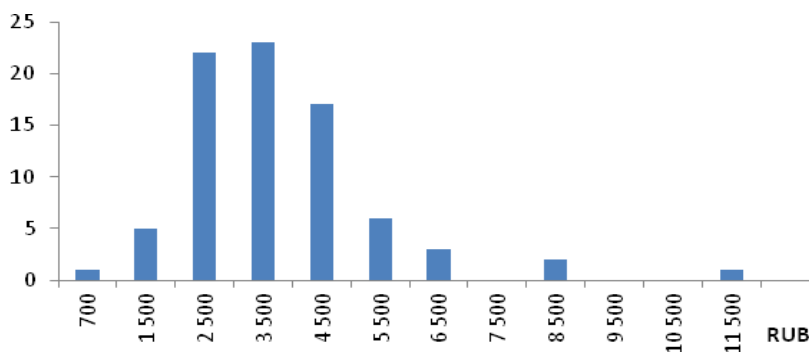ect variation within the distribution in all areas of the period under review, therefore the period is divided into subperiods to estimate the variable under consideration at individual intervals in some studies (Lanzieri, 2010). We divide the period under study into several intervals: 1994-2001, 2001-2005, 1994-2005, 2005-2015 (table 1).

Table 1. Estimation of regression models parameters of absolute β-convergence

Parameter	1994-2015	1994-2001	2001-2005	2005-2015
a	0.331	0.5	0.64	0.307
standard error a	0.032	0.098	0.121	0.055
b	-0.015	-0.024	-0.044	-0.016
standard error b	0.004	0.012* insignificant	0.011	0.0048
R	0.38	0.22	0.4	0.36
convergence speed β, %	1.79	2.7	4.9	1.76
half-period of convergence t, years	38.7	26.0	13.9	39.4
convergence/not convergence	convergence	not convergence	convergence	convergence

Source: calculated by the author

Absolute β-convergence was detected (the parameters are statistically significant) at the three study intervals (1994-2015, 2001-2005, 2005-2015). Throughout the investigated interval, the convergence rate was 1.79%, the half-period of convergence was 38.7 years (3), (4). Positive values of convergence rate indicate higher growth rates of regions with a low initial level of development compared to regions with a higher initial level of development at three intervals.

5. Conclusion

The aim of the paper was to evaluate the convergence-divergence process among Russian regions. The evaluation was carried out on the basis of σ-convergence and absolute β-convergence concepts. The convergence speed is 1.79% in Russia. It is slightly lower than at the Eurozone, whose value is 2%. Indeed, many Russian researchers noted that during the crises (1998, 2008, 2013-2014), the greatest decline was observed in the most developed regions, and the lagging regions suffered less from crises. This is an indirect confirmation in favor of faster growth of the least developed regions.

In contrast, the analysis that was done through the concept of σ-convergence revealed the increase differentiation on all investigated interval. From the graphical analysis, it was

evident that before 2005 there was divergence between the RF regions. Disparity decreased after 2005.

On the one hand, stagnation, Western sanctions, a drop in oil prices have had a negative impact on the Russian economy. On the other hand, the state regional policy to smoothing interregional inequalities and a stagnation led to a decline and stabilization of spatial interregional inequality.

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SHALE INDUSTRY'S ECONOMIC CONTRIBUTION IN OHIO, USA: IMPLICATIONS FOR FUTURE ACTIVITY IN THE STATE

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Abstract

Ohio's shale industry serves as a significant facet of the state's economy, employing nearly 150,000 and contributing over $22 billion of positive impacts as of 2015. With advancements in hydraulic fracturing techniques, and access to the Marcellus and Utica shale plays in the eastern part of the state, Ohio has noteworthy potential for future shale development despite anecdotal discussion of a potential bust of the industry. This research employed a multi-industry economic contribution analysis using IMPLAN and an input-output methodology with 2015 data to quantify the economic contribution of the shale industry across the entire State of Ohio, as well as a 26-county Appalachian Ohio region where most shale extraction activity is taking place. Strong economic impact metrics are found for shale activity, including robust multiplier effects relative to other industries in the state. Out of the six modeled shale-related sectors, Pipeline Transportation, by far, pays the highest wages. Further, in order, the top five counties by total economic contribution per capita are Noble, Monroe, Belmont, Guernsey, and Washington. In fact, roughly 90% of the gross regional product in Monroe and Noble counties is attributable to the shale industry. With these findings, economic development and policy implications are highlighted, which are important as no other shale-play region in the U.S. is so disproportionally affected by resource extraction which contributes to regional poverty and negative pollution effects. Retaining wealth in this region with the legacy of boom-and-bust resource extraction is ever important, and this paper provides a baseline for analysis when looking how the shale industry changes over time.

Keywords: Energy, Natural Resources, Rural Economics, Resource Policy
JEL classification: J68, O13, P48

1. Introduction

The Appalachian region of Ohio has a history of resource extraction booms, often supplemented by subsequent 'busts' in that respective industry. For instance, the region's coal industry provides an exemplary case of a production that was once thriving with employment and opportunity, yet is now struggling due to a national shift away from coal as an energy generation resource, increased environmental regulations, and other market factors. This boom then bust cycle often pulls valuable resources from the region with only temporary positive economic impact.

One of the most recent resource extraction booms relates to the shale gas industry, where advancements in hydraulic fracturing (i.e., 'fracking') techniques have helped spur a shale boom in the region over the past decade. Fracking techniques have helped efficiently extract natural gas from the earth, and companies throughout Appalachian Ohio have increasingly been drilling wells to extract this resource. Moreover, Ohio has two of the largest nationwide shale plays in the Southeastern part of the state: the Marcellus and Utica. This paper considers these resources and works to update prior studies and their shale industry economic impact data.

To accomplish this task, the researcher used a selected subgroup of six NAICS employment codes related to the shale industry in Ohio. Specifically, the researcher used multi-industry economic contribution analysis techniques with IMPLAN version 3.1 and an input-output methodology to determine the impact of these six unique industry sectors to Ohio, as well as a pre-identified 26-county shale-heavy region in Southeastern Ohio. This research also uncovered other, ancillary industries that were affected by Ohio's shale activity, and state and local tax impacts. Finally, county-by-county models were created for each of

the 26 studied counties, highlighting both the real and per capita economic impacts. Throughout all models, employment, wages, value added, multiplier effects, and economic impact figures were generated to help analyze the value of production from Ohio's shale industry cluster.

The following sections of this paper work to define Ohio's shale industry cluster, highlighting the six specific industries investigated. Following a brief review of the existing literature related to shale's economic impact in Ohio, the specific methods and modeling techniques are delineated. Finally, conclusions and implications are discussed, offering considerations for paths forward for industry leaders and policymakers working in this arena.

2. Defining Ohio's shale industry cluster

Ohio's shale industry is the fourth largest in the United States (U.S.), behind only Texas, Oklahoma, and Pennsylvania, with over 275,000 wells drilled (Ohio Oil and Gas Energy Education Program 2017). The industry produces enough energy from natural gas to heat over 1 million businesses and homes in Ohio alone, and almost 70% of all the homes in Ohio are heated by natural gas (Ohio Oil and Gas Energy Education Program 2017). Moreover, shale natural gas can be processed and refined to thousands of everyday products (e.g., medical products, plastics, etc.), indicating its importance as a prominent energy resource, as well as its practical applicability as an input in the manufacturing of key goods used by numerous consumers in the region.

Table 1 displays the 6-digit NAICS codes that represent the direct shale industry cluster in Ohio. Every U.S. business is documented under a specific NAICS code, which defines its area of business operations. The researcher matched these NAICS codes to IMPLAN codes for the purposes of economic impact modeling, which are also displayed in the table.

Table 3: Core Shale-Related Industries

NAICS	Description	IMPLAN#	Description
211111	Crude Petroleum and Natural Gas Extraction	20	Extraction of Natural Gas and Crude Petroleum
211112	Natural Gas Liquid Extraction	21	Extraction of Natural Gas Liquids
213111	Drilling Oil and Gas Wells	37	Drilling Oil and Gas Wells
213112	Support Activities for Oil and Gas Operations	38	Support Activities for Oil and Gas Operations
237120	Oil and Gas Pipeline Construction	58	Pipeline Construction other than Sewer and Water
486210	Pipeline Transportation of Natural Gas	413	Pipeline Transportation

This study specifically focused on the south and eastern geographies of Ohio, where a majority of the state's shale oil & gas resources reside, as shown in Figure 1. Figure 2 consequently illustrates the specific counties included in this analysis, most of which reside directly in the Marcellus and Utica shale plays. However, one county, Hamilton, falls well outside of this region, but was included due to it meeting the criteria of having a large enough number of production and injection wells, as well as primary and secondary oil & gas workers, as derived from Ohio Department of Natural Resources data (Ohio Department of Natural Resources 2017).

Figure 1: Ohio's Shale Oil & Gas Resources

Source: Ohio Environmental Protection Agency. (2017). *How is drilling in the Marcellus and Utica Shales regulated?* Retrieved from http://epa.ohio.gov/marcellusanduticashale.aspx

Figure 2: Shale-Heavy Counties in Ohio
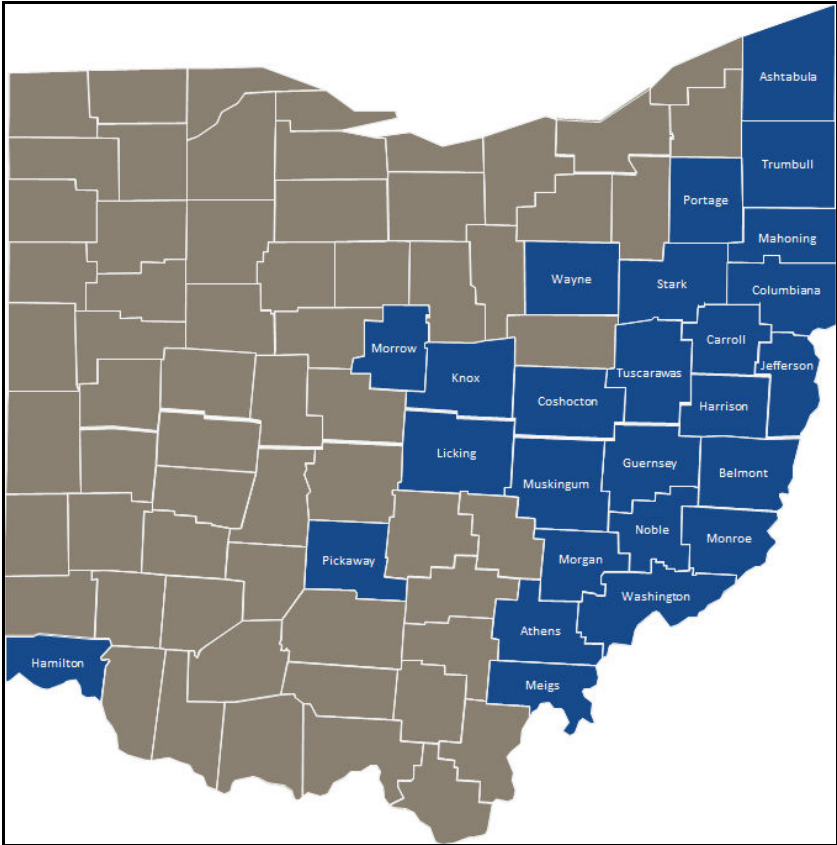
Note: Map created by author.

3. Prior literature

In the U.S., shale gas extraction is a relatively recent phenomena, developing exponentially in the last decade or two due to swift technological developments in the industry. Shale natural gas, in general, is also more environmentally friendly than other fossil fuels such as coal, as it releases less carbon dioxide (CO_2) into the atmosphere (U.S. Energy Information Administration 2017). Taken together, these factors have stimulated a significant uptick in extraction and production across the U.S. in recent years. In a recent study, the American Petroleum Institute found that the natural gas and oil industry supports more than 262,800 jobs nationally, with more than $14.7 billion in wages and $37.9 billion in economic impact (American Petroleum Institute 2017). However, it should be noted that this study defines natural gas and oil jobs in the broadest of terms, and, unfortunately, does not offer specific figures for Ohio.

A small number of prior studies have, in fact, attempted to measure the jobs and economic impact of shale in Ohio. One study, conducted by Cleveland State University, focused on the Utica shale play during 2011–2014, and found that shale-related employment has grown significantly, from just over 2,000 in 2011, to nearly 66,000 in 2014 (Thomas et al. 2012). This research found that average earnings in the industry in Ohio were roughly $69,000 per year (Thomas et al. 2012).

A different study found that, in 2013, Ohio accounted for 7.6% of the total national employment in the petrochemical industry (the petrochemical industry is defined as the compounding, distribution, and conversion of petrochemicals (petroleum or natural gas)) with 74,753 jobs (Lendel et al. 2015). More telling, however, is that the study noted that nearly 69% of national petrochemical employment was located within a 500-mile radius centered around the Ohio, Pennsylvania, and West Virginia tristate area. Moreover, Ohio accounted for around 6% of the national gross domestic product (GDP) that is directly generated by the petrochemical industry, and 5% of the national natural gas supply, in 2013 (Lendel et al. 2015).

Since 2012, the Ohio Department of Jobs and Family Services has conducted quarterly reports on the economic implications of shale in Ohio. In quarter 4 (Q4) of 2012, it was reported that 8,781 people were directly employed in the core shale industries (Ohio Department of Jobs and Family Services 2013). However, in Q4 of 2016, it was reported that 14,669 people were directly employed in core shale industries (Ohio Department of Jobs and Family Services 2017). These reports differ from most prior shale employment research since they utilize the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages data, which may suffer from data suppression issues, and does not capture the ancillary job effects through the supply chain and otherwise. Taken as a whole, although a few studies have investigated the economic impact of the shale industry both nationally and in Ohio, none have addressed these impacts over the past few years, nor have they focused on the localized impacts of the state's shale heavy region.

4. Methodology

The methodology employed for this analysis involved a two-step process. First, the researcher organized the relevant shale industry sectors and gathered industry sales figures from IMPLAN 3.1 software as model inputs. Next, model modifications were made so that each sector in the analysis made 100% of its primary commodity, and trade flows were also adjusted so that the local use ratio was 0 for each sector. Both are standard and necessary steps to conduct a multi-industry economic contribution analysis.

These customizations were completed before running the analysis for the 26-county study area. The 26-county shale study region in Ohio ranges from Ashtabula County in the far northeast, to Meigs County in the Southeast. Four criteria were used to select these counties, and each county that had at least one of these criteria was included in the study. A minimum threshold was used for each criteria to determine whether a significant enough amount of shale activity was happening in the county. The criteria were as follows: number of production wells [2.5% of maximum threshold], number of injection wells [30% of maximum threshold], number of primary oil and gas workers [10% of maximum threshold], and number of primary plus secondary oil and gas workers [10% of maximum threshold]. The production

and injection well data was collected by the Ohio Department of Natural Resources and employment data was collected by JobsOhio.

This method utilized allowed the researcher to assess the direct effects of the six shale industry sectors within each of the 26 Ohio counties. The researcher used 2015 data, as this was the most recent data available at the time of analysis. The following list outlines each of the industry sectors used in this analysis, categorized by their NAICS codes and associated industry name.

- **211111 - Crude Petroleum and Natural Gas Extraction:** This industry comprises of establishments primarily engaged in (1) the exploration, development, and/or the production of petroleum or natural gas from wells in which the hydrocarbons will initially flow or can be produced using normal pumping techniques, or (2) the production of crude petroleum from surface shales or tar sands or from reservoirs in which the hydrocarbons are semisolids.

- **211112 - Natural Gas Liquid Extraction:** This industry comprises of establishments primarily engaged in the recovery of liquid hydrocarbons from oil and gas field gases. Establishments primarily engaged in sulfur recovery from natural gas are included in this industry.

- **213111 - Drilling Oil and Gas Wells:** This industry comprises of establishments primarily engaged in drilling oil and gas wells for others on a contract or fee basis. This industry includes contractors that specialize in spudding in, drilling in, re-drilling, and directional drilling.

- **213112 - Support Activities for Oil and Gas Operations:** This industry comprises of establishments primarily engaged in performing support activities on a contract or fee basis for oil and gas operations (except site preparation and related construction activities). Services included are exploration (except geophysical surveying and mapping); excavating slush pits and cellars, well surveying; running, cutting, and pulling casings, tubes, and rods; cementing wells, shooting wells; perforating well casings; acidizing and chemically treating wells; and cleaning out, bailing, and swabbing wells.

- **237120 - Oil and Gas Pipeline and Related Structures Construction:** This industry comprises of establishments primarily engaged in the construction of oil and gas lines, mains, refineries, and storage tanks. The work performed may include new work, reconstruction, rehabilitation, and repairs. Specialty trade contractors are included in this group if they are engaged in activities primarily related to oil and gas pipeline and related structures construction. All structures (including buildings) that are integral parts of oil and gas networks (e.g., storage tanks, pumping stations, and refineries) are included in this industry.

- **486210 - Pipeline Transportation of Natural Gas:** This industry comprises establishments primarily engaged in the pipeline transportation of natural gas from processing plants to local distribution systems.

5. Findings

Table 2 displays the tax impacts of the shale industry in the region. Within the state and local areas, shale activity generated a total of $1,009,373,536 in revenue from all different sources. Here, household income tax is comprised of personal income tax, motor vehicle license, non-tax fines and fees, property taxes, and other taxes. Tax on production and imports consists of motor vehicle license, property tax, sales tax, severance tax, S/L non-taxes, and other taxes. At the federal level, the shale industry generated a total of $1,596,287,950 in tax revenue. The corporations' tax impact is comprised of only federal profit tax.

Table 2: Tax Impacts of Shale in Ohio, 2015

Description	Employee Compensation	Proprietor Income	Tax on Production and Imports	Households	Corporations
Total State and Local Tax	$15,905,010	$0	$781,374,312	$205,417,450	$6,676,764
Total Federal Tax	$627,431,424	$81,671,688	$107,065,166	$522,233,152	$256,885,520

As shown in Table 3, Ohio's shale industry directly employed almost 86,000 in 2015, with a total employment impact of nearly 150,000. The multiplier effect for employment is 1.71, meaning that for every direct job in the shale industry, an additional 0.71 jobs were created in the state resulting from that activity. The shale industry directly contributed over $13 billion to the state's economy, and, when including all other impacts, more than $22 billion to the state's economy.

Table 3: Contribution Summary of Shale in Ohio, 2015

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	85,973	$4,396,199,705	$6,261,201,287	$13,017,465,088
Indirect Effect	21,978	$1,255,830,573	$2,106,626,577	$3,935,515,796
Induced Effect	39,175	$1,673,994,364	$3,071,422,985	$5,347,882,116
Total Effect	147,126	$7,326,024,643	$11,439,250,850	$22,340,863,000
MULTIPLIER	**1.71**	**1.67**	**1.83**	**1.72**

Figure 3 displays the economic contribution by shale industry sector in 2015, finding that roughly two thirds of its total contribution came from Pipeline Construction at nearly $14 billion. The Extraction of Natural Gas and Crude Petroleum ($3.28 billion) and Extraction of Natural Gas Liquids ($1.63 billion) came in at a distant second and third, respectively.

Figure 3: Economic Contribution by Sector
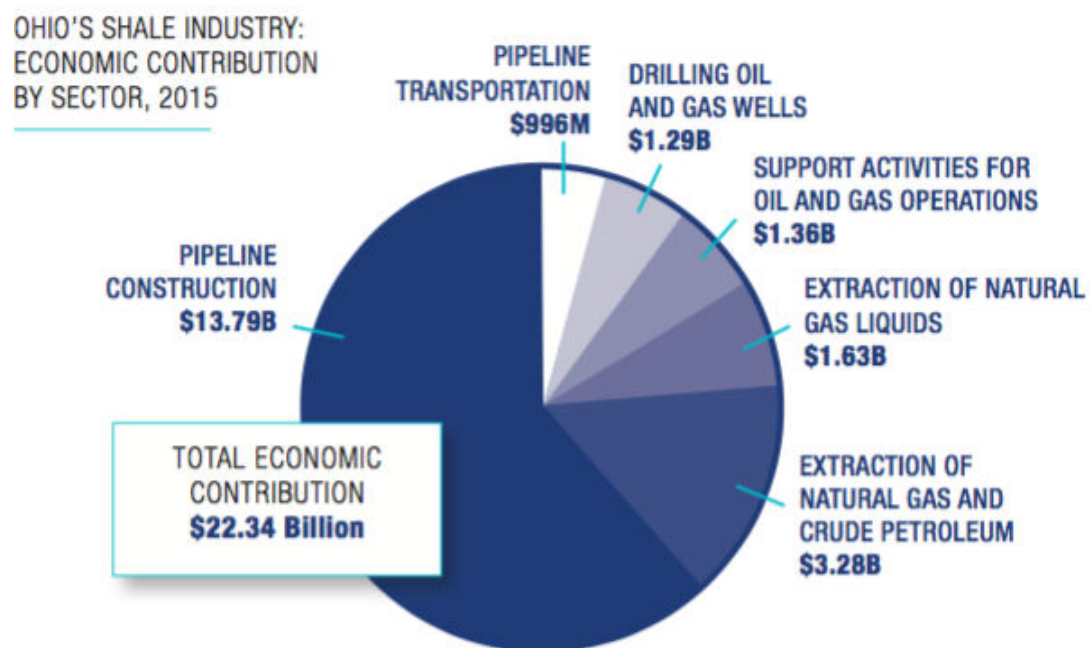
Note: Figure created by author.

Next, Figure 4 displays the employment by sector, which largely mimics the economic contribution data. In this case, pipeline construction accounted for over 95,000 jobs, followed distantly by the Extraction of National Gas and Crude Petroleum with almost 27,000 jobs.

Figure 4: Employment by Sector
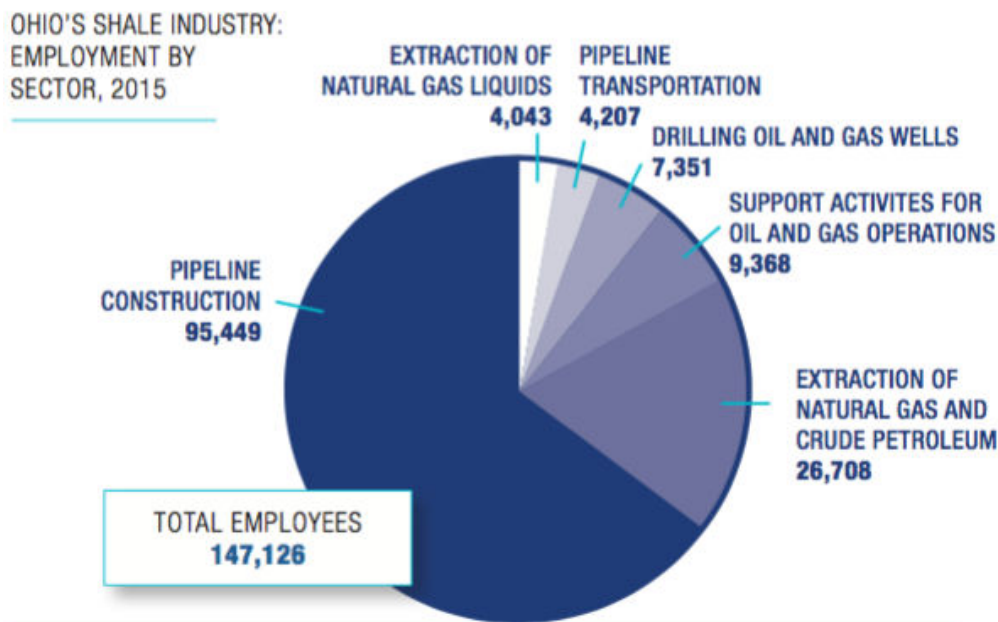
Note: Figure created by author.

The researcher also examined the extent to which Ohio's shale industry affected other, ancillary industries in the study area through the induced effects. Table 4 shows the top five industries affected outside of the direct and indirect effects, organized by employment. While Wholesale Trade represented a sizeable proportion of these impacts, positive effects were also felt in the restaurant, healthcare, and real estate industries.

Table 4: Top Industries Affected By Shale Employment

Sector	Description	Employment	Labor Income	Value Added	Output
395	Wholesale Trade	3,093	$246,744,573	$445,097,123	$728,926,139
502	Limited-Service Restaurants	2,402	$42,634,756	$95,018,032	$176,868,462
501	Full-Service Restaurants	2,343	$48,759,072	$51,696,191	$103,981,664
482	Hospitals	2,226	$158,708,056	$176,811,987	$323,652,177
440	Real Estate	1,986	$71,417,864	$334,431,514	$436,353,413

Next, a wage ranking was created for each of the core sectors related to the shale industry, as defined in Table 1 and Section 4. As shown in Table 5, despite being the lowest economic contributor, Pipeline Transportation paid the highest wages. Pipeline Construction, which employs the most people in Ohio and sits as the highest economic contributor, had an average wage value of nearly $51,000. These figures were calculated by dividing the labor income metric by the employment count per sector. Overall, in 2015, Ohio shale industry workers made an average annual salary of $56,311.06. Next, a wage ranking was created for each of the core sectors related to the shale industry, as defined in Table 1 and Section 4. As shown in Table 5, despite being the lowest economic contributor, Pipeline Transportation paid the highest wages. Pipeline Construction, which employs the most people in Ohio and sits as the highest economic contributor, had an average wage value of nearly $51,000. These figures were calculated by dividing the labor income metric by the employment count per sector. Overall, in 2015, Ohio shale industry workers made an average annual salary of $56,311.06.

Table 5: Wage Ranking by Sector, 2015

Sector	Average Wage
Pipeline Transportation	$84,049.95
Support Activities for Oil and Gas Operations	$57,834.47
Extraction of Natural Gas Liquids	$56,210.02
Pipeline Construction other than Sewer and Water	$50,922.43
Drilling Oil and Gas Wells	$50,573.39
Extraction of Natural Gas and Crude Petroleum	$38,276.07
AVERAGE	**$56,311.06**

Finally, Table 6 outlines the top shale-related counties in the State of Ohio, ordered by their economic impact per capita (i.e., economic contribution/impact divided by county population in 2015). This analysis shows that Noble, Monroe, Belmont, Guernsey, and Washington were the top performing shale counties, per capita, during the study years. Belmont County actually had, by far, the largest aggregate (non per capita) economic impact at $1.1 billion. Number of employees per county is shown in the final column. The full list of counties ranked by economic impact per capita can be found in Appendix A.

Table 6: Ohio's Shale Industry Clusters by County, 2015

County	Economic Impact Per Capita	Total Economic Impact	Employees
Noble	$25,407	$365M	926
Monroe	$23,074	$334M	1,423
Belmont	$15,841	$1.1B	3,991
Guernsey	$10,831	$429M	1,713
Washington	$9,989	$611M	2,695

6. **Conclusions**

The purpose of this paper was to analyze the economic impact of Ohio's shale industry. Using a 26-county region, this research shows that shale is a sizeable contributor to the state in terms of employment, wages, tax contributions, and other key metrics. As the fracking boom continues in Ohio, it is important to quantify these variables in order to provide a baseline for analysis when looking how this industry changes over time. This paper fills gaps in the suite of prior literature with a refined methodology and newer data.

Overall, the Pipeline Construction sector contributed the most to the state's economy and employed the most individuals. Despite this, Pipeline Transportation paid the highest wages across all other sectors. These data should be used in future research and future economic development work to better understand targeted sectors to retain regional wealth and productivity to mitigate the impacts of the impending resource bust. Relevant practitioners and organizations ought to consider strategies such as workforce development and education, training and re-training programs, and supply chain assistance and connectivity. This is increasingly important when considering that the 2015 figures presented in this report show a slight decline from the 2014 figures (e.g., total effect employment declined by about 10,000 jobs).

Appalachian Ohio historically – and currently – suffers from a 'brain drain' issue, and, even for lower-skilled jobs, drug testing, work habits, and basic skills remain a concern. Like many other industries in Appalachia, the shale industry situation may be another care of resource extraction with a failure to capture local value. This leaves increased pollution, infrastructure problems, etc. in the region, while higher value added activity takes place elsewhere. Perhaps workforce training, policy changes, and firm connectivity can alleviate this situation and continue to enhance these economic impact and job metrics looking toward the future.

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THE RELATIONSHIP BETWEEN HEALTH CARE AND TOURISM DEMAND IN IRANIAN ECONOMY

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Abstract

The relationship between health care and international tourism is one of the important issues in tourism literature. The main objective of this study is to investigate the correlation between health care and international tourism in the long-run and short-run by using a fully modified ordinary least square (FMOLS) and Toda-Yamamoto approach over the time period of 1971-2016. The empirical results of this study indicate that there is a long-run relationship between health care and tourism. Health care has a positive and significant effect on the tourists' arrivals as a proxy for international tourism demand. Moreover in the short-run, the results suggest that there is unilateral causality from health care to international tourism. Hence, the main implication policy of the study is that policy makers should adopt policies to improving health care and attract more international tourists.

Keywords: Health Care, International Tourism, FMOLS, Toda and Yamamoto Approach
JEL classification: C22, I10

1. Introduction

International tourism is a major income source and a principal export for many low income countries as well as for developed ones. In recent years, many developing countries focus economic policies on the promotion of international tourism as a potential source of economic growth. Recently, the tourism industry has witnessed a prominent increase all over the world. For instance, the tourism receipts in 2012 reached 1075 billion US dollars vis-a-vis 2 billion US dollars in 1950, and international tourist arrivals increased to 1035 million in 2012 vis-a-vis 25 million in 1950 (UNWTO 2013).

One of the main branches of tourism industry is the health tourism. It has been an emerging industry in recent years and both developed and developing countries are involved in this field. The direction of international trade is opposite that of the traditional model. Consequently, countries that once primarily exported medical services to less developed countries are now purchasing health care from these same countries. So nowadays, health tourism destinations can be divided into two groups; one group is advanced countries in which patients seek to obtain better care unavailable at home, such as those residents that come from developing countries such as China and South East Asia, and another group is developing countries in which patients from developed countries prefer to receive less expensive treatment than that available in their home country. The major push factor for health tourism is the rising health needs of an ageing population which turn to be the major demand for medical care outside of developed nations. The major pull factors for medical tourism are cost-effectiveness and the availability of services on demand in combination with the unique features offered at a destination.

It has been estimated that the global medical-tourism industry currently generates annual revenues of up to US$ 60 billion (negatively 40 billion), with 20% annual growth (Horowitz, Rosensweig, & Jones, 2007). The total number of medical tourists has also increased, from 19 million travelers in 2005 to 25.8 million in 2007, which is an annual growth rate of 16.5%. However, a new McKinsey study prepared by Ehrbeck, Guevara, and Mango (2008), suggests that the market is not as large as reported, and most medical travelers seek higher quality and faster service instead of lower costs. McKinsey places the current market at 60,000–85,000

inpatients per year, but these numbers could grow substantially if certain barriers, such as non-coverage from payers, were removed.

The relationship between international tourism and health care has been considered in theoretical framework and empirical studies such as Connell (2006), Page (2008) & Bies and Zacharia (2007). The review of empirical studies in developed and developing countries shows that in the Iranian economy, as a developing country, the relationship between two variables has not been considered empirically yet. Hence, the main aim of this study is to investigate the short-run and long-run relationship between health care and international tourism in Iran over the period of 1971-2016 [1]. To achieve this objective, the Toda and Yamomoto and Fully Modified Ordinary Least Square econometric methods have been used as appropriate techniques for causality and long run investigation.

For this purpose, the rest of paper is organized as follows: In section 2, the theoretical framework between health care and tourism has been investigated. In the next section, empirical studies on the relationship between tourism and health care have been reviewed. Afterwards, we introduce the model specification and data sources. In section 5, the empirical results of this study have been analyzed. The final section is concerned with concluding remarks and policy implications.

2. <u>THEORETICAL BASE</u>

There are two ways in which the health care can affect the tourism industry of a country. First, tourists may assess a potential destination based on its track record in providing a healthy environment to visitors. Hence, the occurrence of accidents, injuries and health related issues either personally experienced or publicized by the press can adversely affect the experience or perception of tourists, which in turn negatively impacts the tourism demand for a destination. Secondly, a number of governments have sought to develop medical tourism to further enhance their tourism industries, believing such efforts can increase both the number of tourists and tourist revenues. In this view, it is expected that development of health care lead to the increase of international tourists.

According to Page (2008), the relationship between health care and tourism can be discussed in three stages as follows:
•   Pre travel, where the potential tourist decides on the destination and makes the arrangements to travel;
•   The trip (travel phase).
•   The post-travel phase.

During each of these stages, tourists may have interactions with medical services, services or sources of information. The widely argued premise among social psychologists is that the need for travel medicine is predicated on the assumption that tourists' behavior change when on holiday, compared to that in the origin area. Debates associated with the tourist experience on hedonism, behavior change and the cultural significance of holidays in shaping these changes remain contentious and complex to unravel. However, as many empirical studies of traveller behavior and the propensity to experience health problems confirms, many travellers engage in much more risky behavior, either consciously or sub-consciously.

Moreover, low cost is usually the primary motivation for healthcare tourists to travel to abroad, and in addition to receiving medical services, they can benefit from the leisure opportunities. Following to Yap (2007), people travel for four types of healthcare:
•   Essential health care: where the care is not available in the home country, either because the country does not have that level of medical sophistication, or has yet to allow the particular procedure, or has long waiting lists due to resource constraints.
•   Affordable health care: where the care is available but out of reach to the particular patient who simply cannot afford it. This could be because of high costs or insufficient insurance coverage.
•   Quality of health care: where the care available locally is perceived to be of inferior quality to the healthcare available overseas.

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[1] In Iranian economy, the data set for health statistics has been constrained to 2016.

• Premium health care: where traveling for healthcare is seen as a luxury and patients choose the healthcare of another country because it adds prestige and demonstrates that they can afford it or that they have the better sense to select it.

By review of theoretical framework, it can be concluded that health care is one the important issues in tourism literatures, and the relationship between health care and tourism should be considered in the empirical model.

3. EMPIRICAL STUDIES

On the empirical ground, the relationship between health care and tourism has been considered in many studies. Goodrich (2002) studied the relationship between health care and tourism for the US during the 1980-2000. He found that the effect of health care on international tourism has been positive in the long-run. Hundt (2005) has investigated the impact of tourism development on the health care in developing countries over the period of 1980-2003. The results of this study reveal that tourism development has a positive effect on the health care in selected countries. In other study, Connell (2006) has evaluated the impact of tourism on the health care of 10 developing countries. Their findings indicate that tourism development has a positive and significant effect on the health care in these countries. Ging Lee (2010) has analyzed the relationship between health care and international tourism in Singapore during the 1980-2007. The results of this study suggest that there is a long-run unidirectional causality from health care to international tourism. The effect of health care on international tourism is positive. However, in the short-run, the results indicate that there is no causality between these two variables. Using a panel data approach, Smith et al (2011) investigated the effect of medical tourism on the bi-lateral trade of the UK and India during the 1990-2009. They found that health care development has a positive and significant effect on the bi-lateral trade of those two countries. Kushi and Caca (2010) provided an analysis of the main characteristics of MSMEs in this sector and identifies the existing problems using data from 83 holiday hotels during summer 2006 in Durres region, which is the major sun-and-beach segment in Albania. The results of the survey are in line with the general economic situation in Albania which is characterized by the dominance of micro and small-sized enterprises, mainly family businesses. In another study, Crooks (2011) analyzed the impact of medical care on international tourism in the case of India over during 1975-2008. The empirical results of this study shows that medical care has a positive and significant effect on tourism attraction in this country. Heung et al (2011) by using Johansen's co-integrating technique have analyzed the impact of health care on international tourism in Hong Kong over the period of 1990-2007. They concluded that in the long-run there is a positive relationship between two variables. Yu et al (2011) have investigated the effect of health care on international tourism in South Korea during 1992-2009. The results of this study suggest that the improvement of health care has a positive effect on the attraction of international tourist's in this country. Taleghani et al (2011) by adopting the panel data approach has analyzed the role of health tourism in development process for 30 developing countries. Their findings reveal that health tourism has a positive impact on the economic growth in these countries. Lertwannawit et al (2011) have investigated the relationship between health care quality and international tourism in Thailand over 1985-2008. The results of this paper show that there is a significant positive relationship between service quality and tourists' arrivals in this country. By applying panel data approach, Yu and Ko (2012) have investigated the effect of medical care on the international tourism of the countries China, Japan and Korea during the 1980-2009. Their findings indicate that medical care has a positive effect on tourism in these countries. Hudson and Li (2012) have examined the relationship between medical care and international tourism in the US over the 1980-2010. They noticed that the medical care has a positive effect on international tourism in the long-run. Asprogerakas (2012) has analyzed the use of taxation electronic applications, particularly popular as EG applications, in Greece. In the EU, ICT in fact functions merely as a means of realization within pre-existing political, social and economic structures a fact posing restrictions in terms of the results of their potential use. E-Government applications are a more immediate way for the citizen to get in contact with public services and a mechanism of accelerating administrative procedures. There is a lack of contribution to the cohesion of policies and actions. The

constitution of telematics nets and the use of technological applications are the main mechanisms leading to the notion of "electronic space" challenging at the same time the traditional view of accessibility and the functional organization of space. The inferior position concerning conventional accessibility as well as the multi-fragmentation of a spatial unity are distinguished as major factors for the development of EG applications together with the existence of a major urban center. Moreover there is at least some evidence that the use is related to the predominant activity of the area in question with tourism acting as a familiarization tool with the internet and its applications. Avdi (2013) focused on the system of contributions for health insurance scheme. The paper will argue the need for immediate measures regarding this issue. Based on the primary and secondary data, through an economic analysis is studying the trend of contributor's number for five years. Are identified the economic, social and political factors, that affect this process and whole health insurance scheme (HIS). In Albania, partly scheme function, an informal labor market, lack of incentives for participation in health scheme, weak administration capacity for contributions collecting and poor structure, regulatory and supervisor and all in all its funding challenges, are the main factors that accompanies for years the health care system and as the result the contributions system for health insurance. Baboe (2015) conducted in villages Rabauh,Tanjung Untung and Hantapang, Gunung Mas district, Central Kalimantan. The research uses descriptive analytical. The data collection is taken through observations and questionnaires on the relevant program, institutions and community groups. Rabauh rural women's participation in PM2L particular on basic infrastructure development program is inactive. Their involvement only as a receiver and connoisseurs of such assistance. Similarly, at the village of Tanjung Untung and Hantapang. The participation of rural women in PM2L in Gunung Mas is not directly involved due to most activities are carried out is handle by government agencies. Feshari et al (2016) have investigated the long-run relationship between tax ratio to GDP and tourism receipts in OIC selected countries during the period of 1990-2014. The main findings of this study reveal that tax ratio has negative effect on the tourism receipts and GDP per capita and its growth have positive and significant effect on the tourism receipts in Islamic selected countries. Hence, the main policy implication of this paper is that the tourism managers in these countries should adopts policies to improve the tax revenue through the increase of product capacity. Moreover, the increasing of GDP per capita can improve the tourism receipts in these countries. Lyberaki et al (2017) tested whether and to what extent inequalities persist in retirement. It does so by direct comparisons of privileged groups relative to less privileged groups of a large international sample survey of individuals aged 50+, the Survey of Health, Ageing and Retirement in Europe (SHARE), using the fifth wave conducted in 2013. The comparison proceeds by means of odds ratios applied to dimensions of outcomes related to well-being: life satisfaction; better health; chances of a better financial status. This is done for cases of pensioners where the key distinguishing feature is simple presence of someone who used to be employed worked in the public sector. This comparison is also applied at a household level, where in addition to the public-sector effect, hypotheses related to the male breadwinner model can also be approached. The results in general confirm that public sector retirees tend to fare better than their coevals, even with the relatively blunt statistical instrument checking for overall outcomes.

In the case of Iran, it can be argued that none of the studies have explored the short and long-run relationship between health care and international tourism. But in closer and similar studies, Mosaei (2004) estimated the international tourism demand for Iran using data for the period of 1971-2000. The results of this study indicate that the cost of living in one's home country has a negative effect and world income has a positive and significant effect on the international tourism in Iranian economy. In other study Taghavi and Gholipour Soleymani (2009) evaluated the main determinants of the tourism industry in Iranian economy over the 1978-2007. Their results show that nominal exchange rate, tourism receipts and cost of living are the main factors of tourism industry.

Mohammadzadeh et al (2010) by employing the TVP approach estimated the international tourism demand for Iran using data over the 1971-2006. They found that world income, taste and habit have a positive effect and the cost of living in the country of origin has a negative and significant effect on the international tourism of Iran.

In another study, Mohammadzadeh and et al (2010) have estimated the tourism demand function for Iran by using TVP. In this paper, India, Turkey and Pakistan have been selected as the origin countries for travel to Iran. The empirical results indicate that income and habit have a positive and the cost of living has a negative impact on the international tourism of Iran. Moreover, the number of medical tourists who want to travel to Iran from Turkey is more than of Pakistan and India.

By review of empirical studies on the relationship between health care and international tourism, it is revealed that none of the previous studies have examined the relationship between two variables. Hence, the main contribution of this paper is to investigate the short-run and long-run relationship between health care and tourism in Iran by applying Toda-Yamamoto and DOLS approaches.

4. MODEL SPECIFICATION AND DATA SOURCES

In this paper a modified version of the Granger causality test proposed by Toda and Yamamoto (TY) (1995) and the Fully Modified Least Square (FMOLS) have been used for investigating the short-run and long-run relationship between health care and international tourism in Iran. Toda and Yamamoto (1995) procedure based on augmented VAR system and a Wald test statistic that asymptotically has a chi square distribution. In Toda and Yamamoto (1995) approach, the augmented ($k+d$max) the order of VAR estimated where k is the lag length of the system that can be selected by using of information criteria such as AIC and SC. $d$max is the maximum order of integration. One of the main characteristics of Toda and Yamamoto causality test is that it can be applied when there is no co-integration relationship between variables and does not require knowledge of the integration and properties of the system (Akcay, 2011).

The Toda-Yamamoto model can be specified as following bi-variate VAR system:

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11}^{(1)} & \alpha_{12}^{(1)} \\ \alpha_{21}^{(1)} & \alpha_{22}^{(1)} \end{bmatrix} \begin{bmatrix} x_{1,t-1} \\ x_{2,t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{11}^{(2)} & \alpha_{12}^{(2)} \\ \alpha_{21}^{(2)} & \alpha_{22}^{(2)} \end{bmatrix} \begin{bmatrix} x_{1,t-2} \\ x_{2,t-2} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix}$$

(1)

In above formula, x_{1t} and x_{2t} are the international tourism and health care indices respectively. After investigating the short-run causality test between health care and international tourism, the FMOLS approach has been used for estimating the long-run relationship between health indicators and number of tourist arrivals. A Fully Modified Least Square (FMOLS) co-integration approach originated by Phillips and Hansen (1990) that provides optimal estimates of co-integrating regressions. This method modifies least squares to explain the serial correlation effects and for endogeneity in the regressors that arise from the existence of a co-integrating relationship. The FMOLS estimator employs initial estimates of the symmetric and one sided long-run covariance matrices of residuals. For explain the FMOLS method, consider a linear static regression:

$$y_t = \beta_0 + \beta_1' x_t + u_t \quad (2)$$

In above equation, y_t represents the dependent variable and x_t is the ($K \times 1$) vector of covariates.

Moreover, let $\Delta x_t = \mu + w_t$; where μ is a ($K \times 1$) vector of drift parameters and w_t is a ($K \times 1$) vector of stationary variables. With definition of the consistent estimation of u_t and w_t as $\hat{\xi}_t = (\hat{u}_t, \hat{w}_t)'$, the long-run variance covariance of $\hat{\xi}_t(V)$ is $\hat{V} = \hat{\Gamma} + \hat{\Phi} + \hat{\Phi}'$. In this formula, $\hat{\Gamma} = \frac{1}{T-1} \sum_{T=2}^{T} \hat{\xi}_t \hat{\xi}_t'$, $\hat{\Phi} = \sum_{s=1}^{m} w(s,m) \hat{\Gamma}_s; \hat{\Gamma}_s = T^{-1} \sum_{t=1}^{t-s} \hat{\xi}_t \hat{\xi}_{t+s}$ and w(s,m) is the lag truncation window.

With respect to the above formula, the FMOLS estimator has been defined as follows:

$$\hat{B}_{FMOLS} = (W'W)^{-1}(W'\hat{y}^*) - TD\hat{Z} \quad (3)$$

Where, W (t×k) is a matrix of all covariates including a constant term, D represents the deterministic trend regressors, $\hat{y}^* = y_t - \hat{v}\hat{w}_t$ is modified dependent variable and $\hat{Z} = (x', D')$ is the vector of explanatory and deterministic trend variables.

If the error term obtained through FMOLS proves stationary, then y and x variables in equation (2) are co-integrated. The stationary of error term can be tested by any classical unit root tests.

In this paper, the dependent variable has been defined as number of total tourist arrivals to the Iran (TOUR) and variables of number of doctors (D), hospital beds (HB), number of dentists (DEN) has been considered as explanatory variables.

The annual time series data for the number of doctors, hospital beds, number of dentists and number of total tourist arrivals to the destination country (Iran) as a proxy for international tourism have been collected from Iran Statistical Center and Central Bank of Iran over the period of 1971-2016.

5.   <u>EMPIRICAL FINDINGS</u>

In this section, the results of short-run causality and long-run estimation of co-integrating vector have been reported. The short-run Causality Test was carried out by employing the Toda-Yamamoto (1995) procedure. The first step in this approach is to determine the maximum order of integration of the variables (dmax), for this purpose we need to perform a unit root test. The results of Augmented Dickey-Fuller and Philips-Perron unit root test Presented in Table 1.

Table.1. Results of unit-root test

Variable	ADF Test Statistics		PP Test Statistics	
	Constant	Constant and Trend	Constant	Constant and Trend
LTOUR	-0.21*	-1.43*	-0.32*	-1.16*
LHB	-2.54**	-2.69**	-3.48**	-2.87**
LDEN	-0.29*	-1.12*	-0.29*	-1.58*
LD	-0.78*	-4.89**	2.79**	-4.26**

* & ** indicate that variable is I(1) and I(0)

The results of ADF and PP unit root test indicate that LTOUR and LDEN are integrated of order one or I(1) and LD and LHB are I(0).

The next step in Toda-Yamamoto causality test is to determining the optimal lag length (k), with respect to the size of our sample, we used the SC Information Criteria. The results show that the optimal lag length is k=1. After investigate the integration of series and finding optimal lag, we can perform Toda-Yamamoto causality test. The results of Toda-Yamamoto causality test has been shown in Table 2.

Table2. Results of Toda-Yamamoto Causality test

From LHB to LTOUR		From LDEN to LTOUR		From LD to LTOUR	
χ^2 Statistics	P-Value	χ^2 Statistics	P-Value	χ^2 Statistics	P-Value
3.98	0.12	7.23	0.034	11.08	0.0012
From LTOUR to LHB		From LTOUR to LDEN		From LTOUR to LD	
χ^2 Statistics	P-Value	χ^2 Statistics	P-Value	χ^2 Statistics	P-Value
0.59	0.72	3.78	0.14	4.87	0.08

Source: Authors Computations

The results of causality test indicate that there is unidirectional causality from number of doctors and doctors to the number of tourist arrivals at 5% significance level and unidirectional causality from the number of dentists to the number of tourist arrivals at 10% level. Moreover we cannot find any causality from tourist arrivals to the indicators of health care.

To estimate the long-run relationship between health indicators and international tourism, we used the FMOLS method. The co-integrating equation has been estimated by inclusion of 1 lags and leads. The result of model estimation has been reported in Table 3.

Table3. FMOLS estimates of Co-integrating equation

Health Indicators:	Explanatory Variables	Coefficient	t-Statistics	P-Value
Number of Doctor	C	3.32	1.69	0.09
	LD	0.87	4.61	0.000
	DU	-0.77	-2.23	0.032
$R^2 = 0.47$, $\overline{R}^2 = 0.44$, Long-run Variance=0.71				
Number of Dentist	C	3.15	1.98	0.054
	LDEN	1.04	5.86	0.000
	DU	-0.65	-1.7	0.09
$R^2 = 0.79$, $R^2 = 0.78$, Long-run Variance=0.82				
Number of Hospital Beds	C	-15.64	-2.22	0.032
	LHB	2.47	3.99	0.003
	DU	-1.10	-2.31	0.026
$R^2 = 0.68$, $R^2 = 0.66$, Long-run Variance=1.4				

Source: Authors Computations

The results of model estimation by employing FMOLS suggest that the elasticity of international tourism with respect to the number of doctors is 0.87 and the dummy variable has a negative and significant effect on the number of tourist arrivals. In the second model, the number of dentists as a proxy for health care has a positive effect on international tourism and its elasticity is 1.04. The coefficient of dummy variable in this model is -0.65, which represents the war effect. In the third model, we include hospital beds as a proxy for health care; the empirical results indicate that a hospital bed has a positive and significant impact on the tourism demand. In this case, the dummy variable has the negative and significant effect on the number of tourist arrivals in the years of war (1980-1988). In other words, in that period, the number of tourist arrivals has decreased significantly.

6. CONCLUDING REMARKS AND POLICY IMPLICATIONS

The main aim of this paper is to investigate the short-run and long-run relationship between indicators of health care and the number of tourist arrivals as a proxy for international tourism in the Iranian economy over the period of 1971-2016. For this objective, the Toda- Yamamoto and FMOLS approaches has been used for investigation of short-run causality and long-run relationship. The empirical results of TY causality test suggest that there is unidirectional causality from the number of doctor and dentist to the international tourism, but we cannot find any causality from international tourism to the indicators of health care. Moreover the results of FMOLS method indicate that in the long-run, the numbers of doctor and dentist have a positive and dummy variable has a negative and significant effect on the international tourism of Iran over the period of study. The main result of this study is consistent with the economic theories and empirical studies such as Ging Lee (2011), Smith and et al (2011), Connell (2006) and Page (2008). With respect to the results of this paper, we can conclude that development of the health care sector has positive effects on international tourism. Hence the main policy implication of this study is that the policy makers should adopt policies for improving health care and attracting more international tourists.

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PERSON-ORIENTED IRRITABILITY, SOCIAL AND EDUCATIONAL STEREOTYPES AS FACTORS OF ADOPTING CONTROLLING OR NON-AGGRESSIVE POSITION BY STUDENTS

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Abstract

Introduction: The relevance of the problem is determined by the existing necessity to establish factors, mechanisms and conditions that are important for instilling the principles of non-aggressive behavior in students who propose to work in the sphere of psychological and educational support. The aim is to investigate the effect of person-oriented irritability, social and educational stereotypes on adopting either a controlling or manipulative position, or a non-aggressive position by students.

Materials and methods: In the present research, the following methods were adopted: theoretical (analysis, specification, generalization); empirical: unique techniques were developed for the purpose of studying intercommunication patterns between students, for determining levels of person-oriented irritability and the level of students' rigidity; methods of statistical analysis of data: correlation analysis was performed, in which both linear and point-biserial (Pearson) correlation coefficient was employed. 133 students of both genders, average age 20, took part in the experiment, all of them proposing to work in the sphere of psychological and educational support (future teachers, psychologists, social care teachers) at Moscow University for the Humanities (60 persons) and Cherepovets State University (73 persons).

Results: The research helped to establish the following: a greater number of persons causing students' irritation is associated with stronger factors for adopting controlling and manipulative positions. Vice versa, the low level of irritation caused by people is connected with more favorable conditions for adopting a non-aggressive position. We have also found out that the greatest rigidity of social and educational stereotypes is displayed by the students with apparent passive attitudes.

Discussion of results: we have characterized three groups of people that may cause a higher level of irritability, leading to adopting controlling and manipulative behavior patterns, the absence of which results in adopting a non-aggressive position. They include unsociable, reserved, slow or hyper-initiative persons. The most liable to social and educational rigidity are students with predominant passive position. Their attitude is characterized by prevalence of such stereotypes as denial of creative freedom for a university teacher, habit of obeying seniors' orders, admitting necessity of strictness in a teacher, distrust of university's character building potential ('this work should be delegated to the family').

Conclusion: we come to the conclusion that for the purpose of developing skills of non-aggressive communication, it is not enough for the future counselors of psychological and educational support just to be aware of ideas of non-aggression as a universal human value. It is also necessary to develop techniques that will teach students not to get irritated, to recognize and overcome their social and educational stereotypes.

The acquired results may be employed in practical training for creating a humanistic focus in personality development, for developing ability to build up relations avoiding overt and masked forms of pressure.

Keywords: non-aggressive communication, controlling behavior pattern, manipulative behavior pattern, non-aggressive behavior pattern, person-oriented irritability, social and educational stereotypes, students in the field of psychological and educational support.

JEL classification:

1. <u>Introduction</u>

Man as a social being spends the greater part of life interacting with other people. This interaction occurs in different types of activities, including communication. In its course, different issues might arise between the involved parties, who pursue their own objectives. This situation makes it necessary for a person to adopt this or that position and realize a certain strategy in order to influence an opponent, the strategies being imperative, manipulative, and developing (Kovalev, 1987). Typically adopted positions are as follows: controlling behavior, manipulative behavior, non-aggressive behavior, submissive (passive) behavior (Maralov & Sitarov, 2017). Controlling, manipulative and non-aggressive patterns of behavior are means of realizing imperative, manipulative and developing strategies respectively. Submissive position excludes taking active steps; therefore we cannot speak here about a coherent strategy at work.

Controlling behavior is manifested in applying pressure, putting forward demands, issuing orders and threats, subduing, even going from covered to direct aggression. Manipulative behavior is aimed at achieving one's ends by means of deceit, flattery, bribery, bullying, promises, indirect pressure, appealing to authorities, and so on. Non-aggressive behavior demonstrates that a person is able to consider other people's interests to the highest possible degree, that s/he is inclined to resort to non-injuring actions. For example, one uses a request instead of an order; and instead of applying pressure one tries to get a person interested. Typical non-aggressive actions are as follows: cooperation, persuasion, assistance, love, compromise solution, forgiveness and others. Submissive behavior in its passive variant consists in withdrawal from active steps, in avoidance policy, in being patient and resigning to circumstances or the status quo.

In the process of interaction any person can take each of these types of behavior. At the same time, certain patterns begin to dominate and determine one's style of interaction with other people. We consider the situation with prevalence of non-aggressive behavior patterns to be optimal. It is the type of behavior that creates possibilities for implementation of developing strategy, which presupposes dialogue and all possible frankness on the part of participants of communication. Admittedly, not all people are able to abstain from controlling and manipulative practices; but to keep them down to a minimum and to refrain from unjustified pressure is a task within the powers of any person.

Ability of non-aggressive interaction is especially important for occupations that imply working with people: for teachers, psychologists, doctors, and many others. It is difficult to imagine that there exists a teacher who applies only repressive measures to his or her students, measures founded on wanton severity, threats, pressure, disparagement, and so on. If such a teacher does exist, he or she is professionally inadequate.

All types of behavior mentioned above, including non-aggressive position, are instilled in us since early childhood while the child is exposed to either the values of pressure and control or the values of non-aggression, and while s/he acquires the experience of interacting with other people. Viewing the ability of non-aggressive interaction as a professionally relevant personal character trait we must state that colleges and universities that train future members of humanistic professions have the upper hand in developing this important faculty. Attending obligatory and optional courses, doing case studies and trainings, students become competent in non-aggressive interaction and develop such personal traits as kindness, sociability, frankness, empathy and consideration. But at the same time, we know from experience that these activities are not always well-targeted. It is most important to come up with techniques aimed at teaching students non-aggressive behavior and making it their prevalent form of interaction with other people. Therefore, it is necessary to conduct special research of non-aggressive behavior, its structure, factors and conditions that assist the students in or prevent them from acquiring its patterns.

Now therefore the relevance of the problem is determined by the existing necessity to establish factors, mechanisms and conditions important for instilling the principles of non-aggressive behavior in students who study to work in the sphere of psychological and educational support.

We can assume that the most important factors responsible for adopting by the students of a certain behavior pattern in a situation of interaction are as follows: the level of person-oriented irritability, rigidity of social and educational stereotypes, and sensitivity to persons,

as well as factors of motivation connected with achieving success or avoiding failures, inclination to risk-taking, desire of adventure or security.

The aim of the present article is to investigate the effect of person-oriented irritability, social and educational stereotypes on adopting either controlling, manipulative, passive or non-aggressive positions by the students. Irritability and stereotypes (social and educational) are closely connected, social and educational stereotypes being basically schematic and simplified individual representations of proper conduct, reactions and relationships of another person. The failure to fit into the picture created by these representations causes irritation that may prompt a person into applying pressure or using manipulation.

The hypothesis of the present research runs as follows:

- There exists a direct correlation between the level of person-oriented irritability, rigidity of social and educational stereotypes, and the position that students adopt;

- Students with a high level of irritability and rigid social and educational stereotypes tend to adopt controlling and manipulative position rather than non-aggressive or passive positions, which is not true for the students with low level of irritability and unmarked social and educational stereotypes.

2.   Literature Review

From the point of view of philosophy, interaction is viewed as a category reflecting influence of objects on each other, their interdependence, including relationships of cause and effect. Thus, people's interaction is a process of influencing each other, in course of which certain relationships are established and certain aims may or may not be achieved. In the course of interaction people may assume certain attitudes. On the one hand, the attitude is determined by the position of a person in the system of personal interrelations, and on the other hand, it is influenced by the system of his attitudes to the other party. The most typical attitudes or positions are "over", "under" and "at the same level". According to Eric Berne (2012), every person can be in three positions or ego-states, which are allegorically named "Parent", "Child" and "Adult". If we view the position from the point of view of possibility of acceptance and practicing the values of pressure and control or of non-aggression by a person, then, as we stated above, we can single out four positions: controlling, manipulative, non-aggressive, and passive.

At present, a lot of scientific research is devoted to different aspects of such phenomena as coercion and non-aggression.

First of all, there are works concerned with the aspect of the values of coercion or non-aggression. On one end of the scale there are works that authorize man's right to coercion and violence. The example is the "will to power" concept, which is the cornerstone of Nietzsche's philosophy. According to Nietzsche, only the strongest will survive, because they fight fearlessly for their survival. This survival is impossible without violence. Anarchism admits the existence of innate inequality and infringement of human rights in society. Thus it becomes essential to restore justice and postulate man's absolute freedom everywhere and everything. Justice can only be restored by means of violence (Kropotkin, 1991). On the other range of the scale there are works that insist on the priority of non-aggression as a value that enables a person who adheres to it to order his life and his interaction with the world around without resorting to unjustified pressure and coercion. This idea is uphold in all world religions (Jainism, Hinduism, Buddhism, Christianity and so on). No less important are philosophic and ethical foundations of these values, it is enough to mention opinions expressed by Leo Tolstoy, Nicholas Roerich, M. Gandhi, J. Sémelin, M.L. King, A. Schweitzer. In a general way they explain the contemporary treatment of non-aggression as a capacity of man in every moment of his life to choose among a number of alternatives those ones that are least charged with aggression (Maralov & Sitarov, 2015).

In psychology these problems are studied in the context of research of causes of aggressive and altruistic human behavior. Contemporary science offers three approaches that explain the nature of human aggression: drive theory (Freud, Lorenz, Adler, Fromm), frustration theory (Dollard, Berkowitz, Rosenzweig), social learning theory (Bandura, Buss). As for altruistic

behavior, the best studied motives are those of helpfulness. As shown by H. Heckhausen (2003), altruistic behavior is determined by two groups of motives: motives of moral responsibility and motives of empathy.

According to our hypothesis, one of the mechanisms governing a decision to accept a certain position in the process of interaction is person-oriented irritability. We define irritation as a negative emotional state that appears in response to failure of external stimuli, events, situations, or other people's behavior to meet the expectation of a person. Irritation may find expression either in reserve or in affective response and aggression. If this pattern is reinforced and becomes habitual, it develops into irritability as a personal trait, a trait of character (Lerngard, 2000; Lichko, 1983)

Nowadays researchers also pay attention to various aspects of irritable behavior.

First, irritability is viewed as a kind of aggression (Buss, 1961). Irritation and rage are known to be interrelated (Van Coillie, 2005)

Second, a high level of irritability may be a sign of a health disorder. For example, it was shown that a high level of irritability is observed in depressive states (Fava et al., 2010) and is typical of people after a stroke (Angelelli et al., 2004), and also of people with posttraumatic stress disorder (Kuritsyna & Bundalo, 2007). It may be a symptom of chronic fatigue (Pizova, 2012). Irritability is a state that may often be a background for suicidal reflections in young and virtually healthy people (Dubrovskaya et al., 2001). Irritability may indicate activity of psychological defense mechanisms (Larionova, 2014).

Third, it has been noted that irritability may be season-dependent, and the level of its intensity is determined by the length of daylight hours (Pushkina et al., 2015)

Fourth, it is ascertained that irritability is connected with the attitude of an individual to work. There is a connection between work addiction and both stress symptoms and emotional irritability (Jackson, 1993). It was demonstrated that teleworking has a bearing on the emergence of such emotional states as loneliness, irritability, worry, and feeling of guilt (Mann & Holdsworth, 2003).

Fifth, special attention should be paid to research that directly involves problems of person-oriented irritability. In particular, some aspects of irritability were described when doctors direct their irritation at a certain category of patients (Pridmore et al., 2004), and senior managers at company employees (Pollock, 1991). E.J. Bradley (1987) determined that mothers with high levels of irritability directed at their children, even when their children successfully performed experimental tasks, were slow with praise and encouragement as compared with mothers who were satisfied with their children and did not have any negative feelings towards them. The teachers' level of irritability directed at children, coupled with greater or lesser degree of self-absorption, forms the basis of either subject-oriented or person-oriented mode of teacher – child interaction (Maralov, 2010).

The level of a person's rigidity in adhering to social stereotypes is another factor closely connected with irritability. Social stereotype is usually defined as enduring, dogmatic and extremely simplified ideas, opinions or estimations of certain phenomena, persons, groups, or aspects of behavior, etc. This notion was introduced by W. Lippmann (2004) in the 1920s and is widely used in modern science. On the one hand, social stereotypes help a person to cope with a great influx of information by means of its simplification and schematization. On the other hand, they oversimplify thinking, making it non-creative and conventional.

In the present work, we choose to speak about social and educational stereotypes, as the research is devoted to study of social and educational stereotypes and their role in adopting a certain type of behavior by students proposing to work in the sphere of psychological and educational support. We define educational stereotypes as emotionally colored, enduring, schematized mental representations of teaching process, children, parents and teachers. N. Postalyuk (1992) describes three groups of educational stereotypes: stereotypes connected with authoritarian guidance; stereotypes determined by viewing the form of educational process as an aim in itself, not as means of education; stereotypes determined by prioritization of such measures and procedures that do not allow for students' self-organization, self-government and self-control. The example of a typical stereotype is stamping a learner as "good" or "bad" taking into consideration only three characteristics: good conduct, industry, interest in the subject (Ananyev, 1980).

It is confirmed that educational stereotypes show even in college and university students. We found that more than a third of the total number of students have a stereotyped image of the teaching profession, stereotypes of teacher – student communication process, stereotypical image of students, stereotypes of different kinds of teaching activity that make educational process dull, stilted, prescribed and oppressive (Lavrentyev et al., 2005). Other researchers point out that students are not aware of the role of a teacher's personality in his/her professional activity, or of their public mission and social duty, or of active, transforming character of their work (Lukina & Chiganova, 2015).

The rigidity or absence of social and educational stereotypes determines teachers' adherence to subject-oriented or person-oriented mode of interaction among the members of educational process. The more a teacher, or a future teacher or psychologist relies on subject-oriented mode of interaction, the more often s/he chooses to adopt a controlling or manipulative position in achieving their goals. Reliance on a person-oriented mode of interaction, which bans stereotypes, will rather determine choices in favor of the position of non-aggression (Maralov, 2005).

To conclude the review, it is necessary to point out that in spite of considerable attention of humanitarians, the particulars of influence of person-oriented irritability combined with social and educational stereotypes on adopting a certain type of behavior in the process of interaction are not yet sufficiently described. Solving this problem will enable educationists to proceed to practical steps and come up with effective techniques of teaching patterns of non-aggressive behavior to students who specialize in the sphere of psychological and educational support.

3. **Materials and Methods**

In the present research, the following methods were adopted: theoretical (analysis, specification, generalization); empirical (unique techniques were developed for the purpose of studying intercommunication patterns between students, determining levels of person-oriented irritability and of rigidity in students); methods of statistical analysis of data (correlation analysis was performed, in which both linear and point-biserial (Pearson) correlation coefficient was employed).

The Questionnaire form for assessment of the degree of development of a certain pattern of behavior contains 40 statement items, 10 for each type of position: controlling, manipulative, non-aggressive, and passive. The participants were offered statement items and four answer options with only one answer to choose. For example, "In a conflict situation I never give in, I try to win at all costs, to be up and not down". Answer options are the following a) often; b) sometimes; c) seldom; d) never. The choice of (a) option scored 3 points, (b) option – 2 points, (c) option – 1 point, (d) option – 0 points. The final result consisted in total points scored by each participant in each scale. The testing of the questionnaire form was performed on 200 senior students specializing in the sphere of psychological and educational support, who were well acquainted with each other. The internal consistency of the form was tested with the help of Cronbach's alpha coefficient. The level of validity and reliability of the questionnaire was proved to be satisfactory. Thus, we concluded that it was possible to use it for practical diagnostics.

The Questionnaire form for person-oriented irritability was organized in the following way. Students were asked to assess their level of person-oriented irritability according to a five-grade scale. They were given the following instruction: "Use a five-grade scale to estimate how often you are irritated by people: 5 – very often; 4 – often; 3 – sometimes; 2 – seldom; 1 – never". Below there was given a list of qualities: disorderly; hyper-orderly; hilarious, ready to laugh at every given opportunity; touchy; meddlesome; non-sociable, reserved, and others (22 positions in total). For greater convenience for analysis and for the sake of correlation analysis, all results were transferred to a binary scale: 4-5 points counted as a marked symptom and were assigned the index of "1", 1-3 points were regarded as low-level and the index was "0". The generalized irritability index was calculated as a sum of high indices divided by the whole number of items (22) multiplied by a hundred. For instance, if a participant has a high score in 7 positions, then his irritability index will be as follows: 7:22 *100 = 32. The greater the total score is, the higher irritability level shows. Irritability index

higher than 50 was considered as high, 25 – 50 – medium, and 1 – 25 – low. If the total score of a student equaled 0, he was believed to experience no person-oriented irritability.

Questionnaire for finding the level of rigidity of social and educational stereotypes. For establishing the level of rigidity of social and educational stereotypes, we modified a questionnaire we had earlier designed for school teachers (Maralov, 2005). It consists of 30 statement items, and each of them was adjusted to high school environment. For example, it contained the following widely spread opinions, "A teacher is the main figure in high school, so success and efficiency of academic work depends on him", "I believe that creativity in teacher – student relationships is just words; in reality their intercourse is prescribed by standards and curricula from beginning to end", "You can adequately characterize a student within the scope of such notions as 'academic performance', 'conduct', and 'dress'. Agreement or disagreement was assessed on a five-grade scale: 5 – absolutely agree, 4 – agree rather than disagree, 3 – both agree and disagree, 2 – disagree rather than agree, 1 – absolutely disagree. The total score of answers to all statement items indicated a higher or lower level of rigidity of students' stereotypes. Like in the previous case, results were transferred to a binary scale for greater convenience in using methods of mathematical statistics. Grades 4 and 5 were regarded as marked rigidity and were assigned an index of "1". Grades 1, 2, and 3 were regarded as unmarked rigidity and were assigned "0". For every participant, a total index was calculated as a ratio of a total score to the possible maximum (in our case it is 30 points) multiplied by a hundred. A rigidity index higher than 50 was considered as high, index of 25 – 50 was regarded as moderate. An index of 1 – 25 was regarded as low. If a student scored 0, he was assumed to have no stereotypes.

133 students of both sexes, average age 20, took part in the experiment, all of them proposing to work in the sphere of psychological and educational support (future teachers, psychologists, social care teachers) at Moscow University for the Humanities (60 persons) and Cherepovets State University (73 persons).

The research was conducted in three stages. At the first stage, theoretical analysis of the problem was performed, major characteristics of phenomena under discussion were singled out and described, and testing tools were developed. At the stage of practical research we examined the influence of irritability and stereotypes on the choice of pattern of behavior in the course of interaction and the level of its typicality. At the last stage, the collected data were analyzed, results were discussed, and conclusions were drawn.

4. Results

Now let us describe the main results of the research. At the first stage, correlation analysis of behavior types was conducted. They were correlated to each other and also to the level of irritability and the rigidity of stereotypes. This allowed revealing the general pattern of relationships and mapping the way to detecting more specific connections. The Pearson correlation coefficient was employed. The results are shown in Figure 1.

Fig. 1. Relationships of behavior types to each other, to levels of irritability and to rigidity of stereotypes*
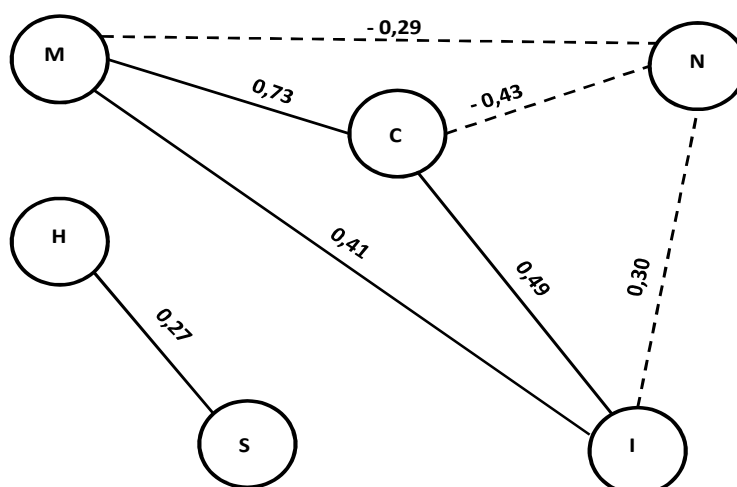
*Note: M – manipulative position; C – controlling position; N – non-aggressive position; H – passive position; I – irritability; S – rigidity of stereotypes; ——————— positive connection; ━ ━ ━ ━ negative connection

As we can see in Figure 1, the © controlling position is positively connected with manipulative position (M) – r = 0,73, where p ≤ 0,01, and is negatively connected with non-aggressive position (N) – r = − 0,43, where p ≤ 0,01. In its turn, the manipulative position (M) is also negatively connected with non-aggressive position (N) – r = − 0,29, where p ≤ 0,01. This demonstrates the fact that controlling and manipulative positions are interconnected. A person with a tendency for control will use direct pressure in some situations and covert pressure by means of manipulative practices, in others. A person who adopts a non-aggressive position tends to employ methods of non-coercive interaction rather than direct coercion or manipulation. The positions of control and manipulation have a positive correlation with irritability level (I) – r = 0,49, where p ≤ 0,01 and r = 0,41, if p ≤ 0,01. And vice versa, the non-aggressive position has a negative correlation with irritability level: r = − 0,30, if p ≤ 0,01. So, we can state that people with a higher level of person-oriented irritability will tend to adopt controlling and manipulative positions more often than a non-aggressive position. The research revealed no relevant connections between controlling and manipulative positions on one hand and the rigidity of stereotypes (S) on the other. On the contrary, passive position (H) has a positive correlation with the level of stereotype rigidity: r = 0,27, if p ≤ 0,01. In other words, a high level of rigidity of stereotypes is associated not with controlling or manipulative positions, as we assumed earlier, but with a passive position.

The above results throw light on the general pattern of interrelations between the types of behavior adopted and the level of person-oriented irritability and the rigidity of stereotypes, but they do not enable us to judge about specific features of these relations. In other words, it is reasonable to ask what type of people is apt to irritate students and cause the desire to exercise pressure and manipulate. Similarly, we can ask a question, what stereotypes determine adopting this of that type of behavior, especially in the light of discovered facts pertaining to a passive position.

Let us examine the points mentioned, one after another. First of all, we will consider interrelationship between types of interactional behavior and irritability directed at certain categories of people. The point-biserial (Pearson) correlation coefficient was employed. The results are shown in Figure 2.

Fig. 2. Relationships of behavior types to irritability directed at certain categories of people*
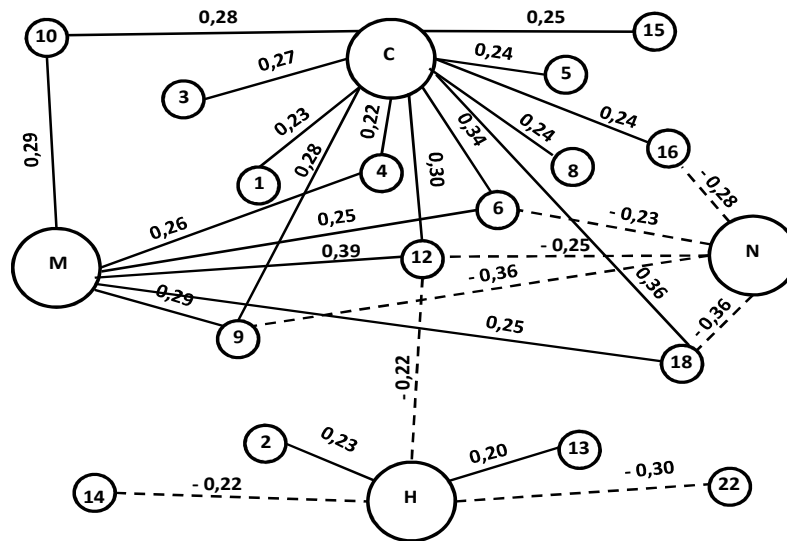
*Note: C – controlling position; M – manipulative position; N – non-aggressive position; H – passive position; and others, 1 – disorderly; 2 – hyper-orderly; 3 – hilarious, ready to laugh at every given opportunity; 4 - touchy; 5 – unduly communicative, meddlesome; 6 – non-sociable, reserved; 8 – too peace-loving, occasionally cowardly; 9 – always showing initiative; 10 　　- passive, indifferent to business; 12 　- "thick-skulled", slow thinking; 13 - hyper-responsible, punctual; 14 – irresponsible, putting things off till tomorrow; 15 - seeking your approval, trying to gain your confidences; 16 　- rejecting contact, estranged; 18 – slow; 22 – lazy; ——— positive connection; — — — — negative connection.

In Figure 2, we represent various negative and positive connections between types of interactional behavior and irritability directed at different categories of people.

Students with marked controlling behavior (C) are mostly irritated at: disorderly people (1) – r = 0,23, if p ≤ 0,01; hilarious, ready to laugh at every given opportunity (3) – r = 0,27, if p ≤ 0,01; touchy (4) – r = 0,22, if p ≤ 0,05; unduly communicative, meddlesome (5) – r = 0,24, if p ≤ 0,01; non-sociable, reserved (6) – r = 0,34, if p ≤ 0,01; too peace-loving, occasionally cowardly (8) – r = 0,24, if p ≤ 0,01; always showing initiative (9) – 0,24, if p ≤ 0,01; passive, indifferent to business (10) – r = 0,28, if p ≤ 0,01; "thick-skulled", slow thinking (12) – r = 0,30, if p ≤ 0,01; seeking your approval, trying to gain your confidences (15) – r = 0,25, if p ≤ 0,01; rejecting contact, estranged (16) – r = 0,24, if p ≤ 0,01; and slow (18) – r = 0,36, if p ≤ 0,01.

Students with marked manipulative behavior (M) are mostly irritated at: touchy people (4) – r = 0,26, if p ≤ 0,01; non-sociable, reserved (6) – r = 0,25, if p ≤ 0,01; too peace-loving, occasionally cowardly (8) – r = 0,24, if p ≤ 0,01; always showing initiative (9) – 0,29, if p ≤ 0,01; passive, indifferent to business (10) – r = 0,29, if p ≤ 0,01; – "thick-skulled", slow thinking (12) – r = 0,39, if p ≤ 0,01; slow people (18) – r = 0,25, if p ≤ 0,01.

Students with dominant non-aggressive behavior (N) do not show any positive connections, only 5 negative ones. This proves that they are not irritated with people who may cause irritation of others. These include: non-sociable, reserved people (6) – r = – 0,23, if p ≤ 0,01; always showing initiative (9) – – 0,36, if p ≤ 0,01; "thick-skulled", slow-thinking people (12) – r = – 0,25, if p ≤ 0,01; rejecting contact, estranged (16) – r = – 0,28, if p ≤ 0,01; and slow (18) – r = – 0,36, if p ≤ 0,01.

Students with dominant passive position (H) show 2 positive and 3 negative connections. They are irritated at hyper-orderly people 2) – r = 0,23, if p ≤ 0,01 and hyper-responsible, punctual people (13) – r = 0,20, if p ≤ 0,05. They are not irritated at: "thick skulled", slow-thinking people (12) – r = – 0,22, if p ≤ 0,05; irresponsible people, putting things off till tomorrow (14) – r = – 0,22, if p ≤ 0,05; and lazy people (22) – r = – 0,30, if p ≤ 0,05.

In the same way we will analyze connections of types of interactive behavior with social and educational stereotypes. The point-biserial correlation coefficient was employed. The results are shown in Figure 3.

Fig. 3. Relationships of behavior types to rigidity of social and educational stereotypes*
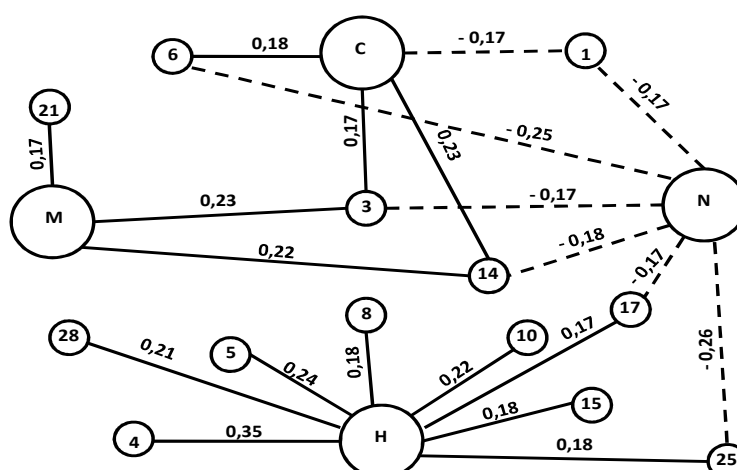
*Note: C – controlling position; M – manipulative position; N – non-aggressive position; H – passive position; 1 – "A teacher is the main figure in high school, success and efficiency of academic work depend on him"; 3 – "Most parents don't bring their children up properly"; 4 – "I believe that creativity in teacher – student relationships is just words; in reality their intercourse is prescribed by standards and curricula from beginning to end"; 5 – "I believe that a teacher should use ready-made materials rather than come up with his/her own ideas"; 6 – "I believe it is not necessary for teachers to reveal their personality to students"; 8 – "Both teachers and students should strictly follow instructions of their superiors, thus avoiding problems"; 10 – "Higher education means giving knowledge, and it's the family who are responsible for upbringing"; 14 – "Nowadays bright students are scarce at universities and colleges, the majority of students aren't very clever"; 15 – "A strict teacher is better in the long run than a lenient one"; 17 –"Young men need more control than young women"; 21 – "It is the family who bear the greatest responsibility for the upbringing of children, not the school or, least of all, college or university"; 25 – "In my opinion, parents' expectations as regards to university (college) are unrealistic"; 28 – "Children take after their parents, it doesn't matter if they are young or grown up."

As it is demonstrated in Figure 3, students with marked controlling behavior show 4 connections: 3 positive and 1 negative. There is direct correlation with the following stereotypes: "Most parents don't bring their children up properly" (3) – r = 0,17, if p ≤ 0,05; "I believe it is not necessary for teachers to reveal their personality to students" (6) – r = 0,18, if p ≤ 0,05; "Nowadays bright students are scarce at universities and colleges, the majority of students aren't very clever" (14) – r = 0,23, if p ≤ 0,01. Negative connection is displayed with the opinion "A teacher is the main figure in high school, success and efficiency of academic work depend on him or her" (1) – r = – 0,17, if p ≤ 0,05.

Students with marked manipulative positions show 3 positive connections. Similarly to the previous example, they are, "Most parents don't bring their children up properly" (3) – r = 0,23, if p ≤ 0,01; "Nowadays bright students are scarce at universities and colleges, the majority of students aren't very clever" (14) – r = 0,22, if p ≤ 0,05. And there was added one more stereotype, "It is the family who bear the greatest responsibility for the upbringing of children, not the school or, least of all, college or university" (21) – r = 0,17, if p ≤ 0,05.

Students with marked non-aggressive behavior show 6 negative connections. They disagree with the following statements: "A teacher is the main figure in high school, success and efficiency of academic work depend on him or her" (1) – r = – 0,17, if p ≤ 0,05; "Most parents don't bring their children up properly" (3) – r = – 0,17, if p ≤ 0,05; "I believe it is not necessary for teachers to reveal their personality to students" (6) – r = – 0,25, if p ≤ 0,01; "Nowadays bright students are scarce at universities and colleges, the majority of students aren't very clever" (14) – r = – 0,18, if p ≤ 0,05; "Young men need more control than young women" (17) – r = – 0,17, if p ≤ 0,05; "In my opinion, parents' expectations as regards to university (college) are unrealistic" (25) – r = – 0,26, if p ≤ 0,01.

The greatest rigidity of social and educational stereotypes was shown by the students with marked passive behavior (8 positive connections). Adoption of a passive position is determined by the following stereotypes, "I believe that creativity in teacher-student

relationships is just words; in reality their intercourse is prescribed by standards and curricula from beginning to end" (4) – r = 0,35, if p ≤ 0,01; "I believe that a teacher should use ready-made materials rather than come up with his or her own ideas", (5) – r = 0,24, if p ≤ 0,01; "Both teachers and students should strictly follow instructions of their superiors, thus avoiding problems" (8) – r = 0,18, if p ≤ 0,05; "Higher education means giving knowledge, it is family that is responsible for upbringing" (10) – r = 0,22, if p ≤ 0,05; "A strict teacher is better in the long run than a lenient one" (15) – r = 0,18, if p ≤ 0,05; "In my opinion, parents' expectations as regards to university (college) are unrealistic" (25) – r = 0,18, if p ≤ 0,05; "Children take after their parents, it doesn't matter if they are young or grown up" (28) – r = 0,21, if p ≤ 0,05. It is noteworthy that such students display adherence to three stereotypes connected with family upbringing. In their opinion, college or university should not meddle with upbringing, since it is the domain of the family; so parents overrate the influence of high school, delegating to it part of their responsibilities. And they also believe that psychological features of parents and children are absolutely identical. "Children take after their parents, it doesn't matter if they are young or grown up".

5. Discussion of results

Thus, we can say that the hypothesis of correlation between person-oriented irritability level and the choice of interactive behavior was fully confirmed. A greater number of persons causing students' irritation is associated with stronger factors for adopting controlling and manipulative positions. And, vice versa, a lower level of irritation caused by people is connected with more favorable conditions for adopting a non-aggressive position.

We presume that it is necessary to pay special attention to the factors that correlate positively with controlling and manipulative positions, and negatively – with a non-aggressive position. In our research, we singled out five such factors. They include five categories of people who can cause irritation: "non-sociable, reserved"; "always showing initiative"; "thick-skulled", "slow-thinking people"; "rejecting contact, estranged"; "slow". They can be also arranged into three groups.

The first group includes non-sociable, reserved people, rejecting contact. While making an attempt to engage them into a conversation, showing frankness and desire to communicate, students have to deal with an estranged and cool attitude, disinclination to contact or open up. As a result, this manner causes irritation, sometimes offence, a desire to "break the wall of misunderstanding", which may lead to a desire to get one's way, using pressure or manipulation.

Another group of people includes slow-thinking people, with slow reaction. In this case irritation appears because of differences in tempo of work. People get irritated because everything is being done so slowly, and often in the wrong way. As a result, there appears a desire to "push the acceleration button", which drives people to adopting a manipulative or controlling position.

The third group comprises people who are always super-active and highly initiative. They irritate people by the fact that they know everything, have their own opinion on everything, they always bubble with initiative, show they are better than others, and assert themselves. Naturally this "thrusting" of initiative on others meets opposition and irritation may develop into a certain position.

If students develop the ability not to be irritated by these categories of people, to treat them with equanimity and accept them the way they are, they are well on the way to adopting a non-aggressive position.

There is special interest in the analysis of irritability in students with a dominant passive position. As it was shown, the following five factors become prominent. Students of this type are irritated at hyper-orderly and hyper-responsible people. They are not annoyed by slow-thinking people or lazy, irresponsible people, who prefer putting things off till tomorrow. In our opinion, in this case we see a projection mechanism at work. Irritation is caused by the fact that such students themselves are not very scrupulous, responsible, or punctual. And, reversely, slowness, laziness, and putting things off do not cause negative feelings in them because they belong to this category of people themselves. This determines the desire to take a passive position, to "lie low", not to show initiative, and not to attract attention.

As for the relationships between the rigidity of stereotypes and interactional behavior, the hypothesis was only partially confirmed. High levels of rigidity of social and educational stereotypes were shown only by students with a dominant passive position. In other categories, we were able to detect only isolated statistically relevant connections. The data acquired are different from those we received earlier, when we studied rigidity of stereotypes in practicing teachers. We can explain this situation by the fact that students have no work experience yet, and that is why stereotypes do not have strong influence on interactional behavior in the same way as it happens to teachers. Students communicated with all parties of a teaching process only during school practice. We can assume that stereotypes are not revealed at this stage yet.

Nevertheless, we established a number of interesting facts that stand in need of interpretation. It was shown that students adopting either controlling or manipulative positions adhere to three stereotypes, repeated with slight variations, which, in all appearances, determine adoption of these positions. Firstly, they admit that a teacher need not reveal his personality to students. In fact, this shows readiness to agree that teaching should be based on subject – object relationships and bear an "impersonal" character. Secondly, they admit that nowadays students are not very bright or talented. Thirdly, students agree that parents do not bring up their children properly. Thus, this is the basis for the following psychological construction, "Students nowadays aren't very clever or talented, and parents are to blame for that, because they don't bring up their children properly. So it is not necessary for the teachers to reveal their personality to students". That is why they are ready to agree with necessity of pressure towards such students, which means, actually, to themselves.

Students with dominant non-aggressive position hold a contrary opinion on the issues above. They do not agree that parents do not bring up their children properly; they do not think that nowadays bright students are scarce at universities and colleges, that the majority of students are not very bright, or that a teacher need not reveal his personality to students. Besides, they disagree with the assumption that young men need more control that young women, and that parents have unrealistic expectations as regards to university or college. Here we observe absence of negative attitudes to the parties of a teaching process, which determines adoption of a non-aggressive position.

The research shows that students with a dominant passive position are most subject to social and educational stereotypes. In general, such students display an impersonal position, which denies the teacher creativity, pursues execution of superiors' instructions (so as to avoid trouble), approves of strictness in a teacher as guarantee that the class will do their work (the same projection mechanism is in action), and mistrusts the pedagogical potential of universities (since this is the responsibility of the families). As likely as not, when these students graduate and start their professional careers, the stated stereotypes may be activated and stimulate them to adopt a controlling or manipulative position, mostly toward their students.

6. Conclusion

Based on the research conducted, the following can be stated. Person-oriented irritability, as well as social and educational stereotypes can become determinant in adopting a certain type of interactive behavior: pressure and control, manipulation, non-aggression or passivity.

During this stage of personal and professional development, person-oriented irritability plays an active part in choice of positions. The higher the number of such potential irritants is, the greater pre-requisites emerge for removal of irritation, by choosing the controlling or manipulative positions in interaction. The less irritation to persons there exists, the more likely one is to adopt a non-aggressive stand. There, the most significant thing is the level of irritability to three types of people: non-sociable, introvert and reserved individuals; reticent and slow thinkers, and also persons characterized by high initiative level.

Adherence to certain social and educational stereotypes may be latent in some students, mostly with marked passive position; yet it influences their choice of an interactional behavior pattern. Controlling and manipulative positions may stem from stereotypes that involve delegating responsibility for upbringing to the family, voiced by those who charge students of nowadays with insufficient ability, and make no requirements for teachers to

reveal their personalities to their students. Where such stereotypes do not apply, the students choose a non-aggressive position.

The study proves that it is not enough to merely talk to students planning to work in the sphere of psychological and educational support about non-aggressive interaction as a universal human value, and subsequently to expect them to adopt non-aggressive behavior. It is essential to develop special techniques that help such students to inhibit irritation and to overcome their social and educational stereotypes. In this we see the prospects of our further research.

The results obtained can be further employed in teaching students with a view to developing their humanistic personalities and competence to relate to people and avoid methods of both direct and covert coercion.

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- Vyacheslav Sitarov – theoretical analysis of literature; collection and organization of data; critical analysis and final text editing; drawing conclusions.

ECONOMIC REGULATION AND MATHEMATICAL MODELING OF INSURANCE PRODUCT COST METHOD

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Abstract

Background. The methodology and economic mechanisms for calculating the cost of a long-term insurance policy, which could optimize management of insurance companies in the Russian Federation, have not been developed. The research into this sphere is relevant under conditions when the functions of insurance supervisors are transferred to the Central Bank of Russia.

Objectives. The priority of this economic study is to establish a scientific rationale for a transfer to the actuarial cost method of an insurance contract, as this method assures a balanced solution for long-term socio-economic problems and stability of the insurance portfolio.

Results. The paper presents the theoretical provisions, methodological approaches and practical recommendations on economic regulation and management of joint business activity involving several participants (partners) in case of premature termination by one of them. This study has investigated the methodological issues of long-term insurance in the Russian Federation; it has developed the theoretical approaches to risk evaluation of premature termination of a joint project because of a participant's leaving; it has provided the scientific substantiation of and developed a conceptual economic mathematical model for calculating risks of one participant's early leaving a joint project due to external circumstances; the scientific and practical recommendations for calculation of a rate net premium have been provided using case study.

Methods. To attain the objectives set out we used probability-theoretical models and actuarial mathematical methods for calculating insured components such as computational analysis, balance and statutory methods, and others.

Conclusion. The developed economic mathematical model can be applied for calculating the cost of an insurance contract, both in case of a single insurance product and a combination of different insurance products, that could help improve an insurance company's liability for consequences of its rate policy. The proposed methods and tools allow taking into account potential risks at all the stages of solution development by an insurance company and avoiding adverse economic consequences in its business activities.

Keywords: insurance rates, net premium, distribution density, distribution function, economic mathematical model of risk insurance

JEL classification: C02

1. Introduction

From the economic point of view, insurance refers to a combination of different economic interrelationships which can be represented as a system of formation of special target financial resources (reserves) that are the source for reimbursement due to an insured event or are used for indemnification in case risks of different types occur. One of the most important types of long-term insurance is endowment insurance, it contributes to welfare of both an individual and a society, and the nation as a whole. However, personal insurance products, in particular, except life insurance, have not been developed enough in Russia until now. They

comprise only a minor part of the insurance portfolio. In this context, the relevance of this research work is to a great extent determined by the lack of methodologies and economic mechanisms for calculating the cost of a long-term insurance policy with the focus on optimizing management of insurance companies in the Russian Federation. Under conditions when the Central Bank of Russia has taken the functions of insurance supervisors, the urgency of the research becomes evident. Insurance supervision is necessary for control over insurance companies; it aims at eliminating fraud in the insurance sphere, assuring observance of insurance legislation by insurers, it provides licensing and accreditation of professional participants of the insurance market. The implementation of the long-term facultative insurance concept intends application of mathematical methods for calculating a rate net premium.

2. <u>Literature review</u>

Nowadays insurance companies consider their work as a protection instrument for business activity and a help to insured people in case of an insured event, on the one side, and as a profitable business activity, on the other side. The main source for an increase in profit of an insurance company is insurance incomes that can be received from temporarily surplus funds placed at bank deposits, enterprises' shares, or investments (Falin G.I.) Insurance is one of the main factors of the state's socioeconomic strategy. It makes it possible to significantly reduce the state budget expenses on payments in the event of emergent technogenic and natural disasters. Due to long-term insurance the national economy gains essential amounts of funds available for investment. One of the most important types of long-term insurance is endowment insurance, which contributes to personal, public and national welfare; and yet, particularly personal insurance products, except life insurance, have not been developed enough in Russia until now. They comprise only a minor part of the insurance portfolio. Key customers applying for personal insurance are corporate clients as it is one of essential components of their employment benefits. On the Russian market, only the leading insurance companies offer annuity assurance (Dubovskikh K.I. et. al, 2014). Recently, we can observe people's growing demand for this insurance service. This fact still causes the increased liability of insurance companies for stability of their businesses and contributes to consolidation of the insurance market. In 2015 the Russian Federation enacted a new law on annuity assurance, which prescribes an obligatory pension ratio for each person. When defining time in employment, a year is measured in pension points, or an individual pension ratio. In order a person would be entitled for insurance pension, they should have at least 30 pension points, while the conditions of these points' accumulation are rather different. The people who have refused from an investment part of the state pension enjoy a priority in accumulation of the pension points. Namely, if a person maintains both the insurance and investment pension parts, then the maximum number of their points will be 6.25 a year, and in case of insurance pension only - 10 pension points a year. At the same time, the number of pension points depends on the minimum monthly wage which a policy holder gets. The people having high salaries gain a greater number of pension points and, consequently, their pension coverage would be larger in comparison with those having low incomes. The Law also prescribes an increased number of pension points (factor 1.8) for each year of compulsory military service, for caring for a person over 80 years old, a disabled person of Group I, a disabled child or the first child. If a family have more children, the multiplying coefficient for the second child is 3.6, for the third and fourth child - 5.4 (these multiplying coefficients are applied only within the first year and a half after the child birth). The people who maintain an investment part of insurance pension, but their minimum monthly wage amounts to one, run significant risks. When achieving the retirement age (in Russia the female retirement age is 55 years old and the male retirement age is 60 years old), they get deprived of insurance pension and have to continue working in order to increase the number of their pension points. According to the new pension legislation of the RF, the minimum time in employment required for retirement pension has also changed. So, before 2015 the minimum time in employment was five years, but after 2015 this period will be increased by one year annually and by the end of 2024 it will have been 15 years, after that the increase will stop. The process of pension payment indexation has undergone significant changes, too. The indexation of insurance pension is planned for every year, this would result in exceeding

pensioners' minimum level of subsistence in different regions of Russia. At the present time, in the Russian Federation beside compulsory pension insurance there is private facultative insurance. However, it exists only as an addition to a compulsory type of pension insurance; and every person sets the size of insurance premiums for this insurance type individually signing an insurance contract with an insurance company. All the pension transformations in Russia encounter a number of large-scale problems such as off-the-books employment and salary payment, accounting fraud. All this significantly decreases efficiency of the national pension system, contributes to the fall of living standards and diminishes confidence in the governmental socioeconomic policy.

3.   SCOPE, OBJECTIVES AND METHODS

Mathematical estimation methods are applied for correct calculation of an insurance rate (*Sukhorukova I.V., Likhachev G.G.,* 2003). They help define the probability of an insured risk event and estimate an average cost of this risk, that is a size of an insurance indemnity paid by an insurance company due to occurrence of loss, assess correctness of insurance rate calculation when a contract between an insurance company and an insured person has been signed. An insurance company always includes its administrative expenses and profit into the cost of an insurance policy. In this contexts, the objective of a rate posteriori estimate is rather relevant.

Life insurance is one of long-term insurance products as it is related to longevity. Pension insurance in Russia has its specific features (*Siniavskaia T.G., Tregubova A.A.,* 2015). First of all, they are connected with the age (*Riabikin V.I. et. al,* 2007)*,* when a person starts receiving guaranteed insured benefits. In the Russian Federation this age is certain, and at the moment it is 60 years old for men and 55 years old for women, for all the types of pension insurance. However, it should be pointed out that a net premium of an insurance policy for a man is much lower than for a woman of the same age (*Boikov A.V.,* 2009). An insurance rate is different as after retirement men live on average for seven years, and women for 20 years. Another essential specific feature of pension insurance in Russia is differentiated distribution of the death rate for each territorial subject of the Russian Federation. The estimated insurance rates for two men of the same age category living in different regions of Russia are different. It is conditioned by the fact that each territorial subject of the RF complies its own mortality tables representing mortality peculiarities specific for the certain region. Despite of this essential factor, practically all insurance companies use mortality tables compiled for Russia as a whole. Consequently, the rates for policy holders from other RF subjects are initially calculated incorrect, which causes violation of the equivalence principle that should be applied to obligations of the parties concerned. An insurer receives a less insurance premium that results in an increased probability of smashup of business or a policy holder pays an excessive price for the policy and, therefore, incurs financial expenses.

Scope. Economic relationships and actuarial analysis methods in risk insurance of joint business activities.

Objectives. The goal of this paper is to develop theoretical provisions, methodological approaches and practical recommendations on economic regulation and management of joint business activity involving several participants (partners) in case of premature termination by one of them. According to this goal, the following objectives have been set out and attained: (i) - to analyze methodological issues of long-term insurance in the Russian Federation; (ii) to develop theoretical approaches to estimation of joint business termination risks due to one partner's early leaving; (iii) to provide a scientific and methodological substantiation and to develop a conceptual economic mathematical model for calculating risks of one participant's early leaving a joint project due to external circumstances; (iv) to make up scientific and practical recommendations for calculation of a rate net premium using case study.

Methodology. To attain the objectives set out we used probability-theoretical models and actuarial mathematical methods for calculating insured components such as computational analysis, balance and statutory methods, and others. The economic mathematical model of calculating a size of insurance rate for risks of one participant's early leaving a joint project due to external circumstances. Numeric calculation implies application of numerical

techniques and simulation methods, if necessary (*Katsnel'son A.A. et al*, 1995), (*Zhmurko G.P. et al*, 1997).

4.   RESULTS AND DISCUSSION

Focusing on promotion and development of actuarial cost methods for risk insurance of joint business the authors of this paper consider the methods of calculating rates of two partners' life insurance. This statement can be interpreted in a wider sense as risk insurance of joint obligations arising as a result of damage caused to the life, health or property of other persons.

The developed methods are based on calculation principles applied for rates of risk insurance classes and recommended by the Federal Service for Insurance Supervision of the Russian Federation.

In Russia the actuarial activity is performed in compliance with Federal Law No.293-ФЗ of November 02, 2013 *On Actuarial Activity in the Russian Federation,*[1] the international agreements of the Russian Federation as well as according to other federal laws and legislative instruments of the Russian Federation.

Actuarial cost methods on the basis of the principle of equality of the insurer's and policy holder's obligations make it possible to find out each policy holder's share of participation in the insurance fund, that is to define the rate sizes (*Sukhorukova I.V., Serdiukova Iu.A.,* 2015) and the impact of macroeconomic factors on the insurance premium size (*Vedmed I. Iu., Vorontsov D.N.,* 2017). In order to estimate the amount which each policy holder should contribute to the insurance fund, it is important to start with the calculation of the policy holder's financial obligations or with the calculation of the accounts payable due to the insurance contracts (*Falin G.I., Falin A.I.,* 2003). The mentioned issues are widely discussed in the studies by international authors (*Bowers N.L. et al,* 1997), (*Gantenbein M., Mata M.A,* 2008), (*Panjer H.H. et al,* 1998), (*Kaas R. et al,* 2001), (*Olivieri A., Pitacco E.,* 2011), (*Black K. et al,* 2013*)*. In order to estimate the sufficient size of the insurance fund, the insurer needs the information on how many objects may be damaged or may not be damaged due to an insured event. Statistical data can be used for calculation of the amount of accounts payable. For example, on the basis of the information on population mortality it is possible to estimate the probability of surviving and death for people of different ages. These data are used for compiling mortality tables that demonstrate dynamic changes in the number of people of a particular age group. The mortality tables are used for calculating net premiums of personal life insurance contracts and pensions for people of a particular age group (*Laptev P.V.,* 2015). Taking into account the long-term nature of such investments the rates are initially reduced by the income size gained as an interest of the insurer's funds used as credit resources.

Actuarial cost methods are also applied for the economic rationale of establishing a reserve fund of an insurance company for each life insurance policy. In addition to it, actuarial cost methods are used for calculation of the reduced surrender values (*Sukhorukova I.V.,* 2006), that allows adjusting of insurance premiums in the event of alteration of life insurance policies.

This paper continues the authors' research into estimating insurance risks of premature termination of a joint project because of one participant's leaving (*Chistiakova N.A., Sukhorukova I.V.,* 2017a). The current objective can be understood as follows. It is supposed that in the beginning of a joint contract of two partners there is an insurance policy that, in case of any partner's early leaving the projects due to external circumstances, implies an insurance cover payment to the other partner for maintenance of the joint project started. In the previous paper (*Chistiakova N.A., Sukhorukova I.V.,* 2017b) the authors revealed the probability of a risk event as well as probabilities of an insurance compensation payment to each partner in dependence of the periods of their obligations arising from the project and the partners' departure intensities specifying external threats for them. The objective of this paper is to estimate the cost of such a policy.

We can introduce the necessary notations ensuring consistency with our previous paper. We consider that the moment of the insurance contract signing coincides with the beginning

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[1] Federal Law No.293-ФЗ of November 02, 2013 *On Actuarial Activity in the Russian Federation* (amended).

of the project. It is a begin time. The periods of obligations of the first and second partners can be expressed as T_1 and T_2, respectively. The prior duration period of the project is $\max\{T_1, T_2\}$; however, as external circumstances may cause an early individual leaving of the project by any of the partners, then the duration time of each partner's work in the project is a random variable. Therefore, we can introduce the τ_1 and τ_2 random variables referring to the work time of the first and second partners, respectively (*Chistiakova N.A., Sukhorukova I.V.,* 2017a). It is evident that the duration period of the insurance contract does not exceed the $\min\{T_1, T_2\}$ value as an insured event can occur only within the time of the partners' joint work $(0, \min\{T_1, T_2\})$. Let us assume that the following parameters are specified as the initial data: (T_1, T_2) - the vector of temporary obligations of the project partners, μ_x and $\tilde{\mu}_y$ - the partners' departure intensities given as the functions of the current time of work in this joint project, $x \in (0, T_1)$, $y \in (0, T_2)$, and describing external threats (risks) for the partners. Each of the introduced values can be defined in the following way.

The first partner's departure intensity at the x moment is the function $\mu_x = \lim_{\Delta \to 0+} \dfrac{1}{\Delta} P(\tau_1 < x + \Delta | \tau_1 > x), 0 < x < T_1$. The second partner's departure intensity at the y moment is defined similarly: $\tilde{\mu}_y = \lim_{\Delta \to 0+} \dfrac{1}{\Delta} P(\tau_2 < y + \Delta | \tau_2 > y), 0 < y < T_2$.

Then, there is a relation between the departure intensity, the distribution function $F_{\tau_1}(x) = P(\tau_1 < x)$ and the survival function $S_{\tau_1}(x) = P(\tau_1 > x)$ of the τ_1 random variable:

$$\mu_x = \lim_{\Delta \to 0+} \frac{1}{\Delta} P(\tau_1 \le x + \Delta | \tau_1 > x) = \frac{F'_{\tau_1}(x)}{S_{\tau_1}(x)} = \frac{-S'_{\tau_1}(x)}{S_{\tau_1}(x)}.$$

We can find the solution of the differential equation $\mu_x = \dfrac{-S'_{\tau_1}(x)}{S_{\tau_1}(x)}$ (*Katsnel'son A.A. et al, 1995*), it is $S_{\tau_1}(t) = e^{-\int_0^t \mu_x dx}$

Then, we obtain the particular densities of the τ_1 and τ_2 random variable distribution:

$$f_{\tau_1}(t) = -S'_{\tau_1}(x) = \mu_t S_{\tau_1}(t) = \mu_t e^{-\int_0^t \mu_x dx}, t < T_1,$$

$$f_{\tau_2}(s) = \tilde{\mu}_s e^{-\int_0^s \tilde{\mu}_y dy}, s < T_2. \tag{1}$$

Further, the external reasons of the contract termination allow considering the τ_1 and τ_2 random variables to be independent events. This circumstance provides us with the opportunity to find the density value of joint distribution of the random vector (τ_1, τ_2). In accordance with the equations (1) it looks like:

$$f_{(\tau_1, \tau_2)}(t, s) = f_{\tau_1}(t) f_{\tau_2}(s) = \mu_t e^{-\int_0^t \mu_x dx} \cdot \tilde{\mu}_s e^{-\int_0^s \tilde{\mu}_y dy}, \ 0 < t < T_1, \ 0 < s < T_2. \tag{2}$$

Now, we have prepared all the parameters necessary for calculation and can find out the cost of the above-mentioned insurance contract. First of all, it is needed to consider in more detail the approaches to definition of the amounts payable to the partners as insurance compensations by occurrence of the insured event. As the partners' shares in the joint project are originally different, it is natural to make the assumption that these compensation amounts are different for the partners participating in the joint project. In our statement of the problem

we believe that at the beginning moment the partners' shares in the project should be agreed by the participants and included into the agreement provisions. We can denote the reimbursement amount at the moment of the first partner's early leaving as S_1 and the reimbursement amount at the moment of the second partner's early leaving as S_2. It is a vector of parameters for the problem considered.

In order to estimate the cost of the above-mentioned insurance service we can assume that the policy holder makes a one-time payment for it at the beginning moment of time. As the process is dynamically developing in time, it is necessary to introduce a compound interest rate valid over the period of the contract term. It is traditionally denoted as $i\%$ per annum. Then, the corresponding present value factor can be expressed as $v = (1+i)^{-1}$. The cost of the insurance contract can be calculated applying the actuarial cost method through equalizing the mathematical expectations of the expenses born by the policy holder and the insurer.

In order to estimate the cost of the above-mentioned insurance contract we need to find out the current cost of the policy holder's obligations (i.e. the cost at the moment of the contract signing). As the time periods of the first and second partners' participation in the joint project are the τ_1 и τ_2 random variables (*Zhmurko G. et al,* 1997), respectively, then the required current cost of the contract is a random variable too, it can be expressed as:

$$A = A(\tau_1, \tau_2) = \begin{cases} S_1 \cdot v^{\tau_1} & \text{at } \{\tau_1 < \min\{T_1, T_2\}_1 \bigcap \tau_2 > \tau_1\} \\ S_2 \cdot v^{\tau_2} & \text{at } \{\tau_2 < \min\{T_1, T_2\} \bigcap \tau_1 > \tau_2\} \\ 0 & \text{in the other cases} \end{cases} \qquad (3)$$

This equation takes into account two mutually exclusive reasons for payment of the insured amount when the first partner leaves the project and when the second partner does. According to the equivalence principle of the insurer's and policy holder's obligations the A mathematical expectation represents the cost of the above-mentioned insurance contract. We can obtain it from the above equation (3) applying the formula of mathematical expectation to the function of a random vector using the found density (2) of the joint distribution of the (τ_1, τ_2) random vector. Figures 1 and 2 represent the (τ_1, τ_2) value ranges where it is necessary to perform the integration at $T_1 \leq T_2$ and at $T_1 \geq T_2$, respectively. In the both cases they form a rectangle divided into a triangle and a trapezoid according to the equation (3).

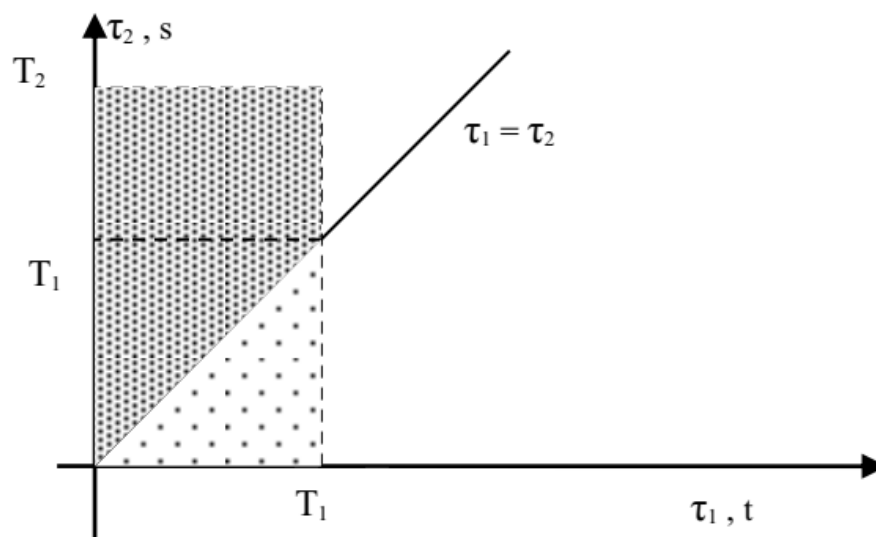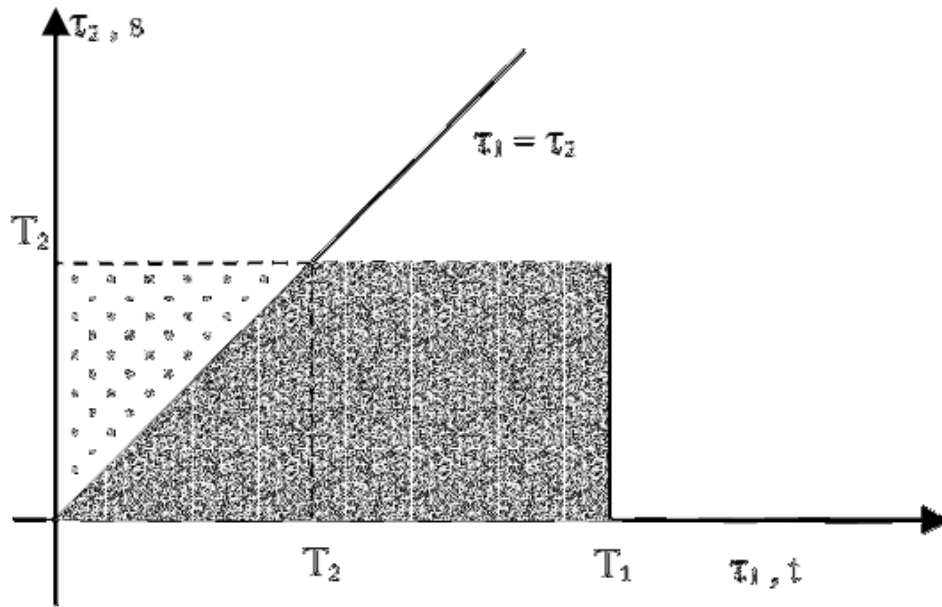**Figure 1 The (τ_1, τ_2) value range for the integral evaluation at $T_1 \leq T_2$**

Figure 2 The $\left(\tau_1,\tau_2\right)$ value range for the integral evaluation at $T_1 \geq T_2$

After integration we obtain

$$MA= \begin{vmatrix} \int\limits_0^{T_1} S_1 v^t \cdot \mu_t e^{-\int\limits_0^t \mu_x dx} dt \int\limits_t^{T_2} \tilde{\mu}_s e^{-\int\limits_0^s \tilde{\mu}_y dy} ds + \int\limits_0^{T_1} \mu_t e^{-\int\limits_0^t \mu_x dx} dt \int\limits_0^t S_2 v^s \cdot \tilde{\mu}_s e^{-\int\limits_0^s \tilde{\mu}_y dy} ds \quad \text{at } T_1 \leq T_2, \\ \int\limits_0^{T_2} \tilde{\mu}_s e^{-\int\limits_0^s \tilde{\mu}_y dy} ds \int\limits_0^s S_1 v^t \cdot \mu_t e^{-\int\limits_0^t \mu_x dx} dt + \int\limits_0^{T_2} S_2 v^s \cdot \tilde{\mu}_s e^{-\int\limits_0^s \tilde{\mu}_y dy} ds \int\limits_s^{T_1} \mu_t e^{-\int\limits_0^t \mu_x dx} dt \quad \text{at } T_1 \geq T_2, \end{vmatrix} \quad (4)$$

The contract cost is obtained. To illustrate this computation by a numeric example we can assume $T_1 = T_2 = 1$ and $S_1 = S_2 = S$ for clearness and simplicity. In addition to it, for simplicity let us assume that the partners' departure intensities due to the external reasons are equal and at the x moment of the project duration can be expressed as $\mu_x = \tilde{\mu}_x = \dfrac{1}{1-x}, x \in (0,1)$. Now, we can calculate the contract cost for this example introducing all the parameters into the equation (4). In this case when $T_1 = T_2 = 1$ and $S_1 = S_2 = S$ the both formulas in the equation (4) provide the same result, therefore in the purpose of clearness let us write down the first of them and we obtain the following:

$$MA= \int\limits_0^1 Sv^t \frac{1}{1-t} e^{-\int\limits_0^t \frac{1}{1-x} dx} dt \int\limits_t^1 \frac{1}{1-s} e^{-\int\limits_0^s \frac{1}{1-y} dy} ds + \int\limits_0^1 \frac{1}{1-t} e^{-\int\limits_0^t \frac{1}{1-x} dx} dt \int\limits_0^t Sv^s \frac{1}{1-s} e^{-\int\limits_0^s \frac{1}{1-y} dy} ds =$$

$$= S\left[\int\limits_0^1 v^t \frac{1}{1-t}(1-t) dt \int\limits_t^1 \frac{1}{1-s}(1-s) ds + \int\limits_0^1 \frac{1}{1-t}(1-t) dt \int\limits_0^t v^s \frac{1}{1-s}(1-s) ds \right] =$$

$$= S\left[\int\limits_0^1 v^t (1-t) dt + \int\limits_0^1 \frac{v^s}{\ln v}\Big|_0^t dt \right] = S\left[\frac{v^t}{\ln v}\Big|_0^1 - \int\limits_0^1 v^t t\, dt + \int\limits_0^1 \frac{v^t - 1}{\ln v} dt \right] =$$

$$= S\left[\frac{v-1}{\ln v} - \frac{t \cdot v^t}{\ln v}\Big|_0^1 + \int\limits_0^1 \frac{v^t}{\ln v} dt + \frac{v^t}{\ln^2 v}\Big|_0^1 - \frac{t}{\ln v}\Big|_0^1 \right] = S\left[\frac{v-1}{\ln v} - \frac{v}{\ln v} + \frac{v-1}{\ln^2 v} + \frac{v-1}{\ln^2 v} - \frac{1}{\ln v} \right] =$$

$$= S\left[\frac{-1}{\ln v} + \frac{v-1}{\ln^2 v} + \frac{v-1}{\ln^2 v} - \frac{1}{\ln v} \right] = 2S\left[\frac{v-1}{\ln^2 v} - \frac{1}{\ln v} \right] = 2S\left[\frac{v-1-\ln v}{\ln^2 v} \right]$$

As the present value factor satisfies the constraint $v = (1+i)^{-1} \in (0,1)$, it is easy to show positivity of this expression.

Applying the specific values of the interest rate we can compile the contract cost table for illustrative purposes. Table 1 below shows the insurance contract cost values at the corresponding annual interest rate values taken for this example.

Table 1 The insurance contract cost in relation to the interest rate

Interest rate, i	Present value factor, v	Insurance contract cost, MA
0.03	0.970874	S*0.990219
0.04	0.961538	S*0.987054S
0.05	0.952381	S*0.983933S
0.06	0.943396	S*0.980857
0.07	0.934579	S*0.977823
0.08	0.925926	S*0.974832
0,09	0.917431	S*0.971882
0.1	0.909091	S*0.968973

It is evident for this example that the cost is high as the duration period of the project is short enough and such departure intensities imply the obligatory reimbursement.

It is obvious that generally in order to make practical numeric forecasts on the probability of compensation payments by the insurance company and to calculate the insurance contract cost it is necessary to thoroughly select the probability parameters characterizing the partners' external threats. In this context, accumulation of appropriate statistical data by the top insurance companies offering such an insurance product as well as application of numerical techniques and simulation methods could be useful.

5. CONCLUSION

It is supposed that each partner has the obligation to accomplish its share of participation in the joint project within the certain period of time. The paper presents the developed theoretical provisions, methodological approaches and practical recommendations on economic regulation and management of joint business activity involving several participants (partners) in case of premature termination by one of them. This study has investigated the methodological issues of long-term insurance in the Russian Federation; it has developed the theoretical approaches to risk evaluation of premature termination of a joint project because of a participant's early leaving; it has provided the scientific substantiation of and developed a conceptual economic mathematical model for calculating risks of one participant's early leaving a joint project due to external circumstances; the scientific and practical recommendations for calculation of a rate net premium have been provided using case study. To achieve the objectives set out we used probability-theoretical models and actuarial mathematical methods for calculating insured components such as computational analysis, balance and statutory methods, and others. The analytical expression of the rate net premium of reimbursement payable to each partner in case of the other partner's early leaving the project due to the external circumstances has been obtained.

Conclusions. The outcomes of this study provides the analytical expressions for calculating insurance rates as one-time payments. The practical significance of the study outcomes is related to the possibility of applying the developed economic mathematical model for calculating the cost of an insurance contract, both in case of a single insurance product and a combination of different insurance products, that could improve an insurance company's liability for consequences of its rate policy. The proposed methods and tools allow taking into account potential risks at all the stages of solution development by an insurance company; avoiding adverse economic consequences in its business activities.

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PROBLEM OF RIVER BANK FAILURE AND THE CONDITION OF THE EROSION VICTIMS: A CASE STUDY IN DHULIAN, WEST BENGAL, INDIA

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Abstract

The present paper deals with the problem of bank failure and the present condition of erosion victims in Dhulian. Continuous shifting of river course and erosion introduce vulnerable conditions on physical as well as social environment. Simple methodologies have been adopted to conduct this study. Primary data have been collected from the erosion victims regarding their condition. Satellite images have been used here for mapping purposes. Several statistical methods have also been used for discussions as well. Thousands of people - especially living along the river bank - are in a high risk condition. Population displacement from the river bank areas is the main impact of erosion. Gradual areal extension of riverine islands (chars) is one of the cause which leads to continuous sifting of Ganga towards right bank exhibits not a good sign for the densely populated Dhulian. Overall the condition of the erosion victims is very poor and challenging.

Keywords: River bank erosion, vulnerability, erosion victims, protective strategies
JEL classification:

1. <u>Introduction</u>

River bank erosion is a natural and inevitable phenomenon of river and can be defined as a dynamic natural process which involves the removal of materials from the banks of a river. The bank erosion will be occurred when the magnitude of flowing water exceeds the strength or shearing resistance of materials or sediments on the basal part of a river bank. The sediments at basal part of the bank are washed out by the running water (rising stage of discharge or effluent flow of ground water into the river) leads to form vacuum at the base and form a steep wall or cliff above which ultimately collapses by hydraulic pressure, geotechnical events or combined effect of both. Das et al., (2014) commend on river bank erosion that once sediment load in river exceeds the carrying capacity of river, the river will transfer from single channel meandering river to a braided channel. Bank erosion mainly occurs in meandering river. In meandering river, river shifting takes place through bank erosion and deposition on the point bar. Most of the rivers in the world are subjected to meandering along with bank erosion. Bank erosion in devastating nature can be found in Mississippi-Missouri river system of North America, Ganga-Brahamaputra-Mekong of Asia, Amazon of South Africa and river Nile of Africa. The Mississippi river is eroding at high rate on the lower part of Brule Reservation Central South Dakota in United States and the rate of losing shoreline in some locations is approximately 8 feet per year. Chakrabarti and Nag (2008) commend on the mechanism of bank failure in upstream and downstream of Farakka Barrage that retreat of water after the initial high discharge, removal of fine materials (sand/silt) by the water force accelerates the process of bank failure. According to Rudra (2006) erosion in Ganges happens during the month of monsoon (June- September) and this erosion has two separate phases: Pre-flood and Post-flood erosion. The sudden fast moving current during the rising stage of discharge helps to remove unconsolidated materials from the base of bank which ultimately collapses. In the post-flood period, erosion which is happened

by effluent flow of ground water into the river which leads to liquefaction and flowage of basal materials into the river. Though river bank erosion is natural phenomena but it is accelerated by anthropogenic activities. Rudra (1998) commend on the bank failure issue of Malda district that un-working of almost 54 sluice gates of Farakka barrage by the side of Malda has been obstructing the flow of Ganges during rainy season and leads to emerge a long strip of land in upstream of the barrage which is also responsible for severe erosion in Malda district. Dhulian and its surrounding areas in the downstream section of Farakka Barrage have been facing the problem of bank erosion by river Ganga and total municipality area lies in highly risky zone caused by severe bank erosion problem of river Ganga. Rudra (1992) stated on the problem of erosion in Dhulian and apprehended that Dhulian may be disappeared in future. Most vulnerable wards are 1, 2, 4, 5, 19, 18, 17, 16. UNDP (2004), stated about vulnerability as "a human condition or process, resulting from physical, social, economic and environmental factors, which determine the likelihood and scale of damage from the impact of given hazard". According to National Institute of Disaster Management (2004), "vulnerability is defined as the extent to which a community, structure, service or geographical area is likely to be damaged or disrupted by the impact of particular hazard on account of either nature, construction and proximity to hazardous terrain or disaster prone area". According to Flood Preparedness and Management Plan (2014), Government of West Bengal, Dhulian town has been shifted four times due to devastating bank erosion problem. People of Dhulian, especially who living along the river bank have been suffering from displacement, unemployment, crisis of habitation, unhygienic surroundings and different socio-economic problems introduced by sifting of river path and severe erosion. Uddin and Basak (2012) stated about the bank failure problem of Bangladesh that severe erosion causes different problems in terms of displacement, loss of agricultural land, loss of production etc and ultimately these ensure more vulnerability. Chatterjee and Mistri (2013) stated about the impact of river bank erosion at Santipur of Nadia that erosion brings mass displacement of population, loss of property which ensure poverty. Again Rudra (2003) stated on the erosion issue of West Bengal that it brings different socio-economic problems mostly the agrarian economy has been seriously affected by loss of fertile land. Actually, Dhulian and its adjoining area are situated in a curse of nature. Severe erosion of 1930, 1950 and 1970 pushed the entire development process of Dhulian and its adjoining area into further deteriorating condition and their effect can also be felt till now. In this context, the present paper deals with the problem of bank failure in Dhulian and the condition of erosion victims on the one hand and on the other hand tries to give necessary measures for the development of life style of erosion victims and fight against erosion.

The present paper has the following objectives-
• To analysis the present condition of Dhulian in terms of vulnerability caused by river bank erosion.
• To find out the condition of people along the river bank.

2. Methodology

Simple methodology has been adopted to conduct this study. A discussion has made with the Executive Engineer, Irrigation and Waterways Department, Jangipur, West Bengal, regarding the problem of erosion in Dhulian. To know the condition of erosion victims along the river bank, a socio-economic survey (end of 2017) has been done based on simple random sample technique and the primary data has been collected by interviewing with the people of affected area. The total population of affected areas (*Ghoshpara, Lalpur, Laxminagar and Guripara)* is 13801(Flood Preparedness & Management Plan-2014, Govt. of W.B). Along the river bank 100 households have randomly selected. Secondary data have been collected from Government offices of Dhulian like Municipality office, BDO and Irrigation office. Google Earth images of 1984, 1990, 1995, 2000, 2005, 2010 and 2015 have been collected here. All bank lines of the respective years have been directly digitized from the Google Earth. After that the bank lines are superimposed with the help of RS and GIS techniques to measure the rate of erosion and deposition. Google Earth images have also been used to measure the bank line shifting. Minus value in the table related to bank line shifting indicates erosion and plus value indicates deposition over the cross sections. To find out the relationship between bank failure, bank deposition and gradual extension of area of riverine islands (Chars), Pearson's

Correlation analysis has accomplished here by using SPSS software. Other statistical techniques are used to get information regarding the condition of erosion victims in this area.

Figure 1. Location of study area
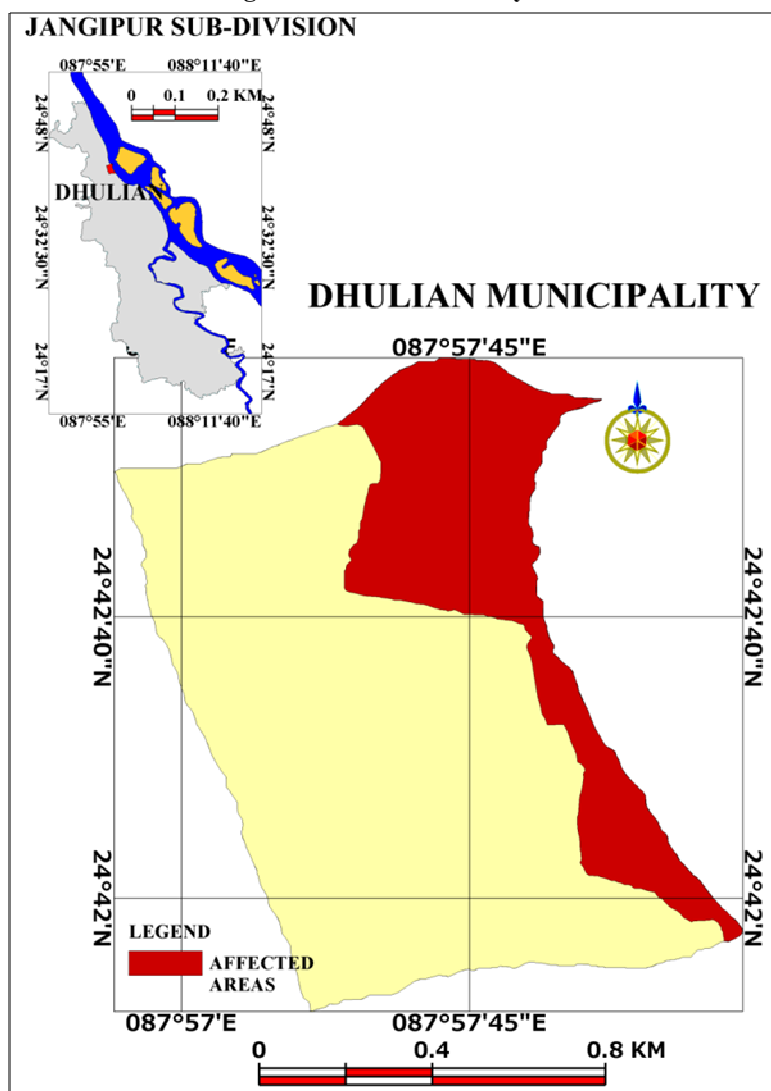
Infrastructural index propounded by United Nations Developmental Programme (UNDP) (2011) has been calculated to identify the level of development of erosion victims in respect of infrastructural facility. The parameters for calculating Infrastructural Index for the study area is dissimilar from Infrastructural Index propounded by UNDP. We have selected the following parameters for calculation Infrastructural index-

INFRASTRUCTURAL INDEX :{ Per-Capita Small Savings Index (in Rs/Month) + Toilet Facility Index + Household Having Electric Facility Index + Drinking Water Facility Index + Doctors Facility Index}/5.

Dimension Index: (Actual Value-minimum Value/Maximum Value-minimum Value).

Per Capita Small Savings (in Rs/Month): Total small savings of each area/total population of the area.

Toilet Facility Index: (total no. of toilets in the area / total no. of population of the area)

Household Having Electric Facility Index: (total no. of household having electricity facility / total no. of household)

Drinking Water Facility Index: total no. of tube-well in the area / total population of the area.

Doctors Facility Index: Total No. of Doctors of the area/ Total population of the area

To categories the level of infrastructural development in the study area , the UNDP (2011) categorization has followed here i.e., less than 0.5 indicates Low Human Development,0.5-0.7

indicate Medium Development, 0.7-0.8 indicates High Human Development, 0.8 – above indicate very High Human Development.

3.   Results and discussion

Bank erosion problem and vulnerability

Dhulian has been facing severe bank erosion problem by river Ganga from past decades (Table 1 and Figure no. 2) but it can be found that the erosion is accelerated after the construction of Farakka Barrage due to limited functioning of barrage gates and concentration of flow along the right bank (Banerjee, 1999). Dhulian and its adjoining areas were badly affected in the mid of the 1970s (Rudra, 1992). Dhulian has been continuously affected by bank failure. The entire area of Dhulian is lying under a threat of erosion. It can be observed that total area of Dhulian, especially along the river bank, is in a vulnerable condition. Thousands of lives are in a highly risky situation because the distance of their households from the bank line is not more than five meters (Fig. 3). It can be stated by observing the shifting of the river Ganges over the cross sections viz., 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 that the right bank line is not shifted remarkably than left bank line because the over populated right bank is protected but the left remains unprotected. Negative shifting (Erosion) has been increased for the last five years on the both bank (Table 2 and Figure 4). We can't considered Dhulian as a protected place and free from severe bank failure. Shifting of the river Ganges is a continuous process and moreover formation of mid channel bars and shoal on the left bank from Farakka towards Dhulian (Figure 5) may help to increase the pressure of water in both banks of Ganges which ensures active erosion and vulnerability. To find out any connection with bank failure and gradual areal extension of the Char's, Pearson's correlation analysis has used here. The correlation between 'erosion' and 'change in area of the riverine island' stands positive and the correlation value is 0.451 (Table no.5). So, it can be concluded that there is a positive relationship between river bank erosion and gradual extension in the area of the Chars. Continuous shifting of bank line results more active erosion along right bank of river and Dhulian is one of the worst effected zone lying on the right bank.

Table 1. History of erosion in Dhulian

Years	1984-1990		1990-2000		2000-2010		2010-2013		2013-2017	
	Erosion	Deposition	Erosion	Deposition	Erosion	Deposition	Erosion	Deposition	Erosion	Deposition
Total in sq. m	9540	51600	30310	13200	105720	0	17739.7	15121.9	3548	12375
Annual rate in sq. m.	1590	8600	3031	1320	10572	0	5913.23	5040.6	507	1767.9

Table 2. Shifting of bank line over the cross sections based on figure no. 4

Cross sections	1984-1990		1990-2000		2000-2010		2010-2013		2013-2017	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
1	18.45	95.57	2.4	-62.5	-19.1	-649.56	2.62	-239.73	-3.55	-242.52
2	16.33	-87.7	-24.8	-127.39	-5.6	-446.4	3.61	-36.42	-6.35	-18.631
3	14.76	498.05	-61.2	-516.16	-34.95	121.87	-1.49	-259.9	-1.193	-122.4
4	-10.94	779.6	-19.74	-429.3	-9.1	-102.93	11.48	-177.37	-4.224	-339.9
5	-13.97	40.25	-61.59	-108.5	-9.53	-207.81	1.484	-246.91	-17.96	-515.52
6	-7.021	177.43	-153.4	-77.54	-13.44	68.176	18.023	-67.41	-33.71	-611.524
7	24.9	-55.484	30.268	48.212	-42.86	101.76	19.71	-21.46	-9.34	-165.81
8	-14.7	73.02	4.52	-325.63	-5.32	56.414	15.58	236.302	-4.2428	-311.025
9	2.57	24.99	38.82	-290.64	3.268	-46.29	-40.913	15.57	-18.401	-37.534
10	-9.004	48.31	-122.02	14.4	10.6	-254.5	82.24	-1.2009	-34.33	30.718

Table 3. Gradual areal extension of char lands on Ganga river in the years of 2010, 2013 and 2017.

YEARS		2010		2013		2017
	NAMES	AREA IN SQ. KM	NAMES	AREA IN SQ. KM	NAMES	AREA IN SQ. KM
CHAR LANDS	A	7.63558149	A	3.63770507	A	8.67826551
	B	0.3622186	B	3.41361881	B	3.84309728
	C	0.52487250	C	4.18216510	C	4.27253614
	D	0.02054730	D	13.80308345	D	6.35049960
	E	0.94485600	-	-	E	1.4667749
	F	0.12370926	-	-	-	-
	G	1.36343724	-	-	-	-
TOTAL		10.9752223		25.03657243		24.8121469

Table 5. Correlations analysis

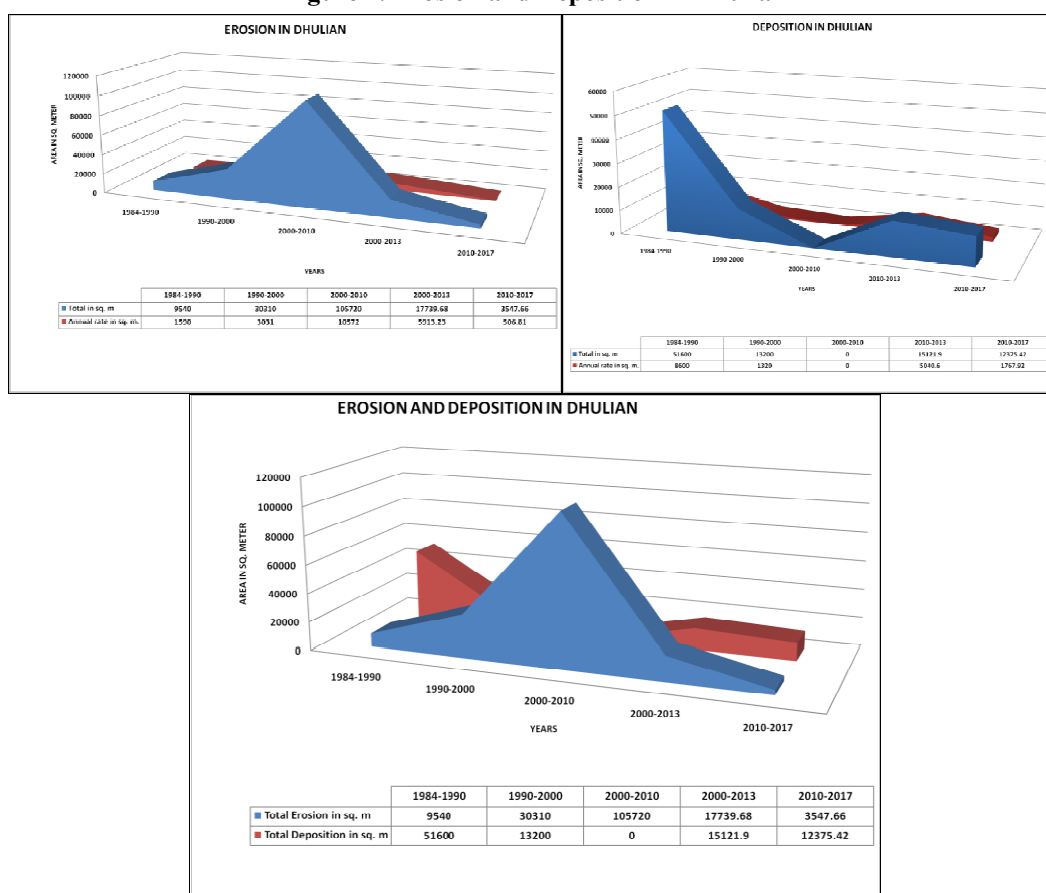|		Erosion in sq. km.	Deposition in sq. km.	Change in char area in sq. km.
Erosion in sq. km.	Pearson Correlation	1	-.730	.451
	Sig. (2-tailed)		.099	.369
Deposition in sq. km.	Pearson Correlation	-.730	1	-.100
	Sig. (2-tailed)	.099		.850
Change in char area in sq. km.	Pearson Correlation	.451	-.100	1
	Sig. (2-tailed)	.369	.850	

Figure 2. Erosion and Deposition in Dhulian

Figure 3. A vulnerable pocket at Dhulian Municipality (2017)

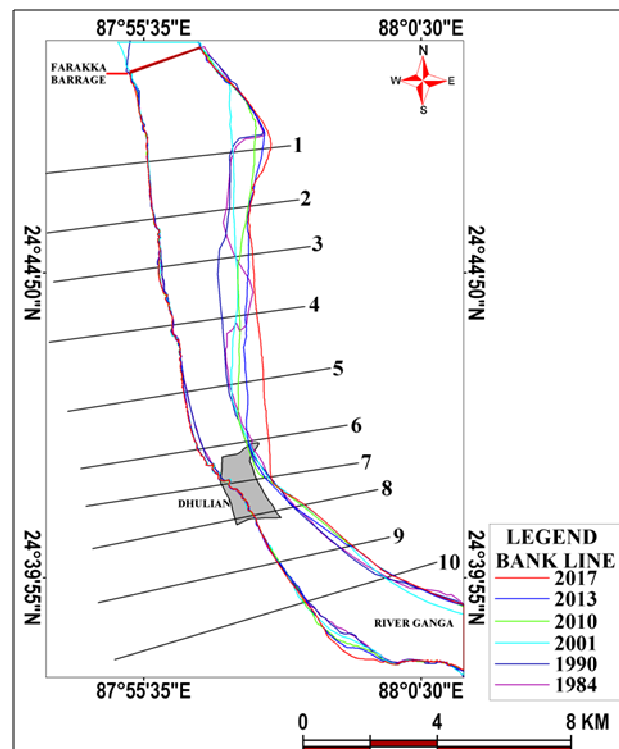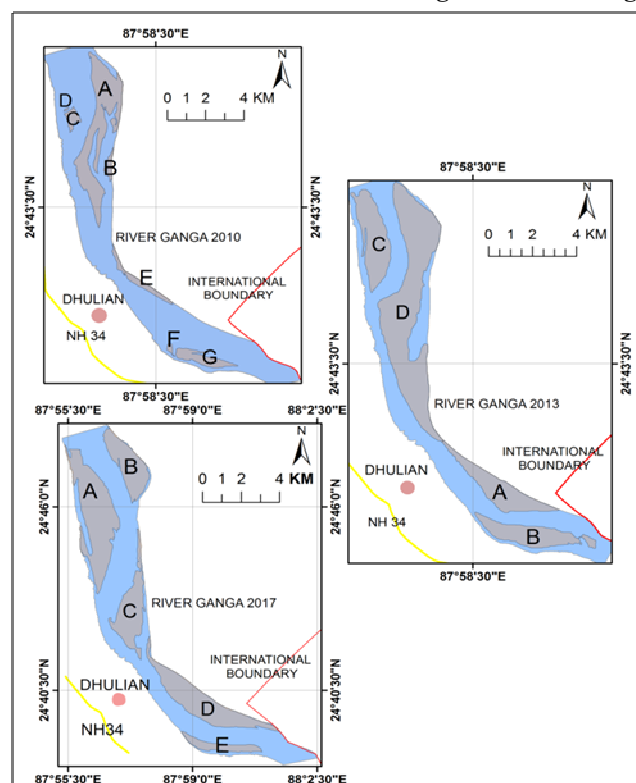**Figure 4. Shifting of river Ganga (Based on Google Earth Images).**

Figure 5. Gradual areal extension of Chars on Ganga based on Google Earth images

4. Condition of people along the river bank in Dhulian

The people living along the bank of Ganga in Dhulian is also suffering by erosion induced problems from past decades. During the erosion of 1950 and 1970 huge number of population was shifted backward. According to Rudra (1992) in mid 1970s, near about 50,000 people become homeless due to devastating erosion in Dhulian. Again Rudra (1996) stated that the problem of erosion and population displacement is not less in the downstream section of Farakka Barrage. Displacement can be found due to erosion in Dhulian, where the number of displacement of 55 percent, 25 percent and 10 percent out of total people are 6 times, 3times and 1 time respectively and rest are not displaced till now (Table 6). They have been facing the problem of displacement from before 80 years to till now due to Ganga river bank failure. Continuous population displacement along the river bank introduces very high density of population i.e., 15,314 person /sq. km. (where according to 2011 census report, the population density of the state, West Bengal, is 1029 person /sq. km. and the district Murshidabad is 1334 person / sq.km.) and increasing the number of slums (Table 7). Due to backward shifting of huge population caused by river bank erosion very much congested (Table 8), unhygienic and unplanned habitation has been developed along the bank where 25-35 people are living togetherly within a small room in a very poor condition. In Dhulian town high percentage of people living in a slum area and most of them are living along the river bank in a very bad condition.

Table 6. Percentage of displaced population and frequency of displacement based on field survey, 2017.

Percentage of displaced population	No. of displacement (frequency)
55	6
25	3
10	1
10	NA

Source: field survey, 2017.

Table 7. Distribution of population in Dhulian municipality during 2011.

Census report	Year 2011
Total population	95706
Total male population	47635
Total female population	48071
Total number of slum	128
Slum population	62210 (65%)
Population density per sq.km	15314

Source: census of India, 2011.

Table 8. Condition of habitation based on field survey, 2017.

No. of families with in average extension (m)	Number of family members with in a family	Total people living within 15-20 meters extension
4-5 families within 15-20meters	6 to 7	24 to 35

Source: field survey, 2017

This erosion induced displacement also ensures loss of properties which is a continuous process.

Table 9. Average amount of land loss due to erosion.

Percentage of surveyed population	Average amount of land loss in Bigha
48	>10
18	5-10
34	<5

Source: field survey, 2017

Table 10. Loss of properties due to erosion.

Type of loss	Percentage of surveyed population
Land + cattle + house	40
House + cattle	35
House	25

Source: field survey, 2017

To know the present condition of the erosion victims, combined infrastructural index (CII) has been computed. The value of CII is **0.23008** which indicates low category of development along the river bank area. From the combined infrastructural index, it can be stated that people along the river bank or the erosion victims do not get basic enough facilities in respect of drinking water, toilet and doctor facility and economically they are also very depressed. Poor erosion victims also suffer from health insecurity due to lack of basic infrastructures.

Table 11. Calculation of infrastructural index based on data collected from field survey, 2015

Electricity facility index	Toilet facility index	Drinking water facility index	Doctors facility index	Per-capita small savings index	Combined infrastructural index
0.75	0.022	0.0555	0.00740	0.316	0.23008

5. <u>Conclusion</u>

After 1980s devastating erosion is not occurred in Dhulian but erosion is still active and no one can say properly about the fore coming days. By observing the river path (river is continuously shifting towards right bank or towards Dhulian and its adjoining area) (Figure 5), it can be stated that Dhulian lies in a denunciation of erosion and thousands of people are living within a highly risky zone. A long term effect of erosion can be found on occupation, education and health. And ultimately bank failure increases socio-economic vulnerability of people specially, along the river bank. The value of combined infrastructural index in study area is 0.23008 which means low category of development in terms of infrastructure. We can fight against erosion in some extent if management plan will be more improved by-

- Construction of concrete bolder jacketing instead of using sand bags to safe the highly populated right bank.

- To fight against erosion as well as to protect the Bed Bars (S1, N2, N3) which are constructed to save the populated right bank, the attention should to pay for their maintenance purposes immediately.

- Plantation of trees should to do along the river bank by considering the active role of trees in protection of erosion.

- And it is important to take the steps to protect the problem areas before monsoon season.

Though it is also not enough because erosion is a natural and inevitable phenomenon of river but concrete bolder jacketing is more erosion resistance than other. And also give more longevity. But we can able to compensate the loss of society caused by erosion by-

- Arranging rehabilitation package for the erosion victims

- Employment for erosion victims to combat against the economic distress

- Arranging adequate drinking water facility, toilet facility, doctor's facility for the poor erosion victims through proper channel.

So, development in the society can be brought by implementing the stated remedies.

<u>Acknowledgements</u>

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DOES TRADE OPENNESS AND FISCAL POLICY AFFECT INEQUALITY AND ECONOMIC GROWTH? A STUDY IN INDONESIA

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Abstract

This paper examines the impact of trade openness and Indonesia's fiscal policy on income inequality and economic growth. The error correction model approach was used to analyze the effect during the period 1980 to 2015. The results show that trade openness can improve inequality but at the same time impede growth. The effect of fiscal policy on reducing inequality is only generated by tax collection but is temporary. Meanwhile, government spending on infrastructure and health proved to encourage growth. On the other hand, education sector spending and tax collection can actually hamper growth.

Keywords: Trade Openness, Inequality, Growth, Fiscal Policy

JEL classification: E62, F63, H50, O40

1. Introduction

The speed of increasing inequality in Indonesia from 1990 to 2000 is ranked second in East Asia (World Bank, 2016). Data as of March 2015 shows the gini index is at 41 (Badan Pusat Statistik, 2016). This condition indicates inequality in Indonesia entering an unsettling stage. The international trade balance deficit in recent years adds to concerns when it adversely affects both inequality and growth.

On the other hand, government efforts to reduce inequality and encourage growth are not running smooth. The Indonesian government is faced with a large burden of personnel and subsidy expenditures, particularly fuel subsidies. The narrowness of fiscal space is exacerbated by the tax unachieved revenue targets. This causes the government's ability to influence inequality and growth is questionable.

The impact of fiscal policy and trade openness on equality and growth is debated. Several literatures show that fiscal policy has a positive impact on reducing inequality (López, 2010; Ostry, Berg, & Tsangarides, 2014; Turnovsky, 2015) but other studies show otherwise (Barro, 2000; Sabir, Yustika, Susilo, & Maskie, 2015). The effect of fiscal policy on growth also varies. Some suggest that fiscal policy positively impacts growth (Bania, Gray, & Stone, 2007; Cashin, 1995; Hur, 2014) while others argue that fiscal policy has a negative impact (Fölster & Henrekson, 2001; Lundberg & Squire, 2003). In line with the impact of fiscal policy, the effect of trade openness in some studies provides mixed results. Dollar & Kraay (2004) concluded that trade is good for encouraging growth but is doubtful of its impact on inequality. The positive effect of trade on growth is also supported by research by Majeed (2016) and Tahir (2015). The impact of trade on inequality will be different in countries with different economic levels. Other studies say, trade has no effect on inequality in developed countries whereas in poor countries show ambiguous results (Babones & Xi, 2008).

Several existing studies have analyzed the economic data sets of several countries. The use of economic data of some countries has a number of weaknesses. The weakness lies in the differences in the character of each country (Wooldridge, 2009). The use of long cross section data resulted in a bias in the study because it is affected by the demographic conditions of each country, the failure to capture the endogenous policies, and can eliminate individual

characters (Fölster & Henrekson, 2001). The same opinion was also expressed by Revallion (2004) in which panel data may obscure the results of the study. With this deficiency, this research will use time series data with focus on Indonesian economy as suggested by Hur (2014).

The new thing that is also raised in this paper rather than writing about other Indonesian inequality is to maximize the use of standardized world income inequality database (SWIID). The use of SWIID data is intended to be comparable to the conditions of other countries. In addition, the maximum use of SWIID data is intended to minimize the possibility of errors in measurement of inequality by the Indonesian Central Bureau of Statistics (Asra, 2000; Leeuwen & Foldvari, 2012).

Given that there have been many studies with various analytical methods and result, this study offers the use of error correction model as an alternative analytical tool. There are two basic questions to be answered in this paper. First, how is the impact of trade openness on growth and inequality. Second, how is the influence of fiscal policy on growth and inequality. This paper consists of several parts. A description of the supporting literature is found in the first section. The second part contains the data and explanation of the methods used. The third section will explain the results and concluded with the conclusion at the end.

2.   Literature Review

The Influence of Fiscal Policy on Growth and Inequality

Keynesian theory and endogenous growth models differ in view of tax collection and spending. If Keynes suggested the government encourages growth through the absorption of aggregate supply excess then Barro's growth model encourages growth through the addition of capital accumulation. In the perspective of endogenous growth model, capital is not only physical but also non-physical. Investment in human resources can have an impact on growth, (Muinelo-Gallo & Roca-Sagales, 2012). Taxes in Barro's endogenous growth model can positively affect growth as long as it is used to finance productive activities and would otherwise lead to crowd out when used for non-productive spending (Bania et al., 2007). In opposite positions, Keynes argues that taxes will reduce growth through reduced purchasing power.

Even thought there is no definitive definition of productive spending, but some literature classifies some type of spending into productive spending. Infrastructure spending, spending on security and order, education and health are classified as productive spending (Bania et al., 2007; Barro, 1990; Glomm & Ravikumar, 1997; Hur, 2014). In addition to some of these types of spending, Cashin (1995) adds transfer spending as a productive expense. The assumption used is that transfer can increase marginal product of capital through patent protection and pension for private employee. Protection of innovation from counterfeiting through patents is intended to encourage new innovations that can increase productivity (Khusaini, 2006). Pension is also intended for the same purpose through the ease of the company to replace old workers with new, more competent workers.

With the same types of spending and taxes, fiscal policy can affect inequality through its ability to redistribute income and provide facilities that benefit its citizens. One of the causes of the rapid increase in inequality in Indonesia is the unequal educational and health opportunities gained when a person is born (World Bank, 2015a). This is the basis for the necessity of the government's role. Investment in the provision of education and health facilities for the poor does not appeal to the private sector so the government is obliged to provide. With the provision of adequate basic facilities, it is expected that every citizen has the same fitness in the economy as the key to inclusive growth (Felipe, 2012; Ranieri & Ramos, 2013). In addition to the direct provision of basic facilities, government policies that remove growth barriers, provide employment, and a favorable investment climate can overcome inequality (Hur, 2014). Furthermore, other opinions said high inequality signifies the failure of fiscal policy to redistribute (Goñi, López, & Servén, 2011). Hassine (2014) said, one of the reasons for the lack of growth influence on inequality is that the government does not focus on developing inclusive growth. In the context of Indonesia this indication can be seen from the study of Khusaini (2014) which concluded that the planning and budgeting in the local government level are not consistent.

Although some opinions said that government intervention in equality can hamper growth (Okun, 1975) but with good policy, negative impacts can be avoided. A number of studies based on inclusive growth show that although income distribution can undermine growth because of its direct impact, the indirect impact of taxes and subsidies actually increases growth (Aoyagi & Ganelli, 2015). Meanwhile, according to Ostry et al. (2014) income redistribution programs through public investment in infrastructure, health, education, social security will have an impact on economic growth and equality. In addition to spending, the ability of fiscal policy is also influenced by the type of tax that is the source of financing (Turnovsky, 2015).

The Effect of Trade on Growth and Inequality

Trade can have both positive and negative effects on growth. Trade is useful because it can increase the production of goods that have comparative advantages, expand the product market, knowledge and technology spillover. Transfer of technology is very useful for countries that do not have the ability to produce new technology but possessing qualified human resources qualities. For the public, trade can improve the standard of living and purchasing power because of the availability of goods at lower prices. Producers benefit arise from the availability of cheaper input factors in the international market (Majeed, 2016). But trade can also be a problem for sustainable growth in the event of distortions such as political instability, weak institutional and minimal infrastructure.

The Heckscher-Ohlin-Samuelson theorem is the foundation for examining the impact of trade on inequality in some literature. Based on Heckscher-Ohlin's trading theory, HOS's theorem argues that the opening of trade will have two consequences. For products whose production factors are abundant results in an increase in product demand and input factor prices. As for products whose production factors are limited, import influence causes domestic demand for products to decline to be replaced with imported products. Decrease in demand for domestic products will affect the price in the input market (Salvatore, 2014). The decline in demand for domestic products based on rare inputs will lead to a decrease in the premium tariff of workers on the products (Amiti & Cameron, 2012). This situation causes the decrease in inequality. However, the increase in wages due to trade is in fact not as great as expected. The difference in mobility between capital and labor factors results in a lower bargaining power of workers than capital owners. As a result wage increases will not be as much as productivity increases (Stiglitz, 2013)

Some studies try to prove HOS Theorem. Trade openness will have a different impact on a country depending on its economic level. In developed countries trade openness will have an impact on increasing inequality while in poor countries, it will reduce inequality (Revallion, 2004). This result is denied by Dollar dan Kraay (2004) which states that trade has no significant relationship with inequality. Similarly, Babones dan Xi (2008) studies argue that trade has no effect on inequality in rich countries and provides ambiguous results in poor countries. Some studies that use data from several countries with different economic levels indicate that the increase in trade actually increases inequality (Barro, 1999; López, 2010; Lundberg & Squire, 2003).

3. <u>Research Methodology</u>

Data

The main sources of inequality data (Gini) used are from Standardized World Income Inequality Database version 3 (Solt, 2016) plus Central Bureau of Statistics (BPS) data for 1982, 1983, 1985, 1986, 2014 and 2015. Use of BPS data can't be avoided, given the unavailability of such data on the SWIID. Although there are differences in data sources but when compared between the two data sources there is no significant difference.

Infrastructure (infr), education (Ed), health (H), transfers (Tr), and tax (Tx) data are the percentage of central government expenditure / revenues derived from the Central Government Financial Report (LKPP) to GDP. The infrastructure expenditure in this study referred to spending on roads, bridges, transportation infrastructure, irrigation facilities, electricity. The transfers in this study use subsidy and social assistance data referred to

Indonesia's budget structure. On the revenue side, the taxes analyzed in this study are the percentage of total income tax plus value added tax (VAT) on GDP. Meanwhile, trade disclosure data (Trade) is the percentage of trade (exports plus imports) to GDP. Trade and GDP sourced from the World Development Indicators.

Analysis Tools

The main purpose of this paper is to examine the effect of trade openness and fiscal policy on inequality during 1980-2105. In addition to the influence of inequality, the influence on growth is analyzed to determine the government's ability to achieve equality as well as growth. The model used in this paper is based on the model created by Hur (2014) with differences in the use of analytical tools (ECM). The model used can be written as follows:

$$\text{Gini} = \beta_0 + \beta_{1t}\text{Infr} + \beta_{2t}\text{Ed} + \beta_{3t}\text{H} + \beta_{4t}\text{Tr} + \beta_{5t}\text{Tx} + \beta_{6t}\text{Trade} + \varepsilon_t \qquad (1)$$
$$\text{GDP} = \beta_0 + \beta_{1t}\text{Infr} + \beta_{2t}\text{Ed} + \beta_{3t}\text{H} + \beta_{4t}\text{Tr} + \beta_{5t}\text{Tx} + \beta_{6t}\text{Trade} + \varepsilon_t \qquad (2)$$
$$\Delta\text{Gini} = \beta_0 + \beta_{1t}\Delta\text{Infr} + \beta_{2t}\Delta\text{Ed} + \beta_{3t}\Delta\text{H} + \beta_{4t}\Delta\text{Tr} + \beta_{5t}\Delta\text{Tx} + \beta_{6t}\Delta\text{Trade} + \beta_{7t}u_{t-1} + \varepsilon_t \qquad (3)$$
$$\Delta\text{GDP} = \beta_0 + \beta_{1t}\Delta\text{Infr} + \beta_{2t}\Delta\text{Ed} + \beta_{3t}\Delta\text{H} + \beta_{4t}\Delta\text{Tr} + \beta_{5t}\Delta\text{Tx} + \beta_{6t}\Delta\text{Trade} + \beta_{7t}u_{t-1} + \varepsilon_t \qquad (4)$$

The ECM approach is chosen because it can see the relationship of the variables both in the short term and in the long term (Gujarati, 2004). In addition, the characteristics of economic variables are generally not integrated of order zero. The use of the ECM model is intended to avoid the occurrence of spurious regression due to non stationary data while ensuring that no information at the zero order is neglected (Leighton, 1997; Maddala, 1992).

The ECM analysis used in this study used the Engle-Granger two steps approach (EG-ECM). Several steps must be taken in this approach (Enders, 2010). The first step, ensuring that data is stationary on the same degree i.e. integrated of order 1 or 2. Augmented Dickey-Fuller (ADF) test was use to know stationary. If the variables have different degrees of stationary then use stationary with the highest degree (Widyawati & Wahyudi, 2016). The second step, check whether there is co-integration between variables. In the EG-ECM approach the co-integration test is performed by observing the stationary of residual (ut) long-term equation. Therefore, prior to co-integration testing it is necessary to estimate long-term equations (equations 1 and 2). The final step is to make short-term estimates (equations 3 and 4).

4. Results

The economic development of Indonesia can be clearly illustrated during the period 1980 to 2015. Some important notes can be taken in this period. First, there is a shift in the economic structure from agriculture to industry. Second, Indonesia's growth experienced a high growth of 7.1% in 1989. Third, Indonesia had experienced economic downturn to experience negative growth of 14.3% during the monetary crisis of 1998. Fourth, interesting thing about this crisis is the level of inequality decreased (figure 1). This is due to the monetary crisis targeting rich people who have financial assets compared to the poor (Akita & Alisjahbana, 2001; López, 2010). But as the economy recovers, inequality rates rise again. The high economic growth (5.4%) causes the poverty rate to decline and encourages the growth of the middle society by 10% each year. But economic growth has not succeeded in pushing the lives of 250 million other people to be more prosperous (World Bank, 2016).

In this period, fiscal governance experienced significant changes. At the beginning of the New Order regime, especially in the oil boom era, development relied heavily on revenue from oil exports. However, after the oil price has fallen, Indonesia started to think about budget financing through tax mechanism (Eng, 2009). Another change in fiscal governance is with the issuance of several laws on the management of state finances. This law requires a more transparent, accountable, and implementation best-practice in budget management.

On the trade side, Indonesia's trade data shows a dynamic condition during the period 1980 to 2015 (figure 2). In 1998 there was an increase in trading volume. This increase is due to the decline in the rupiah exchange rate against the US Dollar. This condition causes Indonesian products to be more attractive because of the cheaper price. After several years, when the Rupiah exchange rate has improved, trading volume has dropped quite drastically. Indonesia's

trade balance has experienced deficits in recent years. Recorded since 2012 to 2015 Indonesia's trade balance has a deficit, -0.39%, -0.79%, -0.78% respectively (net exports to GDP). The same thing happens with the volume of foreign trade to GDP which shows a decrease every year from 2012 to 2015 (49.58%; 48.63%; 48.05%).

Figure 1. Indonesia's Inequality and Economic Growth (1980-2015)
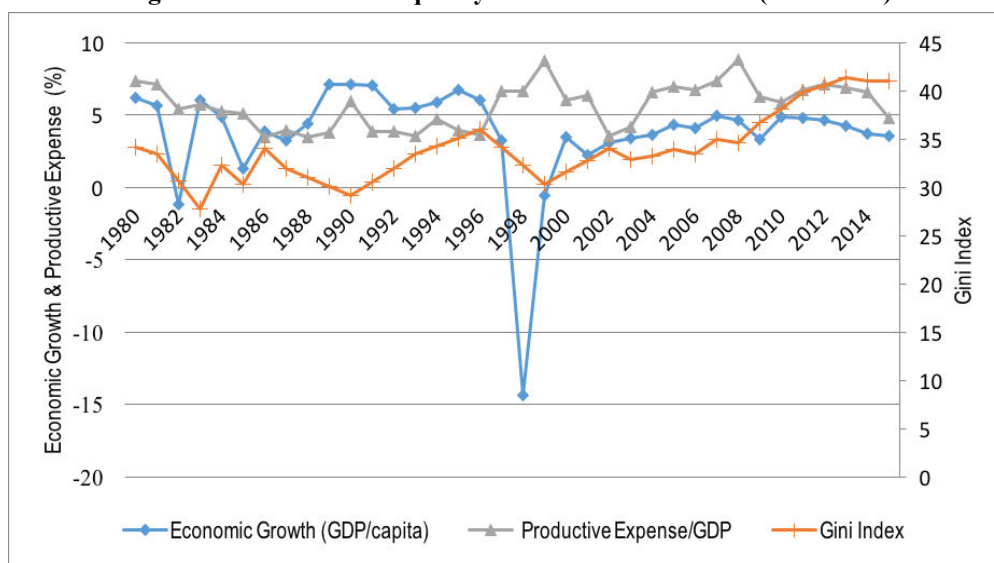
Source: WDI, SWIID, BPS (processed)

Figure 2. Indonesia's Trade Volume and Gini Index (1980-2015)
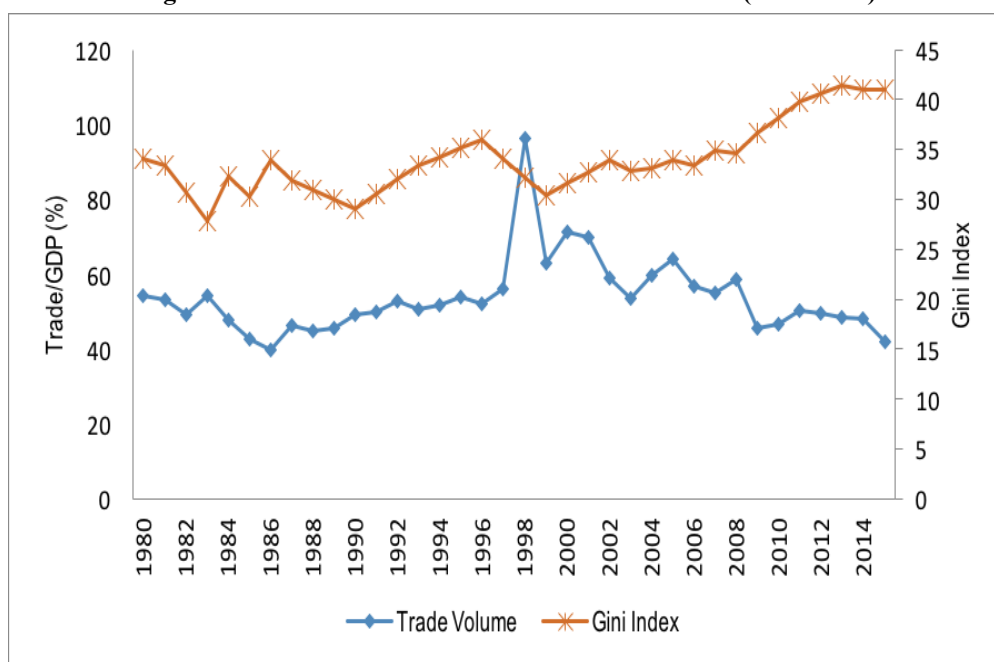
Source: WDI, SWIID, BPS (processed)

When looking at the movement of data as shown in Figures 1 and 2, the question arises as to whether the movement of these data indicates any influence between fiscal policy, trade openness, economic growth and inequality. From figure 1 and 2 cannot be drawn a conclusion directly about the influence between variables. An appropriate analysis is needed to answer this question. Using ECM, the influence of variables can be explained as follows.

Table 1 shows that the stationary of the data is diverse. For that, this research is use first-order difference data. These results indicate the possibility of co-integrating among variables. This indication is shown in Table 2 which shows the existence of co-integration. Using the

Engle-Granger two step, it can be seen that the residuals of the equation estimate 1 and 2 are stationary at the zero order. This result ensures that the variables contained in the model are co-integrated and can be used by ECM as an analytical tool.

Table 1. Stationary Test Result

Variable	I(0)	I(1)
Gini	-0.360700	-7.800952 *
PDB	-4.364936 *	-7.715774 *
Infrastructure (Infr)	-1.783254	-7.766065 *
Health (H)	-3.845797 *	-7.591158 *
Education (E)	-4.330946 *	-10.32651 *
Transfer (Tr)	-1.951882	-6.103546 *
Tax (Tx)	-2.738147 ***	-6.197970 *
Trade Openness (Trade)	-3.142418 **	-9.055567 *

Source: Authors' calculations based on E-Views 7.1

* Significant at the 1% level   *** significant at the rate of 10%

** significant at the rate of 5%

Table 2. Co-integration Test Results

Variable	I(0)	
	Critical Values	t-statistik
u_t (Gini)	-3.632900	-4.048918 *
u_t (PDB)	-3.639407	5.121884 *

Source: Authors' calculations based on E-Views 7.1

* Significant at the 1% level   *** significant at the rate of 10%

** significant at the rate of 5%

Table 3. Long Term Equation Estimation Result

Independent Variable	Dependent Variable			
	Gini		GDP	
	estimate	t-statistic	estimate	t-statistic
Konstanta	0.439956*	8.889817	26.06594 *	6.25089
Infr	-0.0171	-1.445143	1.876912 ***	1.776272
H	-0.076989	-1.104900	15.29506 **	2.468328
E	0.031566	1.310445	-6.839591 *	-3.191933
Tr	0.004463	1.076669	0.557148	1.511369
Tx	-0.003790	-1.656194	-0.349842 ***	-1.718941
Trade Opennes	-0.001254 **	-2.177012	-0.344726 *	-6.727438
	R^2 R^2 : 0.529960		R^2 R^2 : 0.635922	

Source: Authors' calculations based on E-Views 7.1

* Significant at the 1% level   *** significant at the rate of 10%

** significant at the rate of 5%

Table 4. Results of Short-Term Equations Estimates

Independent Variable	Dependent Variable			
	DGini		DGDP	
	estimate	t-statistic	estimate	t-statistic
Konstanta	0.000154	0.049340	-0.047769	-0.119636
D(Infr)	-0.015090	-1.600164	0.703013	0.588423
D(H)	0.022398	0.047510	13.27291 **	2.332410
D(E)	-0.014403	-0.833375	-3.974648 ***	-1.968528
D(Tr)	-0.001202	-0.451904	0.472898	1.399797
D(Tx)	-0.003305 ***	-1.712902	-0.092635	-0.358937
D(Trade)	-0.000318	-0.982723	-0.316464 *	-7.700506
ECT(-1)	-0.307981***	-1.996852	-0.915040 *	-4.549968
	R^2 : 0.363053		R^2 : 0.781010	

Source: Authors' calculations based on E-Views 7.1
* Significant at the 1% level   *** significant at the rate of 10%
** significant at the rate of 5%

The Influence of Trade Openness

Based on the results of long-term (table 3) and short (table 4) term estimates, trade has been able to reduce inequality but has the potential to inhibit growth. The influence of openness to inequality is smaller (0.0012%) than its ability to encourage growth (0.35%) in the long run. Trade capability to encourage growth is consistent in both the long and short term. Meanwhile, trade openness is only able to reduce inequality in short   term. Referring to the HOS Theorem, this means that trade between countries does not necessarily alter the balance in the labor market. Looking at the error correction term value of -0.307, the new trade openness can increase wages after 4 months.

The impact of trade openness on inequality in this study confirms the HOS Theorem (Salvatore, 2014; Yarbrough & Yarbrough, 1994). However, this study is not in line with the results of Barro (1999) López (2010), Lundberg & Squire (2003) who see that trade openness has an impact on increasing income inequality. Looking at existing data, the ability of trade openness reduces the inequality based on Indonesia's export commodities that dominated by primary sectors, agriculture and natural resources (World Bank, 2015b). The agricultural and natural resources sectors are the sectors with abundant inputs in Indonesia. This study was reinforced by Sabaruddin (2015) which concluded that the increase in welfare due to the impact of international trade occurred through, amongst other increased wages of the agricultural sector.

Negative effects of trade openness to Indonesia's growth are thought to be endorsed by several factors. The first factor is Indonesia's unpreparedness in facing a free market. It can be seen from the inferiority of local products when competing with foreign products (Simorangkir, 2006). Based on the Global Competitiveness Index 2007-2008, Indonesia's unpreparedness can be seen from the low competitiveness of technology and infrastructure (Wahyuni & Ng, 2012). In addition to unpreparedness in facing the free market, the composition of international trade also contributes to the negative effects of trade openness into the country. Indonesia's exports are dominated by primary products by 63% while manufactured products contribute 37% of exports (Kementerian Perdagangan RI, 2015). From 37% of manufactured products exported, 65% of its input comes from imports (OECD-WTO, 2015). This fact shows that although Indonesia receives profits from manufacturing exports but a portion of profits must be compensated with the value of imports of intermediate materials. Another factor that plays a role is the low value added of domestic products. The majority of imported products are intermediate goods with high added value. With imports dominated by high value-added products while export-added value is low, Indonesia's export performance has declined in recent years (Tijaja & Faisal, 2014).

Influence of Fiscal Policy

The influence of fiscal policy in this study is vary. In general, fiscal policy in the form of expenditure does not affect the level of inequality. The only fiscal policy that can be used to improve the condition of inequality is tax collection. The effect of infrastructure spending on this research is contrary to research by López (2010), Stiglitz (2013), Turnovsky (2015) which concluded that infrastructure spending is able to reduce inequality. However, this study is in line with the results obtained by Sabir et al. (2015) in the context of South Sulawesi Province and Hur (2014) in OECD and ADB countries. The lack of infrastructure spending to improve inequality can be due to several things. Among the reasons is the smallness of the infrastructure budget, especially since the reforms, ranged from 2% to 3% of GDP (Tabor, 2015). The development of infrastructure is concentrated in Java and Sumatera Island (Keliat, Virgianita, & Astriana, 2013). This condition is causing the price of goods, especially in eastern Indonesia is so high. This is suspected to be one cause of non-significant infrastructure spending on overcoming inequality.

As shown in table 3 and table 4, health and education expenditures have no effect on inequality. Health and education spending that has no effect on inequality is in accordance with Hur's (2014) study. The uneven condition of health and education facilities has resulted in the absence of any influence from this the two expenditures. Health and education facilities such as infrastructure are also concentrated in Java, while in the eastern (Nusa Tenggara, Maluku, and Papua) regions are limited (Kementerian Kesehatan RI, 2013; World Bank, 2015b).

In addition to the distribution problem, the small health budget also adds insignificant influence despite its good potential effect (World Bank, 2015c). Low quality health insurance systems and limited health facilities, causing 40 million workers lose or decreased their productivity and income due to health problems. The World Bank estimates that 2.3 million Indonesians are poor due to enormous health expenditures (World Bank, 2015b).

The incapacity of educational facilities plus increased school fees leads to declining school enrollment rates at each level for the poor (World Bank, 2016). As a result, higher education financed by the government is more enjoyed by middle/upper class. As is known, the higher the level of education the higher the income received (Lemieux, 2006; Reza & Widodo, 2013; World Bank, 2015b). With the low level of education among the poor, the welfare increase is not significant. This is exacerbated by the conditions that most job vacancies available are low-paid (World Bank, 2016). Thus, although the poor are successful to reach higher education but they are faced with the option of working on low wages or unemployed.

Third and fourth table show the positive effect of infrastructure and health spending on growth. The positive effects of infrastructure spending are in line with Cashin (1995), Hur (2014), Nursini (2017), Ostry et al. (2014) Sabir et al. (2015) and Turnovsky (2015), while the effect of health spending on growth is in accordance with research by Glomm & Ravikumar (1997) dan Ostry et al. (2014).. The fact that the distribution of infrastructure and health along with the economic center is concentrated in Java has a good impact on growth. From the perspective of endogenous growth the results of this study confirm the ability of governments to move the economy through the accumulation of capital both physical and non-physical (Barro, 1990; Cashin, 1995; Glomm & Ravikumar, 1997). The significance of infrastructure spending is only existed in the long term as production capacity takes time to adjust to the accumulation of capital increase.

In contrast to the impact of infrastructure and health spending, education spending has actually led to an economic slowdown. This result is contrary to the conclusion of Khusaini (2016) which states that the education budget can encourage growth in the case of East Java Province. Increasing school enrollment, cannot describe the quality of graduates. As Stiglitz (1973) notes, the increasing number of prospective workers with higher levels of education makes the education rno longer an indicator of competence (productivity) but as a fair tool for screening job applicants. This seems to be the case in Indonesia. Based on the trend score in mathematics and science studies (TIMSS) and the international student assessment (PISA) program, Indonesia is on the bottom line (OECD, 2015; Tobias, Wales, Syamsulhakim, & Suharti, 2014; World Bank, 2016). This is directly proportional to the low competence and productivity of workers among some Asian countries (Asian Productivity Organization, 2016; World Bank, 2016). In such condition, the difference between minimum wage setting and

average wage is very high (63%). This leads to a decline in the competitiveness of enterprises and hampers the growth of new jobs.

Tax collection in this study turned out to hamper growth in the long term. Conceptually these results do not conform to the endogenous growth model (Barro, 1990). Although contrary to endogenous growth models, these results are supported by Barro (1990), Fölster & Henrekson (2001), Ostry et al. (2014). In the literature there are several factors that can cause this condition. The size of the government measured by the total budget to GDP is considered as one of the causes (Barro, 1990; Gwartney, Lawson, & Holcombe, 1998). The larger the size of the government, the tax collection will have a negative impact. Considering that tax relation, government size, and growth are determined by the amount and type of spending, thus when more unproductive spending are present, the tax collection will have minimizing or negative impact on growth (Bania et al., 2007).

The short term effect tax collection on inequality in this study is generally consistent with Aoyagi & Ganelli (2015) and (Goñi et al., 2011) The difference in the impact of tax collection is determined by the type of tax, type of inequality and time period (OECD, 2012; Turnovsky, 2015). According to the World Bank report, there is a wrong tax tariff policy applied in Indonesia (World Bank, 2016). The income tax tariff derived from wages is much larger (30%) than the income tax from capital income (10%). This causes the imposition of taxes can decrease income inequality in the short term but inequality will remain high in the long term because the accumulation of capital / wealth continues.

Turning to subsequent variables, subsidies/transfers have no effect, either on inequality or growth. This can be traced from the type of subsidy and the allocated budget. For several years, the largest budget was allocated to the type of energy subsidy spending (fuel). The fact, this subsidy was mostly enjoyed by middle/upper class. In 2008 the richest group in Indonesia enjoyed 41% of the fuel subsidy. The three richest groups enjoy 72% of the fuel subsidy while only 4% percent of the fuel subsidy is enjoyed by 30 per cent of the poor. The average fuel subsidy received by the rich is Rp111,533/month/capita while the poor receive only 10% from that number (Dartanto, 2013). The budget allocation for activities that directly touch the welfare of the people and have a big contribution to equality (Family Hope Program/PKH) gets little allocation ((World Bank, 2015c). The subsidy allocation is not only unsupportive to the decrease in inequality but also unsupportive to growth. The type of subsidy / transfer spending on the budget structure does not indicate government support for private capital accumulation such as support for R & D, copyright protection, and private pension funds. This is what causes the subsidy/transfer budget does not affect growth and inequality.

5. <u>Conclusion</u>

This study is based on the question of whether the impact of trade openness and government policy can affect inequality and growth. In this research it is proved that inequality can be overcome by trade openness and taxation. On the other hand, the government's efforts to overcome inequality through subsidies / transfers are not reliable, as well as their impact on growth. Government efforts to promote growth can be done by increasing the budget allocation for infrastructure and health development. Meanwhile, education spending and taxation and trade openness turned out to be a barrier to the growth rate.

The government's failure to cope with inequality through budget is thought to be due to the government's lack of focus on designing inclusive growth. This can be seen from development priorities and budgets. Development that is allegedly Java-centric was one of the causes. In addition, the preparation of quality human resources through education and provision of productive employment remains a big task to complete by government. On the other hand, the government should think about the best way to export not only the primary sector but also the manufacturing sector. The key to the ability of trade to influence growth is the added value of export products that must be increased and reduce the dependence of imported products as raw materials.

Further research is required to find definitive transmission of how fiscal and trade policies can affect inequality and growth. In addition, technical issues such as availability of data and

proper use of proxies should be of concern. It is hoped that this refinement can provide a more convincing and comprehensive picture of inter-variables.

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DETERMINANTS OF AFFORDABLE HOUSING ALLOCATION: COMMON PERSPECTIVES FROM LOCAL OFFICIALS

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Abstract

In response to the wide social concerns of exponential price inflation and the severe demand for affordable housing over the last decade, the Chinese government has enforced a national plan to enhance the large-scale construction and provision of affordable housing, while municipal governments are responsible at the local level for implementation and allocation via various housing provision programs. In this paper we collected first-hand data from a series of personal interviews with government officials to conduct a systematic analysis of the challenges of housing allocation from the perspectives of administrators at the city level. In light of the responses from practitioners, the four main concerns giving rise to low efficiency and unfairness in housing allocation are: the faction of agencies, ineffective monitoring systems, the lack of transparency of information, and the absence of legal enforcement. Legal enforcement is the most important institutional establishment as it stipulates agency collaboration and monitoring. Transparency, which is affected by legal enforcement, also enhances cooperation among departments.

Keywords: Affordable Housing, Determinants, Allocation and Distribution, Local Officials

JEL classification: R5, R580

1. Introduction

Over the last three decades, the Chinese government has carried out a series of housing reforms in urban areas. In addition to achievements in marketization, serious criticisms have emerged as a result of the real estate boom since the last decade. Specifically, dramatic housing price inflation and the lack of affordable housing have become the top concerns in Chinese society, and this concern has worsened by the ongoing process of urbanization and industrialization across China's major cities. In response, the central government has developed an ambitious plan to enhance the provision of affordable housing. However, municipal governments at the local level are not as enthusiastic in their efforts as the state. Due to the decentralization of the central planning system, the national government has merely responded by developing new policies to support affordable housing; while the municipal governments have taken the majority of responsibility for the testing of the various housing provision programs (Wang and Murie, 2011). Besides maintaining their own priorities and revenues on the one hand, these local governments also have to enforce specific responses to issues of finance, construction, and allocation in order to further implement the central policies. Therefore, the most effective approach of evaluating policy implementation and administration performance is to investigate the inputs and environments at the municipal level rather than the central level. Although the emphasis on affordable housing from the central government has enhanced housing construction and provision, it has been widely reported that there are still a huge number of eligible households waiting for housing units, while thousands of affordable housing units remain vacant. At the end of 2013 in Shenzhen, 1,354 affordable housing units remained vacant while over 10,000 households were on waiting lists and only 55% of eligible applicants had moved into their houses. Similar situations are pervasive among Chinese cities. According to some very recent research, 20% of affordable housing in major Chinese cities is vacant while millions of households are still on the waiting list (Chen and Chen, 2013). The distribution and allocation of affordable housing continues to receive serious criticism due to its low efficiency and injustice.

In this paper, we interviewed ten local government officials, who either work in the housing bureau or the urban-rural development (HURD) departments of municipal

governments in four southern Chinese cities in order to solicit policymakers' views on policy environments and the main challenges on of housing allocation. We evaluate the main factors affecting China's affordable housing allocation at the municipal level, based on the common experience and opinions of these officials. Problems with housing allocation for specific affordable housing programs have been well documented in reports on specific cases and programs, including the rent-seeking and corruption behaviors of local officials, the shortage of housing, and the complex application procedures (Huang, 2011; Li, 2009; Lin 2007; Qian 2003). However, barely any research has focused on the effectiveness of housing allocation or tracked fundamental evidence from local implementation across adopted programs. This paper aims to explore this uncharted territory and look closely into the implementation of housing allocation, and identify the causal factors that contributed to the inefficient allocation issues.   The first factor is information: the lack of transparency across agencies, which gives rise to obstacles in review and verification processes, as well as a lack of transparency which could encourage public participation in the process of allocation. The second cause is "turfs and faction among local agencies which results in ineffective collaboration. Thirdly, top-down supervision merely focuses on the inputs on affordable housing investment, while there is insufficient social monitoring from local residents and media paying attention to the outcomes and justice of allocation, and the fourth factor is the lack of legitimate institutional establishment to provide unitary guidelines. Despite new policies developed since 2010 to enhance housing provision, the implementation of distribution and allocation of housing still needs significant improvement.

This research investigates how local public servants perceive the challenges of implementing housing allocation and compares their opinions originating from day-to-day working situations. The rationale behind utilizing original fieldwork as the main data collection mechanism are as follows: first, the lack of existing data from previous research, which mainly focuses on theoretical arguments and empirical reviews or policy analysis at a national level. More importantly, investigations relying on structured inquiries can tap into the invaluable views of the interviewees and consolidate their experience into systematic arguments, which is crucial to the understanding of the challenges and environments local officials confront in real-life situations. As this exploratory study aims to reveal a series of critical factors, we need to determine the main variables affecting housing allocation. On the basis of these factors, we are also able to policy prescriptions which would improve housing allocation in the future. We begin with a brief review of the arguments and conclusions of previous studies to provide a general background and understanding of why the problem of inefficiency and unfairness of housing allocation has arisen. We then go on to illustrate our findings, which are associated with mainstream theories, discuss the main suggestions to improve housing allocation, and then draw our conclusions as well as outlining the direction of our research in the future.

2.   <u>Factors Impacting on Affordable Housing Allocation—A Comprehensive Review</u>

The literature on China's affordable housing is voluminous. However, the majority of studies focus on affordability, financial issues or policy analyses, with only a few studies having been conducted on housing allocation (Wang and Murie, 2011; Ying, Luo and Chen, 2012; Huang, 2012; Zhu, 2013; Chen, Zan, and Wang, 2014). Improving the final outcomes of affordable housing provision in the current climate is still a major gap in the literature. Since data on local allocation of housing is extremely limited, previous studies have mainly focused on descriptive or theoretical analysis rather than sophisticated fieldwork.

The Chinese government has demonstrated an impressive commitment to providing low-income housing in recent years; however, it is fair to say that the low-income housing program implemented in cities so far has failed (Huang, 2012). One of the reasons for the failure of these housing programs is the problem of allocation. As local public agencies are responsible for reviewing and screening applicant information as well as making this information public for security reasons, rather than merely asking applicants to submit their information, verification is usually considered to be the first main phase of allocation. Thus, information collection is crucial to the performance of this phase, which requires a systematic process of collection and multi-dimensional communication to enforce effective verification. Furthermore, to prevent unsuitable allocation, the issue of information accessibility and

transparency plays an essential role in providing housing for eligible applicants and coping with mismatched target groups.

From an economic point of view, flat size is the prerequisite to effectively distinguish between eligible and ineligible applicants during the process of affordable housing allocation. Zhang and Zhou (2011) established a model for the access management of affordable housing based on the theory of incentive mechanism design. By using data from Beijing, these authors demonstrated that the flat area of affordable housing units plays a critical role in the willingness of applicants to pay for such a public good. In other words, ineligible applicants are unwilling to apply for affordable housing if the flat area is less usable compared with that of market-priced housing according to their economic status (Zhang and Zhou, 2011). Based on this model, affordable housing policies should control the size of affordable housing units to restrict the benefits achieved by ineligible groups. Acquiring housing units that are larger than those permitted is also not allowed for approved applicants (Zhang and Zhou, 2011). In summary, this study attempted to solve the problem of asymmetric information of income by proposing a model for the management of accessibility to affordable housing in terms of incentive regulation. Information asymmetry exists throughout the whole allocation process, not only in the verifying of the income of applicants.

To guarantee fairness in affordable housing allocation, law is regarded as the primary recourse because of its supreme authority. Legislation is an effective way to regulate the process of affordable housing allocation. By investigating a large number of unfair affordable housing distribution cases, Zhang (2011) not only illustrated the current situation and problems with affordable housing allocation, but also introduced a theoretical framework for ensuring fairness in China's affordable housing allocation, which is based on theoretical arguments and the theory of justice. To achieve the goal of fair distribution, Zhang revealed that law is recognized as an effective instrument to direct affordable housing legislation, affordable housing law enforcement, affordable housing judiciary remedies, and sanctions for misconduct (Zhang, 2011). In addition to emphasizing the validity and efficacy of legislation, law enforcement (implementation) must cover all four stages of allocation. These stages include the authorities' acceptance of applications; the two phases of verification, including preliminary examination and review; the supervision system for housing security; and the administration and inspection after approval. These multiple stages of allocation can generate an implementation "circle" that ensures the mechanism is fair and just. Moreover, the judiciary process grants remedies if the process is violated, which include both criminal and administrative procedures. The initial types of sanctions for misconduct (administrative sanctions) will also focus on any fraudulent activities carried out by both applicants and administrative officers. Criminal sanctions are involved because of applicants who commit fraud and officials who engage in bribery or malpractice.

Moreover, the government must establish a monitoring system for applicants' submission materials so that fewer "information fees" are paid and incentive compatibility is retained (Zhang and Zhou, 2011). More severe punishment for those who acquire affordable housing units through cheating should also be specified to decrease the economic expectations of ineligible applicants and the amount of cheating from applicants. In the meantime, Huang also suggests that penalties for false applications must also be increased to punish ineligible applicants. Although these actions are ex post facto when any falsification is found in an application, sanctions are also useful to prevent well-off residents from abusing the system and to eliminate the rent-seeking behavior of officials (Huang, 2012). As a result, affordable housing units can be distributed to local residents who are actually in need of housing. With respect to affordable housing developers, establishing strict supervision on the control of the size of housing units when they develop affordable housing is crucial.

Bureaucratic structure in Chinese government is a major obstacle in housing allocation, that is, the essential cause of China's affordable housing allocation problems is the faction of China's intergovernmental structure (Zou, 2014). Given the current bureaucratic and hierarchical system, local governments are subject to supervision from their higher counterparts rather than being responsible for local residents. However, the absence of effective public scrutiny has given rise to poor performance or even corruption in the process of affordable housing allocation. The central government has become aware of the issue of affordable housing programs. Thus, a series of innovations was introduced to improve the

allocation mechanism in terms of collaborating with local governments. First, a few constraints were enforced to regulate speculation in ownership-oriented affordable housing, including the requirement to sell these units back to the government and certain taxes levied on the added value because of market appreciation. In addition, common housing property rights were introduced, wherein local government and approved household both own part of the property rights to these affordable housing units. Second, the information mechanism was improved to verify income eligibility and other household information regarding affordable housing applicants. Several efforts were also made to strengthen the legal mechanism of affordable housing. Although a number of renovations have been enforced since 2010, the distrust that permeates the inter-governmental structure has not been significantly alleviated.

In general, studies focusing on the situation and problems with affordable housing allocation mechanism are few in number, and there is a lack of research focusing on the implementation and perception of local governments on the system of affordable housing allocation. According to current verification procedures, municipal- and district- (county-) level authorities hold the majority of responsibility for application verification and housing allocation. Although a few valuable insights are provided from these studies, a gap still exists in observing the attitudes of the local level rather than the central (top) level of government. In the present study, the common experience of government officials in the housing departments of municipal governments will be investigated in order to determine the problems with the current allocation mechanism and to propose further policy changes from the perspectives of local government officials.

3. Determinants Extracted from the Common Perspectives of Local Officials

A number of significant statements were extracted from the interviews, and then several major themes would be drawn from these statements in accordance with theory guidance as well as previous research.

Table 1 shows a few examples of the selected ten significant statements are displayed along with their inferred meanings. Participants indicated that there are at least five bureaus involved the overall procedures of affordable housing allocation, and the collaboration of these agencies is the key element to ensuring this mechanism of allocation. From this we can conclude that agency collaboration among bureaus in any city government is the fundamental issue when dealing with housing distribution or allocation. As the Chinese government issued the target of "all residents should have a home," municipal governments are working to extend coverage of affordable housing to migrant workers and new graduates. Due to this extension of coverage but no increase in staffing, public officials have to deal with many more cases than they expected in the process of allocation. The "Sandwich Class" residents representing the group whose incomes are higher than low-income groups but still much lower than the middle classes. are not eligible to apply for affordable housing in spite of the fact that they do actually confront housing problems. Most of the housing programs pay little attention to this group. Even though the government has enforced affordable housing extensions, families from "sandwich classes" are still not currently eligible. One official concluded that there should be four principles of affordable housing allocation: transparency in application, transparency in information, fairness to applicants, and procedural justice. This would mean that information transparency, justice, and fairness are the primary elements of housing allocation. The following two statements specifically pointed out the importance of transparency and of information, which includes information transparency from the government as well as applicants. Furthermore, the multi-dimension monitoring system plays a role in transparency and fairness, as this system ensures allocation is supervised by public opinion and social media. Currently, punishments for any rent-seeking activities or fraudulent behavior are negligible and there is a lack of effective sanctions because legislative guidelines are absent. In addition, the government is not able to sufficiently invest in affordable housing due to insufficient financial support. Last but not least, land supply is extremely limited and is the top concern in affordable housing development; this is the primary issue that impairs the development and further allocation of affordable housing.

Table 1: Examples of significant statements of officials and their inferred meanings

Significant Statement	Inferred Meaning

This allocation mechanism establishes a collaborative system among community authorities, sub-district offices, the department of housing and urban-rural development, the department of civil affairs, and taxation administration.	Affordable housing allocation mechanism involves more than one public agency; greater collaboration is needed between these agencies.
To achieve the target of "all residents should have a home," new workers without homes and long-term migrant workers who have stable full-time jobs are now paid attention.	Coverage in affordable housing provision has been extended.
I deal with 17 to 18 cases every week. Personally speaking, the number of cases is too great to handle in addition to other assignments.	The department is short of labor resources in dealing with housing allocation.
"Sandwich class" groups are usually at the edge of application requirements; they are not eligible to apply for affordable housing but should be included into the coverage extension and higher unit provision. However, there is no specific program for "sandwich class" as the Public Rental Housing (PRH) department is focused on temporary housing problems for low-income families.	The "sandwich class" groups, who also have housing affordability problems, are ignored in affordable housing allocation.
There are four principles of allocation: transparency in application requirements, fairness to all of applicants, justice in the application procedures, and transparency of information about affordable housing.	In the process of affordable housing distribution, information transparency, fairness, and justice are the main principles.
Currently, the poor accessibility to applicants' information, including verifying their income levels and family conditions, gave rise to significant difficulties in processing verifications and reviews.	The improvement of information sharing is composed of two elements: government information and applicant information.
The allocation of affordable housing should be transparent and subject to monitoring from local residents via publicized notices. Moreover, social media should publish information about the processes and results of affordable housing distribution. Meanwhile, the department should launch initiatives to allow residents to report any fraudulent activities from applicants and government officials.	Multi-dimensions monitoring systems should be established to ensure transparency and fairness in affordable housing distribution.
The punishment of fraudulent activities from applicants is negligible; moreover, there is no legislation or specific laws to provide guidelines of affordable housing development and allocation, while it is necessary to improve the effectiveness of misconduct sanctions.	The current mechanism of affordable housing distribution has a lack of effective sanctions and an absence of legislative guidance.
The problem that we are not able to provide sufficient housing units to targeted families is the shortfall of the investment; this financial shortage plays a huge negative role in our programs, which is explicitly demonstrated in the distribution stage.	Financial burdens and a lack of financial investment are problems in affordable housing.
Land supply is extremely limited. To further enhance the programs, land availability is one of the top concerns that must be resolved primarily; however, the only way we can obtain land in the central city is from urban renewal or redevelopment. Therefore, the alternative is affordable housing development in suburban areas.	Land supply is the primary issue in maintaining affordable housing development.

Among these significant statements, the four major themes we learn from the statements and are defined as the determinants based on the frequencies of respondents. Table 2 presents

these themes: "agency faction and multi-agency collaboration," "ineffective monitoring systems," "lack of information sharing," and "absence of legislation enforcement."

Table 2: Frequencies of Themes Mentioned

Themes	Frequency	Percentage %
Agency Fractions	40	18.9
Monitoring System	34	15.9
Transparency	39	18.4
Legislation	30	14.2
Land Supply	20	9.4
Financial Burdens	16	7.5
Labor Shortage	15	7.2
Coverage Extended	11	5.2
"Sandwich Class"	7	3.3

Although the interviewed officials specified several common opinions and concerns about the affordable housing allocation mechanism, these four arguments are essential dimensions that illustrate the current situation and challenges according to their shared daily working experience.

Agency faction and multi-agency collaboration

The procedures of affordable housing allocation are not derived from one departmental decision, but rather from a series of decisions across five public agencies in the municipal government. According to the officials' description, the process starts with the acceptance of applications and the publishing of application bulletins in community committees. Then, the sub-district office reviews all applications based on the materials the applicants submitted. The Department of Civil Affairs further assists to verify the income levels, property assets, family size, and the other financial information of the applicants to check for any fraudulent information or misconduct. Occasionally, Tax Administration is also involved in this verification step depending on the tax records of applicants. A second review undertaken by the Department of Housing and Urban–Rural development focuses on the living conditions and housing space of the applicants. Finally, a decision is made based on the eligibility of the applicant and housing availability. These procedures are in accordance with the four-step law enforcement in the previous study (Zhang and Zou, 2011).

Moreover, the allocation decisions are eventually derived from the perceptions of each of the public agencies involved. Therefore, a vertical inter-government faction between the central and local government, and a horizontal inter-government faction among different departments within the local government both have significant impacts on the situation of affordable housing distribution. To cope with faction issues, improving communication and collaboration among these local agencies on the basis of organization theory is necessary and also expected by the research participants. However, the current processes (allocation mechanism) require community committees and sub-district offices to focus mainly on background information verification such as name, address, and household registration status. The Department of Civil Affairs and Tax Administration must also pay attention to income reviews or so-called means tests. The Department of Housing must likewise examine housing conditions and provide final decisions based on housing availability. The former four departments will not take their verification and review responsibility seriously because they are not responsible for the final decisions. On the contrary, a collaborative system will allow all of these public agencies to participate in the final decision-making, which would improve the efficiency of the allocation processes. Hence, joint bureau collaborations should be established within these agencies across the process of affordable housing allocation.

Ineffective monitoring system

To address the criticism about well-off groups acquiring affordable housing instead of actual eligible households, respondents proposed to establish an improved monitoring system, namely, a top-down level monitoring system, in addition to higher-level supervision. At present, the monitoring activities include routine examinations from upper-level housing departments and audit agencies that are mainly focused on evaluating the performance of financial investment or the construction progress on affordable housing projects. However, the allocation issues are not the primary concerns of these evaluations. Local residents are expected to pay more attention to the outputs of allocation to determine whether these subsidized programs are benefiting the targeted unprivileged families or not, instead of investigating the total investment.

As mentioned previously, from the perspective of the executive deputy director, affordable housing allocation should be transparent and monitored by local residents and social media. Multi-dimensional rather than one top-down dimensional monitoring systems must be established to hear opinions and reports from a variety of local resources. Public agencies can adjust their performance in distribution decision making to fulfill their public accountability.

An official of policy consulting also illustrated that this approach is an alternative way to improve performance in the processes of review and verification. Owing to faction, these departments do not have the power to evaluate and monitor one another. A multi-dimension monitoring system is expected to force them to consider public opinions and adjust inappropriate decisions because they are responsible for giving responses to the public.

According to the responses of two officials, an effective monitoring system would not be the traditional "top-down" evaluation, but a system involving residents' opinions, public participation, or even the expression of interest groups. In this sense, to eliminate any fraudulent or rent-seeking activity, the public supervises the power and processes of allocation with the result of ensuring fairness and justice in affordable housing distribution.

Insufficient information sharing

To achieve transparency in affordable housing distribution, information sharing must be prioritized. Affordable housing allocation involves redistributive processes, and so local governments are bound to allocate based on fairness and equality. To fulfill this fundamental principle, information transparency and sharing systems should be the first steps to enforce.

Improvements in information sharing will also eliminate a crisis in housing availability and housing vacancy. As described by an official, some eligible households do not know how to apply affordable housing, while ineligible households apply for affordable housing and finally obtain approval. Information transparency would make housing information available and update the housing allocation, and thus the entire processes could be supervised by local residents.

Moreover, this information infrastructure also consists of the applicant's information accessibility. Given the difficulty in obtaining and verifying the information provided by applicants, processing the allocation and distinguishing between eligible families and ineligible households is also difficult using the "means-test" such as that in Hong Kong. All verification and review procedures and final decision making have to rely on the materials submitted by the applicant, such as an income certificate and a living address. However, the bureau in charge of decision making is unauthorized to obtain access to these pieces of information for the further review of the economic status of applicants. This phenomenon is one of the reasons a large number of more affluent groups are able to acquire affordable housing. Furthermore, problems with information gave rise to long waiting lists and time-consuming applications, preventing applicants from obtaining basic social security in time.

Absence of legislation enforcement

In this category, most of the respondents focused on punishment for fraudulent information from applicants to discourage them from offering fake materials. Legal sanctions and penalties are an effective way to prohibit the fraudulent activities of applicants. At present, regulations and policy mandates are the only guidelines to enforce punishment if an

applicant violates the application rules, such as the "Administrative Regulations on Public Rental Housing" and the "Administrative Regulations on Cheap Rental Housing." All interviewees proposed to strengthen the sanctions because the current punishment is weak or sometimes non-existent. According to the opinion of an official, some applicants considered affordable housing applications as speculative investment rather than a social welfare program to meets the needs of unprivileged local residents.

In addition to enhancing punishment, one of the officials proposed to establish an overall law that not only prohibits any misconduct from applicants, but also regulates inappropriate behavior from government officials such as fraud and rent-seeking activities. This official also mentioned that legislation is an effective way to clarify the responsibilities of each department involved and promote multi-department collaboration. The essential problem of the current allocation mechanism is not the lack of labor resources or departmental participation, but rather the absence of effective legislation to regulate the behavior of public agencies as well as applicants.

4. Discussion and Policy Implications

Based on the themes drawn from the interviews, we are able to determine the major problems (situations) with the current affordable housing allocation mechanism. In addition to financial and land supply issues, the four main issues are agency faction ineffective monitoring systems, the lack of information-sharing infrastructure, and the absence of legislation enforcement. This inductive research not only further evaluates certain arguments from previous studies, but it also organizes the main concerns about the institutional weakness of the system from government officials who are familiar with the current condition of this allocation system.

First, the establishment of legislation plays an essential role in enhancing the effectiveness of and justice in affordable housing distribution. Although a number of regulations, procedures, and measures have been introduced by the Chinese government, all of these were issued as administrative orders from the MOHURD at the central level and specific orders from housing bureaus or departments at the local levels. The regulation mainly aims to assist these departments in conveniently implementing higher effectiveness and efficiency, instead of explicitly manifesting their responsibilities and the housing rights of citizens. These public agencies have the authority to issue and modify these regulations. Hence, most of them, especially the agencies in municipal governments, are expected to make adjustments to reduce their working pressures on housing distribution, while barely paying attention to the demand of citizens and to equal outcomes. To cope with these concerns, a comprehensive law on housing and affordable housing issues must be established to stipulate the powers and responsibilities of government agencies, as well as the rights and obligations that every citizen has to comply with. Moreover, all administrative orders, including state uniform guidelines and local implementation plans, must be announced or modified in accordance with this comprehensive law. In addition to legislative branch participation, this law could provide legislative authorities with relevant agencies to implement sanctions and punishments, and thus prevent both applicants and officials from committing fraudulent activities. The strength of punishment can also be specified based on the principle of appropriation in the law, rather than at the convenience of local agencies.

Second, "turfs and fractions" among local agencies must be resolved to enhance affordable housing distribution. In China, two main genres of solution are proposed by different groups. One of the solutions that is favored by economists or scholars studying housing issues is to establish a joint-committee, including these relevant bureaus, to collaborate and work on the entire procedure of application and distribution. The remarkable benefits of collaboration include reducing the costs of communication and sharing the responsibility for housing allocation outcomes. Collaboration is also a popular solution and suggestion for dealing with bureaucratic fractions throughout the world. However, some officials proposed another solution instead of a joint-committee establishment. According to these officials, these types of joint-committee are common in the Chinese government. As a matter of fact, the major characteristic of these multi-department institutions is shifting responsibility rather than sharing it because of difficulties in responsibility clarification. The performance of these institutions is deteriorating, and they are discouraged from improving. Given this situation,

officials would rather take advantage of an implementation organization supplemented by a non-governmental organization, which is similar to the establishment of Hong Kong's institution. In this sense, the housing bureau (department) in local government would only focus on local policymaking and policy adjustment, or on planning. Meanwhile, another public institution would be in charge of affordable housing applications, reviewing applicant qualifications, and the housing distribution process. To ensure this institution's implementation, the institution would be authorized to conduct the means test and obtain access to the personal information database to process the entire application and allocation. In addition to supervision under the housing department, this organization would have the power to acquire extra information and give feedback to other related departments to improve justice and equality in affordable housing distribution. Meanwhile, as a public institution that directly gets in touch with applicants, this institution could also obtain opinions from targeted groups. Thus, the essential demands of applicants to help the local government in improving future housing policies and plans are reflected. According to this idea, establishing a public institution as a specific implementation organization to deal with application and distribution would be necessary. This approach reflects functional specialization but essentially enhances agency collaboration. Based on the officials' perspectives, the establishment of this specific public institution would be a more effective way to improve affordable housing allocation as well as the entire policy implementation in municipal government.

Furthermore, information sharing serves two main objectives. One is the internal information-sharing system among departments to eliminate obstacles in application review and verification, and the other is the external mechanism of encouraging public participation in terms of public hearing or social media supervision to improve the outcomes of housing distribution. For internal information sharing, one effective way would be establishing a personal income and asset account for residents in terms of department collaboration. Through this account database, evaluating the qualification of applicants would become easier. For example, an internal information system, which is already established in Shanghai and Guangzhou, is considered to be a milestone in housing distribution improvement. Although the efficiency of affordable housing distribution would benefit from the improved internal sharing system, the external information transparency mechanism also plays a significant role in maintaining justice and equality. Currently, the vast majority of residents are concerned about allocation mismatch because of the complexity in allocation decisions. Meanwhile, several officials disregard this criticism and consider these phenomena as individual events. To address the severe concern of local residents, allocation information transparency would be an effective way to regulate decision-making in housing allocation and eliminate the criticism of residents. Thus, the equality and efficiency in housing distribution depend on information sharing among departments and its transparency to the public.

Contrary to the traditional "top-down" monitoring system, social monitoring involves local residents and social media and is a more effective way to improve the performance of affordable housing distribution. Upper-level agencies have to pay attention to public expenditure and construction progress on affordable housing instead of the final allocation outcomes because these agencies are responsible for budgeting, transferring, and implementation performance. Most of the officials in these agencies are also unqualified to apply for affordable housing. In other words, they are unable to benefit from affordable housing distribution, and are thus reluctant to add more pressure on working and managing the later stages. However, the outcomes of affordable housing distribution have a significant influence on the interests of many local residents, who are enthusiastic to evaluate the performance of affordable housing allocation in the local government. Through combining higher-level supervision with monitoring from local residents and other interest groups, the allocation process and outputs could be monitored from multiple dimensions.

Based on the results, further internal correlations among these four themes are proposed. Legislative establishment, as a fundamental issue, places a great emphasis on affordable housing distribution. According to comprehensive law, the themes of information sharing and transparency, agency collaboration, and monitoring system could be further enhanced because the law provides the essential principles of enforcement. Moreover, information transparency exerts a tremendous impact on agency collaboration and monitoring systems. As mentioned by the officials, the main problem in collaboration and monitoring is the lack of information

sharing and transparency. Enhancing the system and infrastructure of information sharing is necessary to improve these themes and obtain better distribution outcomes. The last two themes, namely, agency collaboration and monitoring systems, appear to be the last stages in improving affordable housing distribution. The accomplishment of these two goals depends heavily on the improvement of legislative enforcement and information accessibility.

5. Conclusion

This paper provides in-depth information on current situations of affordable housing program in China as the efficiency and effectiveness of allocation are still severely criticized by the majority of residents. In addition to improvements in the nationwide policy framework, efforts made at the local level also have an essential impact, since the main responsibility of housing has been decentralized and shifted to municipal governments.

First and foremost is the faction among municipal bureaus in the process of affordable housing allocation. The entire procedure of allocation involves collaboration of five to six bureaus in order to eventually come to a final decision, while most of these bureaus, excluding the housing bureaus, are not responsible for allocation decision. These bureaus are unlikely to pay too much attention to the issues of affordable housing allocation but merely act as participants rather than decision makers. Moreover, these bureaus are horizontal departments in one municipal government and they are not responsible for each other but supervised by the local government and their upper-level departments. Therefore, this gives rise to a "turfs and fractions" situation within affordable housing allocation. To cope with this problem, a joint-committee of multi-agencies is one option to share the responsibility of the entire decision-making process of housing allocation; another option is to establish a non-governmental organization that is in charge of the overall implementation of affordable housing development.

The current monitoring system consists of supervision from higher-level departments, which is focused on inputs such as investment and new project construction rather than the outcomes of allocation efficiency and fairness. This "top-down" monitoring system may be a good way of guaranteeing local investment and the progress of construction, but it is not an effective way to supervise allocation. Hence, a multi-dimension monitoring should be introduced which relies on surveillance from local residents and public media.

Information is a critical element for affordable housing allocation, while the majority of the information associated with allocation is not available for the public or even the housing bureaus. The transparency of information for both local residents and housing bureaus would have a positive influence on the effectiveness and fairness of housing allocation. In this sense, transparency would be in two parts: internal information sharing among local agencies and information publicized for local residents.

Legislation is an overall project to ensure the effectiveness and justice of affordable housing allocation. In addition to specifying sanctions and punishment, a set of fundamental guidelines to enforce the entire process of allocation is necessary. However, there is lack of uniform and comprehensive legislative statutes to govern affordable housing allocation. The establishment of this legislation would not only be increasing punishment of any fraudulent activities, but also a legislative authority to ensure the fairness and effectiveness of affordable housing allocation.

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Announcements, Conferences, News

Urban and Regional Resilience: Strategies for Success
RSA Russia Conference 2018

Conference Overview[1]

The 2018 RSA Russian conference will be held 22-23 October. The Forum is held annually since 2002 and has already firmly and justifiably gained the right to be regarded as the main platform for discussion of methods and tools of strategic planning. This conference will bring together researchers and practitioners from different countries interested in urban and regional development, new development path creation, and urban and regional resilience.

The future development of regional studies and human geography has been informed by a number of critical questions such as: How can we address persistent disparities between prosperous metropolitan regions and less-favored 'peripheries', including small cities and rural settlements? How does centralization of political and economic power influence local and regional development, spatial inequalities, and cohesion? How can we reconcile the imperatives of economic development, sustainability, and human well-being? How do place specific institutional frameworks, cultures, and norms facilitate or hinder development?

This raises the following questions in relation to the long-term resilience of places: What is the role of local, regional, and national level policies and leadership? What role is played by inter-budgetary relations, local self-governance, and inter-municipal cooperation? And in addition, how effective and efficient are the following regional policy instruments: national/regional targeted programs, Special Economic Zones (SEZs), Development Corporations (DCs), Local/Regional Development Agencies, Public-Private Partnership (PPP) projects?

Finally, conference key themes are: Urban and regional resilience, Small cities after decline, Small cities in non-core areas: local, regional and national policies on their shrinking and/or revival, Local self-government and inter-budgetary relations.

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1 Conference overview by Christos Genitsaropoulos, RSI Journal

Implementation Across Global Networks of Regions, Cities and Firms
2018 SMARTER Conference on Smart Specialisation and Territorial Development,
Seville, Spain
26th September, 2018 - 28th September, 2018
CaixaForum Sevilla, Spain

Conference Overview[2]

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This conference offers a comprehensive picture of the smart specialisation policy experience, including an evaluation of its early results, and highlights recent developments both conceptually and empirically.

In addition, particular attention will be given to implementation challenges and ways to address them, as well as to methodologies for impact assessment. Moreover, the conference will explore how smart specialisation engages with global value chains and production networks, and how firms, regions and cities can benefit from relationships across the borders. The concept of smart specialisation has now expanded in geographical scope beyond just Europe. The theory and practice of smart specialisation are being constantly developed and it is enriched by these processes. These developments will be discussed.

More specific, themes of interest to the conference may include:
•   Smart specialisation from design to implementation: lessons, challenges, opportunities, experiences and early results
   •   Methods for monitoring and evaluation
   •   Territorial economic analysis in support of smart specialisation
   •   Smart specialisation, global value chains, and production networks
   •   Urban challenges and strategies for innovation and development
   •   Trans-regional and trans-national cooperation
   •   Models of regional and multi-level governance
   •   The Entrepreneurial Discovery Process and stakeholder involvement
•   The actors of smart specialisation: research organisations, businesses, public actors, civil society groups
•   Smart specialisation experiences worldwide

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2 Conference overview by Christos Genitsaropoulos RSI Journal

<u>Academic Profiles</u>

Theodore Pelagidis is professor of economics at the University of Piraeus, Greece. He has also been a NATO scholar at the Center for European Studies, Harvard University; a National Bank of Greece professorial fellow at the London School of Economics; a Fulbright professorial fellow at Columbia University; and served as an external expert in the internal evaluation office at the International Monetary Fund. He received his diploma in economics from Thessaloniki University, Greece; his M.Phil. from Sussex University, U.K.; and his Ph.D from Paris University, France, while serving as an EU SPES researcher. He has also conducted post-doctoral research on the EMU at the Center for European Studies, Harvard University, USA, (1993-94 and 1995-96 as a NATO scholar).

He has been and NBG professorial fellow at LSE, UK (2010), and a Fulbright fellow at Columbia University, USA (2010). He has published extensively in professional journals.

He is also co-editor of the Welfare State and Democracy in Crisis, Aldershot, Ashgate, 2001, and co-author of Understanding the Crisis in Greece: From Boom to Bust, MacMillan/Palgrave, 2012 2nd revised paperback edition. He is also a co-author of Who's to Blame for Greece? Austerity in Charge of Saving a Broken Economy, MacMillan Palgrave 2015/2016.

Some of his most recent academic publications include the following:

- 2017: (with Petsas, A.). The Uncoverd Interest Parity Puzzle (Uip): Evidence From Major Currencies. Regional Science Inquiry, 9(1), 127-134.

- 2017: (with Palaiologos, Y.). How to Damage an Already Fragile Economy: The Rise of Populism in Greece. Georgetown Journal of International Affairs, 18(2), 51-58.

- 2017: (with Saranti, A. & Mitsopoulos, M.). Efficiency in the tax-auditing administration in Greece. International Journal of Decision Sciences, Risk and Management, 7(1-2), 123-142.

- 2017: (with Mitsopoulos, M.). A model of constitutional design and corruption. European Journal of Law and Economics, 44(1), 67-90.

- 2015: (with Mitsopoulos, M.). Give Greece a Chance. Intereconomics, 50(2), 91-97.

- 2014: (with Mitsopoulos, M.). Why Did Forceful Internal Devaluation Fail to Kick-Start Export-Led Growth in Greece?. Challenge, 57(6), 85-102.

- 2011: (with Arestis, P., Chortareas, G. & Desli, E.). Trade flows revisited: further evidence on globalisation. Cambridge journal of economics, 36(2), 481-493.

Academic Profile by:
Vilelmini Psarrianou
Chief Executive, RSI J

Serafeim Polyzos is a civil engineer, economist and Professor of the Department of Planning, Regional Planning and Regional Development of the Polytechnic School of the University of Thessaly. He holds a degree in Civil Engineering from the Aristotle University of Thessaloniki and an economist from the University of Macedonia. He has a Ph.D. of the Polytechnic School of the University of Thessaly.

He has been involved in organizing and managing projects as a supervising engineer in projects of the Ministry of Environment and Waters (projects for the construction of Smokovo Dam, Acheloos diversion projects, etc.) and has taught at the Department of Civil Engineering, Department of Urban Planning, Spatial Planning and Regional Development, the Department of Economics of the University of Thessaly and the Department of Project Management and Management of TEI of Larissa. He is the Director of the Policy Evaluation and Development Programs Laboratory of the University of Thessaly.

Some of his most recent publications in peer-reviewed journals are:

- Kalatzis O., Tsiotis D. and Polizos S. (2016). The Contribution of Tourism in National Economies: Evidence of Greece. European Journal of Business and Social Sciences, 5 (5): 41-64.

- Polyzos S., Tsiotas D. and Niavis S. (2015). Analyzing the Location Decisions of Agro-Industrial Investments in Greece. International Journal of Agricultural and Environmental Information Systems, 6 (2): 77-100.

- Polizos S. and Saratsis G. (2015). Tourist Capacity and Circle of Life in Tourist Areas: The Case of N. Magnesia. Aichoros, (21): 82-106

- Tsiotas D. and Polyzos S. (2015). Making the Web-Science Operational for Interregional Commuting Analysis: Evidence from Greece. Journal of the Knowledge Economics, 1-14.

- Geraki M. and Polizos S. (2015). Public Spending allocation factors for Alternative Tourism Investment Program NSFR 2007-2013. Evidence from Greece, MIBES Transactions, 63-76.

Academic Profile by:
Antonia Obaidou
Book Review Editor, Public Relations, RSI Journal.

<u>Book Reviews</u>
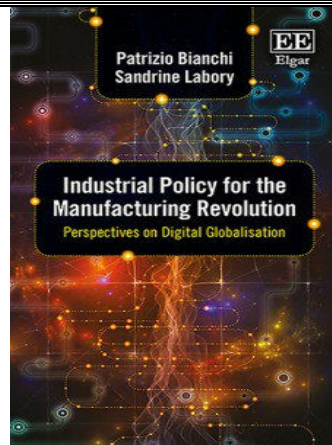
Industrial Policy for the Manufacturing Revolution. Perspectives on Digital Globalisation

## Patrizio Bianchi and Sandrine Labory
2018, Edward Elgar Publishing

This book is well written and provides valuable and significant addition to the literature. More specific, this book offers a critical reflection on the meaning and expected impact of the fourth industrial revolution, and its implications for industrial policy.

We could say that the fourth industrial revolution is having a major impact on industry and societies primarily because of what has been called its raw material: data. New technologies are allowing hyper-connection on a global scale, not only between people, but also between people and machines and, in the case of the Internet of Things, even amongst machines themselves.

Industrial Policy for the Manufacturing Revolution aims to increase our capacity to anticipate and adapt to the forthcoming structural changes. It outlines the type of industrial policy and strategies that are needed in this era of rapid transformation. The authors propose a 'comprehensive industrial policy' that considers the complexity of structural changes involving industry as well as institutions and social and education policies, in order to encourage the participation of all citizens in the development process. The book also features a concrete example of comprehensive industrial policy implementation at the regional level.

Overall, this book should be of interest to a wide audience such as academia, business analysts and policy makers. Also, it will be required reading for all those interested in industrial economics and policy, business and technology.

Book Review by Christos Genitsaropoulos, Technological Education Institute of Sterea Ellada, Greece
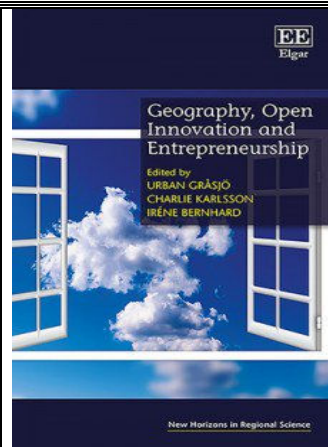
Geography, Open Innovation and Entrepreneurship

Urban Gråsjö, , Charlie Karlsson,
Iréne Bernhard,
2018, Edward Elgar Publishing

This book offer an overview of this rapidly expanding field of research and to thoroughly analyse the complex issue of Geography, Open Innovation and Entrepreneurship.

More specific, Geography, Open Innovation and Entrepreneurship discusses entrepreneurship from both theoretical and empirical viewpoints to provide readers with a wide range of cutting-edge and compelling studies.

The authors highlight the critical importance of open innovation for performance and progress, putting forward determinants of economic growth and development rarely analysed in standard growth studies

Developed countries must be incredibly innovative to secure incomes and welfare so that they may successfully compete against international rivals.

This book focuses on two specific but interrelated aspects of innovation by incumbent firms and entrepreneurs, the role of geography and of open innovation.

Overall, we could say that, this book is "must have book" and not only researchers but also students will find this book useful for innovation and entrepreneurship studies. It is also a helpful tool for policymakers, planners and consultants involved in economic development and regional policies.

Book Review by Christos Genitsaropoulos, Technological Education Institute of Sterea Ellada, Greece

<u>GUIDELINES</u>

**for the Writers & a format model for the articles
submitted to be reviewed & published in the journal**

Regional Science Inquiry Journal

(EconLit, Scopus, RSA I) – www.rsijournal.eu

Guidelines for the Writers & a format model for the <u>articles submitted to be reviewed & published in the journal</u>

The Title of the paper must be centered, and the font must be Times New Roman, size 12, in Uppercase, in Bold

For the writers' personal information use the Times New Roman font, size 11, in bold, and centered. Use lowercase for the first name and uppercase for the last name. The line below the name includes the professional title and workplace; use the Times New Roman font, size 10, centered. In the third line write only the <u>contact</u> <u>e-mail address</u> in Times New Roman 10, centered.

Name LAST NAME
Professional Title, Workplace
E-mail Address

Name LAST NAME
Professional Title, Workplace
E-mail Address

Abstract

The abstract consists of <u>a single paragraph, no longer than 250 words</u>. The font must be Times New Roman, size 11. The text must be justified. The title "Abstract" must be aligned left, in Times New Roman, size 11, in bold. A space of one line must be left between the title and the text of the abstract. The abstract must contain sufficient information, be factual, and include the basic data of the paper.

Keywords: Use 3 to 5 keywords, <u>separated by commas</u>

JEL classification: We kindly request that you classify your paper according to the JEL system, which is used to classify articles, dissertations, books, book reviews, and a variety of other applications. The use of the JEL classification is necessary so that your paper be properly indexed in databases such as EconLit. Select the codes that represent your article and <u>separate them by commas</u>. You can find information on the JEL system here: https://www.aeaweb.org/jel/guide/jel.php

1. <u>Introduction</u>

All articles must begin with an introduction, a section which demarcates the theoretical background and the goals of the paper.

The present document provides the necessary information and formatting guidelines for you to write your article. We recommend that you copy this file to your computer and insert your own text in it, keeping the format that has already been set. All the different parts of the article (title, main text, headers, titles, etc.) have already been set, as in the present document-model. The main text must be written in regular Times New Roman font, size 11, justified, with a 0.5 cm indent for the first line of each paragraph.

We recommend that you save this document to your computer as a Word document model. Therefore, it will be easy for you to have your article in the correct format and ready to be submitted. **The only form in which the file will be accepted is MS Word 2003**. If you have a later version of Microsoft Office / Word, you can edit it as follows:

- Once you have finished formatting your text, create a pdf file, and then save your file as a Word "97-2003" (.doc) file.

- Compare the two files – the pdf one and the Word "97-2003" (.doc) one.
- If you do not note any significant differences between the two, then – and only then – you can submit your article to us, **sending both the pdf and the Word "97-2003" (.doc) files** to our e-mail address.

If you use a word processor other than Microsoft Word, we recommend that you follow the same procedure as above, creating a pdf file and using the appropriate add-on in order to save your document in MS Word "97-2003" (.doc) form. Once you compare the two files (and find no significant differences), send us both.

2. General Guidelines on Paper Formatting

Body

The body of the text consists of different sections which describe the content of the article (for example: Method, Findings, Analysis, Discussion, etc.). You can use up to three levels of sections – sub-sections. For the Body of the text, use the default format style in Word, selecting the Times New Roman font, size 11, justified, with a 0.5 cm indent for the first line of each paragraph (this is further detailed in the section "Paragraphs").

References

The references included in the paper must be cited at the end of the text. All references used in the body of the paper must be listed alphabetically (this is further detailed in the section "References").

Appendices

The section "Appendices" follows the section "References".

3. Page formatting

Page size

The page size must be A4 (21 x 29,7 cm), and its orientation must be "portrait". This stands for all the pages of the paper. "Landscape" orientation is inadmissible.

Margins

Top margin: 2,54cm
Bottom margin: 1,5cm
Left and right margins: 3,17cm
Gutter margin: 0cm

Headers and Footers

Go to "Format" → "Page", and select a 1,25cm margin for the header and a 1,25cm margin for the footer. Do not write inside the headers and footers, and do not insert page numbers.

Footnotes

The use of footnotes or endnotes is expressly prohibited. In case further explanation is deemed necessary, you must integrate it in the body of the paper.

Abbreviations and Acronyms

Abbreviations and acronyms must be defined in the abstract, as well as the first time each one is used in the body of the text.

Section headers

We recommend that you use up to three sections – sub-sections. Select a simple numbering for the sections – sub-sections according to the present model.

First level header format

For the headers of the main sections use the Times New Roman font, size 11, in bold and underlined, and leave a size 12 spacing before the paragraph and a size 6 spacing after the paragraph. The header must be aligned left. Use a capital letter only for the first letter of the header.

Second level header format

For second level headers, follow this model. Use the Times New Roman font, size 11, in bold, and leave a size 12 spacing before the paragraph and a size 3 spacing after the paragraph. Select a 0.5 cm indent. The header must be aligned left. Use a capital letter only for the first letter of the header.

Third level header

For third level headers, follow this model. Use the Times New Roman font, size 11, in bold and italics, and leave a size 6 spacing before the paragraph and a size 0 spacing after the paragraph. The header must be aligned left, with a left indent of 1 cm. Use a capital letter only for the first letter of the header.

4. Paragraphs

In every paragraph, use the Times New Roman font, size 11, with single line spacing. We recommend you modify the default (normal) format style in Word and use that in your text. For all paragraphs, the spacings before and after the paragraph must be size 0, and the line spacing single. Use a 0,5cm indent only for the first line of each paragraph. Leave no spacings nor lines between paragraphs.

Lists

In case you need to present data in the form of a list, use the following format:

- Bullet indent: 1,14cm
- Text:
    - Following tab at: 1,5 cm
    - Indent at: 1,5cm

Use the same format (the above values) if you use numbering for your list.

1. Example of numbered list 1
2. Example of numbered list 1

5. Figures, images, and tables

Figures and images

Insert your figures and images directly after the part where they are mentioned in the body of text. They must be centered, numbered, and have a short descriptive title.

Figures put together "as they are", using Office tools, are absolutely inadmissible. The figures used must have been exclusively inserted as images in Word, in gif, jpg, or png form (with an analysis of at least 200dpi), and in line with the text. The width of an image must not exceed 14,5cm so that it does not exceed the margins set above.

The images, figures, and tables must be inserted "as they are" in the text, in line with it. **Figures and images which have been inserted in a text box are absolutely inadmissible.**

Reference inside the text

Avoid phrases such as "the table above" or the "figure below" when citing figures and images. Use instead "in Table 1", "in Figure 2", etc.

Examples

A model of how to format figures/images follows. For the title, use the Times New Roman font, size 10, in bold. Write the title above the figure, and set a size 6 spacing before the title and a size 0 spacing after it. The line spacing of the title must be 1.5 line. Both the image and its title must be centered.

Image 1: Title
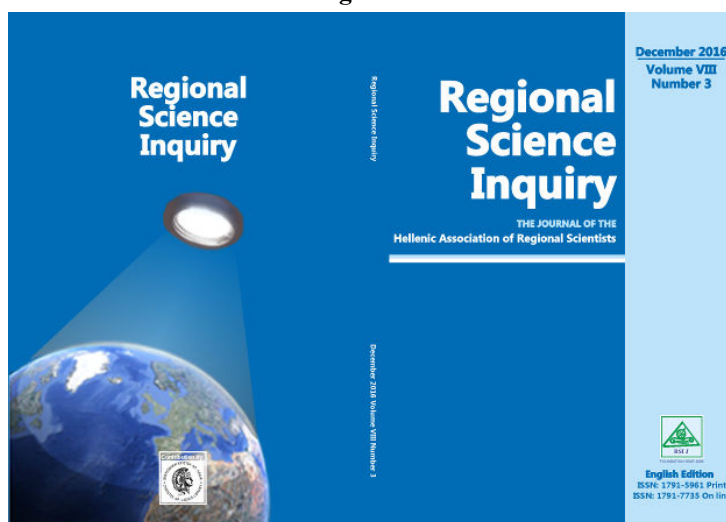
Source: cite the source

Directly below the figure you must cite the source from which you took the image, or any note regarding the figure, written in Times New Roman, size 10. Write it below the figure, leaving a size 0 spacing before and after it, use a line spacing of 1.5 line, and make it centered.

Tables

For the title, use the Times New Roman font, size 10, in bold. Write the title above the table, and set a size 6 spacing before the title and a size 0 spacing after it. The line spacing of the title must be 1.5 line. Both the table and its title must be centered. The width of the table must not exceed 14,5cm so that it does not exceed the page margins set.

Table 1. Example of how a table must be formatted

Age	Frequency	Percentage %
Under 40	44	32.1
40 - 49	68	49.6
Over 50	25	18.2
Total	**137**	**100.0**

Source: cite the source

If the table needs to continue on the next page, select in the "Table properties" that the first line be repeated as a header in every page, as in the above example of Table 1. **Tables (or figures or images) which are included in pages with a "Landscape" orientation are absolutely inadmissible.**

Every table must have horizontal lines 1 pt. wide at the top and bottom, as shown in the example. The use of vertical lines and color fill at the background of the cells is strictly prohibited.

Directly below the table you must cite the source or any note regarding the table, written in Times New Roman, size 10. Write it below the table, leaving a size 0 spacing before and a size 6 spacing after it, and make it centered.

6. Mathematical formulas

There is a variety of tools in order to insert and process mathematical formulas, such as the "Mathematics", found in the most recent editions of Word, "Math Type", "Fast Math Formula Editor", "MathCast Equation Editor", "Math Editor". Since it is impossible for us to provide you with compatibility with all these tools in all their editions, **we can only admit your paper if it contains mathematical formulas solely in the form of images.**

Keep a continuous numbering for the mathematical formulas and center them in the page, as shown in the following example:

$$y = ax^2 + bx + c$$

(1)

The same stands for formulas or particular mathematical symbols you may have integrated in your text. For instance, if you want to use the term ax^2 in your text, you must insert it as an imaged, in line with the text. The images containing the mathematical formulas must be legible (at least 300dpi).

In the exceptional case of a text which may contain a great number of mathematical formulas, the writer may send it to us in <u>TeX form</u> if they so wish.

7. References

We recommend that you use the Chicago Manual of Style Author-Date system, as it is recommended by the AEA (American Economic Association) for the journals included in the EconLit database, and it is the dominant style of bibliography in the field of Economics. For more information you can go to the following links:

- https://www.aeaweb.org/journals/policies/sample-references

- http://www.chicagomanualofstyle.org/tools_citationguide.html

- http://libguides.williams.edu/citing/chicago-author-date#s-lg-box-12037253

Online references (internet citations)

Check your links again before sending your file, to confirm that they are active.

Avoid long internet links. Where possible, also cite the title of the website operator-owner. Return the font color to black, and remove the hyperlink. Links such as the following are impractical and distasteful, therefore should be avoided.

Example of an inadmissible hyperlink

https://el.wikipedia.org/wiki/%CE%9F%CE%B9%CE%BA%CE%BF%CE%BD%CE%BF%CE%BC%CE%B9%CE%BA%CE%AC

References Formatting

For your list of references, use the Times New Roman font, size 10, with single line spacing. The paragraph format must include a size 0 spacing before the paragraph and a size 0 spacing after it, aligned left. Use a 0,5 cm indent only for the first line of each paragraph. Leave no spacings or lines between paragraphs.

Example of how References must be formatted

Bureau of Labor Statistics. 2000–2010. "Current Employment Statistics: Colorado, Total Nonfarm, Seasonally adjusted - SMS08000000000000001." United States Department of Labor. http://data.bls.gov/cgi- bin/surveymost?sm+08 (accessed February 9, 2011).

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