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Contents

The articles published in RSI Journal are in accordance with the approving dates by the anonymous reviewers.

Regional Science Inquiry, Vol. XII, (1), 2020 – Anniversary Issue Editorial Note

Our team is honored to publish this anniversary Issue of Regional Science Inquiry Journal, a decade after its first launch. We are also very grateful of everyone from the academic community and the Editorial Board team, who continuously contribute in the continuation of this effort to enrich the Regional Science with invaluable academic researches, and we would kindly like to thank all cordially.

The current edition focuses on a variety of topics and more specifically:

The first paper titled “Effects of Leisure activities on happiness in the case of Japan” correlates leisure with the subjective well-being (SWB) and by applying a principal component analysis, it investigates the level of SWB across 47 Japanese regions depending on the different leisure related variables.

The second paper raises the topic “Does business geographical acting areas impact on intrapreneurship and sustainability strategies?” and focuses on the region of Tâmega e Sousa, North Portugal by analyzing 283 firms from the manufacturing and the construction industry and notes that those ones with business activity beyond the local borders are more likely to implement intrapreneuriship strategies.

Moreover, the third paper titled “Exploring the components of the intellectual capital in Troso weaving SMEs” examines the impact of intellectual capital, whether it is human capital, structural capital or customer capital, on a business’s competitive advantage and performance.

The following paper titled “Financial inclusion and human capital investment in urban and rural: a case of Aceh province” states a significantly positive impact of the financial inclusion and income on the human capital investment. On the contrary, the size of a family has a significantly negative one. Beside this, other factors investigated in the research, are the gender, the age, the education level in urban and rural regions.

The fifth paper of this edition titled “Measuring the efficiency and productivity change of municipalities: empirical evidence from Greek municipalities over the time period 2013 – 2016” focuses on the regions of Thessaly and Central Greece and marks a gradual improvement of the factors of efficiency and productivity after the implementation of the latest restrictive fiscal policy. Furthermore, the following paper titled: “Changes in human geography: scenarios of counter-urbanization in the context of economic crisis” examines the internal migration of Greek people to rural areas and notes that this is and will be formed by a range of factors, such as the current trends and the upcoming socioeconomic and political circumstances.

The seventh paper titled “Does goods and services spending reduce income inequality? A panel data evidence from Indonesia” examines the impact of goods and services spending and social spending on income inequality, while the eighth paper titled “Effect of inflation on total deposits and financing of sharia commercial banks: a monthly data evidence from Indonesia” observes that in the long term, total deposits and the financing of sharia commercial banks are negatively related to the inflation, whereas in the short term, the inflation has no impact on these two factors.

The ninth paper (“Detection of firms′ clustering by local scaling”) studies three regions in the Czech Republic and underlines that “the companies tend to cluster when the population or the companies’ size is taken into account”. Additionally, the next paper titled “Forms of international assignments applied by foreign companies operating in Albania” raises the topic of investigating and analyzing the different forms of international assignment used by foreign companies with business presence in Albania.

Furthermore, the eleventh paper of this journal titled: “How Cities in India Can Attract More Rural Population?” raises the topic of reduced migration of rural and urban residents in India and highlights the necessity of managing crucial factors, such as the poverty, the inequality and the creation of job opportunities and better technical infrastructure, in order to promote urbanization.

The following paper ("Assessment of innovative potential as a criterion for evolution of the mesoeconomic system") proves the importance of the accumulated aggregate potential of the mesoeconomic system; the latter consists of "infrastructure and legal regulations, innovation and production, education and research, as well as finance and investment".

Paper No 13, which is titled "Agglomeration economics and asymmetric information: Role of institutions", demonstrates the role of the transaction cost under the institutional framework and proves that when analyzing the developing and developed countries, different approaches on the agglomeration economies cases need to be followed.

The fourteenth paper of our edition titled: "Investigating the Quality of Products of Differentiated Trademark Producers (Game Theory Approach)" comes to the conclusion that higher production costs per producer result to a higher product quality in the case of high quality trademarks producers, whereas the opposite happens in low quality producers.

Paper No 15 with title "Impact of auto industry and its special spillover effect on Alabama's economic growth and development" investigates the impact of automobile production on the economy of Alabama and implementing a specific model which uses county data, it comes to the conclusion that the automobile production creates employment opportunities and contributes to the growth of per capita income in the areas close to the automobile plants.

Paper No 16 titled "Is there a Long Run Nexus among Mental Disorder and Socio-economic Indicators?: Experiences from an Econometric Study across 40 Countries" examines the correlation between poor mental health and poverty by relating all types of mental disorders to a different range of factors (social, environmental, financial),such as the GDP per capita and the CO_2 emissions, while the next paper titled "Exploring dynamics between the socioeconomic sectors from North of Portugal and Galicia", begins with the hypothesis that cultural and institutional differences might result to a looser relationship among areas from diverse countries and presents interesting research findings regarding the two areas of concern in this article, North of Portugal and Galicia.

Moreover, paper No 18 with title "Spatial development of the Russian European North in the post-soviet period" observes the existence of polarization as large urban, administrative and industrial centers become the epicenter of the population concentration and economic activity. At the same time, an increase in the area of economic periphery is noted.

Paper No 19 titled "Regional Convergence: Theory and Empirics" brings up the topic of controversy in regions, noticing that despite the existing inequalities among regions, convergence is also observed in some cases, while the next paper with title "Is Stability for regional disparities of unemployment rates truly mysterious? An analysis from statistical approach", focuses on another controversial topic, and more specifically on the regional inequalities in the US caused by the changes in the geographical distribution of the rates of unemployment.

Finally, the last paper of our edition titled "Patterns of mainly tourism sectors at local level by employee's characteristics using GIS multivariate clustering analysis – Romania case study" highlights that the sector of tourism consists a fundamental economic source for many countries and implements a thorough analysis whose results are of great importance both for the development of human resources and talent pool as well as for taking them into consideration in the post-covid recovery period.

Vilelmini G. Psarrianou – RSI J

Articles

EFFECTS OF LEISURE ACTIVITIES ON HAPPINESS IN THE CASE OF JAPAN

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Abstract
With the increase interest in adopting a form of happiness to policy goals, a wide range of studies on subjective well-being (*SWB*) have become available. Leisure is a key component of our daily life which can affect *SWB*. Leisure activities is said to reduce stress and promote health. It can be a social activity that provides a sense of belonging or the time can be used for self-development. There is a wide range of leisure activities such as sports, hobbies, volunteer participation and socializing. This paper examines the underlying characteristics of leisure activities by conducting a principal component analysis across leisure related variables by using cross section data for 47 prefectures in Japan. The main results find that regions with greater active/external type tend to have higher levels of *SWB*, and regions with greater self-development type tend to have lower levels of *SWB*.
Keywords: Subjective well-being, leisure, Japan
JEL classification: I31, Z00

1. Introduction

There has been increasing number of researches on subjective wellbeing (*SWB*) across a number of disciplines in order to understand the determinants of *SWB*. In the area of economics, the relationship between income and happiness have been conducted, and many empirical studies can be found to support that income will have positive impacts on happiness (e.g. ic, et al., 2003; Sanfey, and Teksoz, 2005; Deaton, 2008; Stevenson and Wolfers, 2008; Perovic and Golem, 2010; Ambrey and Fleming, 2012, 2014; Florida et al. 2013; Barrington-Leigh and Behzadnejad, 2017). These previous studies suggest that income is a factor to enhance happiness. Though, in order to achieve higher income, longer hours of work may be necessary. This may lead to less time for leisure activities. However, leisure is considered to have a positive impact on happiness. Leisure activities are considered to reduce stress and improve health (Westman and Eden,1997). There are past studies which show a positive relationship between physical leisure activities such as sports and *SWB* (Menec and Chipperfield, 1997; Chaplin, 2009). Leisure can also be a social activity (e.g. visiting friends and family) and provide a connection or affiliation which can provide a sense of belonging (Lloyd and Auld, 2002). As stated in Maslow (1954)'s hierarchy of needs, love and belonging is a basic need of humans after physiological and safety. Tourism, a popular leisure activity is identified to have a positive effect on *SWB* (e.g. De Bloom et al, 2010; Nawijn, 2011). The relationship between happiness and other leisure activities such as hobbies (Lu and Hu, 2005; Chaplin 2009) and internet and email usage (Koopman-Boyden and Reid, 2009) have also been investigated.

With the popular notions that leisure enhances *SWB*, further studies have been conducted to examine the role that leisure time plays in affecting happiness (Wang and Wong, 2011, 2014 and how ethnicity and leisure satisfaction affected people's happiness (Spiers and Walker, 2008). In examining leisure and its relationship with happiness, leisure activities have adopted various classifications. Lloyd and Auld (2002) distinguish between the two types of leisure variables, person-centred and place centred. The former variables are leisure participation, satisfaction and attitude, and the latter variables include leisure environment and resources. Lloyd and Auld (2002) also classify leisure activities into six categories (mass media, social activities, outdoor activities, sports activities, cultural activities, and hobbies) based on the frequency of their participation. Newman, Tay and Diener (2014) describe two aspects of leisure: structural and subjective. Structural aspect to leisure is defined by the time spent or activity conducted outside obligated work time and the subjective aspect is defined by the individual's subjective sense of being engaged in leisure, through perceived leisure frequency and perceived participation in leisure. Furthermore, Newman Tay and Diener (2014) identify five core psychological mechanisms that links leisure activities to *SWB*: detachment-recovery, autonomy, mastery, meaning and affiliation. These are based on the theories of *SWB* by Maslow (1954), Ryff and Keyes (1995), Ryan and Deci (2000) and Csikszentmihalyi (1990) which identify the psychological needs required to enhance *SWB*. This paper employs a principal component analysis to seven leisure activities (media, relaxation, self-development, hobby and entrainment, sports, volunteer and community activities and relationship) in order to identify underlying characteristics of the leisure activities.

Concerning studies on Japan, Fujii et al. (2005) examine the impact of leisure activities on happiness, targeting welfare facilities in Osaka city and Hashimoto and Atsumi (2015) focus on senior citizens in Kurashiki city. Other than studies which focus on senior citizens, Wakamatsu et al. (2007) investigate factors that contribute to happiness of university students, which include friends, entertainment and study. Moreover, Kawakubo and Oguchi (2015) examine the effects of interaction with others on subjective happiness for Japanese between the ages 20 to 59. However, these studies do not investigate the underlying characteristics of leisure activities. Yamada (2000) attempts to do this by analysing the relationship between leisure and happiness of senior citizens by dividing them into three types: mental leisure group, physical leisure group and neither mental nor physical leisure group.

In order to fill the gaps of previous studies, this paper investigates the underlying characteristics of various leisure activities by employing a principal component analysis and examines the impact they have on happiness for a wide age range, using cross section data on the 47 prefectures in the case of Japan.

The structure of this paper is as follows. In the next section, the data and methods are explained. Section 3 examines the results and provides discussions. Finally, the conclusion is provided referring to policy implications from the results obtained in this paper.

2. Data and Methods

This section will provide explanation on the data and methods applied to the analysis. The data employed are as follows. Note that the term subjective well-being, life satisfaction and happiness are used interchangeably.

Subjective well-being (*SWB*)

This paper employs *SWB* as a dependent variable. The data is from the Japanese General Social Surveys (JGSS-2001) by the Institute of Regional Studies at Osaka University of Commerce in collaboration with the Institute of Social Science at the University of Tokyo (2001) where the answers to the question, "Are you currently happy?" were collected from 2,790 valid respondents from 20 to 89 years of age throughout Japan. The responses were categorised into five levels of satisfaction from happy to unhappy. The aggregated and averaged results at the Japan prefecture level are provided by Matsumoto (2010). These *SWB* by prefecture is provided in Appendix 1.

Leisure time (*LT*)

The principal component analysis is utilized which can be an effective tool to understand the underlying characteristics of the leisure activities which include media, relaxation, self-development, hobby and entrainment, sports, volunteer and community activities and relationship. The definitions of these leisure activities are described in Appendix 2. As represented in Table 1, the results of conducting the principal component analysis obtains seven components. Taking into consideration that the first 3 components in Table 1 shows the eigenvalue to be more than 1 and that in Figure 1 on the scree plot of the eigenvalues, a certain level of difference can be observed between the third and fourth components, the first three components are selected. According to Table 1, the cumulative proportion of those three components amount to 70.3%, which indicates that they will have large impacts on the variance. Therefore, considering the characteristics of the three components as mentioned above and from the principal component loading of Table 2, the following interpretation is made for each component.

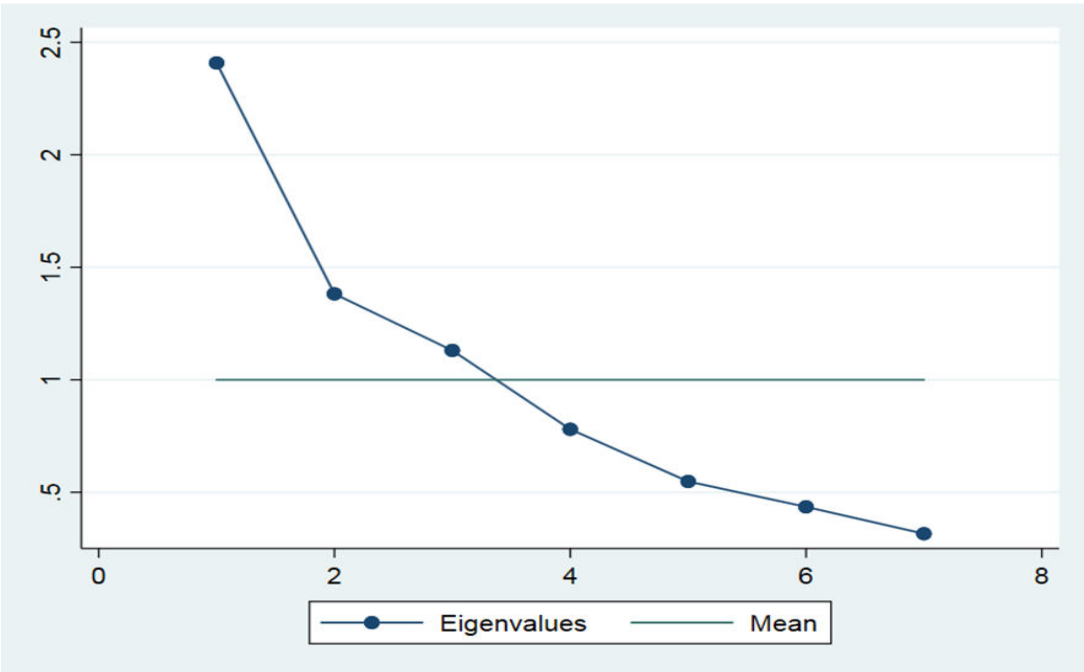
Table 1. Eigenvalues of observed matrix

Component	Eigenvalue	Difference	Proportion	Cumulative Proportion
Component 1	2.408	1.026	0.344	0.344
Component 2	1.382	0.252	0.197	0.542
Component 3	1.130	0.350	0.162	0.703
Component 4	0.780	0.232	0.111	0.814
Component 5	0.548	0.113	0.078	0.893
Component 6	0.435	0.119	0.062	0.955
Component 7	0.316	.	0.045	1.000

Table 2. Principal component loadings

Component	*Media*	*RX*	*SD*	*H/E*	*Sport*	*V/C*	*RP*
Component 1	-0.059	-0.426	0.557	0.450	-0.158	0.521	-0.076
Component 2	-0.480	-0.281	0.077	-0.072	0.600	-0.040	0.565
Component 3	0.696	-0.091	-0.137	0.447	0.094	-0.132	0.513
Component 4	0.129	0.522	0.159	0.254	0.683	0.211	-0.331
Component 5	-0.045	0.562	0.082	-0.191	-0.274	0.528	0.534
Component 6	0.493	-0.333	0.069	-0.671	0.248	0.353	-0.080
Component 7	0.144	0.177	0.793	-0.205	-0.062	-0.512	0.105
Unexplained	0	0	0	0	0	0	0

Figure 1. Scree plot of eigenvalues after principal component analysis



Component 1: "Self-development type (*SD-T*)"

Examining the principal component loading, *SD*, *V/C* and *H/E* are positive and large, while *RX* is negative and large. None of the other variables show any distinguished characteristics. These variables are related to education and contribution to society and so will be interpreted as the self-development type.

Component 2: “Active/External type (*AE-T*)”

This type shows positive and large values for *SPORT* and *RP*, but negative and large for *Media*. This implies that this type prefers external activities opposed to quiet internal activities. Therefore, we will identify this as the active/external type.

Component 3: “Entertainment type (*Ent-T*)”

This type shows a clear preference for *Media*. In addition, it shows a positive and large value for *RP* and *H/E*. The other variables show no distinguished characteristics. Hence, from these three variables, we will interpret this type to prefer relaxing and having fun.

Social/Economic Variables (*SocEcon*)

Other than leisure variables, this paper includes the following social and economic variables to control social and economic factors which will have an impact on *SWB*.

Real gross income per capita for each prefecture (*RPIpc*)

There are several previous empirical studies on the relationship between income and happiness. Frey and Stutzer (2002) find that income has a positive impact on *SWB* which is supported by a number of studies (e.g. Di Tella, et al., 2003; Sanfey, and Teksoz, 2005; Deaton, 2008; Stevenson and Wolfers, 2008; Perovic and Golem, 2010; Ambrey and Fleming, 2012, 2014; Florida et al. 2013; Barrington-Leigh and Behzadnejad, 2017). However, there are also studies that do not support this (e.g. Oswald, 1997; Layard, 2005; Boarini et al. 2006). This paper will examine the real gross income per capita for each prefecture (*RPIpc*) as the indicator for income. This paper will employ *RPIpc* which is expressed in natural logarithm, since the relationship between income and *SWB* is log linear (i.e. shows diminishing returns) (Sacks et al., 2010),

Marital status (*Mrd*)

Concerning previous empirical studies on the relationship between marital status and *SWB*, Perovic and Golem (2010) find that being single has negative and significant impact on *SWB* in transition countries. Studies on marital status for individual countries find significant relationships with *SWB* as in the analysis by Frey and Stutzer (2000) on Switzerland, Ambrey and Fleming (2012, 2014) on Australia, Barrington-Leigh and Behzadnejad (2017) on Canada. Similar results were found for Japan by Kuroki (2011), Ohtake (2004), Tsutsui, Ohtake and Ikeda (2009) and Morikawa (2010). This paper adopts the married couple rate (*Mrd*) which is expected to have a positive impact on *SWB*. *Mrd* is calculated from the ratio of married couples to the population over 15 years of age.

Safety (*Safety*)

The disaster rate is used as the safety related variable. The larger this index is, the lower the *SWB* is expected to be, since the region with high disaster rate represents higher risks. There is a previous study on the relationship between forest fire and happiness in Barcelona (Sekulova and van den Bergh, 2013). In this paper, the disaster rate is calculated through dividing the disaster damage costs by population. The disaster represents storms, heavy rain, floods, high tides, earthquakes, tsunamis, volcanic eruptions and others natural disasters.

Environmental variables (*Env*)

This paper includes climate variables to represent environmental factors since climate has a wide range of impacts which may affect *SWB*, such as the need for domestic heating and cooling, influence clothing requirements, change peoples’ calorific requirements and restrict outdoor leisure activities (Maddison and Rehdanz, 2011). Climate may also possess potential health impacts such as stress and mental health disorder. Hence, this paper employs the following wide range of climate related variables.

Difference in temperature (*TempDif*)

Since large differences in temperature are considered to be taxing to adapt to, large differences in temperatures throughout the year is expected to decrease *SWB*. This was confirmed by Maddison and Rehdanz (2011) where they found that larger deviations from a base temperature of 18.3°C lowers the life satisfaction. The impact of temperature differences has been examined using other methods. Barrington-Leigh and Behzadnejad (2017) examine the yearly and daily average differences in maximum and minimum temperatures and Frijters and Van Praag (1998) studied the difference between maximum and minimum temperature in one calendar year, the average temperature in January and July, and the annual average temperature. Florida, Mellander and Rentfrow (2013) used the average temperature in January and July and the difference between them. This paper examines the temperature from the month with the highest average daily maximum temperature with the temperature from the month with the lowest average daily minimum temperature.

Precipitation (*PD*)

Several previous empirical studies research the relationship between precipitation and *SWB* (e.g. Frijters and Van Praag, 1998; Maddison and Rehdanz, 2011; Feddersen et al., 2016; Barrington-Leigh and Behzadnejad, 2017). This paper examines the number of days of precipitation (*PD*). *PD* represents the number of days in a year with more than 1 mm of precipitation.

Annual average duration of sunshine (*Sun*)

The relationship between the amount of sunshine and *SWB* has been studied by Murray, Maddison and Rehdanz (2011) for Europe, where they found sunshine to have significant impact on *SWB* and Frijters and Van Praag (1998) also find a positive and significant impact in Russia. The same was found in the study by Feddersen, Metcalfe and Wooden (2016) on Australia. *Sun* examined in this paper represents the annual sum of hours that direct sunlight irradiates the surface of the earth.

Annual average relative humidity (*Hum*)

Humidity has been found to have significant negative impact on *SWB* in the studies by Murray, Maddison and Rehdanz (2011) on Europe, Frijters and Van Praag (1998) on Russia and Feddersen, Metcalfe and Wooden (2016) on Australia. Here, we use the annual average relative humidity (*Hum*) to examine its relationship with *SWB*.

The data source for the dependent and independent variables are provided in Appendix 3. Japan prefecture level data for all 47 prefectures for the year of 2001 are applied as the cross section data for the variables.

The following equation represents the basic model used to examine the determining factors impacting *SWB*.

$$SWB_i = \alpha + \beta_{1i} LT_i + \beta_{2i} SocEcon_i + + \beta_{3i} Env_i + e_i \qquad (1)$$

LT is the leisure related factors obtained by the principal component analysis, which represents *SD-T, AE-T, Ent-T*. *SocEcon* denotes social and economic factors including *RPIpc*, *Mrd*, *Safety*. *RPIpc* which are expressed in natural logarithms. *Env* refers to the climate related variables including *TempDif*, *PD*, *Sun* and *Hum*. *i* represents prefecture. *e* is the prefectural level error term.

The explanation of the models based on the above equation (1) is provided below. First, the correlation between *PD* and *Hum* are expected to be positive while the correlation between *PD* and *Sun* are predicted to be negative. Moreover, the correction between *Sun* and *Hum* is thought to be negative. Furthermore, the correlations between each of these three variables and *TempDif* are expected to be limited. The results of the correlations show that the correlation between the three variables and *TempDif* could not be clearly identified while the correlation among the three variables were found (See Appendix 4). Therefore, there is the possibility of multicollinearity if these three independent variables are included in the model at the same time. Hence, *PD*, *Sun*, *Hum* will be included independently in the models.

3. Results and Discussions

First, we will review the main results in Table 3 for each of the *LT* models. Models (1) - (3) only include *PD,* Models (4) - (6) only include *Sun* and Models (7) - (9) only include *Hum,* as the climate factor. Table 3 shows that the estimates of the coefficients are significantly negative in all the models for *SD-T*. This suggests that regions with a greater value of self-development type tend to have lower levels of *SWB*. This may be due to self-development type feeling less satisfied which motivates them to spend time in self-development or they are more vulnerable to social pressure to spend their time on self-development activities or the self-development type activities may be the cause for stress or frustration. On the other hand, with respect to *AE-T*, which is the second principal component, regions with a greater value of active/external types significantly show higher levels of *SWB* in all the models. This suggests that interaction with other people and participation in sports which provide opportunities to obtain social relations affect well-being, as found in previous studies (e.g. OECD, 2013; Kawakubo and Oguchi, 2015). Finally, with regards to *Ent-T*, the estimates of the coefficients are positive in all the models but are insignificant.

With regards to the results other than leisure related factors, regions with more disasters which is a proxy for safety has been identified to significantly decrease *SWB* in over half of the models. This implies that safety can have an impact on *SWB,* which supports the study by Sekulova and van den Bergh (2013). As for *TempDif,* one of the climate factors, is also found to have a significant negative impact on *SWB* in all the model except Model (9). This suggests that the larger difference in temperature leads to lower *SWB*, since the differences in temperatures creates the need to make adjustments in their daily lives and to maintain their health status. This result supports previous research conducted by Maddison and Rehdanz (2011). We also found that in all the models the estimates of the coefficients for *PD* and *Hum* are negative and statistically significant and those for *Sun* are significantly positive. The result for *PD* supports the previous researches such as Barrington-Leigh and Behzadnejad (2017) and the results for *Hum* and *Sun* is consistent with studies such as Frijters and Van Praag (1998), Brereton, Clinch and Ferreira (2008), Murray, Maddison and Rehdanz (2011) and Feddersen, Metcalfe and Wooden (2016). *RPIpc* and *Mrd* did not show significant and consistent results, which mean these results did not support that income and marriage status have impact on happiness, whereas previous studies on the relationship between income and happiness (e.g. Deaton, 2008; Stevenson and Wolfers, 2008; Perovic and Golem, 2010) and between marriage status and happiness (e.g. Frey and Stutzer, 2000; Ohtake, 2004; Perovic and Golem, 2010; Kuroki, 2011; Ambrey and Fleming, 2012, 2014; and Barrington-Leigh and Behzadnejad, 2017) achieved significant results.

Table 3. Determinants of SWB

Variables	Model (1)	Model(2)	Model(3)	Model(4)	Model(5)	Model(6)	Model(7)	Model(8)	Model(9)
RPIpc	0.233	-0.0531	-0.0958	0.0194	-0.192	-0.215	-0.0784	-0.337	-0.350
	(0.256)	(0.230)	(0.240)	(0.241)	(0.213)	(0.222)	(0.251)	(0.236)	(0.245)
Mrd	-2.418	5.274	-0.243	2.448	9.532	6.211	-5.388	2.181	-2.032
	(6.107)	(6.403)	(7.158)	(6.128)	(6.069)	(6.864)	(5.496)	(5.690)	(6.099)
Safety	-9.119**	-4.838	-6.650	-10.63***	-7.184*	-9.147**	-7.911**	-3.931	-5.772
	(4.001)	(4.201)	(4.280)	(3.815)	(3.939)	(4.061)	(3.834)	(4.086)	(4.095)
TempDif	-0.0204**	-0.0203**	-0.0192*	-0.0241***	-0.0241***	-0.0251**	-0.0169*	-0.0173*	-0.0168
	(0.00884)	(0.00911)	(0.0107)	(0.00843)	(0.00850)	(0.0101)	(0.00850)	(0.00884)	(0.0100)
PD	-0.00358***	-0.00329***	-0.00277**						
	(0.00109)	(0.00111)	(0.00132)						
Sun				0.000664***	0.000673***	0.000659***			
				(0.000160)	(0.000161)	(0.000190)			
Hum							-0.0307***	-0.0280***	-0.0255**
							(0.00806)	(0.00828)	(0.00958)
SD-T	-0.0614**			-0.0464**			-0.0611**		
	(0.0247)			(0.0229)			(0.0237)		
AE-T		0.0501*			0.0450*			0.0459*	
		(0.0264)			(0.0243)			(0.0257)	
Ent-T			0.0173			0.00259			0.0149
			(0.0340)			(0.0308)			(0.0319)
Constant	4.665***	4.858***	4.905***	3.282***	3.413***	3.559***	6.663***	6.686***	6.589***
	(0.406)	(0.402)	(0.442)	(0.463)	(0.453)	(0.470)	(0.706)	(0.734)	(0.864)
B-P/C-W test	0.25	0.88	1.35	0.02	0.13	0.06	0.46	0.87	0.48
Prob > chi2	0.6185	0.3478	0.2453	0.8748	0.7207	0.8146	0.4996	0.3521	0.4904
Ramsey RESET	0.34	0.66	0.23	0.86	0.24	0.36	0.89	2.1	1.68
Prob > F	0.7952	0.5838	0.872	0.4697	0.8666	0.7852	0.4537	0.1163	0.189
C/T IM-test	5.42	4.18	2.61	6.7	3.67	3.55	7.74	7.05	4.69
P-value	0.4909	0.6518	0.8562	0.3499	0.7215	0.7378	0.258	0.3163	0.5835
Observations	47	47	47	47	47	47	47	47	47
Adj. R-squared	0.3092	0.2678	0.2072	0.3874	0.378	0.3246	0.3555	0.3042	0.2527

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
B-P/C-W test: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ramsey RESET: Ramsey regression specification-error test for omitted variables
C/T IM-test: Cameron & Trivedi's decomposition of information matrix test

Table 4. Variance inflation factors for each independent variable

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)
RPIpc	1.76	1.34	1.35	1.76	1.36	1.35	1.82	1.49	1.49
Mrd	1.79	1.86	2.14	2.03	1.97	2.31	1.56	1.54	1.65
Safety	1.24	1.29	1.24	1.27	1.34	1.31	1.22	1.28	1.2
TempDif	1.08	1.08	1.39	1.11	1.11	1.45	1.07	1.07	1.29
PD	1.47	1.44	1.89						
Sun				1.68	1.69	2.16			
Hum							1.5	1.47	1.83
SD-T	2.1			2.03			2.08		
AE-T		1.3			1.29			1.29	
Ent-T			1.63			1.57			1.53
Mean VIF	1.57	1.39	1.61	1.65	1.46	1.69	1.54	1.36	1.5

To assess the robustness of the results, the omitted variables in Models (1) - (9) of Table 3 will be investigated. The existence of omitted variables will lead to the problem of endogeneity, and therefore will influence the ability to obtain consistent and unbiased estimates. Hence, the Ramsey (1969) regression specification-error test (RESET) was conducted for omitted variables. The results in Table 3 shows that for all the models, it was not possible to reject the null hypothesis, which require no omitted valuables. Next, the condition of normality is assessed for each model of Table 3. The models need to satisfy normality for adequate statistical hypothesis testing to be made. Therefore, the conditional moments test with third-order moment conditions of Cameron & Trivedi's decomposition of information matrix (IM)-test was conducted. The results find that the null hypothesis of normality cannot be rejected in all the models of Table 3. Furthermore, the test for homoscedasticity is performed. With heteroscedasticity, OLS estimator is not the best linear unbiased estimator (BLUE), and statistical inference would be biased, and t-statistics and F-statistics are inappropriate. Hence, the Breusch-Pagan / Cook-Weisberg test for heteroscedasticity was performed. From the results in Table 3, the null hypothesis of homoscedasticity could not be rejected in all the models.

Next, the variance inflation factors (VIFs) is calculated to confirm whether there is, in fact, the possibility of multicollinearity in the models of Table 3. From the results of Table 4, high value of VIFs could not be found for any of the variables in all the models since even the highest value of VIFs is 2.31 for *Mrd*. Hence, the assessment is that there is no fear of multicollinearity in all the models of Table 3.

Table 5. The mean of the standardized beta coefficients for each independent variable

Variable	Mean of standardized beta coefficient (absolute value)	Rank
Safety	0.258	6
TempDif	0.298	5
PD	0.458	3
Sun	2.678	1
Hum	0.516	2
SD-T	0.405	4
AE-T	0.256	7

Finally, the magnitude of the effects of each independent variable on *SWB* are assessed by calculating the standardized beta coefficients which are normalized by the ratio of the standard deviation of the regressor to the standard deviation of the dependent variable. The independent variables are examined for statistical significance and the means of these variables are compared. The results in Table 5 shows that the largest standardized beta coefficient which affects *SWB* is *Sun* (2.678). The second largest standardized beta coefficient is *Hum* (0.516), followed closely by *PD* (0.458). The fourth is *SD-T* (0.405), followed by *TempDif* (0.298), and *Safety* is sixth (0.258), followed by *AE-T* (0.256) with little difference. The results indicate that most of the climate variables have larger impacts on *SWB* than leisure activities.

4. Conclusions

A range of determining factors of *SWB* for Japan, with a focus on leisure related variables were examined. The results find that regions with higher self-development type leisure activities tend to have lower levels of *SWB*. Since this analysis employs the structural aspect of leisure (Newman et al., 2014), it does not take into consideration whether the individual perceived to be engaged in leisure through these activities. This provides an opportunity to conduct an analysis on the subjective aspect of leisure to understand the lower levels of *SWB* for this type. Moreover, some policy implications may also be found from the results. Since relationship related active/external type leisure activities is found to have a positive effect on *SWB*, these activities may be encouraged through the support of promotion of these activities and provisions of infrastructure. Further planning and preparation for natural disasters may also improve well-being. It may be necessary not only to provide reinforcement of infrastructures but to review the policies, systems and management to have the greatest impact in improving subjective well-being in the region. Furthermore, as climate factors such as temperature difference, humidity, precipitation and sunshine affect well-being, it will be necessary to improve services, goods and living environments to improve comfort from these climate factors.

Acknowledgement

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References

Ambrey, C. L. and Fleming, C. M. 2012. Valuing Australia's protected areas: A life satisfaction approach. New Zealand Economic Papers, Vol. 46 (3): 191-209.

Ambrey, C. L. and Fleming, C. M. 2014. Public greenspace and life satisfaction in urban Australia. Urban Studies, Vol. 51(6): 1290–1321.

Barrington-Leigh, C. and Behzadnejad, F. 2017. The Impact of Daily Weather Conditions on Life Satisfaction: Evidence from Canadian Cross-sectional and Panel Data. Journal of Economic psychology, Vol. 59: 145-163.

Boarini, R., Johansson, A., and d'Ercole, M. M. 2006. Alternative Measures of Well-being. OECD Economics Department Working Paper, No. 476.

Brereton, F., Clinch, J. P., and Ferreira S. 2008. Geography, Happiness and the Environment. Ecological Economics, Vol. 65: 386 – 396.

Chaplin, L. N. 2009. Please May I Have a Bike? Better Yet, May I Have a Hug? An Examination of Children's and Adolescents' Happiness. Journal of Happiness Studies, Vol.10: 541–562.

Csikszentmihalyi, M. 1990. Flow: The Psychology of Optimal Experience. New York: HarperPerennial.

Deaton, A. 2008. Income, health, and well-being around the world: Evidence from the Gallup World Poll. Journal of Economic Perspectives, Vol. 22(2): 53–72.

De Bloom, J., Geurts, S. A. E., Taris, T. W., Sonnentag, S., De Weerth, C., and Kompier, M. A. J. 2010. Effects of vacation from work on health and well-being: Lots of fun, quickly gone. Work and Stress, Vol. 24(2): 196-216.

Di Tella, R., MacCulloch, R., and Oswald, A. 2003. The Macroeconomics of Happiness. Review of Economics and Statistics, Vol. 85: 809-827.

Feddersen, J., Metcalfe, R., and Wooden, M. 2016. Subjective wellbeing: why weather matters. JOURNAL OF THE ROYAL STATISTICAL SOCIETY SERIES A-STATISTICS IN SOCIETY, Vol. 179 (1): 203 – 228.

Florida, R., Mellander, C., and Rentfrow, P. J. 2013. The happiness of cities. Regional studies, Vol. 47 (4): 613-627.

Frey, B. S. and Stutzer, A. 2000. Happiness, Economy and Institutions. Economic Journal, Vol. 110 (466): 918–938.

Frey, B. and Stutzer, A. 2002. Happiness and Economics. How the Economy and Institutions Affect Human Well-being, Princeton and Oxford: Princeton University Press.

Fujii, N., Ono, R., Yoneda, T., Shinohara, H., Nakata, Y., Nagao, T., and Ishikawa, Y. 2005. Relationship between leisure-time physical activities and quality of life in the community-dwelling older people. Kobe Daigaku Igakubu Hokengakka Kiyo, Vol. 20: 53-60.

Frijters, P. and Van Praag, B. M. 1998. The effects of climate on welfare and well-being in Russia. Climate Change, Vol. 39: 61–81.

Hashimoto, S. and Atsumi, N. 2015. A study on relationship between the leisure activities and the feeling of happiness of aged person. Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management), Vol. 71 (5): I567-I576.

Kawakubo, A., and Oguchi, T. 2015. The influence of interaction with others in vacation on subjective happiness and depression. Stress Kagaku Kenkyu, Vol. 30: 69-76.

Koopman-Boyden, P. G., and Reid, S. L. 2009. Internet/E-mail Usage and Well-Being Among 65–84 Year Olds in New Zealand: Policy Implications. Educational Gerontology, Vol.35 (11): 990-1007.

Kuroki, M. 2011. Does social trust increase individual happiness in Japan? Japanese Economic Review, Vol. 62(4): 444-459.

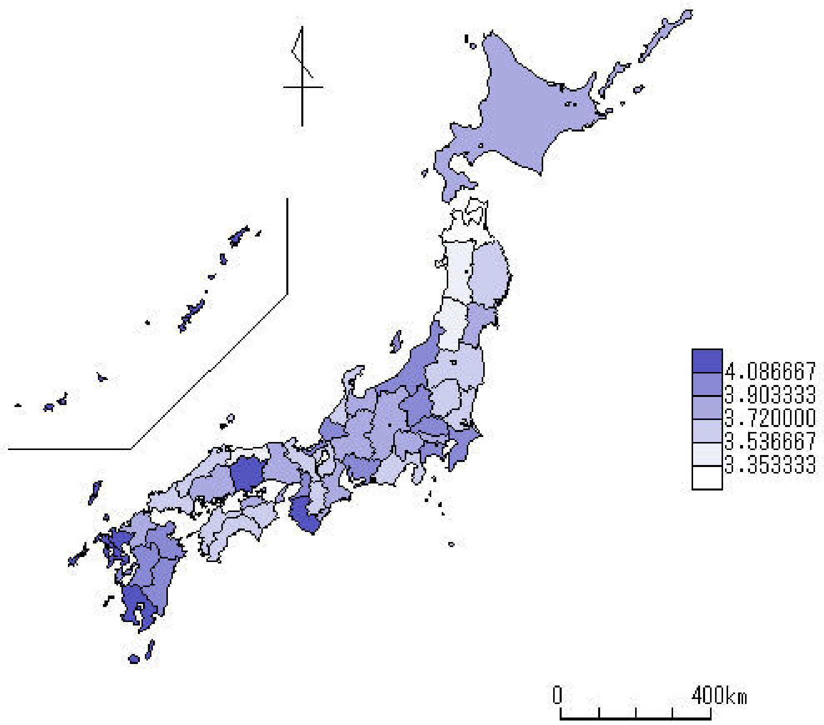
Layard, R. 2005. Happiness: lessons form a New Science. London: Penguin Books.

Lloyd, K. M. and Auld, C. J. 2002. The Role of Leisure in Determining Quality of Life: Issues of Content and Measurement. Social Indicators Research, Vol. 57 (1): 43–71.

Lu, L., and Hu, C-H. 2005. Personality, leisure experiences and happiness. Journal of Happiness Studies, Vol. 6: 325–342.
Maddison, D. and Rehdanz, K. 2011. The impact of climate on life satisfaction. Ecological Economics, Vol. 70 (12): 2437–2445.
Maslow, A. H. 1954. Motivation and Personality. New York: Harper.
Matsumoto, N. 2010. Clarification of value of social relations for subjective well-being -analysis of determinants of subjective well-being based on a social relationship structure model -. MSc thesis. Graduate School of System Design and Management, Keio University.
Menec, V. H., and Chipperfield, J. G. 1997. Remaining active in later life: The role of locus of control in senior's leisure activity participation, health, and life satisfaction. Journal of Aging and Health, Vol. 9(1): 105-125.
Morikawa, M. 2010. Chiiki kan keizai kakusa ni tsuite: Jishitsu chingin/koufukudo (Regional differences in the economy: real wage / happiness), RIETI discussion paper series, 10-J-043.
Murray, T., Maddison, D., and Rehdanz, K. 2011. Do geographical variations in climate influence life satisfaction?. Kiel Working Papers, 1694, Kiel Institute for the World Economy.
Nawijn, J. 2011. Happiness through Vacationing: Just a Temporary Boost or Long-Term Benefits? Journal of Happiness Studies, Vol.12(4): 651-665.
Newman, D. B., Tay, L., and Diener, E. 2014. Leisure and subjective well-being: A model of psychological mechanisms as mediating factors. Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being, Vol.15(3): 555–578.
OECD 2013. OECD Guidelines on Measuring Subjective Well-being, https://www.oecd-ilibrary.org/economics/oecd-guidelines-on-measuring-subjective-well-being_9789264191655-en
Ohtake, F. 2004. Unemployment and Happiness. The monthly journal of the Japan Institute of Labour, Vol. 528: 59-68.
Oswald, A. 1997. Happiness and Economic Performance. Economic Journal, Vol. 107(445): 1815-1831.
Perovic, L. M. and Golem, S. 2010. Investigating Macroeconomic Determinants of Happiness in Transition Countries. Eastern European Economics, Vol. 48(4): 59-75.
Ramsey, J. B. 1969. Tests for Specification Errors in Classical Linear Least Squares Regression Analysis. Journal of the Royal Statistical Society: Series B, Vol. 31: 350-371.
Ryan, R. M., and Deci, E. L. 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, Vol. 55: 68-78.
Ryff, C. D., and Keyes, C. L. 1995. The Structure of Psychological Well-Being Revisited. Journal of Personality and Social Psychology, Vol. 69: 719 – 727.
Sacks, W. D., Stevenson, B., and Wolfers, J. 2010. Subjective well-being, income, economic development and growth. NBER working papers, No. 16441.
Sanfey, P. and Teksoz, U. 2005. Does Transition Make You Happy?, EBRD Working Paper, No. 91.
Sekulova, F. and van den Bergh, J. C. J. M. 2013. Climate change, income and happiness: An empirical study for Barcelona. Global Environmental Change, Vol. 23: 1467–1475.
Spiers, A. and Walker, G. D. 2008. The Effects of Ethnicity and Leisure Satisfaction on Happiness, Peacefulness, and Quality of Life, Leisure Sciences, Vol. 31: 84–99.
Stevenson, B. and Wolfers, J. 2008. Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox. National Bureau of Economic Research Working Paper Series, No. 14282. Retrieved from http://www.nber.org/papers/w14282
The Institute of Regional Studies at Osaka University of Commerce and the Institute of Social Science at the University of Tokyo 2001. The Japanese General Social Surveys (JGSS-2001).
Tsutsui, Y., Ohtake, F., and Ikeda, S. 2009. The reason why you are unhappy. Osaka Economic Papers, Vol. 58(4): 20-57.
Wakamatsu, T., Uchiyama, S., Mohara, N., and Ohki, M. 2007. Factors which contribute to the quality of life in university students (1). Bulletin of Living Science, Vol. 29:189-202.
Wang, M., and Wong, M. C. S. 2011. Leisure and Happiness in the U.S.: Evidence from Survey Data. Applied Economics Letters, Vol. 18 (18): 1813-1816.
Wang, M., and Wong, M. C. S. 2014. Happiness and Leisure Across Countries: Evidence from International Survey Data. Journal of Happiness Studies, Vol. 15(1): 85-118.
Westman, M., and Eden, D. 1997. Effects of a respite from work on burnout: vacation relief and fade-out. Journal of Applied Psychology, Vol. 82:516.
Yamada, N. 2000. The Relationship between leisure activities, psycho-social development and life satisfaction in late adulthood. The Japanese Journal of Development Psychology, Vol. 11(1): 34-44.

Appendices

Appendix 1. SWB by Prefecture



Appendix 2. Definition of each Leisure Activity

Leisure activities	Definition
Television, radio, newspaper and magazine (*Media*)	Time spent watching television, listening to radio, reading newspapers and magazines (print and web).
Self-development (*SD*)	Time spent on education, self-development, and training during free time.
Relaxation (*RX*)	Time spent relaxing with family; breaks during work or school; tea/coffee breaks and taking naps.
Hobby/entertainment (*H/E*)	Time spent on hobbies and entertainment.
Sport (*Sport*)	Time spent on sports
Volunteer/community activity (*V/C*)	Time spent participating in volunteer/community activities such as cleaning parks and local community, fund raising, helping elders, recycling activities, traffic safety activities, PTA and election campaign activities.
Relationship (*RP*)	Time spent socializing and dining with friends, such as attending, weddings, school reunions and visiting/inviting friends.

Time spent on the leisure activities are obtained, based on average hours per days. It is calculated through average hours for weekdays multiplied by 5 days plus hours for Saturday and hours for Sunday.

Appendix 3. Data Sources

Variable	Source
Subjective well-being (*SWB*)	Japanese General Social Survey 2001: Institute of Regional Studies, Osaka University of Commerce in collaboration with Institute of Social Science, the University of Tokyo. The data are aggregated and averaged at prefecture level by Matsumoto (2010).
Income per capita (*RPIpc*)	Prefectural Accounts; Cabinet Office, Population Census, Population Estimates; Ministry of Internal Affairs and Communications
Married rate (*Mrd*)	Population Census, Population Estimates; Ministry of Internal Affairs and Communications
Disaster rate (*Safety*)	White paper on Fire Service, Population Census, Population Estimates; Ministry of Internal Affairs and Communications
Difference of temperature (*TempDif*)	Past Meteorological data; Japan Meteorological Agency
Days of precipitation (*RD*)	Past Meteorological data; Japan Meteorological Agency
Sunshine duration (*Sun*)	Past Meteorological data; Japan Meteorological Agency
Annual average relative humidity (*Hum*)	Past Meteorological data; Japan Meteorological Agency
Leisure time (*LT*)	Survey on time use and leisure activities; Ministry of Internal Affairs and Communications

Appendix 4. Correlation of the Climate Variables

Variables	*TempDif*	*PD*	*Sun*	*Hum*
TempDif	1.000			
PD	-0.064	1.000		
Sun	0.149	-0.770	1.000	
Hum	-0.040	0.703	-0.686	1.000

DOES BUSINESS GEOGRAPHICAL ACTING AREAS IMPACT ON INTRAPRENEURSHIP AND SUSTAINABILITY STRATEGIES?

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Abstract

The present paper aims to analyze the positive or negative impact of local integrated firms on strategies of intrapreneurship and sustainability. The study was developed in the region of *Tâmega e Sousa*, located in the north of Portugal. For that 283 firms from manufacturing and construction industries were analyzed. By local integrated firm were considered those firms that are doing all their business activities within the region where they are established. Most of firms (83.2%) in this region present very good results in the adoption of sustainable strategies, while 80.9% present a weak adoption of intrapreneurship strategies. Crossing variables on local integration and sustainability it was found a light tendency in favor of local firms, i.e., local firms apparently are more concerned with the regional sustainable development, than those that are acting outside the region borders. On what regards the relation between local integration and the adoption of intrapreneurship strategies, those firms that are doing business beyond the region are adopting more intrapreneurship strategies.

Keywords: Local Business, Intrapreneurship, Sustainability
JEL classification: L2, O1, R1

1. Introduction

The importance of entrepreneurship in economic and social development is emphasized both in literature, business practice and governmental policies. Example of that are policies such as the European Smart Specialization1 or the Regional Innovation Strategies2 that focus on the enhancement of innovative local dynamics bringing together several stakeholders to promote these dynamics. In general this is a development of the triple helix model (Etzkowitz and Leydesdorff 1995). Other factors such as the market knowledge and experience, academic ground and internationalization are also presented as the key elements of local development (Kisman and Tasar 2014). What seems to be consensual is that firms are a key element in economic and social development. In order to survive, firms need to develop their businesses. The basic development for any firm is about buying and selling. Within a region, a firm might do business with regional or non-regional stakeholders.

Considering () (below) we present some possible relations: W, X, Y and Z are firms that are doing business among them. W is buying from a supplier located outside the region and selling for a non-regional customer as well. Z is also selling for a non-regional customer. We must take into consideration that this is just a possible scenario. Many different ones could be presented. The main idea is to represent the differences that may occur when doing business at up and downstream levels. In the same figure the “i” aims to represent the individuals that are positively or negatively affected by the firms’ action (getting hired or fired, getting a sponsorship, suffering any type of environmental consequence, etc.).

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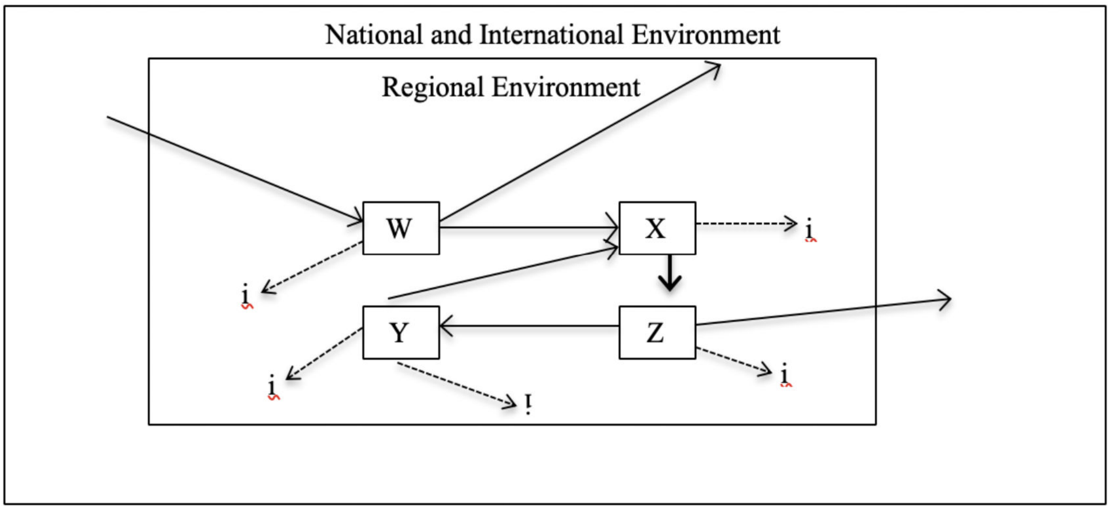
1 http://s3platform.jrc.ec.europa.eu/

2 Europe: https://ec.europa.eu/futurium/en/jobs-and-skills-local-economy/draft-action-4-regional-innovation-strategy-ris3-20; USA: https://www.eda.gov/oie/ris/

Image 1. A possible relation among firms and individuals



Source: Own Elaboration

The main idea that we aim to present with the figure above is that firms are doing businesses with many different stakeholders, and their actions affect their own strategies as well as their stakeholders (in the figure we are focusing in the external individuals). This led us to this paper objective: To analyse if the type of business relations that firms are adopting in terms of buying and selling has impact in their internal strategies (intrapreneurship) and in their sustainable behaviour. Is there any impact for sustainable development from firms that act just locally (X and Y)? Are those firms more or less oriented to adopt intrapreneurship strategies?

In the present paper we aim to analyse this relation. For that, firms from the Region of *Tâmega e Sousa* (Portugal) will be classified in terms of business geographical acting areas. After that we will explore the existence of any relation between the business geographical classification (Local Integration) with the adoption of strategies of innovation, risk and proactivity (intrapreneurship) and sustainable development strategies.

The next chapter will present a brief literature review on the main concepts of this paper, followed by a region description. After that some considerations on the research methodology will be presented. To close this paper the results and the conclusion with the main achievements from this research.

2. Literature Review

2.1. Regional Business

The important role of businesses in regional economic growth and development is widely accepted as it is possible to find along the state of art, as for instance in the studies based in the triple and quadruple helix model [Leydesdorff, (2000); Gouvea, Kassicieh, & Montoya, (2013)].

In economic terms the region is considered as a set of territorial units which, in terms of selected criteria, share many common features and have a number of distinctive characteristics as compared to the surrounding areas; the region is specialized and has a particular set of productive forces (Kuciński, 1990). Is not a aim for this paper to discuss the region concept, however it is important to mention it, since later on we will be discussing about the regional effects in business management. In other words, we are trying to explore the embeddedness effect. According to Lo Iacono (2018) the social density fosters higher levels of trust. In particular, people in denser communities are more likely to trust their unknown fellow citizens, encouraging isolated subjects to engage with strangers. This research was focusing individuals in general, but the entrepreneurial identity comes with individual own behavioral expectations that are defined, or imprinted, through various belief systems, that operate at an individual, interpersonal and group level, and entrepreneurial behavior will be a result of past experiences, observed behaviors, or conformity with a social group (Newbery, et al., 2018; Sluss & Ashforth, 2007).

Wu & Pullman (2015) argue that contrary to the belief that firms act solely for profit and growth, cultural contents such as values, social issues and political ideologies explain firms' motives and guide their economic activities. Along with this perspective Jack & Anderson (2002) found that embeddedness plays a key role in shaping and sustaining business. According to the authors being embedded in the social structure creates opportunity and improves performance.

Authors such as Rutten & Boekema (2007) argues that differences in economic development can be explained, among others, by factors such as regional social capital, that in turn originates from the embeddedness of firms in regional webs of social relations.

However, there are also some negative perspectives of embeddedness. According to Andersen (2013) over-embeddedness presents a negative impact on firm performance. Day et al. (2013) identified a negative curvilinear relationship between relational capital (comprising trust, respect and reciprocity) and performance. They also identified a sequencing of relational inertia and resource misallocation. Still the same authors "*further present a wider paradox when relationship quality is assessed between a buyer and supplier. At both focal companies, the behaviors that led suppliers to 1) value the buying firm as a partner, 2) seek deeper relational embeddedness, and 3) pursue a value co-creation strategy simultaneously sowed the seeds for relationship dissatisfaction*" (Day et al., 2013, pp. 161). Similar ideas and results are also suggested by authors such as Villena et al. (2011) or Halaszovich & Lundan (2016). Taking these different ideas into consideration it is possible to question if the region may have an impact in the firm's strategies. This brief overview allows us to conclude that there is not a clear perception on the effects of regional cooperation and regional integration. These impacts will be studied later on.

2.2. Sustainable Development

Today, it is a widely accepted notion that the development of regions is the driving force behind the economic growth of countries, and the recognition of this fact is reflected in various European Union's policies (Antonescu 2014; Sîrbu 2014). A major factor for this growth can be find in the entrepreneurial fabric, through its role played in generating added value, innovation and jobs (Muresan & Gogu, 2012).

Regional development embraces the processes of quantitative growth as well as qualitative progression. These processes are seen as changes occurring in many spheres, including the economy, technology, natural environment and in society (Duarte and Diniz 2011). These changes have both economic and societal dimensions and in the long term they should lead to improving the quality of life of inhabitants, the setting-up of new enterprises and the creation of new jobs, the upgrading of the regional economic infrastructure and therefore they contribute to an increase in gross domestic product per capita generated in the regional economy.

Not so recent, but still a concerning is the concept and practice of sustainable development [(Eversole, 2003; Schumpeter, 1934; Sinakou et al., 2018; Wiklund & Shepherd, 2005)]. According to Spangenberg (2004), sustainable development is based on the integration of four dimensions: economic, environmental, social and institutional, and is perhaps the biggest challenge ever in terms of policy concept. The Brundtland Commission3 presented three main objectives to achieve a sustainable development:

The environmental objective, taking into account the overall safeguard of the environment from a long-term perspective;

The social objective, strengthening cohesion through justice among peoples, countries, genders, social groups, among others; and,

The institutional objective, ensuring participation in political decisions as a prerequisite for the peaceful establishment of the official agreement.

None of them is an economic objective, however, economics is crucial: Its current way of working is a guiding force behind most problems, but it can also be a force for a better contribution to solve various problems by creating enough wealth. Although a vibrant

3 http://www.un-documents.net/our-common-future.pdf

economy is not an end in itself, it is considered essential for the long-term satisfaction of material needs by providing jobs, income, social security and consumer opportunities.

Economies are the driving force for development, and firms play a crucial role on it, so the next section we will present some concepts on firms' management and strategies, keeping an eye in regional/sustainable development.

2.3. Intrapreneurship

Nowadays it is widely accepted that Entrepreneurship can be measured by three factors: (1) Proactivity (2) Innovation and (3) Risk propensity (Miller 1983). If these factors are important at the firm creation, they are still relevant for firm development. What entrepreneurs must develop is, first of all, the entrepreneurial spirit, so that they can then bring that spirit into the company, thus fostering intrapreneurship, as Pinchot (1985) argued. The concept of entrepreneurship is often referred to as the strategic capacity of the company, the ability to bring new products into the market, or the process of identifying and exploiting opportunities.

When someone is able to innovate, take risks and be proactive in creating a new business, it is expected that this spirit will remain present in the daily management of the company. In other words, it is expected that the concepts of innovation, risk and pro-activity remain present enabling a constant entrepreneurial attitude on the entrepreneur. This attitude is more than strategic management that is asked of companies, since many times, in particular in small businesses, the management is almost limited to daily issues, leaving planning, or the exploitation of opportunities, to a non-priority level.

Through constant entrepreneurship, the company should practice a management, focusing the future, combining strategy and entrepreneurship. These concepts, although often studied separately cannot exist without the presence of the other, as argued by Venkataraman & Sarasvathy (2008). In addition to strategic management, when companies present themselves with an entrepreneurial management, they are at the same time contributing to the development of the region where they are.

When the region provides conditions (infrastructures, manpower, knowledge, positive discrimination, among others) that favor the birth and entrepreneurial development, these tend to respond in a positive way contributing in turn to a greater development of the region. As Venkataraman (2004) argues, the opposite also happens. If the region does not provide conditions, companies in turn do not meet expectations, thus falling, companies and region in a vicious cycle.

Before presenting the region description it also interesting to present some results presented by Rodzinka & Skica (2017) that found evidences of a negative impact between the size of local administration (number and value of wages paid) and the level of entrepreneurship. This means that in order to promote intra or entrepreneurship the alignment among stakeholders as suggested by the concept of sustainable development is highly relevant.

3. The Region

The study was carried in the region of *Tâmega e* Sousa, in Portugal. This region is composed of 11 *Concelhos*4 composing the inter-municipal community of *Tâmega e Sousa*. This community is one of seven inter-municipal entities (groups of *Concelhos* organized as administrative regions) in the Northern Region of Portugal.

4 *Concelho*: Portuguese administrative unit divided into smaller units called *freguesias*.

Image 1: The Region of Tâmega *e Sousa* in Portugal

a) Portuguese map with the Region of Tâmega e Sousa (in black)

b) Concelhos that compose the region

The region presented above is composed of eleven *concelhos* (Amarante, Baião, Castelo de Paiva, Celorico de Basto, Cinfães, Felgueiras, Lousada, Marco de Canaveses, Paços de Ferreira, Penafiel, Resende). For statistical purposes this region is within a NUTE III. The region has an area of 1,830 km^2 and a population of 434,165 inhabitants, about 12% of the northern region. A characteristic element of the Tâmega and Sousa population is its predominantly rural integration: the people who live in towns with more than 2,000 inhabitants do not even reach one third of the population, when the regional and national average exceeds 60% (Castro et al. 2014).

On what regards the economic activity, focusing on the main relevant elements for this paper, in 2012 there was a total 25,500 firms. From those firms 4,399 were acting in the manufacturing sector, while 3,754 in the construction sector. These sectors were employing (in 2011) 53,783 workers in the manufacturing, and 32,685 in the construction. These figures represent 50% of total employment in this region.

According to Castro et al. (2014) the manufacturing industry is the main economic activity of the *Tamega e Sousa*. The 4,700 industrial companies based in *Tâmega e Sousa*, including 2,582 companies have employed 53,745 people and generate a gross value added of 722 million euros for a turnover of 2,372 million euros in 2011. These figures corresponds to 40% of people employed in companies of *Tâmega e Sousa*, 41% of Gross Value Added (GVA) and 36% of turnover, substantially above those recorded in the North and in Portugal. The result is a weight of the *Tâmega e Sousa* industry in total North and upper country to the situation when considering the total economic activities, whatever the indicator used. However, the importance of the *Tâmega e Sousa* is higher in all businesses and persons employed in industry than in the GVA and the volume of industrial business, indicating a lower productivity of the *Tâmega e Sousa* industry regarding the north and Portugal. In 2011, apparent labor productivity in the *Tâmega e Sousa* industry was equal to 13,437 euros per person employed, which corresponds to two thirds of the total registered in North industry and 54% of the domestic industry.

In this region is also possible to find some industrial districts, such as Shoes making in *Felgueiras*; Textile in *Lousada*; Wood furniture in *Paços de Ferreira*, and in Metalworking in *Amarante;*

4. Methodology

The present paper results from a broader project that aimed to analyse among other elements the level of intrapreneurship and sustainability among firms from the manufacturing and construction sectors, located in the region presented above. Besides the questions focusing on the main concepts of that project (intrapreneurship and sustainability) among others were also questioned the location of firms' main suppliers and customers. These are the key variables for the present paper. Since the region presents a high number of firms the study was focused on a valid sample. In order to find the minimum sample size, according to Saunders et al. (2009) it is necessary to define:

Confidence level;

Error margin;

Proportion of answers obtained in a particular section.

A pilot study with 33 observations was developed in order to analyse the proportion of answers regarding the levels of intrapreneurship and sustainability. From this initial sample it is possible to draw some inferences to the final sample, using the following formula:

$$n=p\%*q\%*(z/e\%)^2 \tag{1}$$

where: *n*: minimum sample size required;

p%: proportion belonging to the specified category;

q%: proportion not belonging to the specified category;

z: z value corresponding to the level of confidence required:

e: margin of error required;

In order to calculate the sustainability levels, the three dimensions of sustainable development were first considered, as it can be seen in Table1.

Table 1. Number of questions associated with each strategy

Test area	Economic Development	Social Development	Environmental Development
Number of questions	4 questions	5 questions	3 questions

Source: own elaboration

Each dimension was evaluated according to the identified questions. Each question was answered on a Likert-scale (1 to 5). For each dimension, the results of questions were summed up within that dimension and the average results were calculated.

In order to get the sustainability results, average results for the three dimensions were calculated. The output was organized into 5 categories that describe the approach: very weak; weak; moderate; good; very Good.

To calculate the minimum sample size it is necessary to have a yes or no approach. In other words, it is necessary to find a percentage for firms that take a sustainable *versus* non-sustainable behaviour. In order to do the sample size calculations it was assumed good and very good corresponded to a positive approach, and weak and moderate to a negative one.

The results that were obtained were as follows:

Table 2. Sustainability results of the pilot study

	Frequency	%	Total %
Weak	1	3	12.1
Moderate	3	9.1	
Good	19	57.6	87.9
Very Good	10	30.3	
Total	33	-	-

Source: own calculations

In terms of sample size results, those figures led to the following result:

$$n = 87.9\% * 12.1\% * (1.96/5\%)^2 = 163.44 \tag{2}$$

According to the sustainability results, in order to obtain a valid sample, it would be necessary to gather 164 answers.

On what regards the level of intrapreneurship the same pilot study was respected to calculate the minimum sample required. The results revealed a very low approach to the adoption of these strategies

Table 1. Intrapreneurship results of the pilot study

	Frequency	%	Total %
Very Weak	10	30.3	78.7
Weak	16	48.4	
Moderate	7	21.3	21.3
Total	33	-	-

Source: own calculations

In terms of sample size results, those figures led to the following result:

$$n = 78.7\% * 21.3\% * (1.96/5\%)^2 = 257.58 \quad (3)$$

Considering the results on intrapreneurship strategies, the minimum sample size should be 257 cases. The minimum was accomplished under both scenarios since we got a final sample of 283 cases.

As previously stated, the main purpose of the project, carried out, in the manufacturing and construction sectors in the *Tâmega e Sousa* region (Portugal) was the characterization of the firms in this region relatively to intrapreneurship and local sustainability. As well stated above the specific objectives for this paper was the relation between the business geographical acting areas and the behaviour that firms present towards local sustainability. For that purpose, the following working hypotheses have been put forward:

H_1: Firms that are just acting locally (doing business) are adopting more strategies aiming local sustainability

H_2: Firms that are just acting locally (doing business) are adopting more strategies aiming intrapreneurship (innovation, risk and proactivity).

In the next section we will present and discuss the results from the statistical analysis.

5. Results

In this section the first results to be presented are related to the individual variables (intrapreneurship, sustainability and local business integration).

Starting by the information regarding Intrapreneurship, the results were weak. To measure the intrapreneurship degree, according to Miller (1983) it were combined three other factors: Innovation, Risk and Proactivity. To do so, the questionnaire included some questions in order to identify the strategies adopted by those firms on innovation, risk and proactivity. Once gathered the results and grouped into one variable to get the intrapreneurship level, the results are as follows in Table 4.

Table 4. Intrapreneurship results

	Frequency	%
Very Weak	100	35.3
Weak	129	45.6
Moderate	54	19.1
Total	283	100

Source: own calculations

As seen in Table 4 the level of intrapreneurship is very low. The best results are for firms with a moderate approach, which means that there are no firms with a good approach to intrapreneurship. It might be important to mention that these results are related to the number of strategies adopted by each firm. From the table it is possible to verify that almost 81% of firms in this region present a weak (or very weak) approach to intrapreneurship.

On what regards sustainability the results are not so disappointing, since the firms' behaviour is more sustainable (Table 5):

Table 5. Sustainability results

	Frequency	Valid %
Weak	8	2.9
Moderate	38	13.9
Good	177	64.6
Very Good	51	18.6
missing	9	
Total	274	100

Source: own calculations

From the results it is possible to verify that most firms (83.2%) present a proactive attitude to sustainable development. This might mean that in general firms are adopting strategies that at least respect the three dimensions of sustainable development: Economic, Social and Environmental - (Giddings, Hopwood, & O'Brien, 2002).

Since the main objective for the present paper is related to Local Business Integration (or the business geographical acting area) and its relation with intrapreneurship and local sustainability it is important to present some general results on local business integration focusing on upstream and downstream integration.

On what regards upstream and downstream relations, in the questionnaire was asked to identify the location of firms' three main suppliers and customers, according to the locations presented in Table 6 and Table 7.

Table 6. Location of the 3 main suppliers (%)

	Sup. 1	Sup. 2	Sup. 3
No answer	-	2.8	4.2
In the same municipality	**46.3**	**21.9**	**26.5**
In a neighbour municipality in the region	15.9	**30.0**	13.4
In other municipality in the region	16.6	**32.5**	**30.4**

Source: own calculations

Table 7. Location of the 3 main Customers (%)

	Cust. 1	Cust. 2	Cust. 3
No answer	-	3.5	5.7
In the same municipality	**35.0**	17.7	14.5
In a neighbour municipality in the region	15.2	14.8	16.3
In other municipality in the region	11.0	**31.8**	**30.4**
In other municipality in the country	18.0	12.7	15.2
European Union	17.0	12.7	11.0
Somewhere else	3.9	6.7	7.1
Total	100	100	100

Source: own calculations

From the previous Tables it is clear that most of the businesses are done in the region. However, in order to get a clearer vision of these relations it was built the table below that presents the average results by location considering the 3 main stakeholders.

Table 8. Degree of local integration (%)

		Upstream		Downstream	
Ultra-local	In the same municipality	31.6		22.4	
Local	In a neighbour municipality in the region	19.8		15.4	
Regional	In other municipality in the region	26.5	77.9	24.4	62.2
National	In other municipality in the country	12.8		15.3	
International	European Union and Rest of the World	7.0		19.5	

Source: own calculations

Comparing up and downstream businesses it was possible to verify that firms are doing most of their purchases in the same municipality and in municipalities from the same region. This situation may occur due to the existence of industrial districts as mentioned on chapter 3. The figures from Table 8 also show that on what regards international business, the region presents (in terms of percentages) a surplus at the Balance of Trade, since it is exporting more than importing. Anyway, the figures presented might indicate a high level of dependence on the internal (mainly local) market. Considering the region as a local market it means that the local market represents 77.9% of all purchases and 62.2% of total sales. These figures allow us to conclude that a relevant part of the businesses are done within a local area.

Taking into consideration the results presented above on intrapreneurship, sustainability and local integration we will now try to identify the existence of relations between the variables of local integration with intrapreneurship and local integration.

In order to analyse a relation (variable association) some cross tabulations tests were performed based on the following hypothesis:

H_0: The variables are independent (do not exists variable association) *vs.*

H_1: The variables are dependent (exists association)

As stated in the literature, in order to analyse these hypothesis one must run a χ^2 test. The decision will be taken according to the p value obtained with the χ^2 test.

In first place were created new variables to classify firms according to the geographic business area on both upstream and downstream businesses:

International acting firms: those that are buying or selling from/to abroad

National acting firms: those that are buying or selling in the country but outside their location region.

Local acting firms: those firms that were either buying or selling just for stakeholders (three main suppliers and customers) located in the same municipality, in a neighbour municipality or, at most, in the region (ultra local, local and regional)

According to the results from Table 8 a large percentage of businesses is done within the municipality, in a neighbour municipality or within the region. So, for statistical analysis it was considered two classes:

Local acting firms, and

Non-local (national and international).

After getting these new variables each one of them were crossed with the sustainability variable, in order to analyse their (in)dependence.

The first variable dependence test was related to Local Integration and Sustainable Development.

In order to get statistically valid results the classes within each variable were reduced. On sustainability were used three classes (Weak, Moderate, Good), and on local integration were used two classes (Local and Non-local – the latter are the firms that are either buying or selling at national or international level).

On the cross tabulation result (sustainability vs. local integration) it was verified that some observed results differ from the expected ones, which leads to the possibility of variables association. Apparently local firms are adopting more strategies aiming sustainable development than those that are also acting outside the region borders. By requiring the χ^2 test we got a p-value of 0.661. Since this result is higher than 0.05 it means that H_0 may not be rejected. So, the results seem to identify a tendency but we are not able to validate it statistically.

When analysing the relation Local Integration – Intrapreneurship it were used the same classes for local integration (Local vs Non-local) and three classes for intrapreneurship

(Weak, Moderate, Good) as presented in Table 4. The first analysis, show some evidences that those firms that are doing business beyond the region are the ones more concerned, thus adopting more intrapreneurship strategies. Requiring the χ^2 test we got a p-value of 0.000…7. Since this result is lower than 0.05 we may reject H_0, which means that it might be variable association. This result lead us to conclude that in fact firms that are acting (buying or selling or both) outside the region borders are in fact adopting more strategies of innovation, risk and proactivity. This might occur due to the natural proactivity that those firms demonstrate when going for other markets than those from the region.

Summing up, firms in this region present a sustainable behaviour, but in general do not present behaviour of entrepreneurship. Most of the businesses are done in a local geographic area. On what regards local development, even without statistical evidence, it seems that firms that are doing business just in the region present a more sustainable approach (might be the result of the so called embeddedness effect. Those firms that are acting in other geographies than the region present a higher level of innovation, risk and proactivity (combined in the level of intrapreneurship).

6. Conclusion

The present paper aimed to study the existence of any relation between the business geographical acting areas of firms located in the region of *Tâmega e Sousa*, Portugal with the strategies of entrepreneurship adopted and the sustainability strategies. From the literature review it was possible to find that the embeddedness concept that is quite frequent in a region due to personal relations, might have both negative and positive impacts.

The study took into consideration 283 firms operating in the manufacturing and construction businesses in a Portuguese region, where some clusters or industrial districts are identified. This agglomeration of firms specialized in a region is a positive effect for regional embeddedness.

In a previous analysis it was found a very low level on intrapreneurship. Firms are not following strategies of innovation, risk and proactivity. In a 5 level scale, the highest score was 3, which mean a moderate approach to intrapreneurship. On what regards sustainability strategies firms are more proactive, since they are adopting strategies that aim not only the economic area, but the social and the environmental as well.

Considering upstream and downstream integration, it was possible to realize that most of the businesses in this region are done in the region (in the same *concelho* or in a *concelho* that composes this administrative region). Less than 20% of firms are buying from outside the region (national or international level). However almost 35% of those firms are selling abroad (the region).

As mentioned, the goal for this paper was to find out if firms that are just acting locally present a different behaviour on the strategies followed, to those that are acting in broader markets. On what regards local development, even without statistical evidence, regional firms present a more sustainable approach. Those firms that are acting in other geographies than the region present a higher level of innovation, risk and proactivity, i.e., firms that are buying or selling outside the region border are those that present a higher level of intrapreneurship.

The results here presented lead us to plan about future researches in order to verify whether these results are valid just for this region or if they are valid in other regions. It would also be interesting to enlarge the number of analysed cases in order to get statistical validity for all the results. In order to find different patterns, it could also be analysed the impact of each strategy (Innovation, Risk and Proactivity) and each sustainable development ring (Economic, Social and Environmental) in regional vs. non-regional firms.

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References

Andersen, Kristina Vaarst. 2013. “The Problem of Embeddedness Revisited: Collaboration and Market Types.” Research Policy 42 (1): 139–48. https://doi.org/10.1016/J.RESPOL.2012.05.005.

Antonescu, Daniela. 2014. “Regional Development Policy in Context of Europe 2020 Strategy.” Procedia Economics and Finance 15 (14): 1091–97. https://doi.org/10.1016/S2212-5671(14)00561-9.

Castro, Alberto;, Vasco; Rodrigues, Ana; Vilaverde, Filipe; Gonçalves, José; Silva, Leonor; Sopas, Mário; Ferreira, Miguel; Sottomayor, and Sérgio Costa. 2014. “Plano Estratégico de Desenvolvimento Intermunicipal.” Lousada. http://www.cimtamegaesousa.pt/#/documentacao.

Day, Marc, Stanley E. Fawcett, Amydee M. Fawcett, and Gregory M. Magnan. 2013. “Trust and Relational Embeddedness: Exploring a Paradox of Trust Pattern Development in Key Supplier Relationships.” Industrial Marketing Management 42 (2): 152–65. https://doi.org/10.1016/J.INDMARMAN.2012.12.004.

Duarte, Nelson, and Francisco Diniz. 2011. “The Role Of Firms And Entrepreneurship On Local Development In The Region Of Vale Do Sousa.” Romanian Journal of Regional Science 5 (1): 54–69.

Etzkowitz, H., and L. Leydesdorff. 1995. “The Triple Helix: University-Industry-Government Relations: A Laboratory for Knowledge-Based Economic Development.” EASST Review 14: 14–19.

Eversole, Robyn. 2003. “Help, Risk and Deceit: Microentrepreneurs Talk about Microfinance.” Journal of International Development. https://doi.org/10.1002/jid.972.

Giddings, B., B. Hopwood, and G. O’Brien. 2002. “Environment, Economy and Society: Fitting Them Together into Sustainable Development.” Sustainable Development. https://doi.org/10.1002/sd.199.

Gouvea, Raul, Sul Kassicieh, and M. J R Montoya. 2013. “Using the Quadruple Helix to Design Strategies for the Green Economy.” Technological Forecasting and Social Change 80 (2): 221–30.

Halaszovich, Tilo F., and Sarianna M. Lundan. 2016. “The Moderating Role of Local Embeddedness on the Performance of Foreign and Domestic Firms in Emerging Markets.” International Business Review 25 (5): 1136–48. https://doi.org/10.1016/J.IBUSREV.2016.02.003.

Iacono, Sergio Lo. 2018. “Does Community Social Embeddedness Promote Generalized Trust? An Experimental Test of the Spillover Effect.” Social Science Research 73 (July): 126–45. https://doi.org/10.1016/J.SSRESEARCH.2018.03.001.

Jack, Sarah L., and Alistair R. Anderson. 2002. “The Effects of Embeddedness on the Entrepreneurial Process.” Journal of Business Venturing 17 (5): 467–87. https://doi.org/10.1016/S0883-9026(01)00076-3.

Kisman, Zulfukar Aytac, and Izzet Tasar. 2014. “The Key Elements of Local Development.” Procedia Economics and Finance 15 (14): 1689–96. https://doi.org/10.1016/S2212-5671(14)00642-X.

Leydesdorff, Loet. 2000. “The Triple Helix: An Evolutionary Model of Innovations.” Research Policy 29 (2): 243–55.

Miller, Danny. 1983. “The Correlates of Entrepreneurship in Three Types of Firms.” Management Science 29 (7): 770–91.

Muresan, Mihaela, and Emilia Gogu. 2012. “SMEs’ Public Involvement in the Regional Sustainable Development.” Procedia - Social and Behavioral Sciences 62: 253–57. https://doi.org/10.1016/j.sbspro.2012.09.040.

Newbery, Robert, Jonathan Lean, Jonathan Moizer, and Mohamed Haddoud. 2018. “Entrepreneurial Identity Formation during the Initial Entrepreneurial Experience: The Influence of Simulation Feedback and Existing Identity.” Journal of Business Research 85 (April): 51–59. https://doi.org/10.1016/J.JBUSRES.2017.12.013.

Pinchot, Gifford. 1985. Intrapreneuring: Why You Don’t Have to Leave the Corporation to Become an Entrepreneur. Historical Research Reference in Entrepreneurship. http://ssrn.com/paper=1496196.

Rodzinka, Jacek, and Tomasz Skica. 2017. “The Size of Local Government Administration at a Municipal Level as a Determinant of Entrepreneurship.” Journal of Entrepreneurship, Management and Innovation (JEMI) 13 (2): 5–32.

Rutten, Roel, and Frans Boekema. 2007. “Regional Social Capital: Embeddedness, Innovation Networks and Regional Economic Development.” Technological Forecasting and Social Change 74 (9): 1834–46. https://doi.org/10.1016/J.TECHFORE.2007.05.012.

Saunders, Mark, Philip Lewis, and Adrian Thornhill. 2009. Research Methods for Business Students. Research Methods for Business Students. 5th ed. Essex: Prentice Hall - Financial Times.

Schumpeter, Joseph. 1934. The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Harvard Economic Studies. Vol. 46. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496199.

Sinakou, Eleni, Jelle Boeve-de Pauw, Maarten Goossens, and Peter Van Petegem. 2018. “Academics in the Field of Education for Sustainable Development: Their Conceptions of Sustainable

Development." Journal of Cleaner Production 184 (May): 321–32. https://doi.org/10.1016/J.JCLEPRO.2018.02.279.
Sîrbu, Roxana-Mihaela. 2014. "European Union Strategy and Foreign Direct Investments Impact on Romania's Regional Development." Procedia - Social and Behavioral Sciences 124: 442–50. https://doi.org/10.1016/j.sbspro.2014.02.506.
Sluss, David M., and Blake E. Ashforth. 2007. "Relational Identity and Identification: Defining Ourselves through Work Relationships." Academy of Management Review. https://doi.org/10.5465/AMR.2007.23463672.
Spangenberg, Joachim H. 2004. "Reconciling Sustainability and Growth: Criteria, Indicators, Policies." Sustainable Development. https://doi.org/10.1002/sd.229.
Venkataraman, S., and Saras D. Sarasvathy. 2008. "Strategy and Entrepreneurship: Outlines of an Untold Story." In The Blackwell Handbook of Strategic Management. https://doi.org/10.1111/b.9780631218616.2006.00025.x.
Venkataraman, Sankaran. 2004. "Regional Transformation through Technological Entrepreneurship." Journal of Business Venturing 19 (1): 153–67.
Villena, Verónica H., Elena Revilla, and Thomas Y. Choi. 2011. "The Dark Side of Buyer-Supplier Relationships: A Social Capital Perspective." Journal of Operations Management. https://doi.org/10.1016/j.jom.2010.09.001.
Wiklund, Johan, and Dean Shepherd. 2005. "Entrepreneurial Orientation and Small Business Performance: A Configurational Approach." Journal of Business Venturing. https://doi.org/10.1016/j.jbusvent.2004.01.001.
Wu, Zhaohui, and Madeleine E. Pullman. 2015. "Cultural Embeddedness in Supply Networks." Journal of Operations Management 37 (July): 45–58. https://doi.org/10.1016/J.JOM.2015.06.004.

EXPLORING THE COMPONENTS OF THE INTELLECTUAL CAPITAL IN TROSO WEAVING SMEs

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Abstract

This study aims to test and analyze the effects of intellectual capital to competitive advantage and company's performance at Troso traditional weaving business. The variables in this research are human capital as exogenous variable and structural capital, customer capital, competitive advantage, and company performance as the endogenous ones. The subject of the study was 200 sample consisting 572 craftmen. This research applies structural equation modelling. The result of SEM analysis fulfills Goodness of Fit Index criteria, i.e. chi-square value = 432.543, significance probability = 0.000, RMSEA = 0.070, CMIN/DF = 1.966, TLI = 0.885, CFI = 0.900, GFI = 0.849 and AGFI = 0.810. Based on the research result, it can be concluded that human capital, structural capital, and customer capital influence on competitive advantage and company performance.

Keywords: Intellectual Capital, Competitive Advantage, Company Performance
JEL classification: A, M12, J24

1. Introduction

The Indonesian micro and medium enterprises has an important and dominant roles in the country's economic growth. During the 1997 Indonesian economic crisis and global's in 2008, these enterprises were proven survived and they could even become the country's economic preserver. Considering the amount of these existing micro and medium enterprises as well as their dominant roles in the economic, thus the indicator of the Asean Economic Communities (AEC) success depends on their preparations.

To Indonesia, the establishment of AEC 2015 creates both internal and external challenges amongst the ASEAN nations themselves; in addition to the competition with other countries such as China or India. (Huang & Liu, 2005), describes that in order to prepare for the tough global market competition, intellectual capital has to be improved as a substantial strength to push the economic growth. With greater number of micro medium enterprises compared to another country, Indonesia has bigger chance to be able to compete in global market.

The world is fast moving from a production-based economy to a knowledge-based one (Drucker, 1993; Powell and Snelman, 2004 in Huang & Wu, 2010). This insists SME's to change business strategies from labor-based business to knowledge-based business, thus the main character of the company becomes knowledge based. In this knowledge-based economy, the competitive advantaged obtained by company is no longer determined by ownership or the functions of conventional production factors such as engines or labors, but more to the functions of production factors based on knowledge, innovation, and technology.

According to Ernst & Young (2006), such advanced country as The United States has 60 percent knowledge-based workers. By increasing the knowledge of the workers, a corporation is able to conduct more effective and efficient activities (Hernandez & Noruzi, 2010).

To improve the product competitiveness, micro medium enterprises should pay more attention on intellectual capital as one of their business strategies. The biggest capital owned by micro and medium business is intellectual capital. This capital is a source of creativity, innovation and business model. For example, textile micro medium business of *Tenun Ikat Troso* (weaving) implements this kind of capital to improve their competitiveness.

This *Tenun Ikat Troso* (Troso weaved clothing) product is one of Indonesian famous clothing product besides *batik*. It is originated from Troso village in Jepara, Central Java province. It has been the second famous product of the village after furniture. The residents of the village has possessed the skills to weave cloths since 1935 and the cloth was previously known as *Tenun Gendong* as their heritage. In 1943, *Tenun Pancal* (paddled weaving) started to operate and since 1946 up to now, people has been operating *Alat Tenun Bukan Mesin* (a non-engine weaving tools).

This research is unique because of the concept of intellectual capital is not known to most managers in the industry in Indonesia, especially weaving and textile industry in general.

The research of this case study is based on the findings of the previous research. Sharabati *et.al* (2010), Chen *et.al* (2004), Daud & Amri (2008), Majeed, S. (2011), Rezaian & Naeji (2012), Mananeke (2012), Obeidat *et.al* (2017) and Hamid *et.al* (2017) state that intellectual capital affects the corporate's performance; on the contrary, Kuryanto & Syarifuddin (2009) states that there is not any positive relation between the corporate performance and intellectual capital.

2. Literature Review

2.1. Organization Performance

The performance of an organisation has always created problems for profit or non-profit corporation. According to Horne and Wachowicz (2008), performance is a result in certain period. In order to perform well, everyone should conduct the best effort positively. It also applies for a company, when a company conducts the business activities well, it will result in good performance.

Organization has an important role in our daily lives and therefore, successful organization represents a key ingredient for developing nations. Thus, many economists consider organizations and institutions similar to an engine in determining the economic, social and political progress (Gavrea , Ilies, & Stegerean, 2011). Besides, performance is a result of the organization's objectives. The concept of business performance covers multi dimension. Pelham (1997) in Mananeke (2012) suggests that the indicators of performance cover: firstly, company's efficiency (relativity of product quality, new product success, and customer retention level). Secondly, the growth / market share (sales level, sales increase level and relativity of market). Thirdly, the connection of ROE, profit margin, and ROI.

Another opinion stated by Gharakhani, D and Mousakhani, M (2012) suggests that performance refers to the ability of the organisation to create certain level of results and activities. In the study of Majeed (2011), it is inspected that the relationship between the company's competencies and thier performance is examined. When reviewing the importance of current or potential competencies, the managers should have a clear interest in finalising that where these qualities will lead to choose different benefits. Almost in all organisations there is a good association between company's competitive advantage and its performance. These advantages lead the company towards attaining high profits.

2.2. Knowledge Management and Intellectual capital

In the knowledge-based economy, the nature of resources has been changed. In agriculture-based economy and industrial-based economy the organizations mainly based on tangible assets but now in a knowledge-based economy, intangible assets are considered as the vital resources for the success of organizations (Khalique, 2012). Knowledge in an organisation is a demand due to its ability to make it reliable, steady and competitive. Knowledge is a fusion of information, experience, values, organisations and expertises' opinions. These make knowledge become contextual, relevant, and executable information (Turban, McLean & Wetherbe, 2002) in Setiarso, et.al (2009). The ability of companies to manage intellectual capital (IC) assets is inseparably related to its knowledge management (KM) capability (Andreeva and Kianto, 2011; Rajesh et al., 2011; Ramadan et al., 2017). Intellectual capital is another term of knowledge including its financial knowledge. The term of Intellectual Capital, which was firstly stated by John Kenneth Galbraith in 1969, became popular with theoretical and industrial practical publications.

Understanding the intellectual capital embedded in an organisation requires organisational members to assess their core competencies; they can achieve or have achieved “best-in-the-world” status. The intellectual capital of an organization represents the wealth of ideas and the ability to innovate which later will determine the future of the organization (Sharabati et al., 2010).

Intellectual capital can be defined as intellectual material that has been “formalized, captured and leveraged” to create assets of higher value (Stewart, 1997), (Prusak, 1998). Intellectual Capital can be classified as human capital, organisational capital and customer capital (Edvinsson and Sullivan, 1996; Dumay, J., 2016; Roos and Roos, 1997; Stewart, 1995). Following the study of Edvinsson and Malone (1997), Sveiby (1997), Roos et.al (1997), Bontis (1999), O’Donnell et al. (2006), Curado and Bontis (2007), and Sharabati et.al (2010) among others, intellectual capital is defined as encompassing: human capital; structural capital; and relational capital.

Wu and Tsai (2005) extend the concept of intellectual capital in their research and identify two more components namely, social capital and technological capital. Ramezan (2011) argued that intellectual capital model is based on human capital, organisational capital, social capital, technological capital and business process capital or customer capital. Khalique et.al (2013), argued that intellectual capital covers six main components known as the (1) Human Capital, (2) Customer Capital, (3) Structural Capital, (4) Social capital, (5) Technological Capital and (6) Spiritual Capital. However, this study is at preliminary stage, therefore, the researchers used only three components namely human capital, customer capital and structural capital.

Human capital covers human resources, knowledge and competency, employee education, the job and age. Human capital refers to employees who work for the success of the organisation. It is considered as the main component of intellectual capital. It is also the crucial source of employees’ knowledge, skills, competencies, capability, and innovation. (Khan, 2014; Isaac et.al, 2010; Shaari et.al, 2011; Choo & Bontis, 2002; Bontis et.al, 2000; Bontis, 1998; and Edvinson & Malone, 1997). Human capital basically means the knowledge acquired by a person who increases the value of his contribution to the firm and his own productivity (professional qualifications) (Fernandez et.al, 2000).

Customer capital is the another main component of intellectual capital and it is mainly based on the relationships between the enterprise and its customers (Khan, 2014; Shaari et al., 2011; Tai-Ning et al., 2011; and Edvinson & Malone, 1997). It is very important to organisation to have good relations with its customer, in which it could enjoy the competitive advantage (Roos et.al, 2001). Customer capital of an organisation is based on the knowledge embedded in its customers, suppliers, the government or related industry associations and its customer’s relations (Khan, 2014; Mangena et.al, 2010; Bontis et.al, 2000; Bontis, 1999; Bontis, 1998). There is no ambiguity for any organisation that its main source of revenue generation is its customers; therefore it is obligatory for an organisation to create good relations with its customers and to win them by fulfilling the need (Tai-Ning et.al, 2011).

Customer capital refers to the customer satisfaction, customer loyalty to the organisation. It uses market information in order to attract customers and to maintain them. The main issue of customer capital is the available knowledge in marketing channels and relation to its customers. It also indicates the potential ability of organisation due to its external intangible factors (Skyrme, 2003 in Khajeh et.al, 2014).

Structural capital relates to the company’s competencies in performing its routines, as well as its structures and processes which enable the employees to contribute their best to be more productive (Mangena et.al, 2010). According to Stewart (1997), structural capital covers the knowledge of information technology, the product copy right, the designs and the trademarks. While Chen et.al (2004) states that structural capital refers the systems, the structures, and the on-going procedures of a business in an organisation.

2.3. Competitive Advantage

A company can be stated to have competitive advantages when it can create higher economic values compared to other companies in the industry. Moreover, the most important thing to do is to keep the sustainability of the competitive advantages (Barney & Clark, 2007).

Competitive advantages is a result of abnormal profit (Peteraf, 1993) or the above average returns by using special features of the company (Lin & Huang, 2011). It can be classified into two advantages; first, the logistic-based advantages (Kamboj et al, 2015) and resource-based advantages (Barney, 1991). This study applies the second approach, the resource-based competitive advantages.

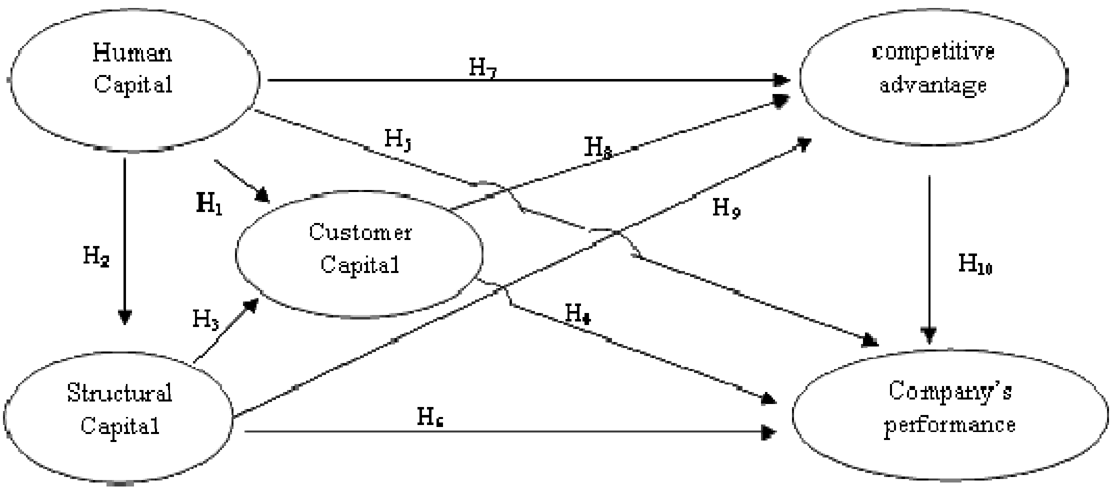
An organisation generally uses intellectual capital as a guide to create sustainable performance and competitive advantages (Cohen & Kaimenakis, 2007; Halid et al, 2018). Intellectual capital becomes an organisation's main source in terms of economic-based knowledge, to gain its competitive advantages and as its main pillar of economic-based knowledge. Intellectual capital management directs a company in making precise decision in its business activities, its investment, and its organisation management to achieve competitive advantages (Shaari et.al, 2011). It has been considered by an organisation as the main resource of competitive advantage which affects creativity and innovation level (Taliyang et.al, 2011).

3. Research model and methodology

Intellectual capital is not created one at a time from human capital, structural capital, or customers, but from the interactions among the capital (Stewart, 1998). Batgerson (2003, in Nawawi, 2012) states that knowledge management is a sistematic approach conducted to manage intellectual asset and other information so it gives competitive advantage to the company. The Depatment of the Navy (DON) of the United States, in their approach, states that the knowledge management improves an organisation's performance through effetiveness, productivity, quality and innovation improvement. (Ross & Sclzulte, 2005 in Nawawi, 2012). Cabrita & Vaz (2006) also describe intellectual capital as an intangible asset that can be used as a sustainable source of competitive advantage; though its components must make interactions to create values.

This study uses several variables. Human capital as an exogenous variable while structural capital, customer capital, competitive advantage and organisational performance are the endogenous ones.

Figure 1. Research design and Hypothesis



Sources : Sharabati et. al. (2010); Majeed (2011); Lakhal (2009); developed.

H1 : Human Capital positive influence to Customer Capital
H2 : Human Capital positive influence to Structural Capital
H3 : Structural Capital positive influence to Customer Capital
H4 : Customer Capital positive influence to company's performance
H5 : Human Capital positive influence to company's performance
H6 : Structural Capital positive influence to company's performance
H7 : Human Capital positive influence to competitive advantage
H8 : Customer Capital positive influence to competitive advantage
H9 : Structural Capital positive influence to competitive advantage
H10 : Competitive advantage positive influence to company's perfomance

Table 1: Variables and research indicator

Variables	Indicators	Symbols
Human Capital	Employees' capabilities & experience	X_1
	Employees' satisfaction	X_2
	Employees' creativity & innovation	X_3
	Employees' education & training	X_4
	Employees' value & culture	X_5
	Loyality & commitment	X_6
Structural capital	Organisation's culture	X_7
	Organisation's process efficiency	X_8
	Information system	X_9
	Organisation's structure	X_{10}
	Organisation's research & development	X_{11}
	Knowledge retains	X_{12}
Customer Capital	Basic marketing capability	X_{13}
	Customer loyalty, suppliers & partners	X_{14}
	Customer's satisfaction, suppliers & partners	X_{15}
	Market intensity	X_{16}
	Knowledge on customers, suppliers, & partners	X_{17}
	Strategic companionship, legality & arrangement	X_{18}
competitive advantage	Innovative product	X_{19}
	Better quality of product & service	X_{20}
	Reliable shipping	X_{21}
	Lower company costs	X_{22}
	Inventories	X_{23}
	Competitiors new product launch	X_{24}
Company's performance	Company's efficiency	X_{25}
	ROI	X_{26}
	Growth or ROI	X_{27}
	Growth of sales	X_{28}
	Market share growth	X_{29}
	Profit margin on sales	X_{30}
	Whole competition position	X_{31}
	Market share	X_{32}

Source : Li et.al (2004), Chen *et.al* (2004), Cohen & Kaimenakis (2007), Sharabati *et.al* (2010), Shih *et.al* (2010), Mananeke (2012), and Rezaian &Naeiji (2012), development

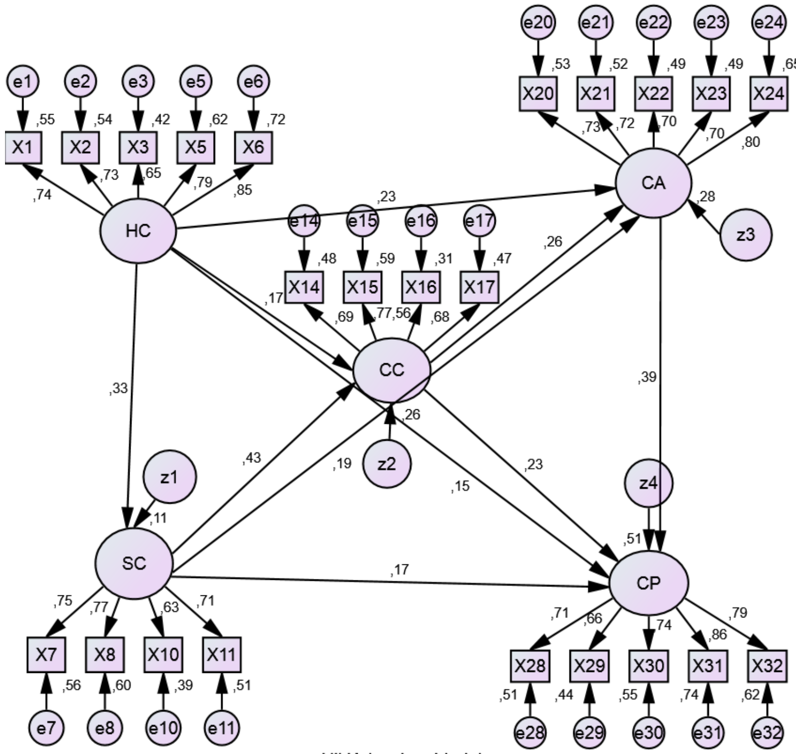
The study uses Confirmatory Factor Analysis and Full Model of Structural Equation Modelling (SEM) as data analysis, covering seven steps of criteria evaluation goodness of fit. (Ferdinand, 2016). They are: (1) Theoretical Model Development, (2) Path Diagram Development, (3) Path Diagram Conversion to Model of Structural Equation Modelling, (4) Designation of Input Matrics & Proposed Model Estimation, (5) Identification Problem Chances, (6) Goodness of Fit Criteria Evaluation, and (7) Interpretation of Test Result & Model Modification.

Goodness of Fit Criteria Evaluation covers Proper & Statistic Test: Likelihood ratio chi-square statistic (χ^2), Root Mean Square Error Approximation (RMSEA), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), The Minimum Sampel Discrepancy Function or Degree of Freedom (CMIN/DF), Tucker Lewis Index (TLI) dan Comparative Fit Index (CFI), Reliability Test, Validity Test & SEM Assumptions.

Moreover, we have to oversee other fit criteria: RMSEA, GFI, AGFI, CMIN/DF, TLI and CFI, which show proper fit values recommended. The test result of endogenous construct confimatory shows that indicators X_7, X_8, X_{10}, X_{11}, X_{14}, X_{15}, X_{16}, X_{17}, X_{20}, X_{21}, X_{22}, X_{23}, X_{24}, X_{28}, X_{29}, X_{30}, X_{31} and X_{32} are valid.

The result of Full Model SEM process shown in figure 2.

Figure 2. Confirmatory Factor Analysis Structural Equation Model (SEM).



source: development result, 2018

The test of models show that it fits to the data used in the study, eventhough probability is 0.000 and significance of chi-square is 432,543. On the other hand, the values of RMSEA, GFI, AGFI, CMIN/DF, TLI and CFI range on the expected values. Based on the goodness of fit criteria, it can be concluded that SEM specified in this study fits the data.

From the data process, we can see that each indicator or dimension of model from each underlying variable shows a good result (CR > 1.96). All values of loading factor for each indicator is smaller than 0.05. With this result, it can be stated that these underlying construct indicators have shown strong indicators in the underlying variable measurements. Moreover, based on the analysis on confirmatory factor, this reasearch model can be used for future studies without any modification.

3.1. Assumption test

Data normality can be shown with the existence of Critical Ratio (CR) with treshold value of ± 2.58 on significance level 0.01 (Ferdinand, 2016). The data process showing multivariate CR 2.240 means that the research data was normal distributed.

Outliers multivariate evaluation can be conducted by using the mahalanobis distance measure to each variables equally in a multidimension room. The mahalanobis distance measure is based on the value of chi-square in the distribution table $\chi 2$ on free level as many as variables used in the research. This research uses $p<0.001$ which is $\chi 2$ (23; 0.001) = 49.73. That makes the data with mahalanobis distance bigger than 49.73 is considered as multivariate outliers. This evaluation uses no data considered as outliers.

In the evaluation of multicollinearity or singularity in variables combination, we need to observe covariant matrix determinant. A tiny determinant indicates the existence of multicollinearity or singularity (Tabachnick & Fidell, 1998 in Ferdinand, 2006) so the data is not valid for the research. From data process, the result of covariant matrix determinant values away from zero, 0,108. It can be concluded that multicollinearity or singularity does not exist making the data valid for research.

The Convergent Validity test can determine whether each indicator validly estimated measures dimension of the tested concept or not; by knowing that each indicator has a critical ratio twice bigger than its error standard. The result of the study shows that all indicators make estimation value with critical error bigger than twice its error standard. Thus, it can be concluded that the variable indicators are valid.

The result of reliability test shows that all reliability values are above 0.70. This means that SEM model measurement fulfills the requirements of measurement reliability. It is similar to extracted variance value which is above 0.50. This means that SEM model measurement is qualified as a good extracting factor.

3.2. Hypothesis Test

The hypothesis test was conducted buy examining CR value and P value on the result of Regression Weights Full Model as shown on the table compared to required statistic limit, which is above 2.00 (CR) and below 0.05 (P). The research hypothesis is accepted when Regression Weights Full Model result show the required value (Byrne, 2016).

Table 2. Hypothesis Test Result Summary

Hypothesis	CR & P value	Test Result
H_1: Human Capital influence to Customer Capital	CR = 1,886 P = 0,059	Not Accepted
H_2: Human Capital influence to Structural Capital	CR = 3,792 P = 0,000	Accepted
H_3: Structural Capital influence to Customer Capital	CR = 4,435 P = 0,000	Accepted
H_4: Customer Capital influence to company's performance	CR = 2,507 P = 0,012	Accepted
H_5: Human Capital influence to company's performance	CR = 2,061 P = 0,039	Accepted
H_6: Structural Capital influence to company's performance	CR = 2,057 P = 0,040	Accepted
H_7: Human Capital influence to competitive advantage	CR = 2,787 P = 0,005	Accepted
H_8: Customer Capital influence to competitive advantage	CR = 2,644 P = 0,008	Accepted
H_9: Structural Capital influence to competitive advantage	CR = 2,021 P = 0,043	Accepted
H_{10}: Competitive advantage influence to company's perfomance	CR = 2,507 P = 0,012	Accepted

source : Proccessed Primary Data, 2018

4. Conclusion

From the results of hypothesis test it can be concluded that human capital does not significantly influence the customer capital. This illustrates that customers are not affected by industry resources. Customers have believed that craftsmen have had the ability and high experience and commitment to troso woven products. The quality of weaving from Troso has been well known.

Human capital have a positive and significant effect on structural capital. This shows that ability and loyalty and commitment of human resources will determine structural capital. Besides that human capital also has a positive and significant effect on company performance and also influences competitive advantage. The management must be able to channel the capabilities, ideas and innovations of employees into the company's work system. In addition, the higher employee loyalty to the company, the more attention to efficiency, culture, structure, and company development. In addition, the better the ability, experience and commitment of weaving craftsmen will increase the market share of the results of Troso woven products. In addition, it will also increase competitive advantage. This study also supports the results of research including Daou et al. (2013), Ning et al. (2011), Shih et al. (2010), Sharabati et al. (2010), Uadiale & Uwuigbe (2009), Cohen & Kaimenakis. (2007), Cabrita & Vaz (2006), Chen et al. (2004), and Bontis (1998).

Furthermore, Structural capital have a positive and significant effect on customer capital. In addition, it also has a positive and significant effect on company performance and also on competitive advantage. This shows that the work process in producing efficient and fast weaving products and various types of products will maintain customer loyalty. In addition, it will also increase company profits and market share. With production efficiency will reduce production costs, so as to increase competitive advantage in a sustainable manner. This study supports the results of research from Daou et al. (2013), Soret et al. (2010), Sharabati et. Al (2010), Uadiale & Uwuigbe (2009), Yusuf & Sawitri (2007), Cabrita & Vaz (2006), Astuti & Sabeni (2005), Chen et. Al (2004), and Bontis (1998).

Then, Customer capital have a positive and significant effect on company performance and also have a positive and significant effect on competitive advantage. This illustrates that customer satisfaction and loyalty is very important to increase sales growth and market share of troso woven products. For this reason, it should be noted that troso weaving products not only provide a standard model, but need to keep abreast of consumer tastes, so that customer loyalty is maintained. This will increase the company's profits and increase the competitive advantage of weaving products both at national and international levels. The results of this study are also supported by the results of the study of Daou et al. (2013), Sharabati et. Al (2010), Soret et. Al (2010), Uadiale & Uwuigbe (2009), Cabrita & vaz (2006), Chen et.al (2004), and Bontis (1998).

The results of this study also showed that the competitive advantage of troso weaving had a positive and significant effect on the performance of the troso woven SMEs. This shows that the higher the attention to product quality, product diversity, product availability and distribution speed will increase profit margins, market share and sustainable company performance. This is in accordance with the results of a study from Prasetya et al. (2007), Li et al. (2004), Chen et al. (2006), and Purnama & Setiawan (2001).

Local government is expected to keep giving trainings to the weavers equally, and to everybody without exceptions. Central government is also expected to help lifting up the trend of traditional weaving of Troso as well as other weaving products around Indonesia.

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References

Andreeva, T. and Kianto, A. (2011), Knowledge processes, knowledge-intensity and innovation: a moderated mediation analysis, Journal of Knowledge Management, Vol. 15 No. 6, pp. 1016-1034

Astuti, Partiwi Dwi and Sabeni, Arifin. (2005). Hubungan Intellectual Capital dan Business Performance dengan Diamond Specification: Sebuah Perspektif Akuntansi. SNA VIII Solo.

Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17, 33-46.

Barney, J.B. & Clark, D.N. (2007). Resource-Based Theory: Creating and Sustaining Competitive Advantage. New York: Oxford University Press.

Bontis, N. (1998). Intellectual capital; an exploratory study that develops measures and models. Management Decision, 36(2), 63-76.

_________(1999). Managing organizational knowledge by diagnosing intellectual capital: framing and advancing the state of the field. International Journal of Technology Management, 18(5/6/7/8), 433-463

Bontis, N., Keow, W. C. C., & Richardson, S. (2000). Intellectual capital and business performance in Malaysian industries. Journal of Intellectual Capital, 1(1), 85-100.

Bontis, Nick, Crossan, M. and J. Hulland. (2001). Managing an Organizational Learning System by Aligning Stocks and Flows, Journal of Management Studies, forth coming

Byrne, B. M. (2016). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming (3rd Edition). New York: Routledge.

Cabrita, Maria do Rosario and Vaz, Jorge Landeiro. (2006). Intellectual Capital and Value Creation: Evidence from the Portuguese Banking Industry. The Electronic Journal of Knowledge Management. Vol. 4, Issue 1, pp 11-20.

Chen, J., Zhu, Z., & Xie, H. Y. (2004). Measuring intellectual capital: a new model and empirical study. Journal of Intellectual Capital, 5(1), pp. 195 - 212 .

Choo, C. W., & Bontis, N. (2002). The strategic management of intellectual capital and organizational knowledge. Oxford University Press, New York. USA.

Cohen, S., & Kaimenakis, N. (2007). Intellectual capital and corporate performance in knowledge-intensive SMEs. The Learning Organization, 14(3), pp. 241-262.

Curado, C. and Bontis, N. (2007), “Managing intellectual capital: the MIC matrix”, International

Curado, C. and Bontis, N. (2007), “Managing intellectual capital: the MIC matrix”, International Journal of Knowledge and Learning, Vol. 3 No. 2/3, pp. 316-28.

Daou, A., Karuranga, E., & Su, Z. (2013). Intellectual Capital In Mexican SMEs From The Perspective Of The Resource-Based And Dynamic Capabilities Views. Journal of Applied Business Research (JABR), 29(6), pp. 1673-1688.

Daud, R. M., & Amri, A. (2008). Pengaruh Intellectual Capital Dan Corporate Social Responsibility Terhadap Kinerja Perusahaan (Studi Empiris Pada Perusahaan Manufaktur Di Bursa Efek Indonesia). Jurnal Telaah & Riset Akuntansi, Vol. 1, No. 2, pp. 213 - 231.

Dumay, J. (2016), "A critical reflection on the future of intellectual capital: from reporting to disclosure", Journal of Intellectual Capital, Vol. 17 No. 1, pp. 168-184.

Edvinsson, L. and Malone, M. (1997), Intellectual Capital: Realizing Your Company’s True Value by Finding its Hidden Brainpower, Harper Collins, New York, NY.

Edvinsson, L. and Sullivan, P. (1996) Developing a Model for Managing Intellectual Capital. European Management Journal, 14, pp. 356-364.

Ferdinand, Augusty, (2016), Structural Equation Modeling dalam Penelitian Manajemen, Edisi 5, Semarang, Badan Penerbit Universitas Diponegoro.

Fernandez, E., Montes, J. M., & Vasquez, C. J. (2000). Typology and strategic analysis of intangible resources. A resource-based approach. Technovation, 20(2), pp. 81-92.

Gavrea C., Ilies L., Stegerean R., (2011), Determinants Of Organizational Performance: The Case of Romania, Management & Marketing Challenges for the Knowledge Society, Vol. 6, No. 2, pp. 285-300

Gharakhani, D., & Mousakhani, M. (2012). Knowledge Management Capabilities and SMEs’ Organizational Performance. Journal of Chinese Entrepreneurship, 4, pp. 35-49.

Halid, S., Choo, H. C., & Salleh, K. (2018). Intellectual Capital Management: Pathways to Sustainable Competitive Advantage. International Journal of Academic Research in Business and Social Sciences, 8(4), pp. 1104 – 1119.

Hamid, M., Maheen, S., Cheem, A., and Yaseen, R. (2017). Impact of Human Resource Management on Organizational Performance, Journal of Accounting & Marketing. J Account Mark 6: 213.

Hernandez, J. V., & Noruzi, M. R. (2010). How Intellectual Capital and Learning Organization can Foster Organizational Competitiveness ? International Journal of Business and Management, Vol. 5 No. 4, 183-193.

Horne, J. V., & Wachowicz, J. (2008). Fundamentals of Financial Management, 13th Edition. England: Prentice Hall, Inc.

Huang, C. J., & Liu, J. C. (2005). Exploration for relationship between innovation, IT and performance. Journal of Intellectual Capital, 6(2), 237 - 252.

Huang, Yi-Chun and Wu, Yen-Chun Jim. (2010). Intellectual Capital and Knowledge Productivity: the Taiwan Biotech Industry. Management Decision, 48(4): 580 - 599

intellectual capital”, Journal of Intellectual Capital, Vol. 7 No. 1, pp. 5-11

intellectual capital”, Journal of Intellectual Capital, Vol. 7 No. 1, pp. 5-11

intellectual capital”, Journal of Intellectual Capital, Vol. 7 No. 1, pp. 5-11

intellectual capital”, Journal of Intellectual Capital, Vol. 7 No. 1, pp. 5-11

Isaac, R. G., Herremans, I. M., & Kline, T. J. (2010). Intellectual capital management enablers: a structural equation modeling analysis. Journal of Business Ethics, 93, 373.391. http://dx.doi.org/10.1007/s10551-009-0227-5

Journal of Knowledge and Learning, Vol. 3 Nos 2/3, pp. 316-28.

Kamboja, S., Goyal, P., and Rahman, Z. (2015). A resource-based view on marketing capability, operations capability and financial performance: An empirical examination of mediating role, Procedia, Social and Behavioral Sciences 189, 406 – 415

Khajeh, M., Mahallati, T., Shaibani, A., & Khodarahmi, S. (2014). The Role of Intellectual Capital in Facilitating Knowledge Management Practices, Journal of Management and Sustainability; Vol. 4, No. 3, 184 -191.

Khalique, M. (2012). Impact of Intellectual Capital on the Organizational Performance of Selected Small and Medium Enterprises in Malaysia and Pakistan, PhD Thesis, Universiti Malaysia Sarawak

Khalique, M., Isa, A. H. b. M., and Shaari, J. A. N. b. (2013). Predicting the Impact of Intellectual Capital Management on the Performance of SMEs in Electronics Industry in Kuching, Sarawak. The IUP Journal of Knowledge Management, 11(4), 53-61.

Khalique, M., Shaari, J. A. N. b., Isa, A. H. b. M., and Samad, N. b. (2013). Impact of Intellectual Capital on the Organizational Performance of Islamic Banking Sector in Malaysia, Asian Journal of Finance & Accounting, Vol. 5(2), 75 – 83.

Khan, M. W. J., 2014, Identifying the Components and Importance of Intellectual Capital in Knowledge-Intensive Organizations, Business and Economic Research, Vol. 4, No. 2, pp. 297-307

Kuryanto, B., & Syafruddin , M. (2009). Pengaruh Modal Intelektual Terhadap Kinerja Perusahaan. Jurnal Akuntansi & Auditing , Vol. 5 No. 2, pp. 128 - 147.

Lakhal, L. (2009). Impact of quality on competitive advantage and organizational performance, Journal of the Operational Research Society Vol. 60, No. 5, pp. 637-645

Li, Suhong., Ragu-Nathan, Bhanu., Ragu-Nathan, T.S., Rao, Subba., 2004. The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance. Omega The International Journal of Management Science, 34, pp 107-124.

Lin, Chiun-Sin and Huang, Chih-Pin. (2011). Measuring competitive advantage with an asset-light valuation model, African Journal of Business Management Vol. 5(13), pp. 5100-5108

Majeed, S. (2011). The Impact of Competitive Advantage on Organizational Performance, European Journal of Business and Management, 3(4), pp 191-196

Management Journal, vol. 14, no.3, pp.179-192.

Mananeke, L. (2012). The Determining Factor of the Competitive Advantege and Business Performance in the Coastal Communities in North Minahasa Regency. Journal of Economics, Business, and Accountancy Ventura. Vol. 15, No. 3, pp 409-422.

Mangena, Musa, Richard Pike dan Jing Li. 2010. Intellectual Capital Disclosure Practices and Effects on the Cost of Equity Capital: UK Evidence. Edinburg: The Institute of Chartered Accountants of Scotland.

Nawawi, Ismail. 2012. Manajemen Pengetahuan. Teori dan Aplikasi dalam Mewujudkan Daya Saing Organisasi Bisnis dan Publik. Ghalia Ilmu: Bogor.

Ning, Yang Tai., Chang Hsiao-Chen., Lin Shou-Yen and Tsao Chiao-Lun. 2011. Knowledge creation and intellectual capital on securities investment services. African Journal of Business Management Vol. 5(3), pp 924-933.

O’Donnell, D., Henriksen, L.B. and Voelpel, S.C. (2006), “Guest editorial: becoming critical on intellectual capital”, Journal of Intellectual Capital, Vol. 7 No. 1, pp. 5-11

Obeidat B.Y., Abdallah A.B., Aqqad N.O., Akhoershiedah A.H.O, and Maqableh M., (2017), The Effect of Intellectual Capital on Organizational Performance: The Mediating Role of Knowledge Sharing, Communications and Network, Vol.09 No.01, Article ID:72590, 27 pages (open access) 10.4236/cn.2017.91001

Peteraf, MA. (1993). The cornerstones of competitive advantage: a resource-based view, Strategic Management Journal, vol. 14, no.3, pp 179-192.

Peteraf, MA1993, ‘The cornerstones of competitive advantage: a resource-based view’ , Strategic

Prasetya, H., Rahardja, E., Hidayati, R. (2007). Membangun Keunggulan Kompetitif Melalui Aliansi Stratejik untuk Meningkatkan Kinerja Perusahaan (Studi Kasus pada PT. Pos Indonesia Wilayah VI Jateng dan DIY). Jurnal Studi Manajemen dan Organisasi. Vol 4, No. 2, pp. 1-19

Prusak, L. (1998). Working Knowledge: How Organizations Manage What They Know. Cambridge, MA.: Harvard Business School Press.

Purnama, N. and Setiawan, H. (2003). Analisis Pengaruh Sumber-sumber Keunggulan Bersaing Bidang Pemasaran Terhadap Kinerja Perusahaan Manufaktur di Indonesia. Jurnal Siasat Bisnis, No. 8 Vol. 2, pp 105 – 130

Rajesh, R., Pugazhendhi, S. and Ganesh, K. (2011), “Towards taxonomy architecture of knowledge management for third party logistics service provider”, Benchmarking: An International Journal, Vol. 18 No. 1, pp. 42-68.

Ramadan, B., Dahiyat, S., Bontis, N. and Al-dalahmeh, M. (2017), "Intellectual capital, knowledge management and social capital within the ICT sector in Jordan", Journal of Intellectual Capital, Vol. 18 No. 2, pp. 437 - 462.

Ramezan, M. (2011), “Intellectual capital and organizational organic structure in knowledge society: how are these concepts related”, International Journal of Information Management, Vol. 31 No. 1, pp. 88 - 95.

Rezaian, A., dan Naeiji, M.J. (2012) Strategic Entrepreneurship and Intellectual Capital as Determinants of Organizational Performance: Empirical Evidence from Iran Steel Industry. Journal of Global Entrepreneurship Research, Winter & Spring, Vol. 2, No.1, pp. 1 – 16.

Roos, G., & Roos, J. (1997). Measuring your company’s intellectual capital performance. Long range planning, 30(3), pp. 413-426.

Roos, G., Bainbridge, A., & Jackobsen, K. (2001). Intellectual capital analysis as a strategic tool. Strategy & Leadership, 29(4), pp 21-26.

Roos, J., Roos, G., Dragonetti, N.C. and Edvinsson, L. (1997), Intellectual Capital: Navigating in the New Business Landscape, Macmillan, Basingstoke.

Setiarso, B., Harjanto, N., Triyono, & Subagyo, H. (2009). Penerapan Knowledge Management pada Organisasi. Yogyakarta: Graha Ilmu.

Shaari, J. A. N., Khalique, M., & Isa, A. H. B. M. (2011). Ranking of public and domestic private sector commercial banks in Pakistan on the basis of intellectual capital performance. Khadim Ali Shah Bukhari Institute of Technology Business Journal, Vol.4, pp. 61-68

Sharabati, A. A., Jawad, S. N., & Bontis, N. (2010). Sharabati, A. A. Intellectual capital and business performance in the pharmaceutical sector of Jordan. Management Decision, Vol. 48 Iss: 1, pp. 105 - 131.

Shih, Kuang Hsun., Chia Jung Chang., and Binshan Lin. (2010). Assessing Knowledge Creation and Intellectual Capital in Banking Industry. Journal of Intellectual Capital. Vol 11, No 1, pp 74-89.

Soret, Ignacio., de Pablos, Carmen., Montes, Jose L. (2010). Intellectua Capital Measure and Competitive Advantage, a Practical Application in The Efficient Consumer Response Initiative (ECR). Esic Market, Vol. 137, pp. 27-64.

Stewart, T. (1997). Intellectual Capital: The New Wealth Of Organizations. New York: Nicholas Brealey Publishing, Business Digest.

Stewart, T. (1998) 'Knowledge, the appreciating commodity', Fortune, October, pp.199–200

Stewart, T.A. (1995). Trying to grasp the intangible. Fortune, October 2, pp. 157-161

Sveiby, K.E. (1997), The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets, Berrett-Koehler, New York, NY.

Tai-Ning, Y., Hsiao-Chen, C., Shou-Yen, L., & Chiao-Lun, T. (2011). Knowledge creation and intellectual capital on securities investment services. African Journal of Business and Management, 5(3), pp 924-933.

Taliyang, S. M., Latif, R. A., & Mustafa, N. H. (2011). The determinants of intellectual capital disclosure among Malaysia listed companies. International Journal of Management and Marketing Research, 4(3), pp 25-33.

Uadiale, Olayinka Marte and Uwuigbe, Uwalomwa. (2011). Intellectual Capital and Business Performance: Evidence from Nigeria. Interdisciplinary Journal of research in Business. Vol. 1, Issue 10, pp. 49-56.

Wu, W.Y. and Tsai, H. (2005), "Impact of social capital and business operation mode on intellectual and knowledge management", International Journal of Technology Management, Vol. 30 Nos 1/2, pp. 147-171

Yusuf and Sawitri, Peni. 2009. Modal Intelektual dan Market Performance Perusahaan-Perusahaan yang Terdaftar di Bursa Efek Jakarta Indonesia. PESAT, vol. 3. pp. B49 – B55

FINANCIAL INCLUSION AND HUMAN CAPITAL INVESTMENT IN URBAN AND RURAL: A CASE OF ACEH PROVINCE

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Abstract

this study is to analyze the effects of financial inclusion and other variables on human capital investment in urban dan rural region of Aceh Province by using pooled regression model with sample size total of 800 households. The results show that financial inclusion and income have a positive and significant effect on human capital investment, whereas family size has negative and significant. Furthermore, male and urban have bigger effects on human capital investment than female and rural region, respectively. Meanwhile, age has a bell-shaped to human capital investment indicates that the higher age smaller human capital investment. The last, the average of years of schooling in urban and rural regions is nine-year means the education level of these regions is junior high school. It is recommended that government should encourage banking to increase their services to a rural area in order to increase human capital investment.

Keywords: Financial Inclusion, Human Capital Investment, Aceh Province, Indonesia
JEL classification: G5, I210, D1, J170

1. Introduction

Human capital is very important to increase an added value of natural resources and to increase productivity, hence the higher economic growth. Natural resources absolutely depend on human capital, as stated by Kim and Lin (2017) in their study and find that natural resources depend on human capital. In addition, Odoardi and Muratore (2019) find that human capital has a positive and significant effect on local economic performance and productivity. Even though some countries have abundant natural resources, but some of them are still poor because human resources have lower quality. Meanwhile, some countries that have a high quality of human capital produce higher income level and also an educational level. Higher quality of human capital will produce higher competitiveness of the countries. For example, Singapore has limited natural resources, but it has a higher quality of human resources, this country has a higher human development index (HDI) and also competitiveness.

Table 1 reveals that Singapore has HDI as 0.932 is at 9th ranking in the world, and it is at the first ranking of world competitiveness ranking even though Singapore has limited natural resources compared to Indonesia. Indonesia only has HDI as 0.694, and it is 116th in the world ranking, and Indonesia is at the lowest rate compared to the countries in Table 1. It is known that Indonesia has abundant natural resources, but there is a problem in human resources to increase the added value of natural resources. In addition, Indonesia is only at 32nd ranking of world competitiveness where this ranking is the second lower of the countries in Table 1. Table 1 indicates that human capital is very important to achieve higher productivity and economic growth.

Table 1. Human Development Index and World Competitiveness Ranking, Selected ASEAN Countries, 2018

No.	Country	Human Development Index[1)]		World Competitiveness Ranking[2)]
		Index	World Ranking	
1.	Singapore	0.932	9	1
2.	Malaysia	0.802	57	22
3.	Thailand	0.755	83	25
4.	Indonesia	0.694	116	32
5.	Philippines	0.699	113	64

Sources: 1) UNDP, Human Development Reports 2018, (2019) and 2) WEF, Global Competitiveness Ranking 2018 (2019)

Similar to Aceh Province that has a huge budget total of USD 30.69 billion from 2010–2018, however, economic growth was 4.49 percent (2018), the poverty rate was 15.97 (March 2019), and the unemployment rate was 5.53 percent (March 2019) [(BPS, 2019)]. There is no guarantee that a huge budget will produce higher economic growth and lower unemployment rate because the human capital has a problem and cannot provide higher productivity and economic growth. Human development index (HDI) represents the human resource problem in this province and other districts in Aceh Province. Table 2, for example, reveals that with a huge budget, the HDI in Aceh Province still low at 70.00 and 70.60 for 2016 and respectively.

Table 2. Years of Schooling, Mean Years of Schooling, and HDI 2016 and 2017

Province and District	Expected Years Schooling (Years)		Mean Years of Schooling (Years)		HDI	
	2016	2017	2016	2017	2016	2017
Aceh Besar District	14,48	14,49	9,92	9,93	71,75	72,00
Banda Aceh Municipality	17,03	17,10	12,57	12,59	83,73	83,95
Aceh Province	13,89	14,13	8,86	8,98	70,00	70,60

Source: BPS (2019)

Pelinescu (2015) concludes that human capital is very crucial to achieve higher economic growth and sustainability. Furthermore, Odoardi and Muratore (2019) find that human capital has a positive and significant effect on local economic performance and productivity. The problem not only about the low economic growth and HDI but also there is a gap among district such Banda Aceh as the capital of Aceh Province and Aceh Besar District as the hinterland of Banda Aceh. Banda Aceh has 83.95 HDI in 2017 and Aceh Besar only 72.00. Aceh Besar as a rural region has lower HDI even though this region is hinterland of Banda Aceh.

Chen and Fang (2018) find that there are gaps between urban-rural, east-west, center-west in term of human capital investment because there is imbalance development of electricity in the regions. Statistics of Table 2 confirms the finding of Chen and Fang (2018), however, empirical evidence is very important to analyze whether there is the gap between Banda Aceh as an urban region and Aceh Besar as a rural region in related to financial inclusion and its effect on human capital investment in these regions. Dutta and Sobel (2018) find that financial capital has a positive and significant role in human capital development. Contrast to Dutta and Sobel (2018), Palamida et al. (2018) find that financial capital has a negative effect on human capital investment in Greek. In the case of Banda Aceh and Aceh Besar it is very important to examine the effect of financial inclusion on human capital investment in urban and rural regions because the previous studies have different results, there is positive effect and also negative effect.

2. Theoretical Review

Zallé (2019) finds that human capital has an important role in natural resource optimization, so the government in Africa should strengthen the quality of human resources. This study shows that human capital is very important to ensure well managed the natural resource allocation and to increase the added value from natural resources to the economy.

Inline to this study, Kim and Lin (2017) use panel cointegration model in analyzing 55 developed and developing countries related to natural resources from 1970 to 2011, and they find that natural resource dependence has a statistically significant effect on education. In addition, they also document that the education-improving effect of resource dependence is more dominant in countries with higher income, better legal quality, higher democracy, lower corruption, and less ethnic diversity.

Human capital investment is a very important factor for economic growth both in developed and developing countries. The role of skills, knowledge, and value of people are an important part of human capital (Pelinescu, 2015). Pelinescu (2015) states that human capital is a very crucial factor in achieving higher economic growth and sustainable development of the countries. Odoardi and Muratore (2019) find that human capital has a positive and significant effect on local economic performance and productivity. However, local financial systems do not support convergence between the North and South part of Italy. Bandyopadhyay (2019) document that sometimes the allocation of human capital investment is misallocation and redistribution on GDP, welfare, IFP, in the economies with financial market imperfections. This misallocation and redistribution have negative effects on TFP and GDP.

Anikina et al. (2015) find that the human capital investment has a production effect, the benefits for the individual and benefits to the government. This investment has a long-run effect on the welfare of society and to achieve sustainable economic development. Blanchard and Olney (2017) use panel of 102 countries and 45 years find that growth in less skill-intensive exports depresses average educational attainment while growth in skill-intensive exports increases schooling. Furthermore, types of sectoral growth are most beneficial for long-run human capital formation. Even, McDonald (2019) concludes that human capital investment during military services is very important even in the military sector because the effects of investments on the accumulation of human capital and output of defense sector have a spillover effect on general production. However, the effect of this investment is lower than investment on formal education.

The work of Wang et al. (2016) shows that workers with greater human capital to be engaged in high-status off-farm occupations. Furthermore, the results show that formal education attainment and post-school training have different impacts on rural people's off-farm occupation choices. Educated workers have higher possibility to earn more income than the lower ones. Onkelinx et al. (2016) report that firm-level of human capital investments are critical for labor productivity and internationalization in fast internationalizes, but not for those firms that internationalize more slowly. In term of training and education, Yokoyama et al. (2019) document that workers with self-motivation to join the training have a higher wage level than the others. Furthermore, the results show that the trend in investment in oneself training and education are increasing from time to time. Receiving training and education raises the likelihood for the workers.

The higher productivity is better by combining the competency in information technology (IT) in order to support the labor ability in the production process. This statement is proven by the study of Siddoo et al. (2019) leader in higher education must keep up with the situation and accelerate plans to produce graduates with the quality and preparation required to meet industrial needs. Furthermore, the competency of the digital workforce, an issue that was identified as vital to the 2017–2021 national agenda. Industries had most expected competencies in the professional skills and IT knowledge category, followed by the IT technical category and IT management and support category.

Theoretically, there are some factors affecting human capital investment, such as income, demography, financial development, and education. This theory is supported by empirical evidence; some of them are Attanasio (2017) find that human capital investment is determined by the income of parents. Higher-income parents have a higher investment in human capital. They also find that investment in younger ages has the greatest impacts on welfare.

Chi and Qian (2016) use data for Urban Household Education Survey 2007 and 2011, find that education expenditure incurred outside the school significantly contributes to increasing household expenditure. Furthermore, compulsory education programs are effective in curbing in-school education expenditure. The last, family income has a positive and significant effect on education expenditure as human capital investment.

Lee and Lee (2016) analyze long-run human capital in 111 countries and over the period of 1820 to 1945 find that human capital investment is determined by income growth and infant mortality rates. Furthermore, they also find that transformation from rural and agricultural to urban and industrial has an effect on human capital.

Winfried and Prat (2018) analyze human capital and distribution, and they find that human capital investment should increase in parental income because of ability transmission across generations, but decrease in inherited assets because of the negative effect of wealth on labor supply.

Eckel et al. (2013) study about behavioral characteristics of low-income individual workers and find that the decision to save for family member's education is somewhat different from that of investing in one's own education. The patient is very important in education because patient participants are more likely to save for family members education.

Culture has a role on human capital as supported by the work of Hoorn (2019) use an epidemiological approach involving second-generation migrants to test for a possible cultural gradient in individuals' propensity towards human capital accumulation. The results show a strong relationship between country-of-origin culture and human capital accumulation and are robust to using years of education instead of individuals' engagement in human capital accumulation as the dependent variable. Neve and Fink (2018) conclude that each educational year of primary schooling in children resulted in a reduction in the probability of maternal death and also the probability of paternal death. This means that parental education is important to ensure the education of children.

Financial is another important factor in human capital investment as found in the study of Thakurata and D'Souza (2018) report that households with zero, ten, and fifteen years education have different access to financial markets. They also find that financial excluded, uneducated households prefer assets with a negative return over human capital investments. The human capital investments begin after the threshold of income at the same level as an educational fund. They decide to withdraw from education if the income level of the household is very low. However, Dutta and Sobel (2018) find that financial capital has a positive and significant role in human capital development. They also document that the countries that have higher financial development, the impact of tertiary enrollment is higher compared to a lower level of financial development.

Palamida et al. (2018) confirm the work of Dutta and Sobel (2018), and they find that financial capital has a negative effect on human capital investment in Greek. They also find that human capital is, directly and indirectly, related to investment intentions. There are three channels for human capital relations, and they are norms, social capital, and personal attitudes.

Another problem in human capital investment is the gap between urban and rural, where human capital investment is higher in the urban region than rural region. Chen and Fang (2018) find that there are gaps between urban-rural, east-west, center-west in term of human capital investment because there is imbalance development of electricity in the regions. Human capital investment is very important for sustainable development.

3. Research Method

This study is conducted in Banda Aceh and Aceh Besar districts. Banda Aceh is capital of Aceh Province, so Banda Aceh represents the urban region in this province, whereas Aceh Besar represents the rural region.

3.1. Data

Data are collected from Banda Aceh and Aceh Besar districts of households data level. The sample size is calculated as (Tejada & Punzola, 2012):

$$n = \frac{N}{1 + Ne^2} \tag{1}$$

y

Where n is sample size, N is population, e is error term, in this study is set 5 percent. Based on equation (1), the numbers of samples are:

Table 3. Households and Sample Sizes in Urban and Rural Regions

Items	Banda Aceh	Aceh Besar
Number of households	64,008	94,683
Sample size (e is 5 %)	395	398
Actual samples	400	400

Source: Field Research, 2019

3.2. Method

Human capital investment is a key factor in economic development as found in some studies such as Anikina et al. (2015), Pelinescu (2015), Odoardi and Muratore (2019), and Blanchard and Olney (2017). However, misallocation of human capital investment causes misallocation and redistribution on GDP, welfare, IFP, in the economies with financial market imperfections. This misallocation and redistribution have negative effects on TFP and GDP. Meanwhile, Chen and Fang (2018) document that there is a gap between one region with others. Based on these findings, the relationship between human capital investment and financial inclusion is stated in a function as follows:

$$HCI_{ij} = \beta_1 + \beta_2 FI_{ij} + \beta_3 Y_{ij} + \beta_4 Age_{ij} + \beta_5 Age_{ij}^2 + \beta_6 S_{ij} + \beta_7 D_{ij} + e_{ij} \quad (2)$$

The variables are HCI as human capital investment is measured in years of schooling, FI as financial inclusion is dummy variable, 1 for a household has access to financial services and 0 otherwise, Y is family income in US dollars, and Age is the age of head of household. Furthermore, to capture the curvature of age to human capital investment, the age is formed in quadratic form, so the Age^2 represent the form of the quadratic function, S is sex, dummy variable, 1 for male and 0 otherwise, and D is dummy variable, 1 for urban and 0 otherwise. If the coefficient of Age^2 is negative and significant, indicating the relationship between age and human capital investment is a bell-shaped curve, whereas positive and significant is *a U*-shaped curve.

Theoretical sign of the coefficients, β_1 is positive, indicating that the average years of schooling, β_2 if this coefficient is significant means that financial inclusion has an effect on human capital investment. In addition, β_3 is positive means increase in income, human capital investment increases, β_4 is positive means the higher the age and human capital investment are higher, but this coefficient should have maximum value to capture maximum age to human capital investment activities. The coefficient of β6 represents a difference between male and female in human capital investment, and β_7 represents the difference between urban and rural regions in human capital investment.

4. Findings and Discussion

This part consists of two subsections; they are statistics of respondents, findings, and discussion. For the statistics of respondents, there are two statistics i.e., Banda Aceh and Aceh Besar districts, and the next parts are as follows.

4.1. Statistics of Respondents

Statistics of respondents show that most of the respondents from Banda Aceh are male (274) and female (126), whereas the most of respondents from Aceh Besar are female (220) and male (180). Table 4 also shows that most respondents have a lower level of education, 226 and 287 for Banda Aceh and Aceh Besar, respectively. Furthermore, the anomaly is found in Banda Aceh as urban region, but the respondents in this region that have financial inclusion only 40 respondents, meanwhile Aceh Besar as the rural region has higher financial inclusion (219 respondents).

Table 4. Sex, Education, and Financial Inclusion of Respondents of Urban and Rural Regions

No	Items		Urban (Banda Aceh)	Rural (Aceh Besar)
1	Sex	Male	274 [68.50]	180 [45.00]
		Female	126 [31.50]	220 [55.00]
2	Education	Higher	174 [43.50]	113 [28.25]
		Lower	226 [56.50]	287 [71.75]
3	Financial Inclusion	Have	40 [10.00]	219 [54.75]
		Not	226 [56.50]	181 [45.25]

Source: Field Research, 2019 (counted).
Note: […] indicates percentages

The anomaly of financial inclusion becomes strange because most of the respondents of Banda Aceh on average is 34.42 years. It is very young compared to Aceh Besar 41.74 years, and Banda Aceh has higher years of schooling (13.29 years) than Aceh Besar (11.62 years). Even, the average income of Banda Aceh is USD 336.95, whereas Aceh Besar is USD 205.09 [see Table 5 for more details].

Table 5. Statistics of Respondents of Urban and Rural Regions

No.	Items	Mean of Statistics		
		Urban (Banda Aceh)	Rural (Aceh Besar)	Average
1.	Age	34.42	41.74	38.08
2.	Family Size	2.21	2.82	2.52
3.	Years of Schooling	13.29	11.62	12.46
4.	Income (USD)	336.95	205.09	271.02

Source: Field Research, 2019 (counted)

4.2. Findings and Discussion

Table 6 shows the estimated results of the effects of financial inclusion, income, sex, regional dummy, age, and age^2. All of the estimated coefficients are theoretically significant because all the signs are as stated in theory. However, two of the variables have a lower significant level i.e., income and age. In addition, the model is free from autocorrelation because the Durbin-Watson statistic is 1.70. These results are an appropriate model to be used in analyzing financial inclusion effect on human capital investment.

Table 6. Estimated Results of Financial Inclusion Effect on Human Capital Investment

Variable	Coefficient	t-statistics	Prob.
Financial Inclusion	1.499631	5.4670	0.0000
Income	0.000034	1.8309	0.0675
Sex	0.576743	2.4888	0.0130
Dummy	2.002578	7.2288	0.0000
Age^2	-0.001626	-2.6833	0.0074
Age	0.095128	1.8192	0.0693
Constant	9.46492	8.5671	0.0000
R-Squared = 0.1407		Jarque-Berra = 177.6593 [Prob. = 0.0000]	
Adjusted R-squared = 0.1342		Durbin-Watson = 1.7027	
F-Statistic = 21.6474 [Prob. = 0.0000]			

Source: Field Research, 2019

The estimated results show that financial inclusion has a positive and significant effect on human capital investment in urban and rural regions of Aceh Province. The magnitude of the coefficient is 1.499631 indicates that if the family has access to financial services, the human capital investment increase by 1.499631; by assumption, other variables are constant. This result is consistent to the work of Thakurata and D'Souza (2018) where financial inclusion has a positive effect on human capital investment, but it is different to the results of Dutta and Sobel (2018) find a negative effect of financial inclusion on human capital investment.

Furthermore, the income variable has positive and significant at ten levels, where the increase in income as USD 1, then human resource investment increase by 0.000034. The magnitude of this coefficient is very small, indicating that the income of the households is very low both in urban and rural regions. This result is in line with the works of Winfried and Prat (2018) and Eckel et al. (2013).

Sex is also positive and significant means that male has a higher educational level than female, and this result confirms the work of Attanasio et al. (2017). Meanwhile, the dummy for rural and urban regions is also significant means that there is a gap between the urban and rural area in human capital investment. Human capital investment in urban is higher than rural region. In addition, the age variable has a maximum for human capital investment because the Age^2 is negative means that the curve of this relationship is maximum. The last coefficient is constant, with magnitude 9.46492 means that the minimum level of human capital in term of education is nine years. This result is similar to a 9-year compulsory educational national program for entire Indonesia. This result is similar to the study of Chen and Fang (2018).

The effect of financial inclusion on human capital investment in details by sex is presented in Table 7. Table 7 shows that the effect of financial inclusion on human capital investment is more effective in the rural region than urban region both for male and female. These results confirm the results in Table 4, where financial inclusion is higher in the rural region than the urban one.

Table 7. Cross–Tabulation Statistics of Financial Inclusion Effect on Human Capital Investment by Sex in Urban and Rural Regions

Sex of Respondents	Pearson Chi–Square Values		df	Two–Sided Significant	
	Urban Region	Rural Region		Urban Region	Rural Region
Female	2.963	17.457	1	0.085	0.000
Male	0.108	13.830	1	0.743	0.000
Total	0.651	31.466	1	0.420	0.000

Source: Field Research, 2019

Table 8 confirms the results in Table 7, where the educational level of respondents of a male in urban is bigger than female, whereas, in the rural region, the female has higher educational level than male. However, respondents with the lower educational level of female in the rural area are bigger than male, indicating that most of the female in the rural area are having a lower educational level.

Table 8. Educational Level and Sex Distribution of Respondents in Urban and Rural Regions

Educational Level	Urban		Rural	
	Male	Female	Male	Female
	%	%	%	%
Higher	37.75	18.75	11.75	16.50
Lower	30.75	12.75	33.25	38.50
Total	68.50	31.50	45.00	55.00

Source: Field Research, 2019 (counted)

5. Conclusion

It should be noted that human capital investment is very important to achieve higher productivity, economic growth, and welfare. In addition, financial inclusion has a positive and significant effect on human capital investment. Income positively and significantly affects human capital investment. Male has a higher educational level than female, and its effect is positive on human capital investment. There is a gap between urban and rural in human capital investment, and urban has a higher human capital investment. Age has a bell-shaped curve, and it has a maximum point to human capital investment.

References

Anikina, E., Ivankina, L., & Tumanova, I. (2015). Human well-being and educational investment efficiency. Procedia - Social and Behavioral Sciences, 166, 48–52.

Attanasio, O., CostasMeghir, & EmilyNix. (2017). Human capital growth and poverty: Evidence from Ethiopia and Peru. Review of Economic Dynamics, 25, 234–259.

Bandyopadhyay, D., King, I., & Tang, X. (2019). Human capital misallocation, redistributive policies, and TFP. Journal of Macroeconomics, 60, 309–324.

Blanchard, E. J., & Olney, W. W. (2017). Globalization and human capital investment: Export composition drives educational attainment. Journal of International Economics, 106, 165–183.

BPS. (2019, September 1). Statistics of Aceh Province. Retrieved from Statistics of Aceh Province: aceh.bps.go.id

Chen, Y., & Fang, Z. (2018). Industrial electricity consumption, human capital investment and economic growth in Chinese cities. Economic Modelling, 69, 205–219.

Chi, W., & Qian, X. (2016). Human capital investment in children: An empirical study of household child education expenditure in China, 2007 and 2011. China Economic Review, 37, 52–65.

Dutta, N., & Sobel, R. S. (2018). Entrepreneurship and human capital: The role of financial development. International Review of Economics and Finance, 57, 319–332.

Eckel, C., Johnson, C., & Montmarquette, C. (2013). Human capital investment by the poor: Informing policy with laboratory experiments. Journal of Economic Behavior & Organization, 95, 224–239.

Hoorn, A. v. (2019). Cultural determinants of human capital accumulation: Evidence from the European Social Survey. Journal of Comparative Economics, 47, 429–440.

Kim, D.-H., & Lin, S.-C. (2017). Human capital and natural resource dependence. Structural Change and Economic Dynamics, 40, 92–102.

Lee, J.-W., & Lee, H. (2016). Human capital in the long run. Journal of Development Economics, 122, 147–169.

McDonald, B. D. (2019). A human capital model of the defense-growth relationship. The Social Science Journal, xxx, xxx–xxx.

Neve, J.-W. D., & Fink, G. (2018). Children's education and parental old age survival–Quasi-experimental evidence on the intergenerational effects of human capital investment. Journal of Health Economics, 58, 76–89.

Odoardi, I., & Muratore, F. (2019). The role of human capital after the crisis in Italy: A regional analysis. Socio-Economic Planning Sciences, 66, 58–67.

Onkelinx, J., Manolova, T. S., & Edelman, L. F. (2016). The human factor: Investments in employee human capital, productivity, and SME internationalization. Journal of International Management, 22, 351–364.

Palamida, E., Papagiannidis, S., & Xanthopoulou, D. (2018). Linking young individuals' capital to investment intentions: Comparing two cultural backgrounds. European Management Journal, 36, 392-407.

Pelinescu, E. (2015). The impact of human capital on economic growth. Procedia Economics and Finance, 22, 184–190.

Siddoo, V., Sawattawee, J., Janchai, W., & Thinnukool, O. (2019). An exploratory study of digital workforce competency in Thailand. Heliyon, 5, e01723.

Tejada, J. J., & Punzola, J. R. (2012). On the misuse of Slovin's formula. The Philippine Statistician , 129-16.

Thakurata, I., & D'Souza, E. (2018). Child labour and human capital in developing countries - A multi-period. Economic Modelling, 69, 67-81.

UNDP. (2018, August 30). Human Development Reports. Retrieved from http://hdr.undp.org/en/2018-update

Wang, W., Li, Q., & Lien, D. (2016). Human capital, political capital, and off-farm occupational choices in rural China. International Review of Economics and Finance, 42, 412–422.

WEF. (2019, August 30). Global Competitiveness Report. Retrieved from World Competitiveness Ranking: http://reports.weforum.org/global-competitiveness-report-2018/

Winfried, K., & Prat, J. (2018). Human capital and optimal redistribution. Review of Economic Dynamics, 27, 1–26.

Yokoyama, I., Kodama, N., & Higuchi, Y. (2019). Effects of state-sponsored human capital investment on the selection of training type. Japan & The World Economy, 49, 40–49.

Zallé, O. (2019). Natural resources and economic growth in Africa: The role of institutional quality and human capital. Resources Policy, 62, 616–624.

MEASURING THE EFFICIENCY AND PRODUCTIVITY CHANGE OF MUNICIPALITIES:EMPIRICAL EVIDENCE FROM GREEK MUNICIPALITIES OVER THE TIME PERIOD 2013-2016

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Abstract

This paper investigates the relative efficiency and productivity change of municipalities of Greece (regions of Thessaly and Central Greece), during the period 2013–2016. It implements Data Envelopment Analysis (D.E.A.) and Malmquist analysis. Additionally it estimates the effects of the environmental factors on the efficiency using Regression Analysis. The empirical analysis reveals that efficiency and productivity values have gradually improved after the latest reform of Local Government and under restrictive fiscal policy. The average efficiency under constant or variable returns to scale is 0.772 and 0.878 respectively and the mean scale efficiency is 0.883. The total factor productivity has risen by an annual average of 3.3% relatively to the base year 2013. Environmental variables such as type of municipality and population density had a statistically significant positive effect on efficiency. The results of the empirical analysis are consistent to the findings from studies that concern European and other countries. The findings provide benchmarks for policy evaluation and suggestions for region-based approaches.

Keywords: Greek municipalities, efficiency, productivity, DEA, Malmquist analysis
JEL classification: C14, J48, P41, P43

1. Introduction

Measuring relative efficiency and productivity of production systems and identifying its determinants has been the subject of a growing literature in the last decades. Municipalities are units of great importance, with multiple inputs and outputs, since many public functions have been transferred from national to local authorities. Over time, municipalities are facing an increasing pressure to provide more and better quality services to citizens with limited resources, which are even more limited in times of economic crises and restrictive policies.

Greece is a member state of the European Union (1981) and of the Eurozone (2001). The basic administrative division of Greece was formed in 2011. The country is divided into 325 Municipalities (1st Grade Local Authorities), 13 Regions (2st Grade Local Authorities) and 7 Decentralized Government Administrations. The regions of Central Greece (25 municipalities) and Thessaly (25 municipalities) are located in the central zone of Greece and have similar characteristics (area 15.549 and 14.037 Km2, population 546.870 and 730.730, population density 35,17 and 52,06 citizens/ Km2 and GDP 10.537 and 11.608 millions €).

The purpose of this paper is manifold:

I. The measurement of relative efficiency and productivity change of municipalities in the two representative regions (Thessaly and Central Greece) over the period 2013-2016. This period is rather special in the Greek case, for two reasons: firstly Greece has to meet the commitments imposed by the very tight fiscal consolidation program, that has been agreed between European Commission, European Central Bank, International Monetary Fund and Greek government, and secondly a major structural reform had preceded in Greek Local Government. Is the performance of Greek municipalities around the average level of the performance of other countries and especially those of the European Union?
II. Have the municipalities´ performance improved over the period 2013-2016?

III. Does the evaluation of municipalities on the basis of efficiency and productivity criteria and the identification of municipalities constituting benchmarks, contribute to policy formulation?
IV. Are the efficiency and productivity change, of the relatively large municipalities, comparatively higher than those of the relatively small municipalities? Is the policy of municipal mergers verified?
V. Are there environmental variables that affect performance?

To the best of our knowledge, this is the first study which answers to these questions.

The remainder of the paper is organized as follows: Section 2, provides a review of empirical literature; Section 3 presents a short theoretical framework; Section 4 specifies the empirical analysis; Section 5 issues the Second Stage Analysis and Section 6 concludes summarizing the main findings and policy recommendations.

2. Literature Review

Over the last 30 years, there have been many empirical studies, that have focused on the measurement of efficiency and productivity and it is possible to identify two categories of empirical research (De Borger and Kerstens, 1996a). Some studies concentrate on the evaluation of a particular service, such as refuse collection and street cleaning (Worthington and Dollery, 2000b; Benito et al., 2010), water services and street lighting. On the other hand, other studies evaluate local performance considering that municipalities supply a wide variety of services and facilities. The empirical studies (Perpina, 2018) use inputs and outputs from the following:

Inputs: X1: total expenditures, X2: current expenditures, X3: personnel expenditures, X4: capital expenditures, X5: other financial expenditures, X6: local revenues, X7: current transfers, X8: public health services, and X9: area.

Outputs: Y1: global output indicator, Y2: population, Y3: area, Y4: administrative services, Y5: infrastructures (Y5.1: street lighting, Y5.2: municipal roads), Y6: services (Y6.1: waste collection, Y6.2: sewerage system, Y6.3: water supply, Y6.4: electricity), Y7: sports, parks, culture facilities e.t.c. (Y7.1: sport, Y7.2: cultural, Y7.3: libraries, Y7.4: parks, Y7.5 : recreational), Y8 : health, Y9 : education (Y9.1 : kindergartens/nurseries, Y9.2 : primary/secondary education), Y10 : social services (Y10.1 : beneficiaries of grants, Y10.2 : care for elderly, Y10.3 : care for children, Y10.4 : social organizations), Y11 : public safety, Y12 : market, Y13 : public transport, Y14 : environmental protection, Y15 : business development, Y16 : quality index, Y17 : others

Municipalities face different environmental conditions in terms of social, demographic, economic, political, financial, geographical and institutional, among others (Perpina, 2018). The selection of the variables depends on the availability of data. In particular, 6 basic categories of variables are examined:

Z1= Population (Z1.1=Density, Z1.2 =Growth, Z1.3= Size, Z1.4 = Age distribution , Z1.5 = Education level, Z1.6 = Immigration share, Z1.7 = Share of homeowners, Z1.8 = Others)

Z2 = Economic (Z2.1 = Unemployment, Z2.2 = Income, Z2.3 = Economic status, Z2.4 = Tourism, Z2.5 = Commercial activity, Z2.6 = Industrial activity, Z2.7 = Other

Z3 = Political (Z3.1 = Ideological position, Z3.2 = Political concentration, Z3.3 = Voter turnout, Z3.4 = Re-election and number of years for elections, Z3.5 = Other

Z4 = Financial (Z4.1 = Self-generated revenues, Z4.2 = Transfers, Z4.3 = Financial liabilities, Z4.4 = Fiscal surplus, Z4.5 = Infrastructure investments, Z4.6 = Other

Z5 = Geographical (Z5.1 = Distance from centre, Z5.2 = Area, Z5.3 = Type of municipalities (sea, mountain), Z5.4 = Other

Z6 = Institutional (Z6.1 = Computer usage, Z6.2 = Mayor and municipal employees, Z6.3 = Amalgamation, Z6.4 = Municipal externalization, Z6.5 = Other

Table 1 presents the classification of empirical studies (European and non-European Countries).

Table 1

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
European Countries							
De Borger et al. (1994)	Belgium	1985	589	T.S.A.-F.D.H./T.R.	X_3, X_4	$Y_2, Y_{5.2}, Y_{7.5}, Y_{9.2}, Y_{10.1}$	$Z_{1.3}, Z_{1.5}, Z_{2.2}, Z_{3.1}, Z_{3.2}$
De Borger and Kerstens (1996α)	Belgium	1985	589	T.S.A, F.D.H., D.E.A.-V.R.S.-I.O.,S.F.A., O.L.S. T.R.	X_1	$Y_2, Y_{7.5}, Y_{9.2}, Y_{10.1}, Y_{10.2},$	$Z_{1.1}, Z_{1.5}, Z_{2.2}, Z_{3.1}, Z_{4.1}, Z_{4.2}$
De Borger and Kerstens (1996b)	Belgium	1985	589	T.S.A.-F.D.H./T.R.	X_1	$Y_2, Y_{5.2}, Y_{7.5}, Y_{9.2}, Y_{10.1}, Y_{10.2},$	$Z_{1.5}, Z_{2.2}, Z_{3.1}, Z_{4.1}, Z_{4.2}$
Worthington and Dollery (2000b)	South Wales	1993	173	T.S.A.,D.E.A.-V.R.S.-I.O., T.R.	X_3, X_4, X_5	$Y_2, Y_{5.2}, Y_{6.1}, Y_{6.3},$	$Z_{4.2}, Z_{4.3}, Z_{4.6}, Z_{6.2}$
Prieto and Zofio (2001)	Spain	1994	209	DEA	X_1	$Y_{5.1}, Y_{5.2}, Y_{6.2}, Y_{6.3}, Y_{7.1}, Y_{7.2}, Y_{7.4}$	
A. Michailov, M. Tomova, P. Nenkova (2003)	Sofia	1999-03/ 2002	24	D.E.A. -C.R.S.-V.R.S.-I.O.	X_2	$Y_2, Y_{5.2}, Y_{7.4}, Y_{9.2}, Y_{9.1}, Y_8, Y_{7.3}, Y_3$	
Afonso and Fernandes (2003)	Portugal	2001	51	F.D.H.	X_1	Y_1	
Loikkanen and Susiluoto (2005)	Finland	1994-2002	353	T.S.A, D.E.A.-C.R.S- O.O., O.L.S.	X_2	$Y_{7.3}, Y_8, Y_{9.2}, Y_{10.2}, Y_{10.3}, Y_{10.4}$	$Z_{1.1}, Z_{1.3}, Z_{1.5}, Z_{2.1}, Z_{2.2}, Z_{4.2}, Z_{5.1}, Z_{6.2}, Z_{6.4}$
Geys (2006)	Belgium	2000	304	T.S.A.,S.F.A.,O.L.S.	X_2	$Y_{5.2}, Y_{7.5}, Y_{9.2}, Y_{10.1}$	$Z_{1.1}, Z_{1.7}, Z_{2.2}, Z_{3.1}, Z_{3.2}, Z_{4.2}, Z_{4.3}, Z_{4.4}, Z_{6.3}$
Afonso and Fernandes (2006)	Portugal	2001	51	D.E.A.(I.O.,O.O., VRS)	X_1	Y_1	
Balaguer-Coll et al. (2007)	Spain	1995	414	T.S.A.,D.E.A.(V.R.S.-I.O.), F.D.H.,Kernel regression	$X_2, X_3, X_4, X_7,$	$Y_2, Y_{5.1}, Y_{5.2}, Y_{6.1}, Y_{7.4}, Y_{16}$	$Z_{1.3}, Z_{3.2}, Z_{4.1}, Z_{4.2}, Z_{4.3},$
Gimenez and Prior (2007)	Spain	1996	258	T.S.A.,F.D.H.,T.R	X_3, X_5, X_7	$Y_2, Y_3, Y_{5.2}, Y_{6.1},$	$Z_{1.1}, Z_{1.3}, Z_{2.2}, Z_{2.4}, Z_{2.5}, Z_{2.6}$
Afonso and Fernandes (2008)	Portugal	2001	278	T.S.A.,D.E.A.(I.O.,O.O.,V.R.S.), T.R.	X_1	Y_1	$Z_{1.1}, Z_{1.2}, Z_{1.5}, Z_{2.2}, Z_{5.1}$
Balaguer-Colland	Spain	1992-1995	258	T.S.A.D.E.A.(I.O., V.R.S.).T.R.	X_2, X_3, X_4, X_7	$Y_2, Y_{5.1}, Y_{5.2}, Y_{6.1},$	$Z_{2.1}, Z_{2.2}, Z_{2.4}, Z_{2.5}, Z_{4.1}, Z_{4.2},$

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
Prior (2009)						$Y_{7.4}$, Y_{16}	$Z_{4.3}$,
Geys, B., Moesen, W., (2009a)	Belgium	2000	304	S.S.A.,D.E.A (I.O.,V.R.S.).,F.D.H.,S.F.A.	X_2	$Y_{5.2}$,$Y_{6.1}$, $Y_{7.5}$, $Y_{9.2}$,$Y_{10.1}$	$Z_{1.1}$, $Z_{1.3}$, $Z_{1.5}$, $Z_{1.7}$, $Z_{2.1}$, $Z_{2.2}$, $Z_{2.4}$, $Z_{2.6}$, $Z_{2.7}$, $Z_{3.1}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{4.4}$, $Z_{6.3}$
Geys, B., Moesen, W., (2009b)	Belgium	2000	304	D.E.A.-I.O.-C.R.S.-V.R.S.,F.D.H.,S.F.-Mean	X_2	$Y_{5.2}$, $Y_{6.1}$,$Y_{7.5}$, $Y_{9.2}$, $Y_{10.1}$	
Zafra-Gomez and Muniz-Perez (2010)	Spain	2000, 2005	923	D.E.A.(I.O.,C.R.S.)	X_2, X_3, X_4, X_7	Y_2, $Y_{5.1}$, $Y_{5.2}$, $Y_{6.1}$, $Y_{7.4}$, Y_{16}	
Benito et al. (2010)	Spain	2002	31	T.S.A.,D.E.A.(V.R.S.,O.O.), Kendall τ test	X_2, X_3, X_7	$Y_{6.1}$, $Y_{6.3}$, $Y_{7.1}$, $Y_{7.2}$, $Y_{7.3}$, $Y_{7.4}$, Y_{11}	$Z_{1.3}$, $Z_{2.2}$, $Z_{2.4}$, $Z_{3.1}$, $Z_{4.1}$, $Z_{4.3}$, $Z_{4.6}$, $Z_{6.4}$
Geys et al. (2010)	Germany	1998,2002, 2004	987	S.S.A.,S.F.A.	X_2	Y_2, $Y_{7.5}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{3.1}$, $Z_{3.2}$, $Z_{3.3}$, $Z_{4.2}$
Kalb (2010)	Germany	1990-2004	1.111	S.S.A.,S.F.A.	X_2	Y_2, $Y_{9.2}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{1.5}$, $Z_{2.1}$, $Z_{2.4}$, $Z_{3.1}$, $Z_{3.2}$, $Z_{4.2}$, $Z_{4.6}$,
Revelli (2010)	England	2002-2007	148	CPA	X_2	Y_1, $Y_{9.2}$	
Balaguer-Coll et al. (2010a)	Spain	1995, 2000	1221	F.D.H.	X_2, X_3, X_4, X_7	Y_2 ,$Y_{5.1}$, $Y_{5.2}$, $Y_{6.1}$, $Y_{7.4}$, $Y_{7.5}$, $Y_{10.4}$, Y_{12}	
Balaguer-Coll et al. (2010b)	Spain	1995,2000, 2005	1.164	M.I.,F.D.H.	X_1	Y_2, $Y_{5.1}$, $Y_{5.2}$, $Y_{6.1}$, $Y_{7.4}$, $Y_{7.5}$, $Y_{10.4}$, Y_{12}, Y_{16}	
Loikkanen et al (2011)	Finland	1994-1996	353	T.S.A.,D.E.A. -C.R.S- O.O., O.L.S.	X_2	$Y_{7.3}$, Y_8, $Y_{9.2}$, $Y_{10.1}$, $Y_{10.3}$, $Y_{10.4}$	$Z_{1.1}$, $Z_{1.3}$, $Z_{1.5}$, $Z_{2.1}$, $Z_{3.1}$, $Z_{3.2}$, $Z_{3.3}$, $Z_{5.1}$, $Z_{6.2}$
Bonisch et al. (2011)	Germany	2004	203	T.S.A.,D.E.A. (I.O,V.R.S.)B.A.-Simar and Wilson,2007	X_3,X_4, X_5	Y_2,$Y_{7.5}$,$Y_{9.2}$,$Y_{10.3}$,Y_{15}	$Z_{1.1}$, $Z_{1.2}$, $Z_{1.4}$, $Z_{2.1}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{6.4}$
ˇStastn´a and Gregor (2011)	Czech Republic	2003-2008	202	S.S.A.,D.E.A-C.R.S.-V.R.S.-,I.O, B.A., SFA-timevariant	X_2	Y_2, Y_3, $Y_{5.2}$, $Y_{6.1}$, $Y_{7.1}$, $Y_{7.2}$, $Y_{7.3}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, $Y_{10.4}$,	$Z_{1.3}$, $Z_{1.5}$, $Z_{3.1}$, $Z_{3.2}$, $Z_{3.3}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{4.5}$,$Z_{5.1}$

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
						Y_{11}, Y_{13}, Y_{14}	
Barone and Mocetti (2011)	Italy	2001-2004	1.115	S.F.A.	X_2	Y_4, $Y_{5.1}$, $Y_{5.2}$, $Y_{6.1}$, $Y_{9.1}$, Y_{11}	
Kalb et al. (2012)	Germany	2004	1.015	S.S.A., S.F.A.	X_2	Y_2, $Y_{7.5}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{2.1}$, $Z_{2.4}$, $Z_{3.1}$, $Z_{3.2}$
Boetti et al. (2012)	Italy	2005	262	T.S.A.,D.E.A. (V.R.S. I.O.), T.R.,S.F.A.	X_2	Y_2, $Y_{5.2}$, $Y_{6.1}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$,	$Z_{1.1}$, $Z_{1.3}$, $Z_{2.2}$, $Z_{3.1}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.6}$, $Z_{5.1}$, $Z_{5.3}$, $Z_{6.2}$, $Z_{6.4}$
Balaguer-Coll et al. (2013)	Spain	2000	1.198	Order-m	X_2, X_3 X_4, X_7	$Y_{5.1}$, $Y_{5.2}$, $Y_{6.1}$, $Y_{7.4}$, $Y_{7.5}$, $Y_{10.4}$, Y_{12}	$Z_{1.1}$, $Z_{1.2}$, $Z_{2.2}$, $Z_{2.3}$, $Z_{2.7}$
Cuadrado-Ballesteros et al. (2013)	Spain	1999-2007	129	T.S.A., M.I. with D.E.A. Bias-corrected (V.R.S.-I.O.)	X_2,X_4,	Y_2,Y_3,Y_4, $Y_{10.4}$,Y_{11}, Y_{14}	$Z_{2.2}$, $Z_{2.4}$, $Z_{3.2}$, $Z_{6.4}$
Bischoff et al. (2013)	Germany	2004	46 &157 municipal associations	D.E.A. Bias-corrected (I.O. - V.R.S.)	X_3, X_4, X_5	Y_2, $Y_{9.2}$, $Y_{10.3}$, Y_{15}	$Z_{1.1}$, $Z_{1.2}$, $Z_{1.4}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{6.4}$
Geys et al. (2013)	Germany	2001	1.021	S.S.A.,S.F.A.	X_2	Y_2, $Y_{7.5}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{2.1}$, $Z_{3.2}$
LoStorto (2013)	Italy	2011	103	D.E.A (I.O., V.R.S., C.R.S.)	X_2	Y_2, Y_3, $Y_{5.2}$, $Y_{9.1}$, Y_{14}	
Ashworth et al.(2014)	Belgium	2000	308	T.S.A.,D.E.A. - C.R.S. - O.O., B.A.- Simar and Wilson,2007	X_1	$Y_{5.2}$, $Y_{6.1}$, $Y_{7.5}$, $Y_{9.2}$, $Y_{10.1}$, $Y_{10.2}$	$Z_{1.1}$, $Z_{1.3}$, $Z_{2.2}$, $Z_{3.1}$, $Z_{3.2}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{4.4}$,
DaCruzand Marques (2014)	Portugal	2009	308	T.S.A.,D.E.A. super-efficiency (I.O.,VRS,C.R.S), T.R., O.L.S. ,B.A.(95% CI)	X_3, X_4, X_5	Y_2, $Y_{6.1}$, $Y_{6.2}$, $Y_{6.3}$, $Y_{7.5}$	$Z_{1.1}$, $Z_{1.4}$, $Z_{1.5}$, $Z_{1.8}$, $Z_{2.2}$, $Z_{2.3}$, $Z_{2.7}$, $Z_{3.1}$, $Z_{3.3}$, $Z_{3.4}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{4.6}$, $Z_{5.2}$, $Z_{5.3}$, $Z_{6.3}$
Carosi et al. (2014)	Tuscan	2011	285	T.S.A.,D.E.A.(I.O , V.R.S),T.R.	X_2	Y_2, $Y_{5.2}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, $Y_{10.4}$,	$Z_{1.1}$, $Z_{1.3}$, $Z_{2.4}$, $Z_{3.4}$, $Z_{4.1}$, $Z_{5.3}$
Seifert&Nieswand (2014)	France	2008	96	D.E.A.(I.O.,V.R.S.)	X_1	Y_2, $Y_{5.2}$, $Y_{7.5}$, $Y_{9.2}$, $Y_{10.1}$	
Pevcin (2014a)	Slovenia	2011	200	S.S.A.,S.F.A.	X_1	Y_2, $Y_{9.2}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{2.1}$,
Pevcin	Slovenia	2011	200	S.S.A.,D.E.A	X_1	Y_2, $Y_{9.2}$,	$Z_{1.1}$, $Z_{2.1}$

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
(2014b)				(I.O., C.R.S., V.R.S.,) S.F.A..		$Y_{10.2}$, Y_{15}	
ˇStastn´aan dGregor (2015)	Czech republic	1995-1998, 2003-2008	202	S.S.A.,SFA-time variant	X_2	Y_3,$Y_{5.2}$,$Y_{6.1}$,$Y_{7.1}$,$Y_{7.2}$,$Y_{7.4}$,$Y_{9.1}$,$Y_{9.2}$,$Y_{10.2}$,$Y_{10.4}$,Y_{11},Y_{13},	$Z_{1.3}$, $Z_{1.5}$, $Z_{3.1}$, $Z_{3.3}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.5}$, $Z_{5.1}$
Arcelus et al. (2015)	Spain	2005	260	S.S.A.,S.F.A.	X_2	Y_3, Y_4, $Y_{5.1}$, $Y_{5.2}$, $Y_{6.3}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{4.1}$, $Z_{4.5}$, $Z_{5.4}$, $Z_{6.4}$, $Z_{6.5}$
Perez-Lopez et al. (2015)	Spain	2001-2010	1.058	T.S.A.,Order-m, B.A.- Simar and Wilson,2007	X_2	Y_2, Y_3, $Y_{5.1}$, $Y_{6.1}$, $Y_{6.3}$, $Y_{7.4}$, Y_{17}	$Z_{1.3}$, $Z_{2.1}$, $Z_{2.4}$, $Z_{3.1}$, $Z_{3.2}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.3}$, $Z_{4.4}$,$Z_{4.6}$, $Z_{6.4}$
Asatryan and DeWitte (2015)	Germany	2011	2.000	Conditional FDH	X_1	$Y_{7.5}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$	$Z_{1.3}$, $Z_{2.2}$, $Z_{3.1}$, $Z_{3.3}$
Lampe et al.(2015)	Germany	2006-2008	396	S.S.A., S.F.A.	X_1, X_2	Y_2, $Y_{7.5}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, Y_{15}	$Z_{1.1}$, $Z_{1.6}$, $Z_{2.1}$, $Z_{2.4}$
Andrews and Entwistle (2015)	England	2007	386	T.S.A.,Ratios, OLS	X_1	Y_1	$Z_{1.1}$, $Z_{1.3}$, $Z_{1.4}$, $Z_{1.6}$, $Z_{1.8}$, $Z_{2.3}$, $Z_{3.1}$, $Z_{4.6}$, $Z_{5.1}$, $Z_{6.4}$, $Z_{6.5}$
Agasisti et al. (2015)	Italy	2010-2012	331	T.S.A.,B.A. DEA (I.O, C.R.S, V.R.S) M.I.	X_2	Y_2, $Y_{5.2}$, $Y_{6.1}$, Y_{11}	$Z_{1.1}$, $Z_{1.4}$, $Z_{1.8}$, $Z_{2.2}$, $Z_{3.1}$, $Z_{3.4}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.4}$, $Z_{4.5}$, $Z_{4.6}$, $Z_{5.3}$, $Z_{5.4}$, $Z_{6.2}$, $Z_{6.4}$, $Z_{6.5}$
Cordero et al. (2016)	Portugal	2009-2014	278	Conditional efficiency	X_1, X_3	Y_2, Y_4,$Y_{6.1}$, $Y_{6.3}$	$Z_{1.1}$, $Z_{2.1}$, $Z_{2.2}$, $Z_{3.1}$, $Z_{4.3}$, $Z_{5.3}$
Lo Storto (2016)	Italy	2013	108	T.S.A.,D.E.A. (I.O, C.R.S, V.R.S) B.A.- SimarandWilson, 2007	X_2	Y_2, Y_3	$Z_{1.1}$, $Z_{1.8}$, $Z_{2.3}$
Cordero et al. (2017)	Portugal	2009-2014	278	Conditionalefficiency, M.I.	X_1, X_3	Y_2, Y_4,$Y_{6.1}$, $Y_{6.3}$	
Carosi et al. (2018)	Tuscan	2011	282	D.E.A. (I.O, V.R.S)	X_2	Y_2, $Y_{5.2}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$, $Y_{10.4}$,	
			Non-European Countries				
Kalseth and Rattsø (1995)	Norway	1988	407	D.E.A. (I.O.,V.R.S.), O.L.S.	X_1	Y_4	

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
Grossman et al. (1999)	U.S.A.	1967,1973, 1977,1982	49	S.S.A.,S.F.A.	-	Y_{17}	$Z_{1.3}, Z_{3.5}, Z_{4.2}, Z_{5.1}, Z_{6.2}$
Ibrahim and Karim (2004)	Malaysia	2000	46	T.S.A.,D.E.A., I.O.,V.R.S,T.R.	X_2	$Y_2, Y_{5.2}, Y_{6.1}, Y_{7.4}, Y_{12}$	$Z_{1.5}, Z_{2.2}, Z_{5.2}, Z_{6.1}, Z_{6.2},$
De Sousa et Stosic (2005)	Brazil	1991	4796	DEA - FDH "Jackstrap"- I.O.,C.R.S,V.R.S	X_2, X_3, X_8	$Y_2, Y_{6.1}, Y_{6.2}, Y_{6.3}, Y_{9.2}, Y_{10.1}$	
De Sousa et al (2005)	Brazil	2000	4796	T.S.A.,DEA "Jackstrap"I.O.,C.R.S,V.R.S, Quantile regression	X_2, X_3, X_8	$Y_2, Y_{6.1}, Y_{6.2}, Y_{6.3}, Y_{9.2}, Y_{10.1}$	$Z_{1.1}, Z_{2.2}, Z_{2.3}, Z_{2.4}, Z_{2.7}, Z_{5.1}, Z_{5.4}, Z_{6.1}, Z_{6.2}, Z_{6.4}, Z_{6.5}$
Moore et al.(2005)	U.S.A.	1993-1996	46	T.S.A.,D.E.A.- O.O.- V.R.S ,T.R.	X_2, X_3	$Y_4, Y_{5.2}, Y_{6.1}, Y_{6.3}, Y_{7.3}, Y_{7.4}, Y_8, Y_{11},$	$Z_{4.1}, Z_{5.2}, Z_{5.4}, Z_{6.5}$
Ibrahim and Salleh (2006)	Malaysia	2000	46	S.F.A.	X_2	$Y_2, Y_{5.2}, Y_{6.1}, Y_{7.4}, Y_{12}$	
Sung (2007)	Korea	1999-2001	222	T.S.A.,M.I. with D.E.A.,T.R.	$X_1, X_3,$	$Y_4, Y_{5.2}, Y_{6.2}, Y_{6.3}, Y_{7.4}, Y_{10.4}$	$Z_{1.1}, Z_{1.3}, Z_{2.5}, Z_{4.1}, Z_{5.2}, Z_{6.1}$
Revelli and Tovmo (2007)	Norway	-	205	T.S.A., RATIO, O.L.S.	X_6	Y_1	$Z_{1.1}, Z_{3.2}, Z_{3.3}, Z_{4.1}, Z_{4.3}$
Seol et al. (2008)	Korea	2003	106	T.S.A.,DEA-based DT approach (I.O.-V.R.S.),T.R.	X_1,X_3	Y_4	$Z_{6.1}$
Borge et al. (2008)	Norway	2001-2005	362-384	T.S.A.,RATIO ,O.L.S.	X_6	Y_1	$Z_{3.1}, Z_{3.2}, Z_{3.3}, Z_{4.1}, Z_{4.2}, Z_{4.6}$
Nijkamp and Suzuki (2009)	Japan	2005	34	DEA- DFM-GA (I.O./O.O.-C.R.S.)	X_1, X_3, X_4	Y_1, Y_{17}	
Dollery and van der Westhuizen (2009)	South Africa	Fiscal 2006/2007	231 local+46 regional	D.E.A(I.O.,O.O,V.R.S.,C.R.S)	X_3	$Y_{6.4}$	
Shiyi and Jun (2009)	China	1978-2005 1993-2005	27	D.E.A.(V.R.S.,O.O.)	X_2	$Y_{9.2}, Y_8, Y_3, Y_{6.4}, Y_{13}$	
Liu et al. (2011)	Taiwan	2007	22	D.E.A. super-efficiency (C.R.S.-V.R.S.-O.O.)	X_3	$Y_{6.2},$	
Bruns and Himmler	Norway	2001-2005	362-384	T.S.A.,RATIO,O.L.S.	X_6	Y_1	$Z_{1.1}, Z_{1.3}, Z_{1.4}, Z_{1.5}, Z_{1.6}, Z_{1.8},$

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
(2011)							$Z_{2.2}$, $Z_{3.1}$, , $Z_{3.2}$, $Z_{3.5}$
Lin, Ming-Ian & Lee, Yuan-Duen & Ho, Tsai-Neng, (2011)	China	2005-2006	31	DEA (V.R.S.,C.R.S.,O.O.) και AHP, MPI	X_4	Y_{17}	
Kutlar and Bakirci (2012)	Turkey	2006-2008	27	D.E.A., C.R.S., V.R.S, I.O.,O.O, M.I.	X_1, X_2, X_3, X_4, X_7	Y_2, $Y_{9.2}$, $Y_{10.2}$, Y_8	
Haneda et al. (2012)	Japan	1979-2004	92	D.E.A. (I.O.,V.R.S.,C.R.S .), M.I.	X_3, X_9	Y_2, Y_{16}	
Nakazawa (2013)	Japan	2005	479	S.S.A,S.F.A., O.L.S, HCSEs	X_1, X_3	Y_1	$Z_{1.3}$, $Z_{1.4}$, $Z_{1.8}$, $Z_{5.2}$, $Z_{6.3}$
Fogarty and Mugera (2013)	Australia	2009-2010	98	T.S.A.,D.E.A.(I.O .,V.R.S.,C.R.S.), O.L.S.	X_3, X_4, X_5	Y_2, Y_3, $Y_{5.2}$	$Z_{1.1}$, $Z_{2.3}$, $Z_{4.1}$, $Z_{6.2}$
Nikolov and Hrovatin (2013)	Macedonia	-	74	T.S.A.,D.E.A.-V.R.S-O.O., S.F.A.	X_2	Y_2, $Y_{5.2}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.2}$	$Z_{1.6}$, $Z_{2.2}$, $Z_{3.2}$, $Z_{4.1}$
Nakazawa (2014)	Japan	2005	479	S.F.A., O.L.S, HCSEs	X_1, X_2	Y_1	
ElMehdiandHafner (2014)	Morocco	Fiscal 1998-1999	91	D.E.A (I.O., V.R.S.), F.D.H. bias -corrected B.A.	X_6	Y_{17}	
Mahabir (2014)	South Africa	Fiscal 2005/2006 - 2008/2009	129	F.D.H.	X_1	$Y_{6.1}$,$Y_{6.2}$, $Y_{6.3}$,$Y_{6.4}$	
Monkam (2014)	South Africa	2007	231	T.S.A.,D.E.A.(I.O., V.R.S.), T.R.	X_2	Y_2,$Y_{6.1}$,$Y_{6.2}$,$Y_{6.3}$, $Y_{6.4}$	$Z_{1.2}$, $Z_{1.5}$, $Z_{2.2}$, $Z_{3.2}$, $Z_{4.1}$
Sørensen (2014)	Norway	2001-2010	430	T.S.A.,O.L.S ,F.E.R	X_6	Y_1	$Z_{1.3}$, $Z_{3.1}$, $Z_{3.2}$
Pacheco et al. (2014)	Chile	2008-2010	309	S.S.A., S.F.A.	X_2	Y_2, $Y_{6.1}$, $Y_{6.2}$, $Y_{7.4}$, Y_8, $Y_{9.2}$,	$Z_{3.2}$, $Z_{4.2}$, $Z_{4.5}$, $Z_{5.1}$
Yusfany (2015)	Indonesia	2010	491	T.S.A.,D.E.A. - VRS, O.O.,T.R.	X_1	Y_1	$Z_{1.1}$, $Z_{2.2}$, $Z_{3.2}$, $Z_{4.1}$, $Z_{4.2}$, $Z_{4.4}$,
Helland and Sørensen (2015)	Norway	2001-2010	430	T.S.A.,O.L.S , F.E.R	X_6	Y_1	$Z_{3.1}$, $Z_{3.2}$
Radulovicand Dragutinovic (2015)	Serbia	2012	143	S.S.A.,S.F.A.	X_2	Y_2, $Y_{5.2}$, $Y_{6.3}$, $Y_{9.1}$, $Y_{9.2}$, $Y_{10.4}$	$Z_{1.1}$, $Z_{1.4}$, $Z_{1.5}$, $Z_{2.1}$, $Z_{5.1}$,

Authors	Country	Years Reference	No of municipalities	Methodology	Inp	Outp	Envir. Variables
Marques et al. (2015)	Tasmania	1999-2008	29	shared input D.E.A.(V.R.S.,I.O.)	X_2	Y_4, $Y_{5.2}$, $Y_{6.2}$, $Y_{6.3}$, Y_8,	

Notes: D.E.A.= Data Envelopment Analysis, S.F.A.= Stochastic Frontier Analysis, F.D.H.= Free Disposal Hull, I.O.= Input Oriented, O.O.= Output Oriented, C.R.S.= Constant Returns to Scale, V.R.S.= Variable Returns to Scale, S.E.= Scale Efficiency, M.I.= Malmquist Index, T.R.= Tobit Regression, B.A.= Bootstrap Approach, C.P.A.= Comprehensive Performance Assessment, D.F.M.= Distance Friction Minimization, G.A.= Goals Achievement, A.H.P.= Analytic Hierarchy Process, HCSEs= Heteroscedasticity - Consistent Standard Errors, O.L.S.= Ordinary Least Squares, D.T.= Decision Tree, T.S.A.= Two Stage Approach, S.S.A=Single Stage Approach, F.E.R.= Fixed effects regressions

More specifically, as can be inferred from Table 1, the large majority of the studies have used only one approach (Data Envelopment Analysis –DEA =43% or Stohastic Frontier Analysis – SFA=18% or Free Disposal Hull – FDH=10%) and the rest 29% combine more than one method. From the studies which employ DEA, about 70% uses Input Orientation (I.O.), 20% uses Output Orientation (O.O.) and 10% both I.O. and O.O. approach. About 10% uses Constant Returns to Scale (C.R.S.), 60% Variable Returns to Scale (V.R.S.) and 30% both V.R.S and C.R.S. approach. Local governments' efficiency analysis, is best studied in Europe, especially in Spain, followed by Germany and Belgium. The most popular methods of estimating the influence of the environmental variables on efficiency are Tobit & Ordinary Least Squares (O.L.S.)

3. Methodology and models

The techniques adopted to assess efficiency are usually classified in parametric (Stohastic Frontier Analysis-S.F.A.) and nonparametric methods (deterministic frontier – D.E.A. model). We estimate here the functional form of the best-practice frontier, relying on the nonparametric technique of DEA.

Efficiency measurement begins with Farrell (1957), who drew upon the work of Debreu (1951) and Koopmans (1951), to define a simple measure of firm efficiency which could account for multiple inputs. Data Envelopment Analysis (DEA) is widely accepted and used by scholars for its strengths, and well recognized as a valuable decision support tool for managerial control and organizational diagnosis, and for conducting benchmarking studies (Lo Storto, 2013). DEA measures the efficiency of different units, called "Decision Making Units" (DMUs). DEA is the non-parametric deterministic mathematical linear programming approach that estimates the relative efficiency of homogeneous DMUs. It introduces very weak assumptions related to the estimation of an empirical production function which converts the inputs into outputs, assuming the existence of a convex production frontier and strong free disposability in inputs and outputs (Charnes, Cooper, & Rhodes, 1978). The piecewise-linear convex hull approach to frontier estimation receive wide attention. The production frontier is generated by solving a sequence of linear programming problems, one for each municipality, while the relative Technical Efficiency (T.E.) (the ability of a unit to produce a given set of outputs with minimum consumption of a set of corresponding inputs, independently of any input prices) of the municipality is measured by the distance between the actual observation and the frontier obtained from all the municipalities under examination. Thus, a municipality results efficient if TE=1, but it is inefficient or technically not efficient if TE < 1. DEA calculates the efficiency of a DMU by dividing a weighted sum of its outputs by a weighted sum of inputs. Weights of inputs and outputs are not given in advance, but they are determined as part of the solution to the optimizing problem. In the simplest case, each DMU is allowed to weigh its inputs and outputs freely to maximize its relative efficiency.

DEA models can be either input (determination of minimum inputs for producing a given level of output) or output (maximization of outputs with given levels of inputs) oriented. However, in this study an input orientation is adopted because municipal administrations have greater control over inputs than they do over outputs and the production function is constructed by searching for the maximum possible proportional reduction in input usage, while output levels are held fixed. As the sample includes municipalities having very different sizes, the efficiency score is calculated adopting two conceptualizations, the first one suggested by Charnes et al. (1978) (CCRmodel) that assumes constant returns to scale (CRS) and the second one that follows Banker, Charnes, and Cooper (1984) (BCC model), assuming variable returns to scale (VRS), In particular, an input-oriented VRS model is defined as:

- Input – oriented – CRS

  min θ, λ, θ

  Yλ ≥ Yi

  s.t. Xλ ≤ θXi

  λ ≥ 0

- Input – oriented – VRS

  min θ, λ, θ

  Yλ ≥ Yi

  s.t. Xλ ≤ θXi

  N1'λ = 1

  λ ≥ 0

where λ is the vector of relative weights (N × 1) given to each unit and N is the number of unit. Assuming that there data on I inputs and O outputs: X represents the matrix of inputs (I × N) and Y is the matrix of outputs (O × N). For the ith unit these are represented by the column vectors Xi for the inputs and Y i for the outputs. These refer to CRS model. The CRS assumption is avoided in the VRS model (Banker et al., 1984) by the introduction of an additional constraint on the λ, allowing returns to scale, i.e., N1′λ = 1, where N1′ is a vector of ones. This restriction imposes convexity of the frontier. Finally, the efficiency score (θ) is a scalar and estimate the technical efficiency by assuming values between 0 and 1, with a value of 1 indicating a point on the frontier and hence a technical efficient unit (Farell, 1957). In our analysis, we computed both CRS and VRS efficiency scores. Also, we interpret the ratio CRS/VRS as the scale efficiency (SE), that refers to the ability of each unit to operate at its optimal scale of operations. In order to find out whether a municipality is scale efficient and qualify the type of returns of scale, a DEA model under the non-increasing returns to scale (NIRS) can be implemented by replacing the N1′λ=1 restriction with N1′λ ≤ 1, putting SE= TECRS / TENIRS. As Fare, Grosskopf, and Lovell (1985) suggest the following rule can be applied: a) if SE = 1, then the municipality is scale efficient, both under CRS and VRS; b) if SE = 1 the municipality operates under increasing returns to scale; c) if SE<1 the municipality operates under decreasing returns to scale.

After the DEA analysis, we carry out also an analysis using the Malmquist productivity index (MPI) to evaluate the possible changes in the efficiency level or technological progress (TC). Technological changes might occur and could affect and shift the frontier. The MPI is introduced as a theoretical index by Caves et al. (1982) and became more popular as an empirical index by Fare et al. (1994). In order to measure the change in the efficiency score, the latter should be split into two components: change in productivity (efficiency) and change in production frontier. Fare et al. (1994) defined the I.O. MI between year t and t + 1 as the ratio of the distance function for each year relative to a common technology, as follows:

$$M^t = \frac{M_1{}^t(x_t + 1, y_t + 1)}{D_1{}^t(x^t, y^t)}$$

If the base year is the t + 1, then the MI for the t + 1 period is as follows:

$$M^{t+1} = \frac{D_1{}^{t+1}(x_t + 1, y_t + 1)}{D_1{}^{t+1}(x^t, y^t)}$$

where the subscript I indicates an input-oriented, M is the productivity of the most recent production point (xt+1, yt+1) (using period t + 1 technology) relative to the earlier production point (xt, yt) (using period t technology), D are input distance functions, x is the inputs, y is the outputs, and t is the current period.

Following Fare et al. (1994) the MI can be expressed as a geometric mean of the two indices, evaluated with respect to period t and period t + 1 technologies as follows:

$$M_I(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_1{}^{t}(x^{t+1}, y^{t+1})}{D_1{}^{t}(x^t, y^t)} \frac{D_1{}^{t+1}(x^{t+1}, y^{t+1})^{1/2}}{D_1{}^{t+1}(x^t, y^t)}$$

Fare et al. (1994) further suggested that this index can be decomposed further into two components: one describing the technical efficiency change (EC) (improvements in efficiency relative to the frontier) and another reflecting on the technological change (TC) (shifts in the frontier) of the different units under study, as follows:

$$M_I(x^{t+1}, y^{t+1}, x^t, y^t) = \underbrace{\frac{D_1{}^{t+1}(x^{t+1}, y^{t+1})}{D_1{}^{t}(x^t, y^t)}}_{\text{Efficiency change}} \underbrace{\frac{D_1{}^{t}(x^{t+1}, y^{t+1})}{D_1{}^{t+1}(x^{t+1}, y^{t+1})} \times \frac{D_1{}^{t}(x^t, y^t)^{1/2}}{D_1{}^{t+1}(x^t, y^t)}}_{\text{Technological change}}$$

The methodology can be further extended by decomposing the efficiency change into scale efficiency (SEC) and pure technical efficiency (PEC) components. The appropriate required distance functions can be estimated via DEA technologies, as described above (Fare et al., 1994; Coelli et al., 2005). Note that MI > 1 denotes progress in the Total Factor Productivity (TFP) change (net effect is positive). MI = 1 denotes no change in TFP, while MI < 1 denotes productivity decline from period t to t+1 (Worthington, 2000).

4. Empirical analysis

The study uses DEA and Malmquist Analysis (MA) in order to measure the relative TE, SE and the Total Factor Productivity Change (TFP change) of the investigated municipalities. Methodologically, we use a two step procedure in empirical analysis. Our decision making units are municipalities. In the first stage, we only use information of their output and input volumes and apply Data Envelopment Analysis (DEA) to derive frontier production functions and related efficiency scores for each municipality. In the second stage we use regression model to explain the variation of efficiency scores among municipalities.

4.1. Data and sources

In Greece, municipalities provide a wide array of essential services. In this study we use three input and four output variables per inhabitant:

X1: total annual expenditures,

X2: total number of employees,

X3: the number of vehicles-machinery

Y1: the number of pupils enrolled in the pre-primary / primary / secondary municipal infrastructures,

Y2: The total quantity of mixed waste in tons leading to landfill or to uncontrolled disposal, Y3: The number of pre-primary / primary / secondary municipal infrastructures and

Y4: The number of beneficiaries from municipal grants.

In particular, the variables are derived from: X1, X3 the municipalities, X2 the Ministry of Administrative Reconstruction, Y1, Y3 the Regional Education Directorates, Y2 the Solid Waste Management Associations, Y4 the Ministry of Labor, Social Security and Social Solidarity. These variables have been used, measured by several authors in order to formulate, analyze and measure efficiency and productivity change of municipalities.

For the data analysis we use the DEAP Version 2.1 software package (Coelli, 1996).

4.2. Descriptive Statistics

Table 2 reports descriptive statistics of inputs and outputs (means, standard deviations maximums and minimums). The findings show that the average trend for X1, X2, Y1, Y2 and Y4 is downward, since most output variables tend to decrease over the period with the exception of the X3 and Y3 that remain more stable.

Table 2:

Variables / Statistics	Inputs			Outputs			
	X1	**X2**	**X3**	**Y1**	**Y2**	**Y3**	**Y4**
2013							
Mean	573,31	0,0055	0,0025	0,1082	0,3564	0,0017	0,0059
St. dev	273,85	0,0028	0,0017	0,0458	0,1946	0,0004	0,0143
Max	1.381,43	0,0152	0,0112	0,1991	1,2259	0,0027	0,0682
Min	212,09	0,0022	0,0008	0,0030	0,0325	0,0004	0,0000
2014							
Mean	515,56	0,0052	0,0025	0,1074	0,3549	0,0017	0,0058
St. dev	253,16	0,0025	0,0017	0,0460	0,1964	0,0004	0,0136
Max	1.685,90	0,0142	0,0112	0,2000	1,2549	0,0027	0,0610
Min	152,87	0,0019	0,0008	0,0031	0,0317	0,0004	0,0000
2015							
Mean	467,89	0,0052	0,0025	0,1061	0,3467	0,0017	0,0057
St. dev	199,30	0,0025	0,0018	0,0465	0,2128	0,0004	0,0133
Max	1.155,63	0,0144	0,0112	0,2036	1,3553	0,0027	0,0576
Min	145,35	0,0019	0,0008	0,0024	0,0291	0,0004	0,0000
2016							
Mean	456,45	0,0051	0,0025	0,1051	0,3536	0,0017	0,0066
St. dev	194,45	0,0025	0,0018	0,0473	0,2077	0,0004	0,0129
Max	1.220,09	0,0144	0,0117	0,2055	1,3491	0,0027	0,0523
Min	205,36	0,0019	0,0009	0,0022	0,0276	0,0004	0,0000

Source: Author's calculation

4.3. First stage: Measuring Relative Efficiency, Productivity Change and Discussion

The analytical results (CRSTE, VRSTE, SE, EC, TC, PEC, SEC, TFP change) of the Municipalities for each of the four years are presented in the Appendices. The average performance values for the period 2013-2016 are presented in the table 3.

When focus is on the whole sample, average CRSTE efficiency score is 0.772 (77.2%). This means that municipalities could produce the same quantities of outputs with 0.228 (22.8%) less quantities of inputs. Minimum efficiency score is 0.320 and maximum 1.000. The number of 100% efficient municipalities is 7 (DMUs: 1, 4, 8, 16, 31, 33, 50). Average VRSTE efficiency score is 0.878 (87.8%). This means that municipalities could produce the same quantities of outputs with 0.122 (or 12.2%) less quantities of inputs. Minimum efficiency score is 0.437 and maximum 1.000. The number of 100% efficient municipalities is 20 (DMUs: 1, 4, 8, 13, 14, 16, 26, 29, 30, 31, 33, 34, 35, 36, 39, 40, 44, 45, 47, 50). Furthermore, Municipalities operate close to the optimal scale, SE=0.883 (refrain 11.7% from the optimal scale).The results are consistent with previous studies (Worthington and Dollery (2000b), Seifert & Nieswand (2014), Pevcin (2014b), Lo Storto (2016)).

The findings also shows that relatively large municipalities with population criteria (population>average population) have comparatively higher efficiency rates (CRSTE=0.876, VRSTE=0.917, SE=0.953) than smaller municipalities (CRSTE=0.739, VRSTE=0.866, SE=0.862). Relatively small municipalities are wasting more resources than relatively large ones. Also municipalities of Thessaly could on average produce the same quantity of outputs with 5.1% less quantity of inputs, whereas municipalities of Central Greece with 19.2%. Table 4 reports the number of municipalities and the average efficiency scores and shows that 17 municipalities have average CRSTE ranging between 0.600 and 0.800, 28 municipalities have average VRSTE ranging between 0.900 and 1.000 and 33 municipalities have average SE ranging between 0.900 and 1.000.

Table 4:

EFFICIENCY SCORE	CRSTE	VRSTE	SE
[0 - 0.600)	8	3	3
[0.600 – 0.800)	17	11	7
[0.800 – 0.900)	10	8	7
[0.900- 1.000]	15	28	33

Source: Author's Calculation

The Malmquist TFP results (Agasisti et al (2015), Sung (2007), Kutlar and Bakirci (2012)) presented in Table 3. The findings indicate that municipalities on average experienced an approx. 3.3% increase in average productivity. In addition we found that the productivity gain may be primarily attributed to a change in relative efficiency and to technical progress. EC increased by 18% while average technological progress improved by 14%. On average, improvements in PEC are the main reasons for the improvements in EC. The average PEC, which measures changes in VRSTE indicates that there is an improvement of 12% over the examined period. Municipalities of Central Greece have higher values of TFP change than municipalities of Thessaly. Also Municipalities of Central Greece have higher values of EC and lower values of TC than municipalities of Thessaly. Table 5 reports that 38 Municipalities have TFP change >1, ranging between 0,10% and 14,10%.

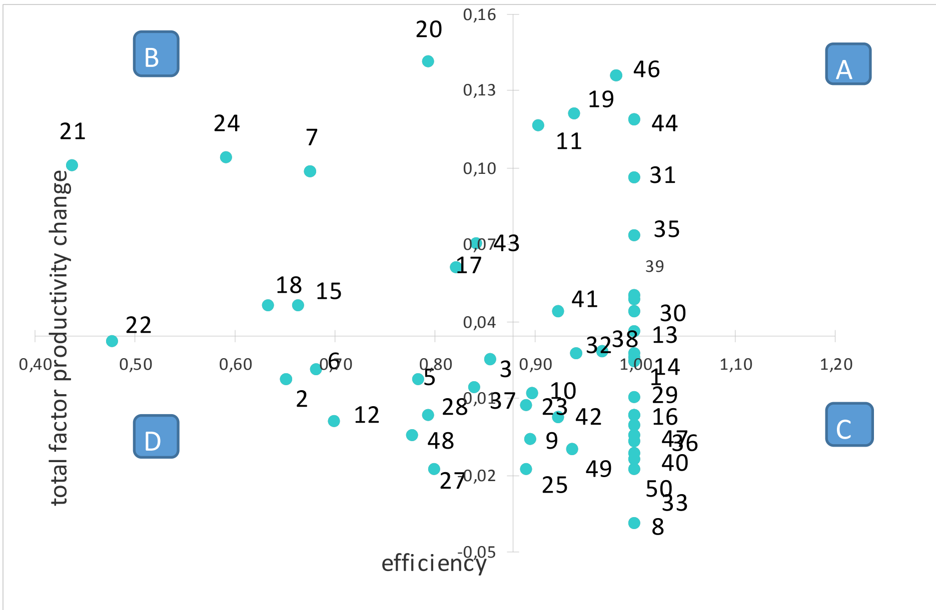
Table 5:

TFP CHANGE / No of municipalities	TFP > 1		TFP < 1		EC >= 1	EC > 1
	TECHCH > 1	EC > 1	TECHCH < 1	EC<1		
	30	8	7	5	32	18

Source: Author's Calculation

12 Municipalities have TFP change < 1 ranging between –0.10% and –3.90%. This means that it was poor technology which needed to be updated or that it has not been used best-practice technology in the management. 16% of Municipalities have no change in efficiency, 48% of Municipalities (experience increase (EC > 1) and the remaining 36% decrease (EC < 1). As a next step, we classify Municipalities on the basis of their average VRSTE in the years 2013-2016 and the results of the average TFP change in the period 2013–2016.

Figure 1: Average VRSTE and TFP change



Source: Author's calculation

The incision of the axes is the point O (mean VRSTE = 0.878, mean TFP = 0.034). The four groups in Figure 1 are characterized as follows:

Quadrant A: High efficiency and positive productivity growth.

Municipalities (DMUS: 11, 19, 46, 44, 31, 35, 3, 30, 41) have the best performance and can be benchmarks for other municipalities. This suggests that they should maintain their position by continuing to implement good strategies so as to fulfill their mission.

Quadrant B: Low efficiency and positive productivity growth.

Municipalities (DMUS: 20, 17, 43, 15, 18, 7, 24, 21, 22,) with medium to low efficiency, have positive productivity growth. Special consideration should be given to these municipalities in order to improve their efficiency by implementing current strategies of productivity improvement.

Quadrant C: High efficiency and negative productivity growth.

Municipalities (DMUS: 10, 23, 42, 9, 25, 49, 32, 38, 14, 1, 29, 16, 47, 36, 40, 33, 50, 8) still maintains a good efficiency in managing their resources, in spite of their productivity decline. Moreover, if they do not want to lose their current position they have to maintain a rapid growth, by maintaining positive technological change.

Quadrant D: Low efficiency and negative productivity growth

Municipalities in the bottom-left quadrant (DMUS: 2, 6, 12, 27, 48, 28, 5, 3) are those that have medium-low efficiency in managing their resources. Special attention should be given to those municipalities so as to diagnose their problems and to improve their efficiency.

5. Second Stage: OLS Analysis

At the second stage of our two step analysis, differences in the DEA efficiency scores are explained by characteristics of municipalities. The regression model explaining variation of efficiency scores among municipalities were estimated with the 2013-2016 data. OLS being the estimation method.

Table 6: OLS Regression analysis results

Variables	Coefficient
Z1	0.195 *(1.122)* *n.s.*
Z2	-0.197 *(-1.406)* *n.s.*
Z3	0.307 (2.070) **
Z4	0.298 *(1.835)* **
Z5	0.151 *(1.108)* ns
Z6	-0.094 *(-0.064)* ns
Z7	-0.188 (-1.286) ns
R	0.261
Adj. R^2	0.138
F	2.122

Note: 1)***, **, * level of statistic significance 1%, 5% και 10%, n.s. non-significant
2) Numbers in parentheses show the t- statistic values
3) Source: Author's calculation

Table 6 reports the results of the OLS regression analysis and presents the variables that were considered in the DEA second stage analysis: number of unemployed as percentage of population (Z1), education level of mayor (Z2), type of municipality (Z3), population density (Z4), mayor's gender (Z5), number of amalgated municipalities (Z6), distance from the center of the region (Z7). The use of these variables are consistent with the existing literature. For this purpose, the exogenous variables regressed with efficiency score includes values between zero and one. Relationships between these variables in the regression model formulated as follows:

$$T.E.i = a + b_1Z_1 + b_2Z_2 + b_3Z_3 + b_4Z_4 + b_5Z_5 + b_6Z_6 + b_7Z_7 + e_i$$

where, i is the municipality to i (i = 1, ..., 50), T.E is the efficiency score, and ϵ is the error term. A positive sign of the coefficient indicates that this latter is positively associated to VRSTE while a negative sign denotes an unfavorable association. The value of R2 is satisfactory, since the data are cross-section. It turned out that number of unemployed as percentage of population, education level of mayor, mayor's gender, number of amalgated municipalities and distance from the center of the region did not explain efficiency differences and had no effect on efficiency. Of the variables examined, only Z3, Z4 have statistically significant and positive effect on VRSTE (Z3 higher statistical effect than Z4). As expected, the type pf municipality and the population density is related to high efficiency. Our location variable (Z3) proved to be the most significant explanatory variable in our estimation results, getting high t-value. For variable population density (Z4) statistically positive and significant impact on the efficiency of local government. This relationship according to Borger and Kerstens (1996) and Afonso and Fernandes (2008) interpreted that a dense residential structure with a portion of the population who live in it, has relatively higher positive effect on efficiency that have a population structure that is relatively less dense.

6. Concluding remarks and policy implications

This paper contributes to the literature on the empirical understanding of relative efficiency and productivity change in the two Greek representative regions (Thessaly and Central Greece). Additionally it determinates the factors, which affects the efficiency coefficients. From empirical analysis and discussion, the following key conclusions are drawn:

i. The average values of technical efficiency under variable and constant returns to scale, scale efficiency and total factor productivity change of the municipalities are in line with the results of European and non- European countries.
ii. Over the four years considered, there was a gradual improvement (year by year) of the average efficiency and productivity of the municipalities.
iii. The best performance (efficiency> mean VRSTE, productivity> mean TFP) have 9 of the 50 municipalities (18%), and can be benchmarks for the other municipalities. The rest of them should try to learn from best practices in order to improve their own performance. That is paramount for a better use of scarce public resources in the context of the European Union's strategic direction to optimize resource use.
iv. Relatively large municipalities with population criteria have comparatively better performances on average than relatively small ones
v. The environmental variables, population density and type of municipality, have statistically significant positive effect on the municipality efficiency score.
vi. Municipalities of Thessaly have on average better performance than municipalities of Central Greece

In fact, by giving insight into the causes of inefficiency, this helps to further identify the reasons for local inefficient behaviour and may support effective policy measures to correct and or control them. Our study, also helps to the ongoing discussion about the need and form of reforms in basic service provision. The proposals have included increasing municipality sizes by mergers or increasing voluntary cooperation of municipalities to make them more efficient. Decision makers at both municipal and central government levels, have to recognize the significance of the findings. Appropriate policy measures will lead to an improvement in the performance of all municipalities and, especially, those with low performance. By merging two or more municipalities into a single new municipality or sharing the provision of public services creating an association or a consortium of municipalities has also benefits in terms of elimination of administrative and political body duplication. Also the establishment of an observatory that aims to systematically measure and monitor the efficiency and productivity change of municipalities, contributes positively to linking performance to resource allocation. In this direction, the introduction of an incentive-based system which will reward efficient municipalities and trigger surveillance programs for those who need to improve, is very important.

Undoubtedly, a need exists to continue the study and to improve certain factors that have not been adequately considered herein. Further research is needed to broaden the scope of services analyzed, with different combinations of inputs and outputs. Besides, repeating the survey year after year would enhance comparisons and allow investigating the evolution of municipal efficiency while the country has come out of the strict monitoring of the memorandums.

References

Afonso A, Fernandes S (2003) Efficiency of local government spending: evidence for the Lisbon region. Technical report no. 2003/09, ISEG-School of Economics and Management, Department of Economics, University of Lisbon.

Afonso A, Fernandes S (2006) Measuring local government spending efficiency: evidence for the Lisbon region. Regional Studies 40(1): 39–53

Afonso A, Fernandes S (2008) Assessing and explaining the relative efficiency of local government. Journal of Socio- Economics 37(5): 1946–1979

Agasisti T, Dal Bianco A, Griffini M (2015) The public sector fiscal efficiency in Italy: the case of Lombardy municipalities in the provision of the essential public services. Technical report, Societa Italiana di Economia Pubblica.

Andrews R, Entwistle T (2015) Public–private partnerships, management capacity and public service efficiency. Policy & Politics 43(2): 273–290

Aparicio J, Cordero JM, Pastor J T (2017) Productivity change of Portuguese municipalities after local reforms, Applied Economics Letters 24(12): 878-881

Arcelus F J, Arocena P, Cabases F, Pascual P (2015) On the cost-efficiency of service delivery in small municipalities. Regional Studies 49(9): 1469–1480

Asatryan Z, De Witte K (2015) Direct democracy and local government efficiency. European Journal of Political Economy 39: 58–66

Ashworth J, Geys B, Heyndels B, Wille F (2014) Competition in the political arena and local government performance. Applied Economics 46(19) : 2264–2276

Balaguer-Coll M.T, Prior D, Tortosa-Ausina E (2007) On the determinants of local government performance: a two-stage nonparametric approach. European Economic Review 51(2): 425–451

Balaguer-Coll MT, Prior D (2009) Short-and long-term evaluation of efficiency and quality. An application to Spanish municipalities. Applied Economics 41(23): 2991–3002

Balaguer-Coll MT, Prior D, Tortosa-Ausina E (2010a) Decentralization and efficiency of local government. Annals of Regional Science 45(3): 571–601

Balaguer-Coll MT, Prior D, Tortosa-Ausina E (2010b) Devolution dynamics of Spanish local government. Environment and Planning 42(6): 1476–1495

Balaguer-Coll MT, Prior D, Tortosa-Ausina E (2013) Output complexity, environmental conditions, and the efficiency of municipalities. Journal of Productivity Analysis 39(3): 303–324

Banker RD, Charnes A, Cooper WW (1984) Some models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. Management Science 30: 1078-1092

Barone G, Mocetti S (2011) Tax morale and public spending inefficiency. International Tax and Public Finance 18(6): 724–749

Benito B, Bastida F, Garcıa J A (2010) Explaining differences in efficiency: an application to Spanish municipalities. Applied Economics 42(4): 515–528

Bischoff I, Bonisch P, Haug P, Illy A (2013) Vertical grants and local public efficiency. Technical report no. 1/2003, Halle Institute for Economic Research (IWH), Germany

Boetti L, Piacenza M, Turati G (2012) Decentralization and local governments' performance: how does fiscal autonomy affect spending efficiency? FinanzArchiv 68(3): 269–302

Bonisch P, Haug P, Illy A, Schreier L (2011) Municipality size and efficiency of local public services: does size matter? Technical report no. 18/2011, Halle Institute for Economic Research (IWH), Germany.

Borge L-E, Falch T, Tovmo P (2008) Public sector efficiency: the roles of political and budgetary institutions, fiscal capacity, and democratic participation. Public Choice 136(3-4): 475–495.

Bruns C, Himmler O (2011) Newspaper circulation and local government efficiency. Scandinavian Journal of Economics 113(2): 470–492

Carosi L, D'Inverno G, Ravagli L (2014) Global public spending efficiency in Tuscan municipalities. Technical report, Dipartimento di Economia e Management (DEM), University of Pisa, Italy

Carosi L, D'Inverno G, Ravagli L (2018) Global public spending efficiency in Tuscan municipalities. Socio-Economic Planning Sciences 61: 102-113

Caves D, Christensen L and Diewert W (1982) The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity. Journal of the Econometric Society 50(6): 1393-1414

Charnes A, Cooper WW, Rhodes E (1978) Measuring the efficiency of decision making units. European Journal of Operational Research 2(6): 429-444

Chen Shiyi Zhang Jun (2009) Empirical research on fiscal expenditure efficiency of local governments in China: 1978–2005. Social Sciences in China 30(2): 21-34

Coelli T. A guide to DEAP version 2.1: a data envelopment analysis (computer) program. CEPA Working Paper 96/08. Armidale, Australia: Departments of Econometrics, University of New England; 1996.

Cordero JM, Pedraja-Chaparro F, Pisaflores EC, Polo C (2016) Efficiency assessment of Portuguese municipalities using a conditional nonparametric approach. Technical report no. 70674, Munich University Library, Germany.

Cuadrado-Ballesteros B, Garcıa-Sanchez I-M, Prado-Lorenzo J-M (2013) Effect of modes of public services delivery on the efficiency of local governments: a two-stage approach. Utilities Policy 26(2): 23–35

Da Cruz NF, Marques RC (2014) Revisiting the determinants of local government performance. Omega 44: 91–103

De Borger B, Kerstens K (1996a) Cost efficiency of Belgian local governments: a comparative analysis of FDH, DEA, and econometric approaches. Regional Science and Urban Economics 26(2): 145–170

De Borger B, Kerstens K (1996b) Radial and nonradial measures of technical efficiency: an empirical illustration for Belgian local governments using an FDH reference technology. Journal of Productivity Analysis 7(1): 41–62

De Borger B, Kerstens K, Moesen W, Vanneste J (1994) Explaining differences in productive efficiency: an application to Belgian municipalities. Public Choice 80(3-4): 339–358

De Sousa M D C S, Cribari –Neto F, Stosic B D (2005) Explaining dea technical efficiency scores in an outlier corrected environment: the case of public services in brazilian municipalities. Brazilian Review of Econometrics 25(2): 287-313

De Sousa M. D. C. S., Stosic B (2005). Technical efficiency of the Brazilian municipalities: correcting nonparametric frontier measurements for outliers. Journal of Productivity analysis 24(2): 157-181

Debreu G (1951) The Coefficient of Resource Utilization: Journal of the Econometric Society 19(3): 273-292

Dollery B, van der Westhuizen G (2009) Efficiency measurement of basic service delivery at South African district and local municipalities. Journal for Transdisciplinary Research in Southern Africa 5(2): 13

El Mehdi R, Hafner C M (2014) Local government efficiency: the case of Moroccan municipalities. African Development Review 26(1): 88–101

Fare R, Crosskopf S, Norris M, Zhang Z (1994) Productivity Growth, Technical Progress and Efficiency Change in Industrialized Countries. The American Economic Review 84: 66-83

Fare R, Crosskopf S, Logan J, Lovell C.A. (1985) Measuring Efficiency in Production: With an Application to Electric Utilities. Managerial Issues in Productivity Analysis 7: 185-214

Farell MJ (1957) The measurement of productive efficiency: Journal of the Royal Statistical Society Series A (General) Part III 120: 253-290

Fogarty J, Mugera A (2013) Local government efficiency: evidence from Western Australia. Australian Economic Review 46(3): 300–311

Geys B (2006) Looking across borders: a test of spatial policy interdependence using local government efficiency ratings. Journal of Urban Economics 60(3): 443–462

Geys B, Heinemann F, Kalb A (2010) Voter involvement, fiscal autonomy and public sector efficiency: evidence from German municipalities. European Journal of Political Economy 26(2): 265–278

Geys B, Heinemann F, Kalb A (2013) Local government efficiency in German municipalities. Raumforschung und Raumordnung 71(4): 283–293

Geys B, Moesen W (2009a) Exploring sources of local government technical inefficiency: evidence from Flemish municipalities. Public Finance and Management 9(1): 1–29

Geys B, Moesen W (2009b) Measuring local government technical (in)efficiency: an application and comparison of FDH, DEA and econometric approaches. Public Performance and Management Review 32(4): 489–504

Gimenez VM, Prior D (2007) Long- and short-term cost efficiency frontier evaluation: evidence from Spanish local governments. Fiscal Studies 28(1): 121–139

Grossman PJ, Mavros P, Wassmer RW (1999) Public sector technical inefficiency in large US cities. Journal of Urban Economics 46(2): 278–299

Haneda S, Hashimoto A, Tsuneyoshi T (2012) Evaluating administrative efficiency change in the post-merger period: a study on Ibaraki prefecture (1979–2004). International Regional Science Review 35(2): 237–262

Helland L, Sørensen RJ (2015) Partisan bias, electoral volatility, and government efficiency. Electoral Studies 39: 117–128

Ibrahim F, Karim M (2004) Efficiency of local governments in Malaysia and its correlates. International Journal of Management Studies 11(1): 57–70

Ibrahim FW, Salleh MFM (2006) Stochastic frontier estimation: an application to local governments in Malaysia. Malaysian Journal of Economic Studies 43(1/2): 85

Kalb A (2010) The impact of intergovernmental grants on cost efficiency: theory and evidence from German municipalities. Economic Analysis and Policy 40(1): 23–48

Kalb A, Geys B, Heinemann F (2012) Value for money? German local government efficiency in a comparative perspective. Applied Economics 44(2): 201–218

Kalseth J, Rattsø J (1995) Spending and overspending in local government administration: a minimum requirement approach applied to Norway. European Journal of Political Economy 11(2): 239–251

Koopmans T (1951) Efficient Allocation of Resources: Journal of the Econometric Society 19: 455-465

Kutlar A, Bakirci F (2012) An analysis on the economic effectiveness of municipalities in Turkey. African Journal of Marketing Management 4(3): 80–98

Lampe H, Hilgers, D, Ihl, C (2015) Does accrual accounting improve municipalities efficiency? Evidence from Germany. Applied Economics 47(41): 4349–4363

Lin Ming-Ian Lee, Yuan-Duen Ho, Tsai-Neng (2011) Applying integrated DEA/AHP to evaluate the economic performance of local governments in China. European Journal of Operational Research. 209(2): 129-140

Liu S-C, Peng P S. -Y C-J, Wu P-C (2011) Local government efficiency evaluation: consideration of undesirable outputs and super-efficiency. African Journal of Business Management 5(12): 4746–4754

Lo Storto C (2013) Evaluating technical efficiency of Italian major municipalities: a Data Envelopment Analysis model. Procedia Social and Behavioral Sciences 81: 346–350

Lo Storto C (2016) The trade-off between cost efficiency and public service quality: a non-parametric frontier analysis of Italian major municipalities. Cities 51: 52–63

Loikkanen H A, Susiluoto I (2005) Cost efficiency of Finnish municipalities in basic service provision 1994–2002.Urban Public Economics Review 4: 39–64

Loikkanen H A, Susiluoto I, Funk M (2011) The role of city managers and external variables in explaining efficiency differences of Finnish municipalities. Discussion Paper 312, Helsinki Centre for Economic Research (HECER), University of Helsinki, Finland

Mahabir J (2014) Quantifying inefficient expenditure in local government: a Free Disposable Hull analysis of a sample of South African municipalities. South African Journal of Economics 82(4): 493–513

Marques RC, Kortt MA, Dollery B (2015) Determining the optimal size of local government: the case of Tasmanian councils. Australian Journal of Public Administration 74(2): 212–226

Michailov A, Tomova M, Nenkova P (2003) Cost efficiency in Bulgarian municipalities. Working Paper s, 2003 - unpan1.un.org

Monkam N F (2014) Local municipality productive efficiency and its determinants in South Africa. Development Southern Africa 31(2): 275–298

Moore A, Nolan J, Segal GF (2005) Putting out the trash measuring municipal service efficiency in US cities. Urban Affairs Review 41(2): 237–259

Nakazawa K (2013) Cost inefficiency of municipalities after amalgamation. Procedia Economics and Finance 5: 581–588

Nakazawa K (2014) Does the method of amalgamation affect cost inefficiency of the new municipalities? Open Journal of Applied Sciences 4(4): 143–154

Nijkamp P, Suzuki S (2009) A generalized goals-achievement model in Data Envelopment Analysis: an application to efficiency improvement in local government finance in Japan. Spatial Economic Analysis 4(3): 249–274

Nikolov M, Hrovatin N (2013) Cost efficiency of Macedonian municipalities in service delivery: does ethnic fragmentation matter? Lex Localis 11(3): 743-775

Pacheco F, Sanchez R, Villena M (2014) A longitudinal parametric approach to estimate local government efficiency. Technical report, Munich University Library, Germany

Perez-Lopez G, Prior D, Zafra-Gomez JL (2015) Rethinking New Public Management delivery forms and efficiency: long-term effects in Spanish local government. Journal of Public Administration Research and Theory 25(4): 1157–1183

Perpina I N, De Witte K (2018) Local governments' efficiency: a systematic literature review—part I International Transactions in Operational Research 25: 431-468

Perpina I N, De Witte K (2018) Local governments' efficiency: a systematic literature review—part II International Transactions in Operational Research 25: 1107-1136

Pevcin P (2014a) Costs and efficiency of municipalities in Slovenia. Lex Localis 12(3): 417-429

Pevcin P (2014b) Efficiency levels of sub-national governments: a comparison of SFA and DEA estimations. TQM Journal 26(3): 275–283

Prieto AM, Zofio JL (2001) Evaluating effectiveness in public provision of infrastructure and equipment: the case of Spanish municipalities. Journal of Productivity Analysis 15(1): 41–58

Radulovic B, Dragutinovic S (2015) Efficiency of local self-governments in Serbia: an SFA approach. Industrija 43(3):123–142

Revelli F (2010) Spend more, get more? An inquiry into English local government performance. Oxford Economic Papers 62(1): 185–207

Revelli F, Tovmo P (2007) Revealed yardstick competition: local government efficiency patterns in Norway. Journal of Urban Economics 62(1): 121–134

Seifert S, Nieswand M (2014) What Drives Intermediate Local Governments' Spending Efficiency: The Case of French Départements Local Government Studies 40(5): 766-790

Seol H, Lee H, Kim S, Park Y (2008) The impact of information technology on organizational efficiency in public services: a DEA-based DT approach. Journal of the Operational Research Society 59(2): 231–238

Sørensen RJ (2014) Political competition, party polarization, and government performance. Public Choice 161(3-4): 427–450

Stastna L, Gregor M (2011) Local government efficiency: evidence from the Czech municipalities. Technical report no.14/2011, Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic.

Stastna L, Gregor M (2015) Public sector efficiency in transition and beyond: evidence from Czech local governments. Applied Economics 47(7): 680–699.

Sung N (2007) Information technology, efficiency and productivity: evidence from Korean local governments. Applied Economics 39(13): 1691–1703

Worthington AC, Dollery BE (2000b) Measuring efficiency in local governments' planning and regulatory function. Public Productivity & Management Review 29(2): 469–485

Yusfany A (2015) The efficiency of local governments and its influence factors. International Journal of Technology Enhancements and Emerging Engineering Research 4(10): 219–241

Zafra-Gomez JL, Muniz-Perez AM (2010) Overcoming cost-inefficiencies within small municipalities: improve financial condition or reduce the quality of public services? Environment and Planning C: Goverment and Policy 28(4): 609–629

CHANGES IN HUMAN GEOGRAPHY: SCENARIOS OF COUNTER-URBANIZATION IN THE CONTEXT OF ECONOMIC CRISIS

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Abstract

The last decade economic developments affected to a large extend the demographic structure of Greece. The period 2001-2011 is characterized by a net slowdown of the intense urbanization trend, while in the context of crisis there have been identified counter-urban trends, revealing new attractiveness zones in the rural areas. These indications of mobility do not concern entirely the countryside as the newcomers settle only in specific rural spatial units. At the same time these areas have specific features that facilitate the establishment of a new population, such as population dynamics, tourism development, agricultural activity, services and structures, reduction of geographical isolation, low cost of living and habitation.

The future of internal migration in Greece heavily depends on existing trends as well as future economic, social and political developments. Though, the lack of official data for the period after 2011 constrains our understanding for the development of internal migration and particularly counter-urban trends in Greece.

The present paper raises the issue of the prospects of the establishment of the Greek population in the countryside, taking into account the pull factors of rural areas. Through Foresight and Strategic Thinking Methods, a longer-term framework is being developed to reflect the potential strategic choices of the internal migrants. This approach is based on a mainly qualitative analysis, scenario planning, in order to present the prerequisites for the further development of such a type of mobility.

Keywords: foresight, scenario planning, internal migration, population, countryside
JEL classification: J1, J6, J11, R23

1. Introduction

Recent studies concerning the internal migration (to a large spatial scale) show the Greeks' population mobility trend from urban to rural areas as developing phenomenon, however of limited intensity compared to other European countries (Gkartzios 2013). The internal migrants' search focuses on the added value, which the perspective place of settlement has to offer to the newcomers. The pull factors that make rural space attractive, focus on areas with population dynamics, tourism development, agricultural activity, services and structures, reduction of geographical isolation, low cost of living and habitation (Anastasiou and Duquenne 2019).

Main purpose of the study is to examine the prospects of the urban population's settlement in the countryside, in the horizon 2030.The period of the study coincides with the developing recession in Greece, therefore in the light of a more secure approach, the phenomenon is set to examination on a medium-term basis. Consequently, by analyzing the present, both the recession component and its duration will be taken into account to a great extent, since its presence actually increases the environment's unsettledness under which the settlement to the rural is studied.

The qualitative approach of the present is based upon the valuation of the conditions which prevail in the external environment (economic, social, technological, and political) in combination with the Greek countryside's attractiveness factors. Through prospective methods and in particular Strategic Thinking, there will turn out a spectrum of possible scenario as far as the prospects of the Greek settlement in the countryside are concerned. On the one hand the alternative scenarios which will be raised will make it clear whether the settlement in the countryside constitutes a phenomenon which was founded in Greece under the circumstances of the financial crisis and what will be the trend of it in the post crisis era.

On the other hand, scenarios will play a major role in the decision making process as well as in the policymaking in order to plan strategies concerning the revival of the countryside.

2. Return to the countryside in the context of crisis in Greece

In recent decades there is observed an increase in the population of urban areas and moreover an agglomeration effect of the Greek population in the two main metropolitan areas, Athens and Thessaloniki (Kotzamanis and Michou 2010). This population distribution change (Dimelli 2016) is mainly caused due to the depreciation of the primary sector and the simultaneous rapid development of the tertiary one (Pnevmatikos, Polyzos, and Tsiotas 2019). As a result, due to the depopulation a large part of the rural areas is characterized as fragile, disadvantaged and marginal (Hadjou and Duquenne 2013). It is evident through the censuses that the alpine population is leaving the mountainous settlements for destinations with urban identity (Xanthos, Ladias, and Genitsaropoulos 2013). At the same time though, the Greek countryside has started changing and transforming to a place of multiple economic and social activities development (Gousios 1999). There is furthermore a trend to focus on the improvement of quality of life in the rural areas rather than primary sector competitiveness (Papadopoulou, Papalexiou, and Hasanagas 2012).

The examination of the settlement in the countryside during the decade 2001-2011 has shown a trend on out of the urban space (Anthopoulou, Kaberis, and Petrou 2017; Anthopoulou and Petrou 2015; Anastasiou and Duquenne 2017). The economic crisis in Greece affected directly and to a large extends the urban areas. Region of Attica (includes the metropolitan area of Athens) has suffered a significant stress, mainly due to the nature of the economic activities developed there. At the same time, rural space has been shown to be more resilient to the economic crisis (Psycharis, Kallioras, and Pantazis 2014).

A great part of the Greek countryside (30% on urban municipal inflows) is characterized by a particularly remarkable counter urban flows intensity (10% - 25%), whereas the settlement takes place in the predominant rural and semi-rural municipalities (Anastasiou and Duquenne 2017). The onset of the crisis in Greece and specifically the period 2008-2011, coincides with the move of almost 17,000 people from the urban space to rural areas in order to work in the primary sector (Kasimis and Papadopoulos 2013). Qualitative surveys link these movements with the existence of high family ties and owned property (Gkartzios 2013). Furthermore, quantitative research reveals that a vast majority of young Athenians, especially those stricken by unemployment, is willing to change place of residence and move towards non-metropolitan destinations (Remoundou, Gkartzios, and Garrod 2016).

The Greeks moving in the internal part of the country go to various places: each age group moves to specific regions according to their needs. Despite the fact that the urban population's tendency to settle in the countryside was diagnosed (Koutsou and Anthopoulou 2008; Duquenne 2009), these movements had a particular intention, while the movers' flows were seen in particular patterns of regions (Anastasiou and Duquenne 2017), in other words there exist several types of rural mobilities (Pratsinakis, Hatziprokopiou, and King 2017). The majority of these municipal inflows is nowhere near to some urban center and is concentrated mostly on mountainous as well as insular and coastal parts of Greece. This fact confirms that it is not just about an urban influence to the neighboring space, but there is indeed a developing rural trend of a new classification in the population, resulting in the reformation of the predominantly rural countryside both to a social and economic level.

Discussions about the rural settlement of the Greeks amid the economic crisis are taking place within the academic community. What is at stake here is the likelihood of the countryside's revitalization, since counter-urban trend was not a temporary phenomenon but was actually confirmed over the next ten years. The recession Greece suffered starting in 2008, was probably the onset of the emergence of urban mobility flows in the Greek countryside. Given that, what is raised here is as to what extend this recession acted as a motive of a real change of lifestyle. However, the bibliography along with the exploratory research focusing on the counter urban trends in the context of the crisis is limited (Gkartzios 2013; Anthopoulou, Kaberis, and Petrou 2017), whereas the census data do not include the reasons for changing place of residence and therefore it is complicated to come to reliable conclusions. A recent qualitative research conducted in Greece depicts the relocation and/or the willingness of relocation of Athenian households to the Greek province in the context of the crisis (Gkartzios and Scott 2015). Empirical studies also reveal that a respectively big proportion of counter-urbans associate their move to the rural with the crisis, whereas the relocation is focused on medium sized towns (Gkartzios, Remoundou, and Garrod 2017).

3. Foresight philosophy and scenario planning methodology

It is acknowledged that the attempts to make accurate predictions for specific future points encrypt high risk and thus there has been established an alternative way of thinking that incorporates a number of possible futures (Portaleoni et al. 2013). Foresight is a planning method developed initially by military planning that, especially in the last decade, is applied in European social policy in order to combine possible futures, strategic planning and policy making (Kurekova 2014; Stratigea 2014). Foresight is highly connected to the human capacity (Conway 2004) and concerns our ability to think of the future systematically and make "mental maps" (Central & East European Health Policy Network 2012) for the ultimate purpose of making decisions in the present (Voros 2001). These kind of future mental maps, in other words the alternative future scenarios, might happen, but they also might not happen (Vah Jevšnik and Toplak 2014). Strategic thinking (Foresight) is the first part of the Strategy development process, followed by Strategic Decision Making and Strategic Planning. At this stage it is not paid the proper attention, since thinking is just a vague meaning and it cannot directly produce quantitative results (Conway 2014), nevertheless is the key stage for developing strategies.

Foresight methodologies are classified into four successive levels (Table 1) depending on the questions to be answered (Input, Foresight, Output, Strategy).

Table 1: Foresight Methodologies Classification

	Levels	Questions	Representative Tools
	Input	What is going on?	Delphi, Environmental Scanning
Foresight	Analysis	What seems to be happening?	Trend analysis, cross-impact matrices
	Interpretation	What's really happening?	Systems Thinking Causal Layered Analysis
	Prospection	What might happen?	Scenarios, Visioning Normative methods, Backcasts
	Output	What might we need to do?	Reports, Presentations Workshops
	Strategy	What will we do? How will we do it?	Strategy Development & Strategic Planning: individual, workgroup, society, etc

Source: (Voros 2003), Author's compilation

Foresight features a deep diversification in relation to the alternative prediction methods. It uses a multi-scientific approach based on the principle that not all problems that we face can be made logically sustainable if they are broken down to one dimension and divided into several parts. Instead, Foresight suggests an approach which is aware of the realities as a whole, including all variables acting on them, regardless of their type (De Jouvenel 2004).

The Prospective methods constitute the most crucial and creative stage for the development of a strategy. Since the future is explored, the actors are creating images concerning potential future developments on which they can try their strategy through questions such as "What if…?". The most important fact is that future potential dangers are being examined, yet without having consequences to be transferred to the present. The prospective methods are in pursuit of developing a viewpoint of alternative future prospects regarding a phenomenon. Programming scenarios is a well-known prospective method which is cooperative and not an isolated activity (Ogilvy 2000). The scenario development is an anthropocentric method demanding knowledge and expertise as combines and intersects information about the external environment as well as information about the internal one.

The scenario planning aim as in every "future" method is not to foresee the future since this is impossible (De Jouvenel 2004), but to project some alternatives as to what may be possible to happen. The exploration of the alternative futures requires a cautious approach since is the mainstay of strategy developments. When scenario making is done properly then fresh and innovative ways of thinking arise. The most critical point here is that scenario planning is a tool, not an output (Conway 2014), while there is a specific methodological framework to be followed (Table 2).

Table 2: The scenario development stages

Stages	Description
Definition of the scope	Time frame Scope of the analysis
Environmental Scanning	Internal Environment External Environment Driving Forces - Basic Trends
Identification of Key Uncertainties	Evaluation of driving forces
Scenario Matrix	Influence – Uncertainty Grid
Scenario Development	Intuition, sensibility

Source: (De Jouvenel 2004)

Each scenario describes the result of the combination of a series of elements. This process incorporates past and present information, to be interpreted with reference to probe future strategic possibilities. The scenarios are based on the analysis and interpretation of the information about the external factors of the change, which may be crucial enough for the under study phenomenon (Conway 2004; Voros 2001).

In a review of scenario planning literature on migration and mobility studies it is evident that foresight methods act complementary and consist useful tools for migration policy and decision making in the medium-term future (Kurekova, 2014; Saunders and Arminaite, 2014; Vah Jevšnik and Toplak, 2014; Stratigea, 2014). Furthermore, foresight is a driving force for pushing regional competitiveness as well as resilience (Zakharova et al. 2016).

4. Analysis

The internal environment of the under study phenomenon concerns the main interpretive factors of the settlement in the Greek countryside (pull factors) (Anastasiou and Duquenne, 2019): population dynamics, tourism development, agricultural activity, services and structures, reduction of geographical isolation, low cost of living and habitation. As regards external environment, the future of counter-urbanization in Greece heavily depends on existing trends as well as future economic, social, digital and political developments (Table 3). For this reason, a thorough bibliographic search took place, as well as a series of interviews was contacted to experts of acknowledged research experience, regarding the developments in the countryside and the influence of crisis in the internal migration flows and in particular of the counter-urban ones.

Table 3: External Environment: Definition of Uncertainty level

Drivers of Change	Elements that define the degree of uncertainty	Uncertainty

Labor Market and Unemployment	Development of Occupation, Work cycle index in the provision of accommodation and food service activities, Reforms in the labor market, Employees pay, Working Poor, Total unemployment, Youth unemployment, Long-term unemployment	High
Brain Drain	Development of the external flows of human resources, Gender and age migration balance (20-39 years), High specialization of external migrants, Tension of repatriation of foreign migrants, Social distrust	Medium
Demographic Developments	Low fertility rates, High life expectancy, Demographic aging Increase of the aged population, Negative migration balance, Negative natural balance, OECD, UNPP, Eurostat and Dianeosis Predictions	Low
Digital Integration	ICT development, Digital Economy and Society Index (SEDI), limited broadband connection of high speed, high broadband coverage of rural areas, Connectivity, Specialization of human capital in ICT, Digitization of public services, Digital skills, Private investment for NGA	Medium
Development of Economy	International Economy, Change of domestic production, Growth rate, Household consumption, Evolution of private investment, Competition, Public Debt, Primary surplus, Inflation, Trade balance, Poverty risk	High
New Consumption and Production Pattern	Environmental protection, Healthy life, Consumers' perceptions, Price-quality-origin-Food safety, Classical intensive production challenge, Multilateralism, Incorporation of new and innovative technologies, Precision agriculture, Occupational opportunities in the primary sector, Average age of farmers, Rural Income, Attractiveness of the Agricultural Occupation, Education & Training of Farmers and Agronomists, Implementation of the CAP	High
Political Stability	Lack of representation (Parties, Parliament, Government) Quality of Governance Institutions, Ineffective Public Sector, Corruption, Bureaucracy, Opacity, Favoritism, Unreliability, Disputes in Institutions - Leadership - Trade Unions, Low expectations of citizens, Electoral abstention, "Much Representation - Little Democracy"	High
International Relations	Terrorism, Refugee issue, Environmental protection, Brexit, Increase in extreme nationalist forces, Foreign Policy of the USA (North Korea, China, Saudi Arabia), Middle East-Rising Market	High

Source: Author's compilation

The intersection of the drivers of change (external environment) in combination with the main interpretive factors of the settlement to the Greek countryside is illustrated in the Influence-Uncertainty Grid (Table 4). The factors' matrix represents to what extend the researcher thinks that every driver of change influences the internal migration, in relation to the extent of uncertainty of its development in the medium-term future.

Table 4: Influence – Uncertainty Grid

Influence - Uncertainty	**Components**

High - High	Labor Market and Unemployment Development of Economy New Consumption and Production Pattern
High - Medium	Digital Integration Brain Drain
High - Low	Tourists Attractiveness Internal Population Dynamic
Medium - Low	Geographical Isolation
Low - Low	Population Developments
Medium - High	Supply of Structures and Services
Low - High	Political Stability International Relations

Source: Author's compilation

The Strategic Thinking methodology defines extensively and precisely the way of building the scenarios. However, since the analysis concerns a predominantly qualitative approach, the development of potential future scenarios to a large extend involves the subjective perception of the researcher concerned.

5. Results

The drivers of change (components) involved in the final grid of scenarios are those that, according to the researcher, show High-High, Medium-High and High-Medium levels of influence-uncertainty as concerns counter-urbanization in Greece. All drivers of change are featured, each one along with three alternative hypotheses, regarding their development within the study period (Table 5). The alternative hypotheses illustrate three potential outcomes of the drivers of change, as regards the settlement in the countryside: The first hypothesis illustrates the adverse scenario, the second the moderate one, whereas the third depicts the best development of the settlement to the rural during the study period. According to scenario planning methodology the following suggestions are in force: the first three components concern the external environment, whereas regarding their participation in the scenarios it is recommended that two out of the three should be necessarily used. The fourth and fifth component concern the interpretive factors of the countryside's attractiveness and the methodological frame points out the participation of at least one out of the two in order to build a scenario. Finally, the sixth and seventh components concern the external environment of the analysis and their participation in the scenarios' formation is optional.

	HYPOTHESES		
Drivers of Change	**HYPOTHESIS 1**	**HYPOTHESIS 2**	**HYPOTHESIS 3**
Labor Market and	Persistence of the	Limited downward	Progressive reduction

Unemployment	unemployment level and jobs cut	trend and keep of unemployment at high levels	in unemployment and creation of new jobs
Economy	Stagnation in current levels	Limited and slow recovery	Intense and fast recovery
New Consumption and Production Pattern	Application of obsolete productive practices & not essential changes in the consumer's attitude	Limited application of new practices & not gradual change in the consumer's attitude	Important turn to new productive procedures and consumption patterns
Internal Population Dynamics	Reversion	Stability	Durability
Tourist Attractiveness	Decline in tourism activity	Stability in tourism activity	Growth in tourism activity
Supply of Structures and Services	Stop of several structures' operation	Keep of the existing structures	Creation of new structures
Digital Integration	Keep of the lag	Progressive digital development	Intensification of digital growth

Source: Author's compilation

Theoretically, 343 possible hypotheses combinations result from the Scenarios Grid. However most of these combinations don't have reasonable interpretations. To what extent can the "keep of unemployment level" hypothesis be in line with "Intense and fast recovery" in the economy? Consequently, the most rational combinations were looked into and finally five main scenarios were built. The first scenario constitutes the most unfavorable, while the fifth one would be the most ideal.

- <u>Scenario 1: Stop of the settlement trend to the countryside and upward urbanization trends</u>

  The exceptionally adverse scenario1 includes hypotheses which not only interrupt the settlement to the countryside, but on the contrary they favor urbanization trends. There emerge strong indications that the counter-urbanization stops, given that the hypotheses' crosschecking pave the way for further urbanization. In this scenario Greece has gotten away from the financial nadir; however, that has not been perceptible at a micro-economic level. Preservation of the unemployment, ceteris paribus, stirs up mobility in the internal part of the country. A potential progressive reduction in unemployment and the creation of new jobs, in combination with the rest of the components, encourages a part of rural population to move to the urban areas. On the contrary, it discourages urban inhabitants to migrate to the countryside.

  This concept is further enhanced by the fact that the negative perception about the rural sector is still in force. At the same time the classic pattern of the Greek traditional farming keeps preserving its dynamics, resulting in the non-application of new methods and practices. Consequently, young capable people who have the know-how needed to revive Greek farming and to promote their agricultural holding are discouraged. So, they find their way out by seeking occupational opportunities in the urban space, where more possibilities arise. Therefore, despite the fact that agriculture is important both in food production as in occupation, young people don't regard farming as attractive. As a result, the number of farmers is continually decreasing and the countryside is finally deserted by its population.

  Furthermore, the Greek countryside is characterized by a relative inadequacy when it comes to its structures and services, having to do with residents' need coverage (such as police stations and health centers). On top of that, the municipal units are digitally isolated, resulting in the inhabitants; introversion both socially and professionally. A component of equal importance is that of the population dynamics of the countryside. Some rural areas' reversion of their relative dynamics (due to retirement, decrease in the number of births or the negative inflows of young people and households) create desertification conditions. The shortage of occupational opportunities along with the development of a social identity lead young people to abandon the countryside and move to an urban center, so that they may be able to seek better life prospects.

- Scenario 2: The Greek countryside grows old and attract the elderly
Scenario 2 satisfies the settlement conditions of the elderly population's mobility from the urban space to the countryside. The limited downward trend in unemployment and the economy's stabilization in the current variable levels, create negative improvement conditions in labor market. In this regard, Greek countryside keeps suffering and the possible option to the young's labor impasse would be the settlement to the urban space.

The intensified aging plays a defining role, given that foresight analysis set pensioners as a particularly important group in the intensity measurement of the settlement to the countryside. According to scenario, the internal population dynamics in rural areas will be reversed. In other words, the population in rural areas will be aging without being renewed. Therefore, it becomes known that although a part of the high intensity inflows to the rural is motivated by the pensioners, the areas whose population ages, tend to attract aging. This special population group bears the following unique characteristics: within the frame of retirement they are not interested in the economic activity of an area, since their living does not depend on this. Furthermore, pensioners don't easily change their consumption habits. Consequently, the rural space component cannot be taken into account, as pensioners do not play an active role in it either as producers or as consumers.

The rural areas that describe the scenario 2 are neither insular nor coastal, but mountainous with a relative level of tourism. In Greece, there is a trend towards agro-tourism and especially mountain-alternative tourism, but it cannot be anticipated in advance that it will flourish or will decline in the coming years. The preservation of poor digital integration is not a phenomenon that affects the elderly's migratory destination choice, as opposed to young people. In contrast, preservation of the existing structures and services are important assets, as they provide to the elderly a relative sense of safety and health.

- Scenario 3: Preservation of the current settlement trend to the countryside
It could be claimed, to some extent, that Scenario 3 illustrates the current situation in Greece. The settlement in the Greek countryside by 2030 is expected to evolve preserving the same intensity as the last population census. This is essentially the 'status quo' of rural areas. This scenario's conditions are not suitable for internal movements into the non-urban space. However, there are tangible signs that the share of people who are severely affected by the general situation in Greece perceives the prospect of a shift in employment as well as in life as a whole.

The conditions favoring this mobility concern mostly the limited but slow downward unemployment trend and the persistence of comparatively high unemployment rates, as mentioned before. The limited but certain revival of the economy creates occupational perspectives in the countryside. In particular, those who suffer from recession in the urban centers will move to the rural, given that they own agricultural land to exploit. This is probably the most important motive for settling to a non-urban destination, since the conditions prevailing in the countryside (based on Scenario 3) are not adequate enough to justify such mobility. In particular, owing agricultural land in combination with young peoples' knowledge on primary sector along with the application of new practices, offer an important revival chance and further occupation opportunities. It is important to note that the development of such change in the primary sector is mainly due to the already existing population dynamic in specific rural areas.

As regards the digital integration component, the lag elongation acts suppressive to the migrating decision making, especially that of young people and households, as new technologies become essential in their everyday lives. What offsets this disadvantage is the preservation of the existing structures and services as it offers safety and reassures families with underage children. Concluding, recession made it possible for the agricultural sector to get into a growth path or at least a revival. It seems that the new population's settlement in the countryside in times of crisis benefited the entrepreneurship. It also contributed to the development of a more effective and innovative agriculture, which could potentially contribute to the installation of other young people, but provided that the infrastructure and the evolution of technology are improved.

- <u>Scenario 4: Intensification of the settlement in the countryside</u>
  Scenario 4 show the prerequisites so that the population settlement from the urban space to the rural will be intensified, taking for granted that labor market and economy by 2030 will remain at the same levels as today's. This is essentially a negative scenario regarding the general economic context in Greece, which nevertheless creates the conditions for the revival of the rural areas. This particular scenario suggests that there are population groups that choose to move in the countryside so as to change their lifestyle and search for better living conditions, close to the nature. This approach attributed to the relative downward trend of unemployment. Despite the current high levels, there has started a slow reversion of this trend and consequently the creation of new jobs.

  The fact that young people leave the job search in the urban areas, especially under the increased chance of failure, and motivated by their engagement in activities which can be developed in the rural, reinforce their conviction of an essential change of lifestyle. On the other hand, there is this young group who despite of the improved level of the labor market, find it hard to join in the workplace on the grounds that the unemployment trend is kept at high levels. Being hard for the young people to enter the labor market is a fact that affects internal migration. Some Greeks regard countryside as an alternative solution to the recession. Other than the economy frame, conditions for the population's settlement to the countryside can be created, since there are prerequisites for occupation, especially in the tourism and primary sector.

  From a different perspective, it could be said that the intensification is based on what countryside can offer to the potential newcomers, namely to the versatile dynamic of a settlement destination. The parallel and complementary development of tourism and agriculture boosts the intensification of the settlement, in areas which are proper to offer activities and cover not only the elderly needs but also those of the younger. Particularly important is the component of the progressive digital integration. That includes areas which can combine and offer alternative forms of occupation along with new applicable trends in agriculture. In other words, beyond social networking other types of entrepreneurship as well as digital services could be developed. Finally, settlement intensification is actually based on a triptych: (a) distrust of young people about the possibilities to find a job in urban areas (b) agriculture and tourist development (c) digital upgrade.

- <u>Scenario 5: Settlement in the countryside as an intense phenomenon in the context of crisis</u>
  The uncertainty prevailing in Greece over the last decade is the basis for the Greeks' decision making for changing place of residence and population reclassification. Prior to 2008, ceteris paribus, in spite of counter-urbanization trends in specific rural areas, urbanization was the predominant trend of internal migration. Scenario 5 establishes a new rural revival pattern: the installation in the Greek countryside is not just a trend, but a phenomenon that emerges through an economic crisis period. It is absolutely interwoven with the high rates of unemployment, low job supplies and economic distress at microeconomic as well as macroeconomic level.

  In the last scenario establishment in the countryside is encouraged by a clearly recession-stricken environment. The financial crisis confirms that a part of Greek people makes the decision for inadvertent internal migration. Despite its negative aspect, crisis indirectly helped in the revitalization of certain areas of the countryside as well as the development of new forms of entrepreneurship. The sharp rise in unemployment is particularly affecting the urban centers. This fact combined with limited jobs has a negative impact on peoples' leaving urban areas and at the same time contributes to the outflows to the non-urban areas. The negative level of the unemployment rate has a positive impact on the change of migratory destination and in particular it pushes urban residents into the countryside. This is because limited opportunities and jobs are affected by adverse economic conditions, and therefore the workforce, in search of a longer-term solution, is turning to other areas of activity that are primarily developing in the non-urban areas.

Such areas of activity are the primary sector and the touristic ones. The primary sector is really starting to rejuvenate and this is due to the application of new practices and technologies. The recession of the Greek economy and at the same time significant unemployment among young people have made the agricultural profession quite attractive. There is a tendency for young people to return to agriculture, who are nevertheless investing in innovation, research and production technology for high value-added products and services, radically changing the classic and rather old-fashioned and obsolete practices and attitudes.

With regard to areas with increased tourist attractiveness it is clear that a variety of economic activities are developing and operating at the same time, which adds a clear dynamic to the area. The hypothesis of progressive digital development makes the scenario of intensifying the installation in the countryside even more attractive, as it offers a high sense of socialization and extroversion while facilitating the development of service delivery. In addition, digital integration provides the ground for the development of innovative methods of employment through electronic devices. The primary sector and tourism are developing substantially. Combined with the dynamics of rural areas and the progressive digital development, this scenario fulfills all the requirements for the Greek countryside to become a pole of attraction for young people and households.

6. Discussion

Foresight methodologies pursue the data collection along with their comprehension so people can think in different and new ways for the future. This data can be collected by people or by analyzing documents and objects or both, while they can be analyzed using qualitative and/or quantitative techniques. However, to be used in strategy processes, data must be analyzed, interpreted, and used in a way that makes sense. The information derived from this analysis and interpretation allow for a better understanding of the past and the present, which provides the basis for the use of forecasting methods to explore possible future developments.

In the present paper, an effort has been made to create scenarios with the ultimate aim of making clear the prospects of the Greeks settling in the countryside in a ten-year horizon, with emphasis on a qualitative analysis method, scenario planning. In order to create the scenarios there was carried out an analysis of the conditions in the external environment –such as political, economic, social, digital, and demographic- and the attractiveness factors of the Greek countryside. The analysis has shown whether the installation in the countryside is a phenomenon established in Greece in conditions of economic crisis and secondly the most likely scenarios and conditions for this settlement to the countryside to last. The development of the scenarios surrounding the phenomenon of return to the countryside in Greece in times of crisis is primarily an unintended phenomenon, which is fueled and evolving due to the economic crisis. However, it has contributed to the revitalization of some rural areas, especially the areas that have experienced high inflows.

Future developments are difficult to predict nevertheless they have a high impact on the policy recommendations. In turn, the lack of data lays the basis for a lack of policy. It is further acknowledged that the quantitative methodology used cannot reveal the empirical approach of internal mobility in a context of crisis. Nevertheless, this research provides useful insights on the importance of socioeconomic considerations in understanding mobility patterns, and it does respond to a stated call for more engagement with quantitative and experimental methods in rural mobility research.

References

Anastasiou, Evgenia, and Marie-Noëlle Duquenne. 2017. "The return to the rural in greece during the last decade: a methodological approach of the potential spatial patterns." In Fifth International Conference of the Balkans Demography The population of the balkans at the dawn of the 21st century, edited by Verica Janeska and Aleksandra Lozanoska, 331–54. Institute of Economics - Skopje, Ss. Cyril and Methodius University in Skopje Prolet 1, 1000 Skopje, Republic of Macedonia.

Anastasiou, Evgenia, and Marie-Noëlle Duquenne. 2019. "Where Do Greeks Choose to Live? A Multi-Criteria Analysis for the Detection of Internal Migration Flows in Times of Crisis." 1.

Anthopoulou, Theodosia, Nikolaos Kaberis, and Michael Petrou. 2017. "Aspects and Experiences of Crisis in Rural Greece. Narratives of Rural Resilience." Journal of Rural Studies 52: 1–11. https://doi.org/10.1016/j.jrurstud.2017.03.006.

Anthopoulou, Theodosia, and Michael Petrou. 2015. "Aspects of Crisis and the Return to Rural Space: The Debate on Rural Resilience." Aehoros 20: 96-121 [in Greek].

Central & East European Health Policy Network. 2012. "STRATEGIC SCENARIOS 2020 THE FUTURE OF CEE HEALTHCARE." http://www.ceehpn.eu/images/pdfs/Scenarios2020.pdf.

Conway, Maree. 2004. "Scenario Planning : An Innovative Approach to Strategy Development." Most. 2004.

Conway, Maree. 2014. "Foresight : An Introduction A thinking futures reference guide." Melbourne.

Dimelli, Despina P. 2016. "Planning Settlements in the Greek Islands." Regional Science Inquiry VIII (1): 23–38.

Duquenne, Marie-Noëlle. 2009. "Attractiveness and the Small and Medium-Sized Cities of Greece." In 25 Texts on Spatial Planning and Development, Collective Volume for the 25th Year of the Department of Spatial Planning, Urban Planning and Regional Development, University of Thessaly, 119–30. Volos: University Publications of Thessaly, [in Greek].

Gkartzios, Menelaos. 2013. "'Leaving Athens': Narratives of Counterurbanisation in Times of Crisis." Journal of Rural Studies 32: 158–67. https://doi.org/10.1016/j.jrurstud.2013.06.003.

Gkartzios, Menelaos, Kyriaki Remoundou, and Guy Garrod. 2017. "Emerging Geographies of Mobility: The Role of Regional Towns in Greece's 'Counterurbanisation Story.'" Journal of Rural Studies 55 (October): 22–32. https://doi.org/10.1016/J.JRURSTUD.2017.07.011.

Gkartzios, Menelaos, and Karen Scott. 2015. "A Cultural Panic in the Province? Counterurban Mobilities, Creativity, and Crisis in Greece." Population, Space and Place 21 (8): 843–55. https://doi.org/10.1002/psp.1933.

Gousios, Dimitrios. 1999. "Countryside, Rural Area and Town: From the Agriculturalization to the Local Development." In The Development of Greek Cities: Interdisciplinary Approaches to Urban Analyses and Policy, edited by Dimitrios Oikonomou and Georgios Petrakos. Gutenberg [in Greek].

Hadjou, Lamara, and Marie-Noëlle Duquenne. 2013. "A Theoretical and Methodological Approach of «fragile» Areas: The Cases of Greek Regions Crossed by Egnatia Road." Regional Science Inquiry V (2): 45–58.

Jouvenel, Hugues De. 2004. "Invitation à La Prospective." http://www.futuribles.com.

Kasimis, C., and A.G. Papadopoulos. 2013. "Rural Transformations and Family Farming in Contemporary Greece." In Agriculture in Mediterranean Europe: Between Old and New Paradigms, edited by D. Ortiz-Miranda, A. Moragues-Faus, and E. Arnalte- Alegre, 263–93. Emerald Group Publishing Limited.

Kotzamanis, Byron, and Zacharoula Michou. 2010. "Where I Was Born, Where I Live? Geographical Mobility in Greece, a First Spatial Approach." Demo News 11: 1–6.

Koutsou, Stavriani, and Theodosia Anthopoulou. 2008. "Rural In-Migration and Productivist Systems: Spatial and Social Reproductions of Rurality." In Rurality, Society and Space. Athens: Plethron.

Kurekova, Lucia. 2014. "Developing Future Scenarios of Demographic, Migratory and Labour Market Processes." 5. Bratislava.

Ogilvy, J. 2000. Scenario Planning, Critical Theory and the Role of Hope, Knowledge Base of Futures Studies (1 St Edition). Brisbane: Foresight International.

Papadopoulou, Eleni, Christos Papalexiou, and Nikolaos Hasanagas. 2012. "Participatory Evaluation of Rural Development Programmes: A Qualitative Approach in the Case of Modernisation of Agricultural Holdings in Greece." Regional Science Inquiry. Vol. IV (1): 81-94.

Pnevmatikos, Triantafyllos, Serafeim Polyzos, and Dimitrios Tsiotas. 2019. "Assessing the Structural Changes in the Greek Economy for the Period Prior to Economic Crisis" XI (3): 69–82.

Portaleoni, Claudio Gomez, Svetla Marinova, Rehan Ul-Haq, and Marin Marinov. 2013. Corporate Foresight and Strategic Decisions. Corporate Foresight and Strategic Decisions. 1st ed. Hampshire: Palgrave Macmillan. https://doi.org/10.1057/9781137326973.

Pratsinakis, Manolis, Panos Hatziprokopiou, and Russell King. 2017. "Beyond Migration Binaries and Linear Transitions: The Complexification of Greece's Migratory Landscape at Times of Crisis." 92. https://www.sussex.ac.uk/webteam/gateway/file.php?name=mwp92.pdf&site=252.

Psycharis, Yannis, Dimitris Kallioras, and Panagiotis Pantazis. 2014. "Economic Crisis and Regional Resilience: Detecting the 'Geographical Footprint' of Economic Crisis in Greece." Regional Science Policy & Practice 6.

Remoundou, Kyriaki, Menelaos Gkartzios, and Guy Garrod. 2016. "Conceptualizing Mobility in Times of Crisis: Towards Crisis-Led Counterurbanization?" Regional Studies 50 (10): 1663–74. https://doi.org/10.1080/00343404.2015.1057561.

Schoemaker, Paul. 1995. "Scenario Planning: A Tool for Strategic Thinking." Sloan Management Review 36: 25–40.

Stratigea, Anastasia. 2014. "Setting Policy Targets for the Future of Agriculture in EU 2020 - A Methodological Approach." Regional Science Inquiry VI (1): 95–110.

Vah Jevšnik, Mojca, and Kristina Toplak. 2014. "Foresight as a method in migration studies." Dve domovini, no. 40: 139–46.

Voros, Joseph. 2001. "A Primer on Futures Studies, Foresight and the Use of Scenarios." Prospect: The Foresight Bulletin 6 (1).

Voros, Joseph. 2003. "A Generic Foresight Process Framework." Foresight 5 (3): 10–21. https://doi.org/10.1108/14636680310698379.

Xanthos, Georgios, Christos A. Ladias, and Christos Genitsaropoulos. 2013. "A Method for Forecasting Population Changes in Alpine, Semi-Alpine and Lowland Communities of Epirus Region in Greece." Regional Science Inquiry Journal V (1): 173–79.

Zakharova, Elena N, Elena E Kardava, Rita R Avanesova, and Elena P Avramenko. 2016. "Management of the Economic Capacity of the Region on the Basis of Foresight (on the Example of Adygea, Russia)." Regional Science Inquiry. Vol. VIII (2): 45-53.

DOES GOODS AND SERVICES SPENDINGS REDUCE INCOME INEQUALITY? A PANEL DATA EVIDENCE FROM INDONESIA

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Abstract

The main purposes of our study are to investigate the effect of goods & services spending (GSS) and social spending (SS) on income inequality (GR). Using a panel data set of 26 provinces in Indonesia from 2005 to 2015, panel vector autoregressive and Granger causality test are employed to explore the causal relationship of the variables. The study found out that the SS has a negative and significant effect on GR at the 2-period horizon. The GR has a positive and significant effect on the GSS at the 4-period horizon, but negative and significant effects at the 3-period horizon. The result of the Granger causality test indicates that there is a unidirectional causality running from GSS to SS, and bidirectional causality exists between GR and SS, and between GR and GSS.

Keywords: Income inequality, goods and services spendings, social spendings, Panel Vector Autoregressive, and Granger Causality test.

JEL classification: D33, H53, I38

1. Introduction

Income inequality had been a common phenomenon in developing economies (Cabrera et al., 2015). The existence of this economic variable can cause social problems which affect various aspects of people's lives (Wu & Li, 2017). Therefore, the government should be able to take development policies which not only oriented towards increasing output but also improving income distribution in communities. Of the most popular policies used by the government in reducing income inequality is through the allocation of public spendings.

So far, research studies on the relationship between government spending and income inequality have received serious attention from many economic researchers (Muinelo-Gallo & Roca-Sagales, 2014; Celikay & Gumus, 2017). Physical infrastructure development activities carried out by the government to increase economic activities are believed to be able to improve the welfare of the community, but not necessarily able to improve income distribution. On the one hand, economic growth is increasing fastly, but on the other hand, income inequality is also getting higher. Actually, the expected ideal conditions as measurement of the success of economic development are high economic growth in line with better income distribution (Amri & Nazamuddin, 2018).

Local government policies in Indonesia to reduce income inequality is carried out through local government expenditure policies in the form the goods & services spending, and social spending. Through spending on goods and services, the local government seeks to increase the supply of goods and services that aims to improve public services to meet the needs of the people in the region (Wu & Li, 2017). Furthermore, the allocation of social spending is usually channeled to low-income communities, especially the poor, so that it is expected to reduce the income gap in the community. Moreover, social spending in Indonesia is usually channeled in the form of transfer payments and subsidies for low-income households.

Regarding the income distribution, primarily data discover that income inequality of the perspective provinces in Indonesia is relatively different from one another. This can be seen from the development of the Gini ratio of each region. In 2015, regions with a high level of income inequality and above the national average were West Papua with a Gini ratio of 0.44, DI Yogyakarta and East Java with a Gini ratio of 0.43 and 0.42, respectively. At the same time, the allocation of local government budgets in the form of goods and services and social spending was also relatively different. The largest-expenditure regions on goods and services are Papua, West Papua, and Aceh province. The opposite is West Java and Central Java province. In terms of social spending, the first-highest-expenditure province is West Papua, then Papua in the second. On the contrary, Lampung and Central Java are the lowest-social expenditure provinces compared to other regions in Indonesia. So, the income inequality in the respective provinces is in line with differences in local government budget allocations on goods, services, and social spendings.

As stated earlier, the study of the relationship between the allocation of government expenditure and income inequality has been carried out by previous researchers. Crudu (2015) in his research in European Union countries concluded, that local government budget policies could change income distribution (reduce inequality or increase inequality). Previously, Gallo & Sagales (2013) in their research with a sample of 21 high-income countries over the period 1972-2006 found out that income inequality was an important determinant of the outcome of fiscal policy in terms of government spending, especially goods and services and social spending.

A number of researchers found a negative relationship between the two kinds of government spending with income inequality. For example, Higgins & Pereira's (2014) research in Brazil concluded that government spending for goods and services as well as social spending, especially in the form of transfer payments and subsidy, could improve income distribution. Doerrenberg & Peichl's (2014) study for the case of OECD Countries also found a negative impact on social spending on income inequality. Previously, research study which is conducted by Ramos & Roca-Sagales (2008) and Niehues (2010) also presented the same conclusions where some components of fiscal policy such as goods and services spending and social spending could reduce income inequality. Recently, research study of Heer & Scharrer (2018) also concludes that the increasing in government spending will decrease income and wealth inequality.

In contrast to the empirical findings of the researchers as explained above, the same research study which is conducted by Muinelo-Gallo & Sagales (2013) concluded that government spending increases income inequality. In line with Gallo and Sagales, the findings of Claus et al.'s (2014) study for the case of 15 Asian countries also found that social spending has an impact on increasing income inequality. Likewise, Sabir et al. (2015) also show that regional government spending has a positive and significant influence on income inequality.

Having the absence of consistent results regarding with the direction of causality between the two kinds of government expenditure and income inequality, then our research study re-examined the relationship between these variables in the context of the Indonesian economy. Unlike the previous researchers, our study utilizes panel vector autoregressive as means of an econometric model that is applied to analyze the relationships between the variables. In addition, the use of Granger causality tests also allows us more detail to investigate the nature of causal relationships of the variables.

The paper is composed of five sections. The second section contains information about the literature review that explains empirical findings on the relationship between government spending and income inequality. The third section describes the research method containing data sources and econometric analysis models that are applied to analyze relationships between variables. The fourth section is the result and discussion containing information about the trends of spending on goods and services, and social spending as well as the dynamics of income inequality in Indonesia, the result of PVAR estimate coefficient and Granger Causality test and its discussion. Then, the last section is conclusions and recommendations.

2. Empirical literature

Local government expenditure is an important instrument of regional fiscal policy reflected in the local administrations budget. This expenditure excludes the form of public expenditure to finance development, employee salaries and the provision of public infrastructure to meet community needs but also in the form of goods and services, and social spending (Crudu, 2015). The allocation of the two kinds of spending at the regional budget is an important policy for local governments that are expected to affect economic growth and income inequality (Afonso et al., 2008).

So far, there have been many research studies on the impact of government spending, especially for good and services, and social spending on income inequality. However, their empirical findings are still confusing. That is, the research findings of researchers do not yet have the same conclusions regarding the direction of the causal relationship between the variables. Ali & Ahmed (2010) prove that government spending in the form of providing public goods and services enables to reduce income inequality. Anderson et al. (2017) also found that the allocation of the government budget on goods and services spending was able to reduce income inequality. Likewise, with the empirical study conducted by Heer & Scharrer (2018) regarding the impact of government spending shock on income inequality also provides empirical evidence that increases in government spending will decrease income inequality.

The findings of the studies are consistent with previous studies conducted by Donoaghue et al. (2004) and Decoster et al. (2009) concluding that public spending on goods and services may be able to reduce inequality. When the government increases the budget for goods and services to meet the needs of the community, the policy can improve income distribution.

Regarding the linkage of social spendings and income distribution, several studies have pointed out the positive impact of the spending on income distribution. For example, the empirical study conducted by Niehues (2010) and Martinez-Vazquez et al. (2012) discovered that social spending has a positive impact on income distribution. The impact of the spending on income inequality reduction is even greater when compared to the impact of increasing taxes which also aims to improve income distribution (Lustig et al., 2014; Doerrenberg & Peichl, 2014).

In contrast to the empirical findings as explained above, the results of the study by Claus et al. (2014) in Pakistan found that social spending increases income inequality. Similar to the results of the study of Khan & Hashmi (2015) in Pakistan proofing that social spending increase income inequality. Gallo & Sagales's (2013) research also prove that government spending increases income inequality. The findings are in line with the findings of Sabir et al. (2015) founding out that government spending had a positive and significant influence on income inequality. Previously, the study of Jones (2007) on the linkage of income inequality and social spending in Japan also concluded that the impact of social spending on income quality in Japan is weak compared to other OECD countries.

3. Data and research methods

The data used in this study is a secondary data which is provided by Indonesian central bureau of statistics. The secondary data are an annual panel dataset of 26 provinces in Indonesia from 2005 to 2015. The measurement of income inequality uses the Gini ratio. A number of the previous research study also utilizes the ratio as measures of income inequality (Modalsli, 2018; Amri & Nazamuddin, 2018). Furthermore, the measurement of goods & services spending and social spending are based on per capita spending for the two kinds of spending and then measured by IDR thousand per capita.

A first stage in our empirical study is represented by the analysis of stationary. I used the Levine–Lin–Chu (LLC) method (Levine, Lin, & Chu, 2002) and the Im–Pesaran–Shin (IPS) method (Im, Pesaran, & Shin, 2003) to check the order of integration to see where the time series variable attains stationary. Both the LLC and IPS methods were deployed on the principles of the conventional Augmented Dickey–Fuller (ADF) test. The LLC methods explores the heterogeneity of intercepts across members of the panel, while the IPS method explores the heterogeneity in the intercepts, as well as in the slope coefficients. Both tests were applied by averaging individual ADF t-statistics across cross-section units.

The second stage in the method of the analysis is co-integration test. The concept of co-integration, introduced by Granger (1969), is relevant to the problem of determining long-run relationship between the variables. The basic idea that underpins co-integration is simple. If the difference between two non-stationary series is itself stationary, then the two series are co-integrated. If two or more series co-integrated, it is possible to interpret the variables in these series as being in a long-run equilibrium relationship (Engle & Granger, 1987). By contrast, a lack of co-integration suggests that the variables have no long-run relationship-thus, in principle, the postulated variables can arbitrarily move far away from each other.

In the three stage, the causality analysis between the three variables is performed by means of a panel vector auto regression (PVAR) model. The panel data VAR methodology combines the traditional VAR approach, which treats all the variables in the system as endogenous, with the panel-data approach, which allows for unobserved individual heterogeneity (Grossmann et al., 2014). The optimal of lag length is evaluated by means of the Schwarz information criterion. PVAR model employed to examine the causality relationship among income inequality, social spending and good & services spending formulated as follow:

$$\Delta LGR_{it} = \alpha_0 + \sum_{j=1}^{n} \beta_{1j} \Delta LGR_{i,t-j} + \sum_{j=1}^{n} \beta_{2j} \Delta LGSS_{i,t-j} + \sum_{j=1}^{n} \beta_{3j} \Delta LSS_{i,t-j} + \mu_{it}$$

$$\Delta LGSS_{it} = \alpha_0 + \sum_{j=1}^{n} \beta_{1j} \Delta LGSS_{i,t-j} + \sum_{j=1}^{n} \beta_{2j} \Delta LGR_{i,t-j} + \sum_{j=1}^{n} \beta_{3j} \Delta LSS_{i,t-j} + \varepsilon_{it}$$

$$\Delta LSS_{it} = \alpha_0 + \sum_{j=1}^{n} \beta_{1j} \Delta LSS_{i,t-j} + \sum_{j=1}^{n} \beta_{2j} \Delta LGR_{i,t-j} + \sum_{j=1}^{n} \beta_{3j} \Delta LGSS_{i,t-j} + v_{it}$$

where ΔLGR denotes the first difference of the natural logarithm of Gini ratio as the measurement of the income inequality, $\Delta LGSS$ denotes the first difference of the natural logarithm of goods and service spending per capita, and ΔLSS denotes the first difference of the natural logarithm of social spending per capita, i denotes the province of i, and t denotes the period of t. Furthermore, α and β are constants to be estimated, as well as, μ , ε , and v denotes a stochastic error term of the PVAR equation, respectively.

4. The findings and discussion

4.1. The descriptive statistics of the variables

From 2005 to 2015, income inequality at the provincial level in Indonesia differed one and another. The difference likely is shown from the Gini ratio of the respective province. Besides the dynamics of income inequality also change over the period. On one side, there are several provinces have an increased Gini ratio, and others with a Gini ratio that tends to decline. The results of descriptive statistics show that the highest Gini ratio of 0.44, and the lowest of 0.35 with an average of 0.351.

The local government budget for the provision of public good and services and social spending also differs between the province. Highest-goods and services spendings province is IDR1,267,956.00 per capita. Conversely the lowest-goods and services spendings provinces of IDR106,307.40 per capita with an average of IDR173,621.60 per capita. The government budget for social spendings is lower compared to spending on public goods and services. The highest social spendings are IDR641,332.50 per capita and contrarily the lowest of IDR51,651.71 per capita. In detail, the results of the descriptive statistics and correlation coefficients of the variables, as shown in Table 1.

Table 1. Descriptive statistics of the research variable

Statistical Measures	Gini Ratio	Goods and Services Spending (IDR000 per capita)	Social Spending (IDR000 per capita)
Mean	0.3514	173,621.60	90,761.93
Median	0.3500	106,307.40	51,651.71
Maximum	0.4400	1,267,956.00	641,332.50
Minimum	0.2600	16,821.30	316.95
Std. Dev.	0.0422	202,529.60	91,494.22
Observations	286	286	286
Correlation between variables			
GR	1		
GSS	0.2248	1	
SS	0.3626	0.6397	1

Sources: Authors' Computation using E-views 9.0

Table 1 above also show the correlation between the three variables. The relationship between income inequality (GR) and GSS showed a correlation coefficient of 0.228. This thing evidence that the two variables correlated positively. Coefficient correlation between SS and income inequality, and between the GSS and SS showed by a correlation coefficient of 0.3626 and 0.6397, respectively. Thus, it is can conclude that the nature of relations between the variables is positive. Goods and services spending are positively related with social spending. higher goods and services spending, higher social spending.

4.2. The result of unit root test

The most important thing about the use of the econometric model in analyzing time series data is that the data attains a stationary condition (no unit roots). Therefore, the main step in data analysis is testing whether the data suffers from unit roots or vice versa have achieved stationarity. The unit root test of panel data set utilizes six approaches consisting of Levin, Lin & Chu (LLC), I'm, Pesaran & Shin (IPS), ADF - Fisher X2, ADF - Choi Z-stat, PP - Fisher, and PP - Choi test (Amri, 2018). The result of the test summarized in table 2.

Table 2. The result of panel unit root test

No	Variabel	Methods	Individual Intercept				Intercept & Trend			
			Level		First Difference		Level		First Difference	
			T-stat	P-value	T-stat	P-value	T-stat	P-value	T-stat	P-value
1	Income Inequality (LGR)	Levin, Lin & Chu	-3.813	0.000	-5.771	0.000	-2.898	0.002	-4.672	0.000
		Im, Pesaran & Shin	0.309	0.622	-2.092	0.018	0.705	0.759	0.488	0.687
		ADF - Fisher X^2	40.790	0.869	74.064	0.024	36.876	0.944	42.368	0.827
		ADF - Choi Z-stat	0.340	0.633	-3.027	0.001	0.792	0.786	0.370	0.644
		PP – Fisher	43.597	0.790	133.716	0.000	32.048	0.987	126.262	0.000
		PP – Choi	-0.021	0.492	-6.502	0.000	2.341	0.990	-4.529	0.000
2	Sosial Spendings (LSS)	Levin, Lin & Chu	-3.885	0.000	-9.034	0.000	-9.171	0.000	-12.646	0.000
		Im, Pesaran & Shin	1.266	0.897	-4.707	0.000	-1.148	0.125	-2.002	0.022
		ADF - Fisher X^2	36.318	0.952	118.664	0.000	76.853	0.014	97.903	0.000
		ADF - Choi Z-stat	1.550	0.939	-5.828	0.000	-2.269	0.012	-4.033	0.000
		PP – Fisher	38.485	0.918	286.997	0.000	135.358	0.000	252.354	0.000
		PP – Choi	1.865	0.969	-12.646	0.000	-4.576	0.000	-11.278	0.000
3	Good and Services Spending (LGSS)	Levin, Lin & Chu	-3.229	0.000	-5.287	0.000	-3.758	0.000	-5.913	0.000
		Im, Pesaran & Shin	2.373	0.991	-3.061	0.001	0.186	0.574	-0.487	0.313
		ADF - Fisher X^2	26.444	0.999	92.707	0.000	56.201	0.321	63.326	0.135
		ADF - Choi Z-stat	2.771	0.997	-3.785	0.000	0.365	0.643	-1.768	0.038
		PP – Fisher	96.075	0.000	182.799	0.000	57.338	0.284	163.151	0.000
		PP – Choi	-2.510	0.006	-8.726	0.000	1.498	0.933	-7.162	0.000

Note: p-value < 0.05 indicates the 95% level of significant, and p-value > 0.05 indicates the 95% level of insignificant.

Sources: Authors' Computation using E-views 9.0

As shown in table 2 above, at the level, the majority of the respective p-value for all methods of panel unit root test is more than 0.05. This thing indicates that the variables are non-stationer at the level. However, the p-value is less than .05 at the first difference either for Individual intercept, and intercept & trend approach. Thus, the variables achieved stationary after the first differencing.

4.3. The result of co-integtation test

Co-integration tests are aimed to test whether the long run-relations exists between the variable analyzed, or vice versa. The test uses Pedroni's (1999) co-integration test, which suggests seven statistical methods to detect the existence of cointegrating conditions for a set of panel data. The statistical methods categorized into two groups. The first group tests a cointegrating phenomena within-dimension (test panel) containing the panel v-statistics, panel rho-statistics, panel ADF-statistics, and panel PP-statistics. The second group detects cointegrating phenomena between dimension (group test), including rho-Statistic, PP-Statistics, and ADF-Statistics. The test proposes two hypotheses consisting of null hypotheses proposing that there is no cointegration between income inequality, GSS, and SS, and then alternative hypotheses that suggest that the three variables are co-integrated. Acceptance or rejection of the hypotheses refers to the p-value of Eviews output with the criterion that the alternative hypothesis is accepted, and vice versa the null hypotheses is rejected if the p-value is <.05. Conversely, the alternative hypotheses rejected and the null hypotheses is accepted if p-value> .05. The result of Pedroni's cointegration test shown in Table 3.

Table 3.The result of Pedroni's cointegration test

Panel Cointegration Statistics (Within-Dimension)		
Test Statistics	Statistical Values	
	Individual Intercept	Individual Intercept and Trend
Panel v-Statistic	1.4643 (0.0716)	-1.6320 (0.9487)
Panel rho-Statistic	1.1158 (0.8678)	3.6916 (0.9999)
Panel PP-Statistic	-1.2782 0.1006)	-0.3773 (0.3530)
Panel ADF-Statistic	-1.8293 (0.0337)*	0.0712 (0.5284)
Group Mean Panel Cointegration Statistics (Between-Dimension)		
Test Statistics	Statistical Values	
	Individual Intercept	Individual Intercept and Trend
Group rho-Statistic	3.1527 (0.9992)	5.3443 (1.000)
Group PP-Statistic	-1.8430 (0.0327)*	-2.0688 (0.0193)**
Group ADF-Statistic	-0.5207 (0.3013)	1.5011 (0.9333)

Note: The values in parentheses give the probabilities values. Ho: no cointegration; * and ** indicate the rejection of null hypothesis at 95% and 97.5% significant level, respectively.

Sources: Authors' Computation using E-views 9.0

Table 3 above informs that the criterion of unit root test has not fully attained. Among the four measures of statistical criteria used to detect the cointegrating phenomena within-dimension of panel data set, only the ADF-Statistic Panel has p-value <0.05, whereas the p-value of the other statistical value > 0.05. This thing statistically means that there is no within-dimension cointegration of the data set panel. In term of the cointegration test for between dimensions, table 3 above also shows that among the three approaches used, only PP-Statistics has p-value <0.05. Conversely, two more approaches (rho-Statistics and ADF-Statistics) have a p-value >0.05. This thing also statistically indicates that there is no cointegration between dimensions in the panel data set. Referring to the results of Pedroni

(1999)'s panel cointegration tests described above that can be known that the majority of p-value > 0.05. Thus, it can interpreted the absence of co-integrative relations between the three variables. In other words, there is no long-run relationship between them.

The absence of an equation that explains the long-run relationship of the variables is also in line with the results of the Kao's Residual Panel Cointegration Test. The existence of long-term relationships based on the p-value generated by econometric calculation. P-value <0.05 indicates that there are co-integrated relations between the variables. Conversely, the p-value> 0.05 statistically explained that there are no co-integrated relations. The result of the panel cointegration test, as summarized in Table 4.

Table 4. The Result of Kao's Residual Panel Cointegration Test

Null Hypothesis	T-Statistic	P-value
No cointegration	0.327	0.415
Residual Variance	0.002	
HAC variance	0.005	

Source: Authors' Computation using E-views 9.0

The statistical result of the Kao's panel integration test shows the p-value of 0.415 (> 0.05). This thing statistically provides the strong evidence that in the long-run, the three variables are not co-integrated.

4.4. The result of the lag length criteria

The tests used were determined based on informational criteria - *the Akaike information criterion (AIC), Hannan-Quinn (HQ), and Schwarz information criterion (SC)*, taking into consideration that if the number of lags is too small then the model does not capture all the information while if there are too many lags then the degree of freedom are wasted. Different information criteria suggest different optimal lag lengths for the VAR model, as shown in Table 3. The standard information criteria of sequential modified LR test statistic and Final prediction error shows an optimal lag length of 6. Information criteria of Akaike information criterion also shows an optimal lag length of 6. Whereas, the standard information criteria of Schwarz information show and optimal lag length of 1. In this respect we use Akaike information criterion in making sure optimal lag of PVAR.

Table 5. Result of VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-125.7819	NA	0.002389	2.4766	2.5528	2.5075
1	104.0780	442.0382	3.42e-05	-1.7707	-1.4656*	-1.6471
2	114.5699	19.5715	3.32e-05	-1.7994	-1.2655	-1.5831
3	123.3653	15.8993	3.34e-05	-1.7955	-1.0327	-1.4865
4	141.1376	31.1016	2.83e-05	-1.9642	-0.9725	-1.5624
5	152.6232	19.4372	2.70e-05	-2.0119	-0.7915	-1.5175
6	**175.7245**	**37.7617***	**2.07e-05***	**-2.2832***	**-0.8338**	**-1.6959***

* indicates lag order selected by the criterion; LR is stand for sequential modified LR test statistic (each test at 5% level); FPE is stand for Final prediction error; AIC is stand for Akaike information criterion; SC is stand for Schwarz information criterion; and HQ is stand for Hannan-Quinn information criterion.

Sources: Authors' Computation using E-views 9.0

Since the variables achieved stationarity after first differencing and Akaike information criterion shows an optimal lag length of 6, we use lag length of 6 in using panel vector auto regressive.

4.5. The result of VAR stability test

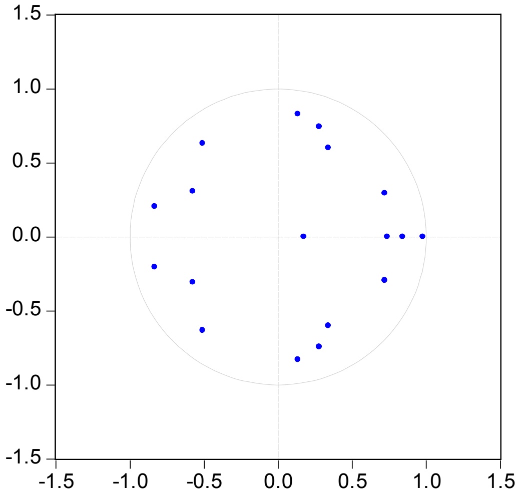
The stability of the analysis model is very important to ensure that the model provides accurate estimation results. The econometric model used in this study is PVAR. When the model is unstable, then the analysis of Impulse Response Function and Variance

Decomposition are unbelievable. The stability test of the econometric model utilizes the roots of characteristic polynomials. A VAR system has a stability condition if the modulus of its roots is smaller than one (Gujarati, 2004), and all of the points lies on the AR roots graph circle (Wibowo & Mubarok, 2017). Refer to the results of the lag order selection criteria as previously explained, the stability test, in this case, is carried out at the lag length of 6. In detail the results of the PVAR stability as shown in Table 6 and Graph 1.

Table 6. AR Roots Table

Root	Modulus
0.995461 - 0.029179i	0.995889
0.995461 + 0.029179i	0.995889
-0.885347 + 0.439470i	0.988420
-0.885347 - 0.439470i	0.988420
-0.543707 + 0.692502i	0.880441
-0.543707 - 0.692502i	0.880441
0.614385 - 0.576339i	0.842399
0.614385 + 0.576339i	0.842399
0.081268 + 0.821413i	0.825423
0.081268 - 0.821413i	0.825423
0.306529 - 0.747021i	0.807465
0.306529 + 0.747021i	0.807465
0.762651 - 0.067650i	0.765645
0.762651 + 0.067650i	0.765645
0.707759 + 0.276518i	0.759859
0.707759 - 0.276518i	0.759859
-0.710601 - 0.265038i	0.758418
-0.710601 + 0.265038i	0.758418
0.177861 + 0.695746i	0.718120
0.177861 - 0.695746i	0.718120
-0.340390 - 0.377508i	0.508309
-0.340390 + 0.377508i	0.508309
-0.401404	0.401404
0.288909	0.288909
No root lies outside the unit circle	
VAR satisfies the stability condition	

Figure 1.
Inverse Root of AR Characteristic Polynomial



Sources: Authors' Computation using E-views 9.0

Based on the VAR stability test as in the table and figure above, it is able concluded that the VAR estimation used for IRF and VD analysis is stable in the lag length of 6 due to a modulus range of 0.288909-0.995889.

4.6. The result of panel vector autoregressive

Taking into account the variables studied have no long-run equilibrium and stationary at the first difference, then the econometric model used to analyze causality between variables is panel vector autoregressive (PVAR). The result of PVAR shows that income inequality in a certain period is positively and significantly affected by its self at the 1-2 period before. GSS negatively affect income inequality. Similarly, SS also has an impact on reducing income inequality. The negative effect of GSS on income inequality occurs after the 4th period, while the negative influence of social spending exists after the 2nd period, faster compared to the negative effect of GSS. This thing indicates that in the short term, the increase in SS is the best solution for local governments in improving income distribution. Allocating government budgets to these expenditures can directly have an impact on income in the community. For example, government spending on education and health assistance for the poor, government spending on community empowerment and institutional strengthening and spending on implementing poverty reduction programs are part of social spending. The difference in the effectiveness of GSS and SS in reducing poverty in the short-term is consistent with the results of the research of Costa & Gartner (2017) for the case of Brazilian economy that social spending of local governments has a faster effect in reducing income inequality. This finding supports the results of the study of Ali et al. (2015) concluding that social spending is the most favorite fiscal policy to improve income distribution.

The GSS positively influenced by its self in the 1-period time horizon. Income inequality for a certain period has a positive and insignificant effect on GSS in the 2-period time horizon. This thing indicates that income inequality is not the main consideration of the local government in determining local budget policy, especially in term of the goods and services public expenditure. Furthermore, SS has an ambiguous effect on the GSS, but the effect is not significant. At the 1-3 period time horizon, SS has a positive effect, but at the 4-6 period time horizon, the effect is negative. In details of the functional relations of the three variables in the dynamic model of PVAR as shown in table 5.

Table 7. The Summary of panel vector autoregresion

Independent Variable	Dependent Variable					
	ΔLGR		ΔLGSS		ΔLSS	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
ΔLGR(-1)	0.6481	6.2663	0.1629	0.5507	-1.1356	-1.3802
ΔLGR(-2)	0.2373	2.0023	0.1120	0.3304	2.6907	2.8534
ΔLGR(-3)	-0.2592	-2.0226	-0.9207	-2.5119	0.5241	0.5141
ΔLGR(-4)	0.2087	1.6330	0.3703	1.0131	-4.6657	-4.5887
ΔLGR(-5)	0.0223	0.1378	-0.5411	-1.1702	3.7879	2.9451
ΔLGR(-6)	-0.0618	-0.5276	0.6418	1.9152	-1.5798	-1.6948
ΔLGSS(-1)	-0.0208	-0.5346	0.8047	7.2161	-0.5088	-1.6403
ΔLGSS(-2)	0.0514	1.0663	-0.0426	-0.3087	0.1567	0.4086
ΔLGSS(-3)	0.0040	0.1082	-0.0178	-0.1673	-0.0879	-0.2965
ΔLGSS(-4)	-0.0806	-2.3221	0.0944	0.9514	0.4716	1.7085
ΔLGSS(-5)	0.0905	2.8314	0.2506	2.7409	-0.6333	-2.4897
ΔLGSS(-6)	-0.0315	-1.2309	-0.1245	-1.7018	0.6637	3.2616
ΔLSS(-1)	0.0118	1.0700	0.0152	0.4797	0.4031	4.5869
ΔLSS(-2)	-0.0331	-3.3100	0.0225	0.7863	0.1241	1.5615
ΔLSS(-3)	0.0159	1.4816	0.0149	0.4871	-0.1543	-1.8094
ΔLSS(-4)	-0.0033	-0.3062	0.0307	0.9871	0.2268	2.6236
ΔLSS(-5)	-0.0145	-1.6914	-0.0019	-0.0794	0.1272	1.8681
ΔLSS(-6)	0.0143	1.7988	-0.0213	-0.9346	-0.1496	-2.3635
C	-0.2413	-2.0563	-0.1795	-0.5351	4.3787	4.6903
R-squared	0.7178		0.9659		0.7176	
Adj. R-squared	0.6580		0.9588		0.6579	
F-statistic	12.0103		134.1009		12.0025	
Akaike AIC	-2.7869		-0.6853		1.3608	
Schwarz SC	-2.3038		-0.2022		1.8439	
Mean dependent	-0.9788		12.0627		11.6054	
S.D. dependent	0.0946		0.7796		0.7527	

Note: t statistics > 2,00 indicate a significant effect; and t statistics < 2,00 indicate an insignificant effect.

Sources: Authors' Computation using E-views 9.0

The income inequality for a certain period has a positive effect on SS at the 2-period later. This thing means that income inequality has been the main determinant factor of public spending policy for the local government, especially regarding social spending allocations. This finding confirms the empirical research of Cimoli et al. (2010) for the case of Latin America discovering, that the social spending growth is parallel to the hike of income inequality.

Further, The GSS has a negative and insignificant effect on SS at the 3-period horizon. This statistical evidence indicates a trade-off between GSS and SS. When local governments increase budget allocations for GSS, they must reduce SS. Conversely, when GSS decreases, the budget allocation for SS can be increased. However, the trade-off relationship between the two instruments of fiscal policy is not significant. The existence of the inverse relationship between the two variables is in line with the study of Jones (2007) in OECD countries founding out that social spending hike depends on the fiscal situation.

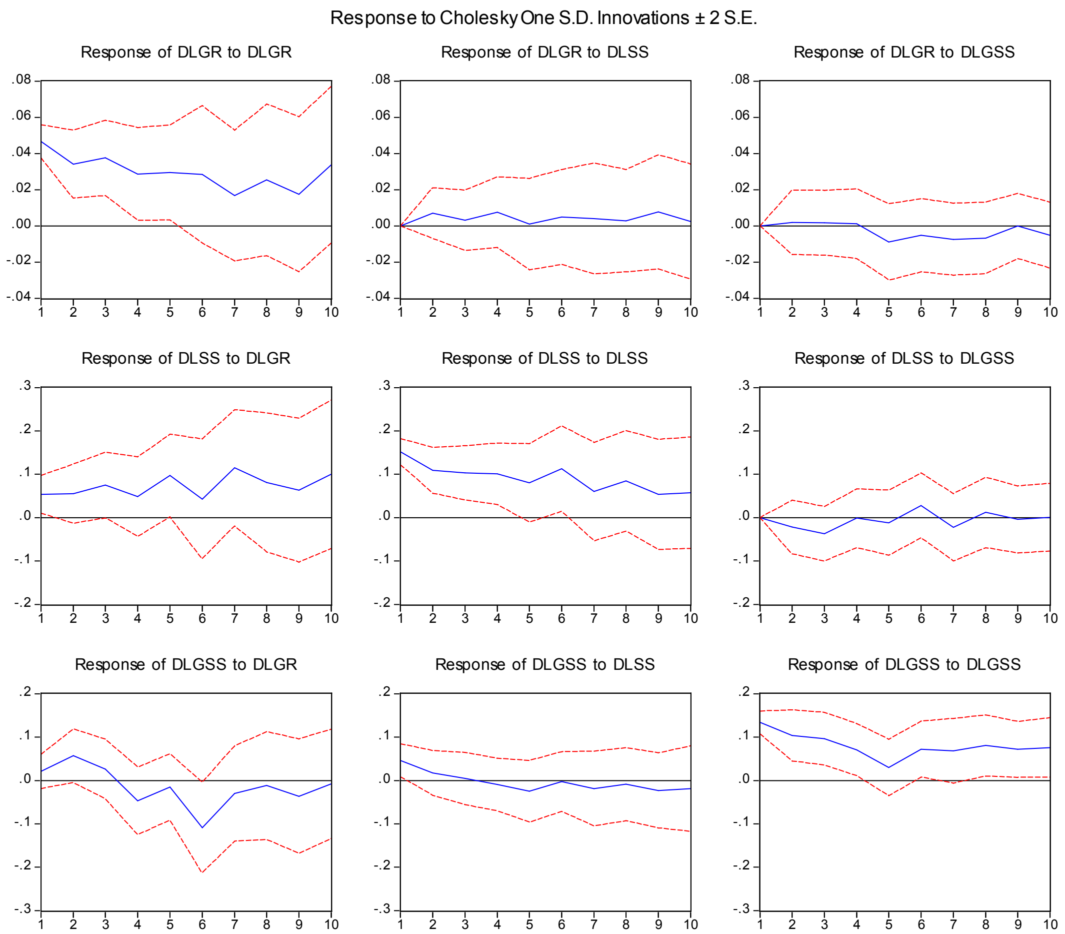
The negative effect of SS on income inequality is faster than the effect of spending on goods and services. The increase in GSS spending decreases income inequality after the 4 periods, whereas social spending decreases income inequality after 2 periods. Thus, in the short term, government budget allocation in the form of social spending is more effective in improving income distribution in society compared to goods and services.

This finding supports the results of a study by Johanson (2000) discovering that the reallocation of government spending towards goods and services would increase income in the long run, while the increase in social welfare spending will improve income distribution in the short-run. This finding is also consistent with the results of an empirical study by Higgins & Pereira (2014) proofing that social spending effectively increases the distribution of income. A recent research study conducted by Sánchez & Pérez-Corral (2018) for the case of several EU countries also revealed a negative relationship between SS and income inequality. A contrarily, this finding is not in line with the result of Goudswaard & Caminada's (2008) study discovered that there is no significant relationship between social spendings and the distribution of income.

4.7. The result of impulse response function

The IRF graphically depicts the time spanning and nature of the response of the inter variables in the VAR dynamic models. Figs 2 provide the impulse response graphs for relationship income inequality, GSS, and SS, respectively. The GR positively and weakly reacts to the shock of its own self. When examining the impulse response of income inequality to the shock of SS social spending (upper central), we find that the existence of shock in SS tends to increase the income inequality over the period. At the 5 and 10-period horizons, the response is towards the equilibrium point. The response of income inequality to the GSS is zero for the 4-period horizon, then is negative in the following period.

Figure 2. Impulse response function of the variables



The SS negatively responds to the shock of the GSS at the 1-3 period horizon, and then positively at the 6th period. Further, the GSS positively reacts on the shock of the SS at the 1-2 period horizon, and then negatively at the following period. Then, the GSS positively responds to the shock of itself, but the reactions weakly tend for the 5th period and then strongly until the 6th period.

4.8. The result of variance decomposition analysis

One way to determine how important the different exogenous shocks are in explaining the dependent variables is to calculate the fractions of the forecast error variance of these variables attributable to the respective orthogonal shocks. The analysis would reveal the contribution of the variable in explaining the forecast error variance of either itself or others. The variance decomposition analysis is utilized to assess the dynamic interactions between the variables in panel VAR model.

The results of the variance decomposition are shown in Table 4. In general, the results further substantiate the earlier findings which base on the impulse response function. Variations in GR variable explain around 98.63 percent of its forecast error variance at the 3-year horizon, indicating that decreasing in GR is one of the most important variables in explaining the dynamic of its own variance. The VDA result also shows that GSS and SS contribute up to 0.143 percent and 1.225 percent of the forecast error-variance of GR at the 3-year horizon, respectively. This indicates the two variables are not one of the important factors in explaining the evolution of GR in the community.

Table 8. Variance decomposition of variables

Period	Variance Decomposition of ΔLGR:			Variance Decomposition of ΔLSS:			Variance Decomposition of ΔLGSS:		
	ΔLGR	ΔLSS	ΔLGSS	ΔLGR	ΔLSS	ΔLGSS	ΔLGR	ΔLSS	ΔLGSS
1	100.000	0.000	0.000	11.083	88.917	0.000	2.120	10.568	87.312
2	98.419	1.467	0.114	14.253	84.581	1.166	10.583	7.085	82.332
3	98.632	1.225	0.143	19.538	77.231	3.230	9.769	5.554	84.677
4	97.811	2.043	0.146	19.366	77.965	2.669	12.603	4.939	82.458
5	96.912	1.765	1.323	26.639	71.019	2.343	12.608	5.938	81.454
6	96.590	1.880	1.529	24.452	72.776	2.772	26.150	4.524	69.326
7	95.835	2.010	2.155	31.887	65.313	2.801	25.324	4.619	70.057
8	95.554	1.939	2.507	33.464	63.921	2.614	23.448	4.335	72.216
9	95.075	2.521	2.405	34.659	62.839	2.502	23.091	4.581	72.328
10	95.324	2.283	2.392	38.174	59.539	2.287	21.672	4.642	73.686
Cholesky Ordering: ΔLGR ΔLSS ΔLGSS									

Sources: Authors' Computation using E-views 9.0

Table 8 above statistically informs that the statistical contribution of income inequality to explain variations in GSS and SS is greater than the statistical contribution of the two kinds of spending in explaining variations in income inequality. This thing provides empirical evidence that the decisions of local governments in Indonesia in determining spending policies for the provision of goods and services and social spending make income inequality a consideration.

4.9. The result of PVAR Granger causality test

Causality test is used to investigate the nature and direction of causal relationships between variables. The results of the test can explain whether two variables have a reciprocal or one-way relationship. Due to the research operationalizes a panel data set, the causality test which we employed is PVAR Granger causality. The result of the test statistically points out that bidirectional causality exists between SS and income inequality, and between income inequality and GSS, as well as unidirectional causality running from GSS to SS. Table 5 describes the causality relationship between the variables.

Table 9. The result of VAR Granger causality

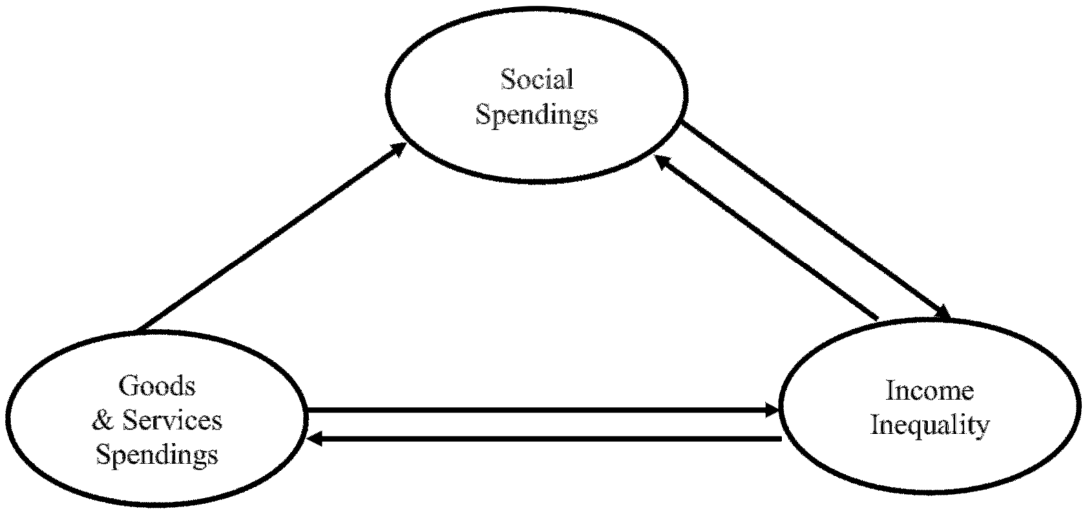
Endogenous Variable	Exogenous Variable		
	ΔLGR	ΔLSS	ΔLGSS
ΔLGR	-	(14.709) [0.023]**	(11.919) [0.064]*
ΔLSS	(37.999) [0.000]***	-	(16.991) [0.009]***
ΔLGSS	(12.877) [0.045]**	(4.920) [0.554]	-

Note: Number in ( ) is chi-square; Number in [ ] is p-value

* significant at 90% level, ** significant at 95% level, and *** significant at 99% level.

Referring to the table 8 below, the direction of causality relationship among goods and services spending, social spending and income inequality as seen on Figure 3.

Figure 3. The nature of causality relationship among the variables



The existence of two-way causality between income inequality and SS indicates that the variable can lead to income inequality. Likewise, income inequality also causes SS. This thing proves that the strategic decision of the local government to allocate public budgets in SS also based on income inequality the main reason. These findings are consistent with the PVAR results which explicitly show, that social spending in a certain period positively and significantly affected by income inequality at the two periods earlier. On the other hand, income inequality is negatively and significantly affected by the SS of the previous two periods.

The existence of two-way causality between income inequality and spending on goods and services indicates that the distribution of income had been an important consideration for local governments to determine the budget allocation into the two kinds of spendings. In other word, the government's policy in determining these spendings indicates that they have a positive response toward the change of income inequality. Conversely, changes in government spending on goods and services can also cause changes in income inequality. This thing is consistent with the results of the PVAR explained earlier that informs positive and insignificant effect of income inequality on goods and services spendings at one and two-period horizons. Meanwhile, an increase in spending on goods and services has a significant impact on decreasing income inequality at the four-period horizon.

The figure 3 above shows that the existence of one-way causality between spending on goods and services and social spending indicates the local government expenditure into social spendings not may be separated from the total spending budget composition of the government. The change in goods and services spendings lead to a change in social spending. As explained earlier, the spendings on goods and services negatively and insignificantly affect social spending at the one-period horizon. But at the two-period horizon, the effects are positive and insignificant.

This finding is in line with the results of a study by Gallo and Sagales (2013) which concluded that income inequality is an important determinant of the composition of the government budget. Previously, an empirical study conducted by Ospina (2010) also pointed out that the increase in income inequality related to social and economic changes and in turn, affect government spending. This finding also supports the results of the empirical study conducted by Ali et al. (2015) in Pakistan which emphasizes that government policies for social spending are very important to improve income distribution in the community.

5. Conclusions and Suggestion

Debate on the effectiveness of government spending on goods and services and social welfare in improving income distribution has long been the highlight of economic researchers. Some researchers conclude that these spendings cannot reduce income inequality. Others found empirical evidence suggesting that spending on goods and services and social spending can be a solution for improving income distribution in the short-run. This study seeks to reveal the effect of these two kinds of spendings on income inequality in the perspective of the Indonesian economy. In addition to analyzing the direction of causality relationships between variables, this study also examines which of these spending is more effective in reducing income inequality.

Using a panel data set of 26 selected provinces in Indonesia for periods of 2005 to 2015, then the data is analyzed by econometrical models of PVAR, and Granger causality test. The main finding of the research as follows: Firstly, there is no long-term relationship between the three variables. At the 2-periods horizon, income inequality is positively influenced by itself. This thing means that income inequality in a certain period has an impact on decreasing income distribution in 1-2 periods later. At the same period horizon, goods and services spending has a positive but not significant effect on income inequality. At the 3-period horizon, the expenditure has a negative and significant impact on income inequality. Furthermore, social spending reduces income inequality at the 2-period horizon. That is, the increase in social spending of a certain period has a significant impact on income inequality reduction after 2-periods later. Then, in the 3 to 6 -periods horizon, social spending does not affect income inequality. Secondly, the policy of local government sets the social spendings to improve income distribution regarding the allocation of goods and services spendings. The change in budget allocation in social spending is a response to the increase in other expenditure budgets, especially for goods and services spendings. The results of the causality test indicate a two-way causality between social spending and income inequality, and between goods and services spendings and income inequality. The local government policy in allocating these two types of expenditure is a response to income inequality. Furthermore, the decline in income inequality is a response to spending on goods and services and social spending.

This research implies that local government policies in reducing income inequality should do through increased public expenditure on goods, services, and social spending. However, the implementation of spending not enable to reduce income inequality in the long-run. Social spending is a short-term solution for reducing income inequality and not being able to improve income distribution in the long-run. Therefore, it is better for local governments in Indonesia to formulate regional budget policies that oriented towards increasing income distribution in the community. The occurrence of income inequality should not be responded with increase the public expenditure component for social spending and the provision of goods and services significantly, but be prefaced through spending policies that oriented towards improving public infrastructure to increase economic activities, especially for people living in rural areas.

References

Afonso, A., Schuknecht, L., & Tanzi. (2008). Income distribution determinants and public spending efficiency, Working Paper Series No. 861, European Central Bank.

Ali, A., Iftikhar, S. F., Fatima, A., & Naz, L. (2015). Income inequality, redistribution of income and trade openness, The Pakistan Development Review, 54(4), 865–874

Ali, S., & Ahmad, N. (2010) The effects of fiscal policy on economic growth: Empirical evidence based on the time series data from Pakistan. The Pakistan Development Review, 49(4), 497-512.

Amri, K. (2018). The macroeconomic impact of regional minimum wages: A cross-province data evidence from Indonesia. Regional Science Inquiry. 10(3), 163-176.

Amri, K., & Nazamuddin (2018) Is there causality relationship between economic growth and income inequality? Panel data evidence from Indonesia, Eurasian Journal of Economics and Finance, 6(2), 8-20.

Anderson, E., d'Orey, M. A. J., Duvendack, M., & Esposito, L. (2017). Does government spending affect income poverty? A meta-regression analysis, Journal of Economic Surveys, 31(4), 961-897.

Cabrera, M., Lustig, N., & Moran, H. E. (2015). Fiscal policy, inequality, and the ethnic divide in Guatemala, World Development, 76, 263–279.

Celikay, F., & Gumus, E. (2017). The effect of social spending on reducing poverty, International Journal of Social Economics, 44(5), 620-632.

Cimoli, M., Neto, A. M., Porcile, G., & Sossdorf, F. (2010) Productivity, social expenditure and income distribution in Latin America, Series Production Development, United Nations.

Claus, I., Martinez-Vazquez, J., and Vulovic, V. (2014). Government fiscal policies and redistribution in Asian countries. In Inequality in Asia and the Pacific edited by R. Kanbur C. Rhee and J. Zhuang. Manila: Asian Development Bank; and London: Routledge.

Crudu, R. (2015). The Influence of fiscal policy on income inequality in European union's member states, Verslo Sistemos Ir Ekonomika Business Systems and Economics, 5(1), 46-60.
da Costa, G. P. C. L., & Gartner, I. R. (2017). The effect of allocation function in budgeting to reduce income inequality in Brazil: an analysis of spending on education and health from 1995 to 2012, Brazilian Journal of Public Administration, 51(2), 264-293.
Decoster, A., Loughrey, J., O'Donoghue, C., & Verwerft, D. (2009) Micro simulation of indirect taxes, AIM-AP-Project Paper, International Journal of Microsimulation, 4 (2), 41-56.
Doerrenberg, P., & Peichl, A. (2014). The impact of redistributive policies on inequality in OECD Countries, Discussion Paper No. 14-02, Zentrum Fur Europaische, Centre for European Economic Research.
Donoaghue, C., Baldini, M., & Mantovani, D. (2004). Modelling the redistributive impact of indirect taxes in Europe: An application of EUROMOD. Euromod Working Paper EM 7/01.
Engle, R. F., & Granger, C.W.J., (1987). Co-integration and error correction: Representation, estimation, and testing, Econometrica, 55(2), 251-276.
Gallo, L. M., & Sagales, O. R. (2013). Joint determinants of fiscal policy, income inequality and economic growth, Economic Modelling, 30, 814–824.
Goudswaard, K., & Caminada, K. (2008). The redistributive impact of public and private social expenditure, Onderzoeksmemorandum 2008.05 Hervorming Sociale Zekerheid
Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. Econometrica, 37(3), 424-438.
Grossmann, A., Love, I., & Orlov, A. G. (2014). The dynamics of exchange rate volatility: A panel VAR approach, Journal of International Financial Markets, Institutions & Money, 3, 1-17.
Gujarati, D. N. (2004). Basic Econometrics. 4th edd. New York: McGraw-Hill International.
Heer, B., & Scharrer, C. (2018). The age-specific burdens of short-run fluctuations in government spending, Journal of Economic Dynamics and Control, 90, 45-75.
Higgins, S., & Pereira, C. (2014). The effects of Brazil's taxation and social spending on the distribution of household income. Public Finance Review, 42(3), 346–367.
Im, K.S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels, Journal of Econometrics, 115(1), 53-74.
Johanson, A. (2000). Public finance, economic growth and inequality: A survey of the evidence, Economics Department Working Paper No. 1346
Jones, R. S. (2007), Income Inequality, Poverty and Social Spending in Japan, OECD Economics Department Working Papers, No. 556, OECD publishing, doi:10.1787/177754708811.
Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. Journal of Econometrics, 90(1), 1-44.
Khan, R. E. A., & Hashmi, B. J. (2015). Fiscal policy and income inequality in pakistan: An ARDL approach, European Journal of Economic Studies, 13(3), 161-174.
Levin, A., Lin, C.F., & Chu, C. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties, Journal of Econometrics, 108, 1-24.
Lustig, N., Pessino, C., & Scott, J. (2014). The impact of taxes and social spending on inequality and poverty in Argentina, Bolivia, Brazil, Mexico, Peru, and Uruguay. Introduction to the special issue. Public Finance Review, 42(3), 287–303.
Martinez-Vazquez, J., Vulovic, V., & Moreno-Dodson, B. (2012). The Impact of tax and expenditure policies on income distribution: Evidence from a large panel of countries, Review of Public Economics, 20(4), 95-130.
Modalsli, J. (2018). The regional dispersion of income inequality in nineteenth-century Norway, Explorations in Economic History, 67, 62-79.
Muinelo-Gallo, L., & Roca-Sagalés, O. (2013). Joint determinants of fiscal policy, income inequality and economic growth, Economic Modelling, 30, 814-824.
Muinelo-Gallo, L., & Roca-Sagalés, O. (2014). Is the fiscal policy increasing income inequality in Uruguay? Journal of Economics and Development Studies, 2(3), 137-156.
Niehues, J. (2010). Social spending generosity and income inequality: A dynamic panel approach, Discussion Paper, No. 5178, IZA, Bonn Germany.
Ospina, M. (2010). The Effect of social spending on income inequality: An analysis for latin American countries. Documentos d trabajo, Economia y Finanzas, Centro de Investigaciones Economicas y Financieras (CIEF). Universidad Abierta al mundo
Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. Oxford Bulletin of Economics and Statistics, 61(1), 653–670.
Ramos, X., & Roca-Sagales, O. (2008). Long-term effects of fiscal policy on the size and distribution of the pie in the UK, Fiscal Studies, 29(3), 387-411.

Sabir, Yustika, A. E., Susilo., & Maskie, G. (2015). Local government expenditure, economic growth and income inequality in south Sulawesi province, Journal of Applied Economics and Business, 3(2), 61-73.

Sánchez, A., & Pérez-Corral, A. L. (2018). Government social expenditure and income inequalities in the European union, Review of Public Economics, 227(4), 133-156.

Wibowo, M. G., & Mubarok, A. (2017). The analysis of double monetary transmission effectiveness on economic growth in Indonesia, Jurnal Ekonomi dan Pembangunan, 25(2), 127-139.

Wu, X., & Li, J. (2017). Income inequality, economic growth, and subjective well-being: Evidence from China, Research in Social Stratification and Mobility, 52, 49-58.

EFFECT OF INFLATION ON TOTAL DEPOSITS AND FINANCING OF SHARIA COMMERCIAL BANKS: A MONTHLY DATA EVIDENCE FROM INDONESIA

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Abstract

The main purpose of the paper is to determine the effect of inflation on total deposits and the financing of sharia commercial banks in Indonesia. A monthly time series data over the period of 2012.1-2017.6 was analyzed using Johansen Co-integration test, vector error correction model, and Granger causality test. The co-integration test indicates that there is a long-run relationship between the variables. In the long-run, inflation is negatively related to total deposits and sharia financing. In the short-run, the inflation has no significant effect on the two variables. The sharia financing has a negative effect on itself at the 1 and 2-month period. The result of the Granger causality test points out that there is a bidirectional causality relationship between total deposits and sharia financing. Furthermore, unidirectional causality running from the inflation to sharia financing and from total deposits to the inflation.

Keywords: Inflation, Total Deposits, Sharia Financing, VECM, and Granger Causality Test

JEL classification: E31, E51, G21, N15

1. Introduction

The presence of sharia commercial banks provides an expectation for the improvement of economic activities of the community in Indonesia. Most of the people of this country are Moslems who in all aspects of their lives are required to always guided by the shariah values, especially in the economic activity. Until 2012, there are 25 units of sharia finance institution in Indonesia. The number increase to 34 units in 2017. Along with the increase in the number of Islamic financial institutions in Indonesia, third-party funds and the distribution of Islamic financing also increased over year. The financing is not only distributed by sharia banks but also sharia business units. Until the period of January 2012, the total of sharia financing in Indonesia reached IDR101.689 billion, increased to IDR147.505 billion in January 2013 with the average growth for the period amount to 3.45 percent per month. The increase in the total financing indicates that sharia financing is in great demand by the public. The demand for the financing is not only intended to meet the needs of household consumption but also for the working capital and investment financing.

The dynamics of the total financing in the sharia commercial banks are related to the macroeconomic factors such as inflation. It is due to inflation is a monetary variable that affects the balance in the financial market. The inflation viewed as a profitable condition for the business activity, so in under conditions of rising inflation, the businessmen extremely want to improve their business capacity through the increases in the investment and working capital. The lack of internal financing resource to fund the two programs allows them to request for the financing of the bank. As a result, the demand for financing tends to increase over time. On the other side, based on deposits customer's point of view, inflation can also affect the propensity to save. When inflation increases, the cost of living is going to increases, and the condition will reduce the ability to save. In turn, the total deposits held in the financial institution tend to decline.

Study on the relationship between inflation with total deposit and sharia financing was carried out by previous researchers. However, they provide a relatively different conclusion from one another. The relationship between inflation and total deposits is negative (Abduh et al., 2011), insignificant (Ali et al., 2012), relatively weak (Sharma & Mani, 2012) and positive significant (Moussa & Chedia, 2016; and Husaeni, 2016). The study conducted by the researchers only investigate the one-way relationship between the variables without analyzing the presence or absence of the long-run relationship and causality direction among the three variables.

Furthermore, studies on the impact of inflation on financing also still provide paradoxical conclusions. The empirical results presented by Calza et al. (2004) revealed that inflation is the main determinant of bank lending. This finding is in line with the results of Katusiime's (2018) findings discovered that inflation has a statistically significant effect on the growth of private sector financing. The impact of inflation on bank lending is positive. In other words, an increase in inflation drives an increase in demand for bank financing (Shingjergji & Hyseni, 2015). The main argument underlying the positive relationship is that price increases are an incentive for entrepreneurs to increase their production output. They want to achieve optimal production levels to maximize profits, and bank financing is a source of capital to finance production activities. Previously, different findings were revealed by Arsene& Guy-Paulin (2013) for the case of the Cameroon economy providing empirical evidence that there was a negative relationship between bank financing and inflation. In contrast to some of the researchers above, Johnson (2015) concluded that there is no relationship between inflation and bank financing.

Since several studies such as those described above have not provided consistent conclusions our study re-examines the impact of inflation on total deposits and Islamic bank financing for the context of the Indonesian economy. In contrast to previous research, this study does not only examine the effect of inflation to total deposits and Sharia financing but also analysis the long-run and short-run relationships as well as the causality of the three variables. Therefore, the findings can be used to initial information for the next empirical studies. In term of practical implication, the findings provide information for governments and policymakers regarding the distribution of sharia financing in Indonesia.

The paper is arranged into five sections, following this introduction is section two which presents the literature reviews regarding the linkage of inflation, total deposits, and sharia financing. Section three consists of data sources, measurement of variable and model analysis. Section four pertaining estimation result and discussion, as well as section five, highlight the conclusion and suggestion.

2. LITERATURE REVIEW

2.1. The relationship between inflation and total deposits

Inflation has an impact on people's behavior in using their funds, including the decision to deposit funds in a bank financial institution. The total deposits have usually come from the community as savings customer. Economic theory states that savings are the difference between income and consumption. The greater the share of income used to meet consumption needs, the smaller the availability of funds for savings. Under conditions of inflation, the raising in prices leads to the increase in household's consumption spending which in turn reduce the propensity to saving (Athukorala & Tsai, 2003). Thus, inflation not only affects the propensity to consume but also affects the volume of savings, including the number of third-party funds in Islamic financial institutions. This thing is in line with the empirical findings of Cetin (2014) which proved that the increase in price impacts on third-party funds of bank finance institution.

The total deposits on the sharia financial institutions are also related to inflation. As the research findings of Mobin & Masih (2014) pointing out that in the case of sharia bank, the inflation also has a strong impact on the total deposits. Several studies on the interrelation between the two variables also provide the empirical information that inflation has a negative and significant effect on the total deposits (Athukorala & Tsai, 2003; Akhtar et al., 2011; and Anthony, 2012). Haron & Azmi (2008) also concluded that inflation has a negative relationship with total deposits. The research conducted by Larbi-Siaw & Lawer (2015) also proves the negative impact of inflation on the total deposits in the long and short-run. In contrast to the research findings, Ali et al. (2012) found that inflation has an insignificant effect on mudharabah deposit as one of the main sources of third-party funds in sharia bank.

Several other studies also provide different conclusions. For example, Karim (2014) concludes that inflation has a positive and significant effect on total deposits of Islamic banks and has a significant negative effect on total deposits of conventional banks. Previously, Alfred (2010) found that the inflation rate has a positive - weak while the real interest rate has a negative - weak relationship with total deposits by a correlation coefficient of -0.05. An empirical study conducted by Abduh et al. (2011) also discovered that inflation negatively affects the total deposits of sharia bank..

2.2. The relationship between inflation and financing

The linkage between inflation and financing has been analyzed by previous researchers. Nahar & Saker (2016) in their study using the unbalanced panel data of 172 Islamic banks from 48 Islamic and Non-Islamic countries concluded that inflation rates have a significant positive relationship with Islamic banking financing. These findings are in line with the research finding of Adebola et al. (2011) found that there is a positive relationship between inflation and bank financing in the short run. Karim et al. (2014) also found that inflation has a positive and significant effect on Islamic bank financing. The positive effect of inflation on financing was also found by Nazir et al (2013) in their study for the case of Pakistan economy who found that the supply of loans positively related to the inflation.

Unlike with a number of those findings above, Sharma & Mani's (2012) studies in India provides empirical evidence that inflation has a weak relationship with financing. Similarly, the result of Husaeni (2016) which concludes that inflation has an insignificant positive effect on Islamic bank financing. Similar findings are also evidenced by Moussa & Chedia (2016) in their research in Tunisia which revealed that there is a positive relationship between inflation and bank credit (if inflation is rising by 1%, bank credit increase by 4%).

2.3. The relationship between inflation and financing

Bank financial institutions are basically just performing an intermediary function between people who excess funds on the one side with people suffering the lack of funds on another side. Third party funds in bank financial institutions are the accumulation of public savings. The funds are offered by banks to the public in the form of financing. Thus, the greater the third-party funds of the bank financial institution the greater the availability of funds offered to the financing customer. The results of empirical studies by previous researchers provide evidence that there is a very strong positive relationship between third-party funds saved by the community in Islamic banks with total financing (Karim et al., 2014). The increase in total deposits significantly increases the financing offered to customers (Husaeni, 2016). In line with the findings of Husaeni, research conducted by Amelia & Fauziah (2017) also proves that total deposits have a positive and significant effect on financing. The empirical findings of Nazir et al. (2013) for the case of Pakistan were also found out that the number of deposits positively related to the offered loan of financial institutions.

The empirical studies conducted by Mukoya et al. (2015) for the case of the commercial bank in Kenya point out that the volume of deposits has a positive and significant effect on total loans. From the findings, for every unit increase in the volume of deposits, a 10.9%, unit increase in total loans advanced is predicted. A study conducted by Nguyen et al. (2018) for the case of Vietnamese banking is also conclude that bank deposits have a positive and significant impact on bank loans.

Contrast to the empirical findings explained above, Moussa & Chedia's (2016) studies in Tunisia provide strong evidence that total deposits have no significant effect on distributed loans. Other research conducted by Alfred (2010) for the case of Nigerian union bank uncover that there is a positive and moderately significant relationship between bank deposits and loans by a correlation coefficient of 0.53. Hence, loans are in-elastic to bank deposits..

3. Data and research methods

The data used is time series data in the form of monthly data for the period of 2012.1 to 2017.6, sourced from Statistics Report of sharia banks of Indonesia. The initial stage of data processing begins with unit root test or stationarity test of the data. There are two common ways to do unit root test, namely Augmented Dickey-Fuller test (ADF) and Phillips-Peron test (PP). Econometrically, using ADF-test to test the unit root of the data is formulated as follows (Albiman & Suleiman, 2016).

$$\Delta Y_t = \propto_0 + \propto Y_{t-1} + \sum_{k=1}^{n} \propto \Delta Y_{t-k} + \varepsilon_t \quad (1)$$

$$\Delta Y_t = \propto_0 + \sum_{k=1}^{n} \propto \Delta Y_{t-k} + \delta_t + \varepsilon_t \quad (2)$$

Then, the PP-test formulated as follows:

$$\Delta x_t = \beta_0 + \beta_2 x_{t-1} + \delta + \varepsilon_{2t} \quad (3)$$

$$\Delta x_t = \beta_0 + \beta_2 x_{t-1} + \delta + \varepsilon_{2t} \quad (4)$$

Where: Δ is the first difference for all variables, Y and X are time series data, t is linear time trend, n is the optimum lag for dependent variables important to make the serial of error terms not correlated between the first and second equations, and ε is random error terms. The same method applies to x_{t-1} in equations 3 and 4. By applicating of *E-views* software, the standard of the data stationarity using both ADF and PP refer to the probability values. A data justified reaching a stationary when the probability value of it less than 0.05. Conversely, if the probability value is greater than 0.05, means the data is not stationary or has a unit root.

After the unit root test, the analysis then continued with lag length criteria test. In analyzing the tardiness of the model, the most important question is how to determine the length of slowness, and this is a problem in the model specification (Amri, 2018). So, in order to determine the model of causality test (the relationship between variables) required determination of optimal lag length as an initial stage.

The next stage is to perform co-integration test for the equations. The co-integration test used in this research is Johansen's co-integration technique. The determination of whether the equations are co-integrated refers to the comparison of both the trace statistic value and critical value, and the max-Eige statistic value and the critical value with the provision that if the trace statistic value > critical value, and max-Eige statistic value > critical value can be concluded that the equations are co-integrated.

The result of the unit root test indicates that the variable achieves stationer at the first differencing and the co-integration test points out that the variables co-integrated. Therefore, the data were analyzed utilizing a vector error correction model (VECM). The equation formulating the causal relationship between variables in the dynamic model as follows:

$$\Delta LSF = \propto_0 + \sum_{i=1}^{n} \beta_{1i} \Delta L(SF)_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta L(TDs)_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta L(Inf)_{t-i} + \gamma e_{t-1} + \varepsilon_1 \quad (5)$$

$$\Delta LTDs = \propto_0 + \sum_{i=1}^{n} \beta_{1i} \Delta L(TDs)_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta L(SF)_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta L(Inf)_{t-i} + \gamma e_{t-1} + \varepsilon_2 \quad (6)$$

$$\Delta LInf = \propto_0 + \sum_{i=1}^{n} \beta_{1i} \Delta L(Inf)_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta L(SF)_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta L(TDs)_{t-i} + \gamma e_{t-1} + \varepsilon_3 \quad (7)$$

Where ΔLSF is the first difference of the natural logarithm of sharia financing, $\Delta LTDs$ is the first difference of the natural logrithm of total deposits, and $\Delta LInf$ denotes the first difference of the natural logarithm of the inflation, α and β are constants to be estimated, as well as ε denotes a stochastic error term. t is the period of t, and i is lag length optimal.

The model above can avoid the loss of short-term information. The short-run deviation toward to long-term equilibrium, directly adjusted to long-run equilibrium. Therefore, the term of error helps to correct the proportion of imbalances on the next period. The term error correction model (ECM) is represented by the coefficient γ if the variables are cointegrated. Finally, Granger causality employed to test the causality relationship between the variables studied..

4. THE RESULT AND DISCUSSION

4.1. The descriptive statistics of the variables

During the period of 2012.1-2017.6, the total deposits on Islamic commercial banking in Indonesia tend to increase over monthly. In January 2012 the total deposits of IDR116.518 billions and then increases to IDR148.731 billions in January 2013. Until January 2017 the total deposits reached IDR177,930 billions. At the same period, the total of sharia financing of Islamic commercial banking also significantly increase. In January 2012 the total financing of IDR101.689 billions, and then growing to IDR149.672 billions in January 2013. The number has continued to IDR181.398 billions in January 2017.

Furthermore, the rates of monthly inflation for the same period are relatively fluctuated and tend to increases. At the period of January 2012, the monthly inflation rate of 3.75%, increased to 4.6% in January 2013 and 8.2% on January 2017. The Descriptive statistics of the three variables, as shown in Table 1.

Table 1. Descriptive statistics of the research variable

	Sharia financing (IDRBillions)	Total Deposits (IDRBillions)	Inflation rates (%)
Mean	150,952.0	150,076.6	5.909
Median	157,576.5	153,879.5	5.390
Maximum	187,885.0	185,508.0	8.790
Minimum	101,689.0	114,018.0	3.560
Std. Dev.	29,226.13	25,016.6	0.018
Skewness	-0.349	-0.163	0.412
Kurtosis	1.629	1.514	1.553
Jarque-Bera	2.758	2.699	3.236
Probability	0.252	0.259	0.198

Source: Author's Computation using E-views 9.0

Table 1 above also shows the Jarque-Bera test and the probability value of the respective variable. Econometrically, these two values are utilized to measure the normality of the data. The result of the econometric test shows that the statistical value of the Jarque-Bera test is respectively of 2.758 for the financing, 2.699 for the total deposits, and 3.236 for the inflation. The p-values of the respective variables are greater than 0.05. This thing indicates that the data of the respective variables have a normal distribution.

4.2. The result of unit root test

The initial stage of using the time series data in the research is checking the unit root of the data tested. As explained before, the unit root test in this research using ADF-test and PP-test. Prior to doing the test, the research variables transformed into logarithmic form. The unit root test at the level indicates that only the total financing reach stationary with p-value <0.05. Conversely, total deposits and inflation are not stationary with p-value> 0.05. The test then performed the first difference data. The result of unit root test as shown in Table 2.

Table 2. The summary of unit root test

Variable	Augmented Dicky Fuller (ADF)				Phillips-Perron (PP)			
	Constant		Constant and Trend		Constant		Constant and Trend	
	Level	First difference	Level	First difference	Level	First difference	Level	First difference
Shariah financing	0.032*	0.787	0.997	0.100	0.024*	0.006**	0.998	0.000**
Total Deposits	0.875	0.000**	0.782	0.000**	0.878	0.000**	0.743	0.000**
Inflation	0.677	0.005**	0.518	0.021*	0.654	0.006**	0.795	0.026**

Source: Author's Computation using E-views 9.0.

*) significant at the 95 percent level; **) significant at the 99 percent level.

Refer to the unit root test as shown on Table 2 above the data achieves stationary at the first difference. Previously, the results of co-integration test pointed out that there are two co-integration equations of the three variables. Taking into for reason, the econometric data analysis of our study utilizes vector error correction model (VECM).

4.3. The result of lag length criteria test

In analyzing the slowness model, the most important question is how to determine the lag length time of slackness, and this is a problem in the model specification. So, to determine the model of causality test (the relationship between the three variables) required determination of optimal lag length as the main stage.The optimal lag length is the duration of time that gives a significant effect or response of a certain variable to other variables (Amri, 2017). The tests were determined based on informational criteria - the Akaike information criterion (AIC), Hannan-Quinn (HQ), and Schwarz information criterion (SC) (Amri et al., 2019). Among the four criteria, the Akaike information criterion is believed to be more accurate than the others (Liew, 2004).The result of lag length criteria tests as shown in Table 3.

Table 3. The resulf of lag length criteria test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	153.8557	NA	1.15e-09	-12.06846	-11.92219	-12.02789
1	249.9740	161.4786*	1.09e-12	-19.03792	-18.45286*	-18.87565
2	260.6255	15.33823	9.93e-13*	-19.17004*	-18.14619	-18.88607*

Source: Author's Computation using E-views 9.0

Note: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion.

Referring to the E-views output above, the optimal lag length of the VECM model achieved in the second period. This thing means that the optimal effect of an exogenous variable on the endogenous variable occurs within the two-period horizon. Hence, the application of the econometric models operationalized at the lag of 2.

4.4. The result of Johanson's Co-integration test

The cointegration test in this study uses the Johansen cointegration test. The equation is indicated to be cointegrated refer to the comparison of the trace statistic value and critical value, and the max-Eige statistic value and critical value with the provision if the value of trace statistic > critical value and max-Eige statistic> critical value indicates that there is co-integration equation. On the contrary, if the trace statistic value < critical value, and max-Eige statistic value <critical value interpreted that the equation is not cointegrated. Johansen cointegration test results as shown in Table 4.

Table 4. The Result of Johansen's Co-integration Test

Variabel in Equation	Unrestricted Cointegration Rank Test (Trace)				
	NullHypothesis	Eigenvalue	Trace Statistic	0.05Critical value	Prob.**
LSF LTDs LInf	None *	0.661	48.548	29.797	0.000
	At most 1 *	0.399	20.404	15.495	0.008
	At most 2 *	0.239	7.133	3.841	0.008
Trace test indicates 3 co-integrating 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)				
Variabel in Equation	Null ypothesis	Eigenvalue	Max-Eigen Statistic	0.05Critical Value	Prob.**
LSF LTDs LInf	None *	0.661	28.144	21.132	0.004
	At most 1	0.399	13.270	14.265	0.071
	At most 2 *	0.239	7.133	3.841	0.007
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values					

Source: Author's Computation using E-views 9.0.

Table 4 above shows the value of trace statistic > critical value, as well as max-Eige statistic > critical value. This means that in the long run there is co-integration within the model of the equation. In econometrics when the variables mutually co-integrated indicate a long-term equilibrium. That is, in the long-run, there are two co-integration equation describing the long run relationship between the inflation, total deposits and financing of sharia commercial banks in Indonesia.

4.5. The Result of Vector Error Correction Model

Since the data reaches the stationer at the first difference and has cointegration, the data analysis model then using VECM. As the previous analysis results, the optimal lag obtained at the lag of 2, therefore in the VECM analysis using the lag of 2. The first part is related to the co-integration equation and error correction pointing out the long-run and short-run relations between the three variables. The second part represents the short run equation between the variables. The result of VECM describing co-integration equation and error correction pointed in Table 5.

Table 5. The summary of co-integration equations and error correction

Cointegrating Eq:	CointEq1	CointEq2	
Δ**LSF** (-1)	1.0000	0.0000	
Δ**LTDs** (-1)	0.0000	1.0000	
Δ**Linf** (-1)	23.4728	21.0226	
	[5.0448]	[5.3867]	
C	-13.3218	-13.1664	
Error Correction:	Δ (Δ**LSF**)	Δ (Δ**LTDs**)	Δ (Δ**Linf**)
CointEq1	**0.4762**	0.9352	0.0117
	[5.9594]	[5.5648]	[0.1581]
CointEq2	-0.5795	**-1.0596**	-0.0149
	[-6.2667]	**[-5.4489]**	[-0.1748]

Source: Author's Computation using E-views 9.0.
Note: the number in [ ] is t-statistics

Refer to the result of VECM above, the co-integration equation describing the long-run relationship among the inflation and total deposit and total financing as shown in the following equation:

$$\Delta \mathbf{LSF} = \mathbf{13.323} - \mathbf{23.472} \Delta \mathbf{Linf} \quad (8)$$

$$\Delta \mathbf{LTDs} = \mathbf{13.166} - \mathbf{21.023} \Delta \mathbf{Linf} \quad (9)$$

The eight equation represents the long-run relationship between inflation and sharia financing. In the long-run there is a negative relationship between the two variables. This means that the increase in inflation significantly affects the decrease in financing. The existence of a negative relationship between the two variables is due to inflation leads Islamic banks to increase financing margins. The financing margin is a capital cost that will be paid by the financing customer. Therefore, when the margin increases, the demand for Islamic financing decreases. This finding supports the results of the study of Calza et al. (2004) for the case of European countries discovering that inflation is as determinants of bank lending. The empirical findings of Ibrahim & Shah (2012) from the Malaysian economy also provide a similar result, that the macroeconomic conditions as inflation have a positive and significant effect on bank lending. Likewise, research conducted by Katusiime (2018) for the case of Uganda economy also proves the existence of an inverse relationship between inflation and bank loan. The higher the inflation, the lower the bank loan. However, this finding contradicts the findings of Shingjergji & Hyseni's (2015) study in Albania for the case of conventional banks found that credit growth is positively related to the inflation rate. Even, an empirical study of Yuksel & Ozsari (2016) in Turkey which concluded that there is no causal relationship between inflation and bank credit.

The ninth equation represents the long-run relationship between inflation and total deposits of Islamic finance institution. In the long-run, the inflation also has a significant negative relationship with total deposits. The increase in prices, in general, reduce the propensity to save for deposits customers. The higher the inflation, the higher the need for funds for consumption purposes which in turn impact on the decrease in savings. This is what causes a negative relationship between inflation with total deposits.

The existence of a negative relationship between inflation and total deposits consistent with the findings of Epaphra (2014) studies on the determinants of national saving in Tanzania have concluded that inflation has negative effects on total deposits of bank financial institutions. When inflation is high, the purchasing power of the people decreases and the portion of the income they use to meet consumption needs will increase. In turn, the tendency to save will decrease. This finding also in line with the results of Tinoco-Zermeno (2014) for the case of Mexico economy that found out that high inflation rates contributed negatively to bank lending growth. So, the negative relationship between the two variables is related to the ability of income to meet the daily necessities of the people. The results of an empirical study conducted by Otiwu et al. (2018) in the case of the Nigerian economy explicitly explains that income is an important determinant of the ability to save, which in turn, it has an impact on the total of third party funds in banking institutions. Increased inflation reduces the incentive to save and people respond rationally by giving priority to ownership of goods compared to saving money at banking institutions (Abdelaty&Esmail, 2014).

Error correction term represents the short-run relationship of the variables. CointEq1 deals with the relationship between total financing and inflation. In the short-run, when the total financing is lying above the long-run equilibrium, then the inflation will increase at the next period. Increased financing by sharia banks directly increases the money supply in the community. At the same time, the growth of the real sectors is relatively slow. This finding is consistent with the empirical result of Gatawa et al. (2017) for the case of Nigerian economy pointing out inflation occurs when financial sector growth is faster than the real sector growth.

Furthermore, cointEq2 deals with the short-run relationship between total deposits and inflation. In the short-run, when the total deposit lies above the long-term equilibrium, then inflation will fall in the next period. This thing is due to an increase in deposits in bank financial institutions such as sharia banks means reduces in the money supply in the community so, that the general price tends to decrease. This finding supports the results of the study conducted by Shirvani & Bayram (2013) that discovers a negative impact of raising deposits on inflation. The increase in deposits is parallel to the increase in savings interest rate. The interest rate is the main instrument for financial policymakers to control the increase in prices of goods and services in the economy.

The short-run effect between variables pointed out by the short-run equations generated by VECM. The total financing of a certain month is negatively affected by its self at the one and two-months before. This thing indicates that the distribution of financing in a certain period has a negative and significant impact on the total financing of the next one and two-period.

Table 6. The results of VECM estimates

Endogenous Variables	*Exogenous Variables*						Determination coefficient and F statistics
	ΔLSF		ΔLTDs		Δ*LInf*		
	Lag1	Lag2	Lag1	Lag2	Lag1	Lag2	
ΔLSF	(-.742) [-2.392]**	(-.593) [-2.175]**	(.216) [2.329]**	(.169) [2.201]**	(.022) [.065]	(.339) [1.217]	R^2 : .869 Adj. R^2 : .799 F stat : 12.473
ΔLTDs	(-.224) [-.344]	(.071) [.124]	(-.042) [-.124]	(-.146) [-.494]	(-.579) [-.802]	(.0453) [.077]	R^2 : .719 Adj. R^2 : .569 F stat : 4.800
ΔLinf	(.181) [.630]	(-.201) [-.798]	(-.083) [-.549]	(.139) [1.065]	(.309) [.971]	(-.154) [-.598]	R^2 : .241 Adj. R^2 : -.164 F stat : .594

Source: Author's Computation using E-views 9.0.

Note: Number in ( ) is regression coefficient, Number in ( ) is t statistics, ** significant at 95% level.

Total deposits have a positive and significant effect on total financing either in the period of 1 or 2 months. These findings support the research findings of Sholikhah et al. (2017)which also point out a positive effects of the total deposits on the financing volume of Islamic banking. The greater the total deposit, the greater the financing. Previously, the study conducted by Husaeni (2016) also showed the same result that the total deposits increase the financing of Islamic banking. The positive influence of total deposits towards financing due to banks performing financial intermediation functions in the community. When propensity to saving increases, the total third party funds flowing to banks also increase, so that the supply of financing for lending customers also increases.

The existence of a positive effect of total deposits on the financing of islamic commercial banks in Indonesia indicates that the availability of third-party funds is an important condition for banks to be able to distribute the sharia financing. This finding is consistent with the findings of Alfred (2010), Nazir et al. (2013),Mukoya et al. (2015) and Nguyen et al. (2018) which concludes that there is a positive relationship between the financing and total deposits. An increase in total deposits can directly increase the financing. On the contrary, this finding is in contrast to the research finding of Moussa & Chedia (2016) for the case of Tunisian banking uncovering there is not a significant effect of deposits on financing.

Total financing positively affects inflation at the 1-month period, but the effect is not significant. The positive effect of total financing on inflation is due to the increase in the money supply in the community, while at the same time the financing has not had an impact on developments in the real sector. The positive impact of total financing on the developments in the real sector requires at least a duration of more than 1 month. So, at the 2-month time horizon, the financing effects on inflation becomes positive, but still not significant. The absence of any significant effect of total financings on inflation is in line with the result of empirical findings of Korkmaz (2015) for the case of 10 European countries revealed that the lendings that distributed by the banking sector to financing customers did not affect inflation. Conversely, these findings contrast to the result of an empirical research study conducted by Igan & Pinheiro (2011) who concludes that bank lending growth impacts the price stability. This finding also contradicts Dhungana & Pradhan (2017) research in Nepal which concluded that bank lending has a positive and significant effect on inflation.

4.6. The result of Granger causality test

Granger causality test is not only used to determine the causal relationship between variables. But it is also capable of analyzing which of the two variables (examined) first appear. Given the variables used in this study theoretically and logically have relationships with each other, then the need for a test of causality. Such as the relationship between the variable of inflation and the distribution of financing. The increase in financing increases the money supply and in turn, promotes the existence of inflation. On the other hand, the general rise in prices is usually an important consideration for the businessmen to utilize bank financing to improve its business capability, so inflation can also affect total financing.

The causality between total financing and total deposits logically can be explained that the financing distribution by financial institutions depends on the availability of third-party funds sourced from the savings account. In relation to inflation as one of the macroeconomic indicators, the variable can also affect the prospensity to save, The test of causality between inflation, total deposit and total financing of sharia financial institutions as shown in Table 7.

Table 7. The result of Granger causality tests

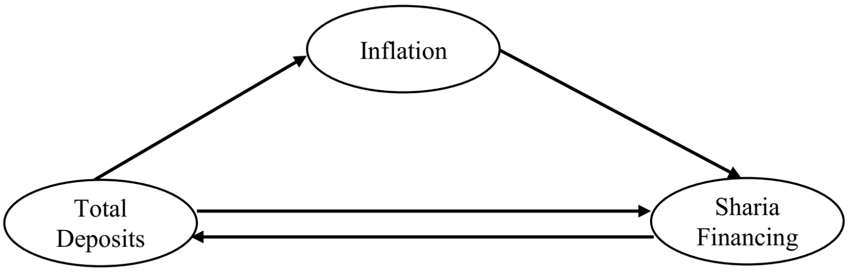
Endogenous Variables	Exogenous Variables		
	ΔLSF	ΔLTDs	ΔLInf
ΔLSF	-	(5.454) [.013]**	(4.024) [.034]**
ΔLTDs	(6.253) [.008]***	-	(.274) [.763]
ΔLInf	(1.773) [.196]	(2.362) [.089]*	-

Source: Author's Computation using E-views 9.0.

Note: Δ is the first difference operator, the values in parentheses ( ) are F-Statistic, the values in bracket [ ] are p-values. *, ** & *** indicates the significant at 90%, 95% and 99% level respectively.

Based on the result of the Granger causality test explained above, so the direction of causality relation among the three variables as in Figure 1.

Figure 1. The direction of causality relations between the variables



The Figure 1 above shows the existence of two-way causality between total financing and total deposits. That is, the financing distribution by sharia commercial banks in Indonesia was supported by the availability of third-party funds coming from savings customers. In other words, the increased financing of the commercial banks is a response to the increase in total deposit increases. Furthermore, the increase in total deposits is also due to an increase in the distribution of financing to the public. The financing distributed to the community will promote the productive economic activities which in turn leads to the increase of income. The increases in income, will lead to the ability to saving. This causes the bidirectional causality between financing and total deposits.

One-way causality exists from total deposit to inflation and from inflation to total financing. The existence of one-way causality from total deposit to inflation indicates that price increases are generally related to the money supply in the community. When the total deposit increases the money supply decreases and then the inflation decreases. This is what causes the causality of total deposits to inflation. This finding is not in line with the empirical result of Daood Al-Oshaibat & Banikhalid (2019) for the case of Jordan that discovers the existence of the mutual effect between the two variables.

The existence of one-way causality from inflation to total financing indicates that general price increases are still an important consideration for people to utilize the financing of Islamic financial institutions. Especially for those engaged in productive enterprises, the decision to take up financing at sharia financial institutions is based on the benefit-cost analysis. The financing decision is considered profitable when the financing is able to provide greater benefits than the cost that must be incurred.This finding is not in line with the results of Yuksel & Ozsari (2016) study in Turkey which found empirical evidence that there is no causal relationship between customer loans and inflation. This finding also refutes the results of Arsene & Guy-Paulin's (2013) research for the case of Cameroon economy concluding that there is only unidirectional causality from financing to inflation.

5. Conclusions and Suggestion

The main reason for this research is to investigate the effect of inflation on total deposits and total financing of sharia commercial banks in Indonesia. Using monthly time series data over the period of 2012.1-2017.6, Johansen cointegration tests, error correction model vectors, and Granger causality tests were employed to analyse the relationship between these variables. The results of the study prove that there is a long-term relationship between inflation and total deposits and total financing.

In the long run, inflation is negatively and significantly related to sharia financing and total deposits. In the short term, the financing is positively and significantly related to inflation. When financing lies above the long-term equilibrium, inflation will increase in the next period. Conversely, total deposits are negatively related to inflation. when the total deposit lies above the long-term equilibrium, inflation will decrease in the next period. The result of Granger causality test indicates that there is unidirectional causality running from total deposits to inflation and from inflation to the financing of sharia commercial banks. and then, bi-directional causality exists between the total deposits and the financing.

Referring to the conclusions above, the recommendations of this study are that policymakers in Indonesia should control inflation at the beneficial rate for the economy. Furthermore, the allocation of shariah financing on sharia commercial banks must be oriented towards developments in the real sector so that the increase in the financing will lead to the increases in goods and services production which in turn can reduce inflation.

References

Abdelaty, H., & Esmail, H. (2014). Macroeconomic determinants of savings in Egypt "Statistical Model", International Journal of Business and Economic Development, 2(2), 26-33.

Abduh, M., Omar, M. A., & Duasa, J. (2011). The impact of crisis and macroeconomic variables towards Islamic banking deposits, American Journal of Applied Sciences, 8(12), 1378-1383.

Adebola, S.S., Yousaf, W.S.W., & Dahalan, J. (2011). The Impact of macroeconomic variables on Islamic banks financing in Malaysia. Research Journal of Finance and Accounting, 2(4), 22-32.

Akhtar, M. F., Ali, K., & Sadaqat, S. (2011). Liquidity risk management: A comparative study between conventional and Islamic banks of Pakistan. Interdisciplinary Journal of Research in Business, 1(1), 35–44.

Albiman, M., & Suleiman, N.N. (2016). The relationship among export, import, capital formation and economic growth in Malaysia. Journal of Global Economics, 4(2), 2–7.

Alfred, U. A. (2010).The determinants of commercial bank deposits in Nigeria 1989 – 2007: A study of union bank of Nigeria PLC, Master Thesis, Faculty of Sciences, Azikiwe University Awka.

Ali, S., Hassan, A. A., & Kasim, K. (2012). Macroeconomics variables and its impact to mudharabah investment depositsin Malaysia, Finance Management, 51, 10866-10869.

Amelia, E., & Fauziah, H. E. (2017). Determinants of mudharaba financing: A study at Indonesian Islamic rural banking, Etikonomi, 16(1), 43 – 52.

Amri, K. (2017). Analisis pertumbuhan ekonomi dan ketimpangan pendapatan: panel data 8 provinsi di Sumatera (Analysis of economic growth and income inequality: Panel data evidence of 8 provinces in Sumatera). Jurnal Ekonomi dan Manajemen Teknologi, 1(1), 1-11.

Amri, K. (2018). The macroeconomic impact of regional minimum wages: A cross-province data evidence from Indonesia,Regional Science Inquiry. 10(3), 163-176.

Amri, K., Masbar, R., Nazamuddin., & Aimon, H. (2019). Is there a causality relationship between local tax revenue and regional economic growth? A panel data evidence from Indonesia, Regional Science Inquiry, 11 (1), 73-84.

Anthony, O. (2012). Bank savings and bank credits in Nigeria: Determinants and impact on economic growth. International Journal ofEconomics and Financial Issues, 2(3), 357–372.

Arsene, M. F., & Guy-Paulin, D. D. (2013). An econometric analysis of the nexus between credit to the private sector, inflation and economic growth: Case of Cameroon 1965 – 2010, Global Journal of Management and Business Research Interdiciplinary, 13(7), 41-53.

Athukorala, P-C., & Tsai, L. P. (2003). Determinants of household saving in Taiwan: Growth, demography and public policy. Journal of Development Studies, 39(5), 69–88.

Calza, A., Manrique, M., Souza, J. (2004). Credit in the euro area: an empirical investigation using aggregate data. Quarterly Review of Economics and Finance 46, 211–226.

Cetin, H. (2014). Econometric modelling of Turkish participatory banks deposits, International Journal of Trade, Economics and Finance, 5(4), 322-326.

Daood Al-Oshaibat, S., & Banikhalid, H. H. (2019). The impact of bank credit on inflation in Jordan by using vector auto regression model: A case study of Jordan during 1968-2017, International Business Research, 12(5), 34-39.

Dhungana, N. T., & Pradhan, R. S. (2017). Effect of bank lending on inflation in Nepal, Journal of Advanced Academic Research, 4(2), 27-43.

Epaphra, M. (2014). Empirical investigation of the determinants of Tanzania's national savings, Journal of Economics and Development Studies, 2(4), 223-241.

Gatawa, N. M., Abdulgafar, A., &Olarinde, M. O. (2017). Impact of money supply and inflation on economic growth in Nigeria (1973-2013), Journal of Economics and Finance, 8(3), 26-37.

Haron, S., & Azmi, W. N. W. (2008). Determinants of Islamic and conventional deposits in the Malaysian banking system, Managerial Finance, 34(9), 618-643.

Husaeni, U. A. (2016). The variables effects of murabaḥah in Islamic commercial banks, International Journal of Nusantara Islam, 4(2), 1-16.

Ibrahim, M. H., & Shah, M. E. (2012). Bank lending, macroeconomic conditions and financial uncertainty: Evidence from Malaysia. Review of Development Finance, 2(3-4), 156–164.doi:10.1016/j.rdf.2012.09.001.

Igan, D., &Pinheiro. (2011). Credit growth and bank soundness: Fast and furious? IMF Working Paper11/278

Johnson, K-A. (2015). Analysis of the impact of the economic credits on the inflation and economic growth in Togo, African Journal of Marketing Management, 7(6), 69-79.

Karim, M. A., Hassan, M. K., Hassan, T., & Mohamad, S. (2014). Capital adequacy and lending and deposit behaviors of conventional and Islamic banks, Pacific-Basin Finance Journal 28, 58-75.

Katusiime, L. (2018). Private sector credit and inflation volatility, Economies, 6(28) 1-13.

Korkmaz, S. (2015). Impact of bank credits on economic growth and inflation, Journal of Applied Finance & Banking, 5(1), 57-69

Larbi-Siaw, O., & Lawer, P. A. (2015). Determinants of bank deposits in Ghana: A cointegration approach. Asian Journal of Economics and Empirical Research, 2015, 2(1),1-7.

Liew, V. K-S. (2004). Which lag length selection criteria should we employ? Economics Bulletin, 3(33), 1-9

Mobin, M. A. & Masih, M. (2014). Do the macroeconomic variables have any impact on the Islamic bank deposits? An application of ARDL approach to the Malaysian market. MPRA Paper No. 62342.

Moussa, M. A. B., & Chedia, H. (2016). Determinants of bank lending: Case of Tunisia, International Journal of Finance and Accounting, 5(1), 27-36

Mukoya, P. M., Muturi, W., Oteki, E. B., & Wamalwa, R. W. (2015). Volume of deposits, a determinant of total long-term loans advanced by commercial banks in Kenya: Case of Bungoma County, Journal of Economics and Finance, 6(6), 44-48.

Nahar, S., & Sarker, N. (2016). Are macroeconomic factors substantially influential for islamic bank financing? Cross-country evidence, Journal of Business and Management, 6(1), 20-27.

Nazir, M. S., Naqvi, I. H., & Nawaz, M. M. (2013). Role of rate of return, inflation and deposits on loan supply: An empirical study of banking sector in Pakistan. African Journal of Business Management, 7(25), 2427-2431.

Nguyen, T., Tripe, D., & Ngo, T. (2018). Operational efficiency of bank loans and deposits: A case study of Vietnamese banking system. International Journal of Financial Studies, 6(14), 1-13.

Sharma, E. & Mani, M. (2012). Impact of macroeconomic and financial market indicators on the banking sector: Some evidence from India. International Journal of Research in Finance & Marketing, 2(2), 172-185.

Otiwu, K., Okere, P.A. & Uzowuru, L.N (2018). Determinants of private domestic savings in Nigeria (1981- 2015). International Journal for Innovation Education and Research, 6(2), 21-40.

Shingjergji. A., & Hyseni, M. (2015). The impact of macroeconomic and banking factors on credit growth in the Albanian banking system, European Journal of Economics and Business Studies, 1(2), 113-120.

Shirvani, H. M., & Bayram, S. G. (2013). Interest rate liberalization and inflation in developing countries: A theoretical analysis. Banks and Bank Systems, 8(3), 115-120.

Sholikhah, Z., Pramuka, B. A., & Adawiyah, W. R. (2017). Determinant of the equity based financing volume: A case of Islamic banks in Indonesia, Research Journal of Finance and Accounting, 8(1), 30-39.

Tinoco-Zermeno, M.A., Venegas-Marti´nez, F., & Torres-Preciado, V. H. (2014). Growth, bank credit, and inflation in Mexico: Evidence from an ARDL-bounds testing approach, Latin America Economics Review, 23(8), 1-22.

Yuksel, S., & Ozsari, M. (2016). Impact of consumer loans on inflation and current account deficit: A Toda Yamamoto causality test for Turkey, World Journal of Applied Economics, 2(2), 3-14.

DETECTION OF FIRMS´ CLUSTERING BY LOCAL SCALING

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Abstract

The paper analyses locations of headquarters of companies and their interactions by inhomogeneous point process, especially local scaling principles, because companies choose their locations according to the number of the local population. Relationships of the companies within economic sectors are studied using the analysis of locally scaled L function. The inhomogeneity was modelled using the local population, then the company's size was included. Lastly the level of clustering in each sector was computed. The companies are located in three regions in the Czech Republic. It was found out that the companies tend to cluster when the population or the companies' size is taken into account.

Keywords: Inhomogeneous point process, L-function, Global envelope test, Spatial clusters, Agglomeration

JEL classification: C21, L60, O18, R12

1. Introduction

The localization of corporate activities is the most important decision for a company and is the result of many factors and decision-making of actors such as companies, households and the public sector. Due to this fact the location of companies has been a part of economics for many years. For decision making about the companies' location, it is necessary to take into account the external and internal factors that influence activities of the companies and the optimal combination of these factors leads to optimal localization. One of these factors is the location where the company operates. This fact has led to the development of location theory that is one of the oldest theories dealing with regional economics (Alonso, 1972). Localization theory is focused on the geographic location of economic activities and it tries to answer the question why and where economic activities are placed and try to define location factors which can explain the decisions of firms (North, 1955). Each author of location theory introduces different location determinants. For example, Weber (1929) identifies transportation costs, labour costs and consumer agglomerations as the main localization factors. In addition, Weber differentiates factors according to the company sector on the socio-political, natural-technical and socio-cultural factors and dispersion of economic activities on regional and agglomerative factors. Ježek (2002) considers the natural resources, labour, suppliers of goods and services, information and access to information as the main location factors. According to Kuşluvan (2013) the location is determined by technological, economical and geographical, political and social factors. Christofakis (2014) considers, as the most important determinant, transport and infrastructure costs and costs associated with transport services. However, the division of location factors into soft and hard can be regarded as crucial. In general, it can be said that hard localization factors are those that directly affect business activities and can be directly calculated (acquisition of property, labour force, etc.).

Soft localization factors, on the contrary, have an indirect or very small impact on an enterprise and are not recorded in accounting documents (quality of life, population education...) (Damborský and Wokoun, 2010). Investors, however, attribute different weight and motivation to these factors.

Localization theories have undertaken huge development due to various changes concerning the world economy, the environment, and also globalisation (Fujita, 2010). The origin of localization theories can be dated to the early 19th century to Germany, when there was a great development of industry and agriculture. As the founders of the theories are considered Johann-Heinrich von Thünen (1826), William Alonso (1972) and Alfred Weber (1929), whose models served as a basis for localization theories, and were broadened to suit the needs of geographers, economists and regional scientists. The first localization theories focused on agriculture activities (e.g. Stevens, 1968; Alonso, 1972; Berry and Harris, 1970) which were then expanded to industry (e.g. Weber, 1929; Krugman and Lawrence, 1993).

The further development of localization theories has expanded since the second half of the 20th century with the use of multi-criteria approach and modelling (Rumpel et al., 2008) and due to the large-scale globalization. There is much research dealing with cluster modelling of economics activities. The localization theories have been expanded in particular by the features of foreign activities such as the exchange rate, political risk, transnational policy and politics, and cultural differences (Popovici, Călin, & others, 2014). K-function has become a popular tool used for the recognition of spatial behaviour (Dixon, 2002). This field is the interest of Espa et al. (2010), Marcon and Puech (2003), Duranton and Overman (2005), Quah and Simpson (2003) and Arbia et al. (2008) who popularized the use of K-function when analysing companies' locations. Arbia et al. (2010) expanded the cluster analysis of companies adding time perspective using space-time K-function.

All localization theories have been the subject of criticism over the years as it is based on many assumptions that lead to generalization, unrealism, etc. However, removing these assumptions is unrealistic due to the variation of environment and conditions and many influential factors.

The spatial distribution of companies is not homogeneous, because the probability of hosting companies is not geographically constant. Arbia et al. (2012) consider inhomogeneous space and assume that a company's location choice depends on physical or administrative constraints. In our research, we presume that taking homogeneous economy space into account is not realistic. We assume that the main source of inhomogeneity is caused by the given population. Until this time, the inhomogeneity with respect to the companies' location has been solved using different methods. For example, Sweeney, Feser (1998) and Marcon, Puech (2003) used D-function that considers density variations. They tested whether small companies were more concentrated than large ones. Another approach to solve non-stationarity used inhomogeneous K-function (e.g. Arbia et al., 2012) that is a generalization of Ripley's function which assumes second-order intensity-reweighted stationarity (Baddeley et al., 2000). In this paper, we propose to solve the inhomogeneity by the method of local scaling (Hahn et al., 2003). We believe that modelling the inhomogeneity using local scaling is, in the case of companies' locations more realistic, because the local scaling deforms the original Euclidian space into space where the distances are governed by the assumed inhomogeneity. In our case it is governed by population and then by size of firms. Particularly, it allows us to vary the range of interactions in uneven dense space of companies. Although, the second order reweighting stationarity is frequently used to model inhomogeneity, we prefer the use of the L-function, which is a variance stabilizing transformation of K-function, as a tool for our modelling purposes since it is one of the most commonly used summary characteristic of point patterns.

The main aim of this paper is to reveal whether the positions of companies' headquarters are spatially dependent or independent. We tackle the problem of spatial heterogeneity with the population given in observed window, because homogeneity leads to unreality due to existence of natural features and settlement. Thus as the first step of the analysis, we test if the data can be modelled using locally scaled point process with inhomogeneity governed by population. In the other step, we add to the inhomogeneity also the size of the companies and perform the same test.

This paper is organized as follows. First of all, in Section 2, we introduce methodological statistical framework, especially methodology of Ripley's K-function (Ripley, 1976), in empirical analysis preferred Besag´s L-function (Besag, 1977), inhomogeneous spatial point processes and Global Envelopes. Chapter 3 contains data description and empirical application of the methodology in inhomogeneous case. At the end of paper in Section 4 there are the conclusion and discussion of research and our next steps in future studies in this field.

2. The statistical methodological framework

Companies can be established at different location. To find out a spatial phenomena of the companies, we have to introduce a statistical test that provides information about behaviour of the companies in space. In this section, we introduce Ripley's K-function and its derived Besag's L-function that is used for determination of the distribution of the companies in our research. Then, we explain the inhomogeneous point process, especially the method of local scaling.

2.1. K-function analysis

It was considered that companies' positions form a point process. The most important activity in point processes is to summarize data sets by numerical and functional characteristics. The second-order characteristics offer a way to present statistical information about interactions among the points in different distances. Probably the most commonly used and the most popular functional second-order summary characteristics for the analysis of point patterns are Ripley's K function K(r), Besag's L-function L(r) and the pair correlation function g(r). Illian et al. (2008) believe that these distance-based functions are more powerful than the other summary characteristics because of their way of statistical presentation of distributional information of point patterns. Further L function provides the easiest interpretation because of its linear form.

Ripley's K-function was proposed by B. D. Ripley and describes the spatial dependence between events in point patterns (Ripley, 1976). This function calculates the expected number of additional events located in a ball surrounding a randomly chosen event and quantifies spatial dependence and clustering (e.g. Diggle (1983) and Ripley (1976)).

In homogeneous case the density, denoted λ, is considered to be constant The K-function (Ripley, 1976) is defined as:

$$K(r) = \lambda^{-1} E(number\ of\ points\ falling\ at\ a\ distance \leq r\ from\ an\ arbitrary\ point)$$

, where E(.) indicates the expectation operator and λ (intensity) represents the mean number of events per area. λK(r) can be interpreted as the expected number of points within a distance r of an arbitrary point of the process. The empirical homogeneous K-function is defined as

$$\hat{K}(r) = \frac{|W|}{n(n-1)} \sum_{i=1}^{n} \sum_{\substack{j=1 \\ j \neq i}}^{n} 1\{d_{ij} \leq r\},$$

where $|W|$ is total study area, d_{ij} Euclidean spatial distance between the i^{th} and j^{th} observed points.

For complete spatial randomness (points are distributed completely randomly and independently in the area, abbreviated by CSR), K-function is equal to $K(r) = \pi r^2$, for $r > 0$. Significant deviations from this hypothesis represent alternative hypothesis e.g. clustering for $K(r) > \pi r^2$, for $r > 0$ or inhibition for $K(r) < \pi r^2$, for $r > 0$ (Ripley, 1976).

To determine whether the distribution of companies is significantly different from CSR, L-function is commonly used. The L-function is a transformation of K-function proposed by Besag (1977) and presents the same information as K-function and has graphical advantages. The L-function in two-dimensional case is:

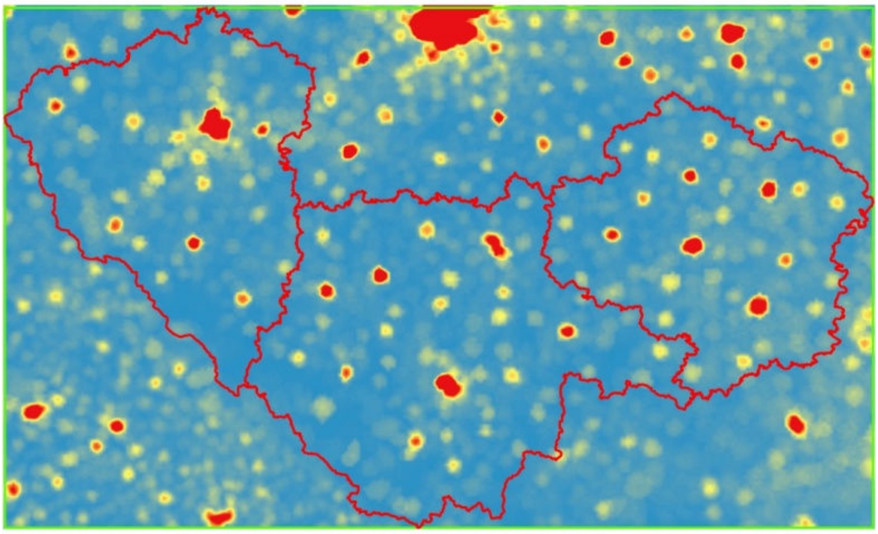
$L(r) = \sqrt{\frac{K(r)}{\pi}}$ for $r \geq 0$.

The practical interpretation of *L(r)* is *L(r) = r* leads to CSR, *L(r) > r* indicates clustering of point pattern while *L(r) < r* indicates dispersion of point (Illian et al., 2008) in the interpoint distance *r*.

2.2. Inhomogeneous spatial point patterns

We cannot consider that the density of companies is the same in the whole observation window so we suppose that the location of the companies depends on the population (Figure 1) and the size of the companies (Figure 2) in the given area. This approach is more realistic in large observation areas and areas with geographical features like mountains where concentration of companies is not as common. From this reason, it was necessary to use tools for inhomogeneous analysis.

Figure 1. Population density



Source: Own processing

The Population density in the given area is depicted in Figure 1. The observation area is highlighted with the red curve. The values with low population density are blue and with high population density are displayed in red. The size of the companies belonging to the sector of agriculture, forestry and fishing and their positions are depicted in Figure 2 below.

For inhomogeneous point processes, various models differing in the specification of how the interactions between points depend on the local intensity of points have been suggested. We will use local scaling for modeling the inhomogeneity (Hahn et al., 2003). This approach yields models for patterns that are homogeneous up to the local scale factor. The inhomogeneity is obtained by local scaling of the template process with a location-dependent scaling factor (in our study it is the population). If the scaling factor is constant, then the point process behaves like a template.

The main aim of local scaling is to find global summary characteristics which are adapted to variable point density by a mechanism of rescaling distances relative to local point density. This is achieved by replacing distance measures used in the density with locally scaled analogs defined by a location dependent scaling function (Hahn et al., 2003). Due to local scaling pattern, distances become shorter in the regions with low population density and longer in the regions with high population density.

Locally scaled version of K-function modifies distances for each pair of points x_i, x_j by rescaling factor $s(x_i, x_j)$. The rescaled distance for each pair of data points xi, xj is defined as $d^*_{ij} = \frac{\|x_i - x_j\|}{s(x_i, x_j)}$, where the rescaling factor is computed as $s(x_i, x_j) = \frac{1}{2}\left(\frac{1}{\sqrt{\hat{\lambda}(x_i)}} + \frac{1}{\sqrt{\hat{\lambda}(x_j)}}\right)$ (Baddeley et al., 2015).

The most common way to find out differences of the empirical distribution of companies from a given null model is by using an exploratory tool called envelope tests that are often used in spatial statistic and were introduced by Besag (1977) and Ripley (1976). However, in our study, Global envelope tests are used as they are more exact and also offer a graphical interpretation (Myllymäki et al., 2017). These tests generate an acceptance band by computing L-function for n simulated patterns of the null model, i.e. inhomogeneous Poisson processes with the same intensity and the same number of points as the observed pattern. The Global envelope tests reject the null hypothesis if the observed L function is not completely inside the envelope. Their undeniable advantages are that they allow the selection of α and they yield p-values and provide graphical representation. The significance level α = 0.05 was used in the analysis.

Global envelope tests have two approaches primary depending on a selected number of simulations (Myllymäki et al., 2017). The first approach Global rank envelope test as having a better performance because its bounds are constructed directly from the functions. On the other hand, it is necessary to use it with an appropriate number of simulations. The second approach Global scaled maximum absolute difference (SMAD) envelope test is not as accurate as the first approach because bounds are parameterized by the r-wise variance or quantiles. The advantage of this approach is that it does not need a large number of simulations. In this paper, we used Global SMAD envelope test, concretely Direction quantile MAD envelope test with 99 simulations because of a time limitation.

In case of Global SMAD envelope test (Myllymäki et al., 2017), the critical bounds were calculated as follows $T^u_{low}(r) = T_0(r) - u \times |\underline{T}(r) - T_0(r)|$ and $T^u_{upp}(r) = T_0(r) - u \times |\overline{T}(r) - T_0(r)|$, where $\overline{T}$ and $\underline{T}$ denote the r-wise 2.5% lower and upper quantiles of the distribution of T(r) under null hypotheses. T(r) denotes functional statistics in our case $L^*(r)$, i.e. the locally scaled version of L-function. The critical bounds are parametrized with respect to u, where u is found to correspond to required global level of significance α.

Lastly, we wanted to compare the tendencies towards clustering between the sectors so the level of clustering was determined in both analyses. The level of clustering was defined as $\frac{L^*(r) - L^*_{central}(r)}{L^*_{upp}(r) - L^*_{central}(r)}$, where $L^*_{central}(r)$ is the value of the estimated L-function in a given argument r obtained for the null model, i.e. inhomogeneous Poisson process of given sector and $L^*_{upp}(r)$ is the value of the simulated upper band of envelope for the null model in a given argument R. The argument of interest was chosen to be equal to the rescaled distance equal to 0.25.

3. Results

3.1. Data description

In our empirical analysis, we used a set of companies in three regions located in the Czech Republic, i.e. Jihocesky, Plzensky and Vysocina regions. These regions were chosen not to effect the results because of the similar characteristics in these regions. The main source of economic wealth is primary sector, further economic-social level in these regions is almost the same, especially the dynamic of development and the quality of life (Martinčík, 2008). The data set was collected in 2015 by database Albertina Gold and contains information from the financial reports of the companies from the year 2013.

The classification of the companies into the given sectors was selected using the CZ-NACE methodology according to the core business that is the main product of the companies. Based on their economic activities, the companies were divided into 13 sectors. The data set contains 10 201 companies and their full addresses. Some descriptive analysis to understand the localization pattern is displayed in the table 1 below.

Table 1. Descriptive analysis of the observed window

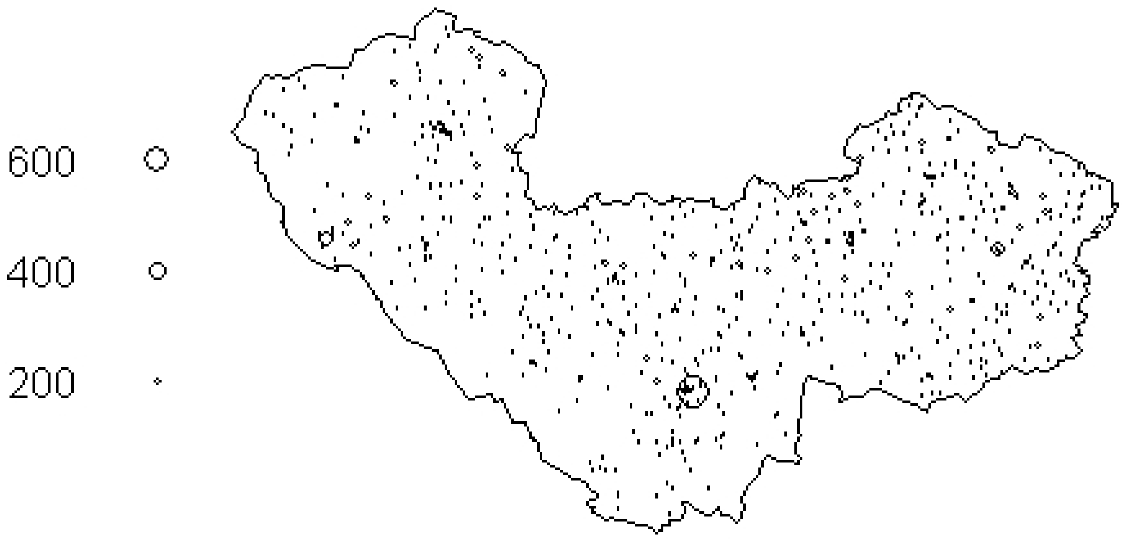
	Region	Number of companies	Mean of employees
Agriculture, forestry and fishing	Total	747	35,1
	Jihocesky	312	29,5
	Plzensky	163	34,6
	Vysocina	272	41,3
Mining and quarrying	Total	20	72,8
	Jihocesky	10	32,3
	Plzensky	7	123,4
	Vysocina	3	62,7
Manufacturing industry	Total	2193	83,3
	Jihocesky	862	66,5
	Plzensky	622	92,6
	Vysocina	709	90,8
Production and distribution of electricity, gas and water	Total	245	34,5
	Jihocesky	114	40,0
	Plzensky	70	32,8
	Vysocina	61	30,6
Construction	Total	1234	18,0
	Jihocesky	570	18,2
	Plzensky	325	17,2
	Vysocina	339	18,7
Wholesale and retail trade, repair of motor vehicles	Total	2127	15,8
	Jihocesky	919	16,1
	Plzensky	586	19,3
	Vysocina	622	11,9
Transport, storage and communication	Total	439	8,6
	Jihocesky	227	7,6
	Plzensky	130	10,8
	Vysocina	82	7,3
Accommodation and food service activities	Total	653	32,3
	Jihocesky	277	31,4
	Plzensky	213	35,0
	Vysocina	163	30,4
Financial intermediation	Total	75	7,6
	Jihocesky	26	4,7
	Plzensky	28	11,8
	Vysocina	21	6,2
Real estate activities, renting and business activities	Total	1737	12,8
	Jihocesky	914	8,6
	Plzensky	447	20,9
	Vysocina	376	9,0
Education	Total	102	9,4
	Jihocesky	50	7,4

	Region	Number of companies	Mean of employees
	Plzensky	19	8,3
	Vysocina	33	12,4
Health and social care, veterinary activities	Total	458	28,4
	Jihocesky	181	53,8
	Plzensky	172	18,8
	Vysocina	105	12,6
Other community, social and personal services	Total	171	17,3
	Jihocesky	77	16,7
	Plzensky	63	24,9
	Vysocina	31	10,3

Source: Own processing

We analysed all the sectors in the observed area but in this paper, we introduce results only for the sector of agriculture, forestry and fishing which has 746 companies. In this sector, there is 286 micro companies (less than 10 employees), 291 small companies (less than 50 employees), 167 medium companies (less than 250 employees) and 3 big companies (more than 251 employees). The size of the companies is displayed in Figure 2. This sector was chosen as it is the most important sector in the observed area.

Figure 2. Size and positions of companies belonging to sector agriculture, forestry and fishing



Source: Own processing

The spatial distribution of the companies together with their sizes in this sector is displayed in Figure 2. In the first visual inspection, it is clear that the companies tend to make clusters by concentration on some specific positions in the observed window.

To take inhomogeneity into account, we generated a matrix population for each 2x2 km in the observed window in Geographic Information System. The population values were given for the year 2011 and interpolated by Inverse Distance Weighing Method with the power 0.3. The population density is displayed in Figure 1.

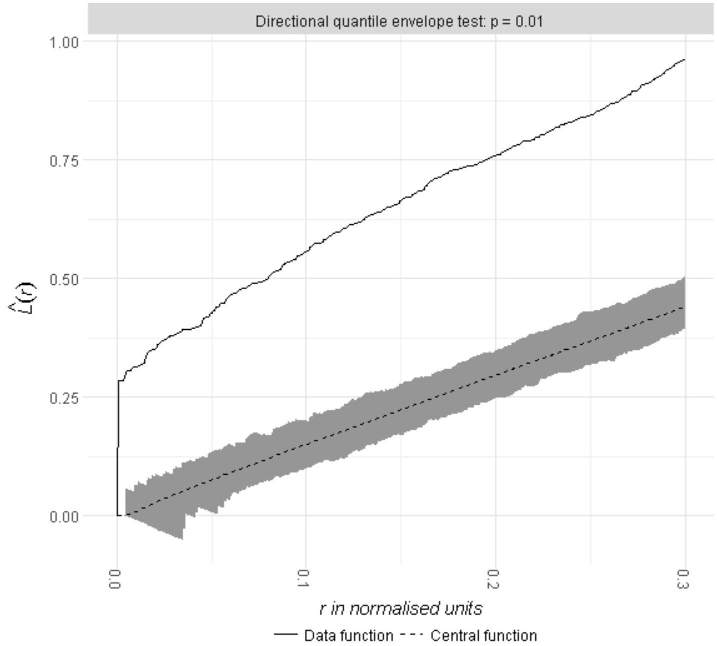
4. Analysis

In the analysis we considered these three regions as one observation window due to similar conditions in these regions mentioned above. The observed area is characterized by variant natural features like mountains, rivers, forests etc. At the first glance we can see that companies are more concentrated in areas of towns. From that reason, we tested spatial behaviour of the companies in inhomogeneous case where inhomogeneity was firstly given by population density. Secondly, we assumed that bigger companies drain away more workers from population and it leads to less available workers for establishment of a new company. Further according to Ježek (2002) factors affecting the foundation of enterprises rank the sectoral structure of the local or regional economy, the prevailing size of enterprises, the educational level of the workforce and regional business traditions. Therefore, we spatially smoothed the size of companies and tested inhomogeneity which was given by dividing of population density with the smoothed size.

We used L-function was as a tool for testing geographical interaction of the companies (Besag, 1977) and this function was tested in inhomogeneous case. Inhomogeneity was tested by local scaling where the locally scaled factor was given by population density in the first case and by the spatially smoothed size of the companies in the second case. The models' significances were identified by Directional quantile MAD envelope test (Myllymäki, et al., 2017), which were computed using 99 simulations. The null hypothesis of the test was CSR under the given inhomogeneous function. The analysis was carried out for all sectors but in this paper there are shown only results of agriculture, forestry and fishing sector because other sectors tends to same tendency of clustering.

Generally, values of locally scaled L-function outside the envelopes represent the distance where the spatial concentration or dispersion is significant. The result of Directional quantile MAD envelope test is shown in Figure 3. At first glance, we can reveal a strong phenomenon of spatial clustering in each distance *r*.

Figure 3. Directional quantile MAD envelope test computed using 99 simulated realizations of inhomogeneous Poisson process with intensity equal to the intensity of population in Figure 1

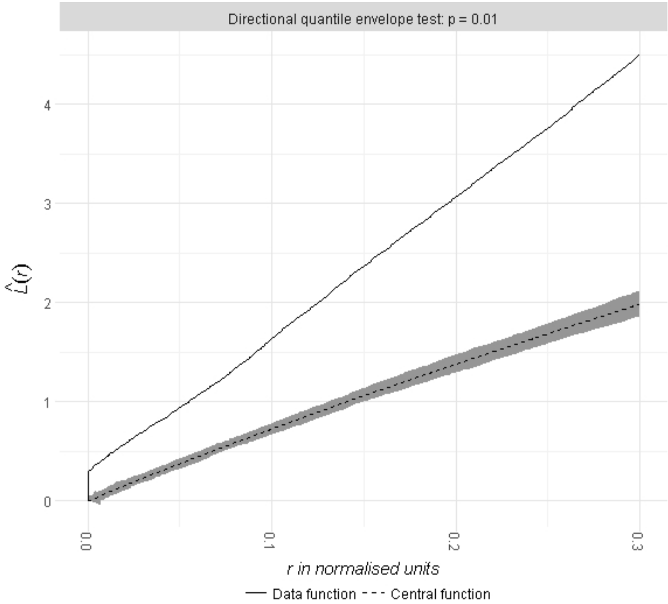


Source: Own processing

It is necessary to reject (p-value = 0.01) the hypothesis that companies are completely spatially random when the population is taken into account (Figure 3). Spatial concentration cannot be explained by the population given in the observed area.

In the second step, we tried to find out if the size of the companies can drive clustering or not thus the inhomogeneity was modelled with the size of the companies. The scaling factor was, for inhomogeneous process, calculated at every grid point as a ratio of the population and the size of the closest company. This formulation of inhomogeneity corresponds to the hypothesis that greater companies repel more employees than small companies. In Figure 4, there is depicted Directional quantile MAD envelope test where the scaled factor is calculated as a ration of the population and the companies' size. As before, the locally scaled L-function is outside the envelopes so it is necessary to reject the hypothesis of CSR (p-value = 0.01).

Figure 4 Directional quantile MAD envelope test computed from 99 simulated realizations of inhomogeneous Poisson process with intensity derived from the size of companies in Figure 2



Source: Own processing

The both analysis show positive external agglomeration effects in which spatial interaction of businesses arise. Positive agglomeration effects could be caused by many factors such as concentration in the place of natural resources, creation of special supply sector, creation of a specialized labour market, existence of special research and development facilities, special infrastructure, etc. We found out that the agglomeration effect can be explained by population only partly and there must be effect of another factors.

The last level of clustering was detected. In our case, the level of clustering was found out for distance $r = 0.25$ in each sector.

Table 2. Level of clustering in the distance $r = 0.25$ for all sectors with inhomogeneity given by population and size of companies

Sector	Level for population	Level for size	Number of companies
Agriculture, forestry and fishing	7.518	37.198	748
Mining and quarrying	1.437	3.160	21
Manufacturing industry	4.805	15.084	2192
Production and distribution of electricity, gas and water	10.215	20.263	245
Construction	131.172	247.633	1234
Wholesale and retail trade, repair of motor vehicles	376.509	696.577	2125
Transport, storage and communication	68.339	90.661	439
Accommodation and food service activities	48.175	68.454	652
Financial intermediation	12.988	13.430	73
Real estate activities, renting and business activities	534.979	708.294	1735
Education	12.759	14.143	100
Health and social care, veterinary activities	33.467	48.015	456
Other community, social and personal services	18.293	21.783	169

Source: Own processing

Considering the first case, the level of clustering was 7.518. When considering the second case, the value was 37.198 regarding the sector of agriculture, forestry and fishing. The level of clustering is lower in all sectors for the inhomogeneity given only by population (see Table 2). There is higher tendency to make clusters when the size of companies is taken into account so the companies' size does not clarify the clustering.

The highest concentration of companies is located in the town even when the population and size of companies is taken into an account. Geographic concentration is stronger than population because it helps to amplify production and innovation benefits, specifically to reduce transaction costs, increase information flow, improve specialized needs and be stronger in competitive environment. Many companies probably realise the advantages lie in clustering where the whole is more than the sum of its parts.

5. Discussion and Conclusion

The choice of a suitable location for a company and its economic activities is one of the most important decisions in the company. For this reason, the location approach had been solved in deep history when a settlement was dependent on accessible livelihoods and suitable climatic conditions and was focused on the choice of location for economic activities with optimal resources. These theories are considered as the starting point for regional science that is based on discovering specific characteristics that affect the location of activities. The first location theories were focused on agriculture and originated from the time when this sector was the most widespread. The development of industry gave rise to industrial location theories. These theories were followed by modern location theories that are based on multi-criteria approaches and modelling as in our case.

In the research we tried to find out if companies are spatially independent or if there is some spatial dependence between them. Our aim was to compare the level of clustering between sectors, not the causes of clustering. There are a lot of papers trying to explain the economic mechanism of firms' clustering by applying different methods. For example, to identify clustering of firms D-function was firstly used by Sweeney and Feser (1998) on companies in the southeast of USA. They were followed for example by Marcon and Puech (2003) with companies in Paris, France or Albert, Casanova, and Orts (2012) who analysed firms in Madrid, Spain. The bivariate K function to study location of companies in Italy was used by Arbia, Espa and Quah (2008). Sweeney and Gómez-Antonio (2016) used Gibbs models as a framework for studying industry localization. For example, Espa et al. (2010), Marcon and Puech (2003), Duranton and Overman (2005), Quah and Simpson (2003) and Arbia et al. (2008) popularized the use of K-function on location of companies.

There are existing few studies focused on inhomogeneous space of companies. The inhomogeneous K function to analyse spatial concentration of companies was solved by Arbia et al. (2012) who was concentrated on spatial concentration on five sectors of high-tech manufacturing in Milan, Italy. Further Mori, Nishikimi and Smith (2005) studied companies' localization by D-index. In the analysis they removed the effect of regional population size. Sweeney, Feser (1998) and Marcon, Puech (2003) used D-function that considers density variations to analyse if small companies are more concentrated than big ones. There is the main difference between our paper and the existing literature. Although we were concentrated on the study of location of companies as others, we used local scaling, the method nobody used on companies before.

We assumed that the location of companies could be caused by the clustering of firms in towns where a higher population exists. To remove this circumstance, we put population as a variable into our analysis. Due to the application of population we tried to explain the clustering of firms. We have shown that the clustering of firms is not completely driven by population and there has to be an influence of other factors. Therefore, the influence of the size of companies was taken into account. We found out that even after implementing population density and size of companies in the model, the companies of the studied sector still tend to make clusters in the space. We confirm the hypothesis of Porter (2000), who claims that new companies are mostly established in areas where there are other companies. The main reasons for this behaviour can be cluster advantages such as better information about opportunities. Porter and Porter (1998) found out that clustering of firms is source of economic growth and prosperity in the area because clusters increase the current (static) productivity of constituent firms or industries, the capacity of cluster participants for innovation and productivity growth, stimulate new business formation that supports innovation and expands the cluster. There were another authors who found the advantages of clusters. Krugman (1997) said that the idea of clustering of producers in given locations generates benefits. The main reason for concentration of firms for Marshall (2009) were location savings, creation of specialized workforce stock and transfer of knowledge and technical progress among firms. According to Kovárník and Stejskal (2009) the main reason for the formation of clusters is the solution of the implementation of innovation and knowledge in sectors.

Variables for inhomogeneity (population and size of companies) were determined based on another studies, for example Mori, Nishikimi and Smith (2005) who take population in their analyses into the account too. Then Porter and Porter (1998) claimed that strong clusters are often concentrated in particular geographic areas, especially in a single city or metropolitan region. In the study of Klier's (2006) was found out that headquarters of companies disproportionately locate in large metropolitan areas where the size of company plays the important role. Further Ježek (2002) found out that the role of location effects depends on the size of the enterprise.

At first sight, the mining and quarrying sector has the lowest level of clustering. Similar results are shown by the agriculture, forestry and fishing sector too. Generally, the Raw Materials Sector (Primary Sector), which covers all sectors of human activities that transform natural resources into basic products, has lower values of clustering than the Industry Sector (Secondary Sector) and the Service Sector (Tertiary Sector). The highest level of clustering is for the wholesale and retail sector and the sectors for the trade and repair of motor vehicles and real estate activities, renting and business activities. In both cases, these are companies from the Tertiary Sector. It confirms the ideas of Sweeney and Gómez‐Antonio (2016) who claims that the clustering will be very strong among companies from the high-tech industry and knowledge sectors.

Investors' decisions are not only dependent on geographical factors. The location of business activities is primarily dependent rather on macro and microeconomic factors. Cohen (2000) revealed major influences on location decision-making of companies about a city for the company. He revealed there are three main factor that can explain the decision about location, e.g. technology, business organisation and government policies (education, speeding-up the permitting process and simplifying bureaucracy and the (un)importance of tax incentives. From that reason we would like to add marks to the point process describing microeconomic factors especially health of companies that is indirectly united with business organization.

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References

Albert, J. M., Casanova, M. R., and Orts, V. 2012. "Spatial location patterns of Spanish manufacturing firms." Papers in Regional Science. 91(1). 107-136. doi: 10.1111/j.1435-5957.2011.00375.x.

Alonso, W. 1972. "A theory of the urban land market." Readings in urban economics. New York. 104-112. doi: 10.1111/j.1435-5597.1960.tb01710.x.

Arbia, G., Espa, G., and Quah, D. 2008. "A class of spatial econometric methods in the empirical analysis of clusters of firms in the space." Empirical Economics, 34(1). 81-103. doi: 10.1007/s00181-007-0154-1.

Arbia, G., Espa, G., Giuliani, D., and Mazzitelli, A. 2010. "Detecting the existence of space–time clustering of firms." Regional Science and Urban Economics. 40(5). 311-323. doi: 10.1016/j.regsciurbeco.2009.10.004

Arbia, G., Espa, G., Giuliani, D., and Mazzitelli, A. 2012. "Clusters of firms in an inhomogeneous space: The high-tech industries in Milan." Economic Modelling. 29(1). 3-11. doi: 10.1016/j.econmod.2011.01.012.

Baddeley, A. J., Møller, J., and Waagepetersen, R. 2000. „Non‐and semi‐parametric estimation of interaction in inhomogeneous point patterns." Statistica Neerlandica. 54(3). 329-350. doi: 10.1111/1467-9574.00144.
Baddeley, A., Rubak, E., and Turner, R. 2015. "Spatial point patterns: methodology and applications with R." CRC Press. doi:10.1201/b19708.
Berry, B. J., and Harris, C. D. 1970. "Walter Christaller: an appreciation." Geographical Review. 116-119.
Besag, J. E. 1977. "Comments on Ripley's paper." Journal of the Royal Statistical Society B. 39(2). 193-195.
Christofakis, M. 2014. "Transport cost in location practice and economic geography: traditional theories, some new dimensions and policy implications." Bulletin of Geography. Socio-economic Series. 25(25). doi:10.2478/bog-2014-0029.
Cohen, N. 2000. "Business location decision-making and the cities: bringing companies back." Washington, DC: Brookings Institution Center on Urban and Metropolitan Policy.
Damborský, M., and Wokoun, R. 2010. "Lokalizační faktory malého a středního podnikání v podmínkách ekonomiky ČR." http://dspace5.zcu.cz/handle/11025/17329 (accessed May 9, 2018).
Diggle, P. J. 1983. "Statistical analysis of spatial point processes." Academic-Press. London.
Dixon, P. M. 2002. "Ripley's K function." Encyclopedia of environmetrics.
Duranton, G., and Overman, H. G. 2005. "Agglomeration and the adjustment of the spatial economy." Papers in Regional Science. 84(3). 311-349. doi: 10.1111/j.1435-5957.2005.00038.x.
Espa, G., Giuliani, D., and Arbia, G. 2010. "Weighting Ripley's K-function to account for the firm dimension in the analysis of spatial concentration." Department of Economics. University of Trento. doi: 10.1177/0160017612461357.
Fujita, M. 2010. "The evolution of spatial economics: from Thünen to the new economic geography". Japanese Economic Review. 61(1). 1-32. doi:10.1111/j.1468-5876.2009.00504.x.
Hahn, U., Jensen, E. B. V., Van Lieshout, M. C., and Nielsen, L. S. 2003. „Inhomogeneous spatial point processes by location-dependent scaling." Advances in Applied Probability. 319-336. doi:10.1239/aap/1051201648.
Illian, J., Penttinen, A., Stoyan, H., and Stoyan, D. 2008. "Statistical analysis and modelling of spatial point patterns." John Wiley & Sons. doi: 10.1002/9780470725160.
Ježek, J. 2002. "Prostorová a regionální ekonomika." Plzeň: ZČU.
Klier, T. H. 2006. "Where the headquarters are: Location patterns of large public companies, 1990-2000." Economic Development Quarterly. 20(2). 117-128. doi: 10.1177/0891242405286158.
Kovárník, J., and Stejskal, J. 2009. "Regionální politika a její nástroje." Praha: Kosmas.
Krugman, P. R. 1997. "Development, Geography, and Economic Theory." MIT Press. doi: 2389.001.0001.
Krugman, P., and Lawrence, R. 1993. "Trade, jobs, and wages." National Bureau of Economic Research. doi:10.3386/w4478.
Kuşluvan, S. 2013. "A review of theories of multinational enterprises." Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 163–180. doi: 10.1142/9789813238459_0002.
Marcon, E., and Puech, F. 2003. "Evaluating the geographic concentration of industries using distance-based methods." Journal of Economic Geography. 3(4). 409-428. doi:10.1093/jeg/lbg016.
Marshall, A. 2009. "Principles of economics." New York: Cosimo Classics.
Martinčík, D. 2008. "Ekonomicko-sociální úroveň krajů: komplexní srovnávací analýza."
Mori, T., Nishikimi, K., and Smith, T. E. 2005. "A divergence statistic for industrial localization." Review of Economics and Statistics. 87(4). 635-651. doi: 10.1162/003465305775098170.
Myllymäki, M., Mrkvička, T., Grabarnik, P., Seijo, H., and Hahn, U. 2017. "Global envelope tests for spatial processes." JRSS Series B 79/2. 381-404. doi:10.1111/rssb.12172.
North, D. C. 1955. "Location theory and regional economic growth." The Journal of Political Economy. 243-258. doi:10.1086/257668.
Popovici, O. C., Călin, A. C., and others. 2014. "FDI theories. A location-based approach." Romanian Economic Journal. 17(53). 3–24.
Porter, M. E. 2000. "Location, competition, and economic development: Local clusters in a global economy." Economic development quarterly. 14(1). 15-34. doi:10.1177/089124240001400105.
Porter, M. E., and Porter, M. P. 1998. "Location, clusters, and the" new" microeconomics of competition." Business Economics. 7-13.
Quah, D., and Simpson, H. 2003. "Spatial cluster empirics." London School of Economics Working Paper Series.
Ripley, B. D. 1976. "The second-order analysis of stationary point processes." Journal of applied probability. 255-266.
Rumpel, P., Slach, O., and Koutský, J. 2008. „Měkké faktory regionálního rozvoje." University of Ostrava.

Stevens, B. H. 1968. “Location theory and programming models: The von Thünen case.” Papers in Regional Science. 21(1). 19-34. doi: 10.1111/j.1435-5597.1968.tb01438.x.

Sweeney, S. H., and Feser, E. J. 1998. “Plant size and clustering of manufacturing activity.” Geographical Analysis. 30(1). 45-64. doi:10.1111/j.1538-4632.1998.tb00388.x.

Sweeney, S., and Gómez‐Antonio, M. 2016. “Localization and industry clustering econometrics: an assessment of Gibbs models for spatial point processes.” Journal of Regional Science. 56(2). 257-287. doi: 10.1111/jors.12238.

Thünen, J. H. 1846. “Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie.”

Weber, A. 1929. “Theory of the Location of Industries.” University of Chicago Press.

FORMS OF INTERNATIONAL ASSIGNEMENTS APPLIED BY FOREIGN COMPANIES OPERATING IN ALBANIA

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Abstract

Various authors argue that, in today's highly competitive global business environment, the effective management of international human resources, is imperative for the MNCs[1]' ability to appropriately identify and fulfill markets' demands, to continuously innovate and consequently to differentiate from their competitors. Within the context of international human resources management (IHRM), global staffing, has been receiving particular attention among researchers, for almost three decades, firstly focusing on expatriates' management and more recently on new forms of international assignments.

Nevertheless, discussions on the field of IHRM as well as the issue of global staffing are quite new and rare in the Albanian management literature, despite the growing number of foreign companies investing and operating in Albania. Due to this literature gap, especially regarding the new forms of international transfers, the purpose of this paper is to make the first step in understanding the actual forms of international assignments used by foreign companies in Albania. Accordingly, the paper is built as an exploratory study, based on three main pillars. At first, it aims to present the various forms of international transfers MNC's use. Second, it tries to explore, through the use of case studies, if any of these forms is applicable by foreign companies in Albania. And third, it aims to set a base for raising questions for future research in this specific topic.

The primary research instrument used for the purposes of this paper is the semi-structured interview, conducted with the HRM officials at the headquarters of the companies selected as case studies, or the manager of the HR department of these companies' subsidiaries in Albania. Given the exploratory nature of the study and the fact that it belongs to a quite new topic in the Albanian literature, several foreign companies operating in our country, belonging to different sectors, such as banking, production, insurance, education and telecommunication, have been subject of interviews with HRM staff. However, only the interview results of two of these case studies are presented in details in the paper.

Keywords: expatriates, international assignments, foreign companies, Albania
JEL classification: M160

1. Introduction

Various authors argue that, in today's highly competitive global business environment, the effective management of international human resources, is imperative for the MNCs' ability to appropriately identify and fulfill markets' demands, to continuously innovate and consequently to differentiate from their competitors (Zheng, 2011 referring to Schuler & Tarique, 2007 and Dowling et al., 2008; Petković & Đorđević, 2013; McDonnell & Scullion, 2013; Boriçi et al., 2013; Boriçi & Çelepija, 2014; Vasquez & McGaughey, 2016; Boriçi, 2017). Within the context of international human resources management (IHRM), global staffing, has been receiving particular attention among researchers, for almost three decades, firstly focusing on expatriates' management and more recently on new forms of international

[1] MNC-multinational company

assignments (Mayerhofer et al., 2004; Collings et al., 2007; Collings et al., 2009; Mayrhofer et al., 2012; Vasquez & McGaughey, 2016).

Expatriates, also called parent country nationals or PCNs (Harzing, 2001), represent employees relocated together with their families for a limited period of time varying between 12 to 36 months, or 3 to 5 years (Vasquez & McGaughey, 2016 referring to Mayerhofer et al., 2004b; Tahvanainen et al., 2005 & Collings et al., 2007, pg. 199). This relocation assumes that they are sent by the headquarters to work for the above mentioned period in one of the company's subsidiaries abroad (Harzing 2001a, pg. 366; Mayrhofer et al., 2012), to perform mainly managerial tasks. Based on the work of Edström & Galbraith (1977), researchers in the field of IHRM have identified three major reasons for MNCs to send out expatriates (Harzing, 2001; Gong, 2003b; Mayerhofer et al., 2004; Bonache & Pla-Barber, 2005; Tarique et al., 2006; Reiche, 2006; Collings et al., 2007; Reiche & Harzing, 2008; McNulty & Brewster, 2017): a) position filling, b) management development, and c) organization development. At first, MNCs decide to send managers from the home office to run their subsidiaries abroad, in cases when, in markets where subsidiaries operate, there is shortage of qualified individuals to accomplish this task. In addition, the transfer of PCNs to foreign markets helps the later to enhance their global conscience and experience, and therefore to evaluate the company they work for from a global perspective (Boriçi & Çelepija, 2014). Moreover, expatriates are judged well suited to perform the control, communication and coordination task among the headquarters and the subsidiaries (Harzing, 2001, Tharenou, 2013). This function has received particular attention during the crisis of 2008-2009 and the years following, since throughout this period the level of insecurity and instability in the world economies increased, hence expanding the MNCs' need to exert more control over their subsidiaries, and consequently their need to employ more expatriates to accomplish this task (Boriçi, 2017 referring to Bhatti, 2014).

Nevertheless, the use of expatriates is associated with some disadvantages, which have been repetitively emphasized by the IHRM literature and MNCs' managers. In various cases, such disadvantages have influenced MNCs' decisions on staffing policies, pushing them to replace expatriates with host country nationals (HCNs) (Harzing, 2001, employees from the host country) and/or apply new alternative forms of international transfers (Collings et al., 2007; Meyskens et al., 2009; Mayrhofer et al., 2012, Vasquez & McGaughey, 2016). The first disadvantage is related to the fact that expatriates, as compared to HCNs, are much less familiar with the host country's business environment (Boriçi & Çelepija, 2014 referring to Harvey et al., 1999, 2000b; Czinkota et al., 2005; Tharenou & Harvey, 2006, Wild & Wild, 2016). The lack of clarity and deep knowledge on the political, economic, socio-cultural and technological characteristics of this environment can influence negatively on their ability to make the right decisions in the subsidiaries they are assigned to manage. Additionally, the presence of expatriates at the subsidiaries' top-level management may create communication barriers among them and lower-level employees. The later may feel they are not well understood by their upper – level managers since they belong to a foreign culture and are not able to integrate to the local one (Wild & Wild, 2016). As a consequence, a cold and non-cooperative climate is created within the subsidiary, so affecting its future performance.

Expatriation is as well a very expensive staffing policy. MNCs pay expatriates several allowances, first of all to induce them accept the transfer (Czinkota et al., 2011), and second, to provide compensation for all the expenses associated with their relocation together with their families (Wild & Wild, 2016). According to Mitrev et al., (2012) the annual salary of a PCN can be three to five times higher than that of an HCN. Besides, in many cases expatriates have big difficulties to adjust to the environment, culture and business practices in the host country. In other cases, their families fail to integrate to the culture and lifestyle there, so exerting pressure on expatriated managers and their ability to perform well on their managerial tasks (Czinkota et al., 2011; McDonnell & Scullion, 2013; Boriçi & Çelepija, 2014; Wild & Wild, 2016, Erogul & Rahman, 2017). This can often bring to a phenomenon called expatriate failure, which has been defined as: a) premature return of expatriates from their international assignments, b) expatriates' weak performance, 3) and/or resignation of them from the company right immediately after repatriation (Boriçi & Çelepija, 2014 referring to Christensen & Harzing 2004).

Cases of expatriate failure are also associated with high costs, direct and indirect, for both, the MNC and the manager (Boriçi & Çelepija, 2014). A failed international assignment can cost a company from 250.000$ up to 1 million $ (Erogul & Rahman, 2017). The MNCs' investment on the salary, training and relocation expenses of PCNs reveals worthless if they fail on their international assignments. Moreover, companies may lose opportunities and market share as a result of a weak expatriate performance. On the other hand, the expatriated manager him/herself may lose self-esteem and motivation to accept difficult tasks in the future, or even worse, his family relationships can suffer from a possible expatriate failure (Boriçi & Çelepija, 2014).

Based on the above mentioned expatriation disadvantages, as well as on the need of MNCs to have international managers'/employees' transfers across subsidiaries, for the purpose of coordination, control and knowledge flow among them, researchers and business practitioners have proposed and applied new alternative of international assignments. The next section provides a complete overview on them, emphasizing on the description of each, the advantages and disadvantages as well as on the specific cases when each is mostly used.

2. Alternative forms of international assignments

Short-term assignments – in this case the assignments might last from 1 month to a year and are usually driven by the necessity to solve specific problems, which on most of the cases are of technical or engineering-related nature (Meyskens et al., 2009). Families do not need to relocate in these types of assignments. Furthermore, in these cases, salary, pension, social security and other career related issues are yet handled by the headquarters (Mayrhofer et al., 2012). According to a study on Australian MNCs this kind of assignment is mainly used to reduce the failure rate of classical expatriation (Mayrhofer et al., 2012 referring to Jie & Lang, 2009).

A key positive effect of short-term assignees for the organization is cost reduction compared to classical expatriation (Mayrhofer et al., 2012 referring to Tahvanainen et al., 2005; Collings et al., 2007b). Cost reduction in such cases is possible too because the procedures for their selection and preparation for the host country are more informal and ad-hoc (Reiche & Harzing, 2008). Nevertheless, they still replace well PCNs in accomplishing some tasks. They train the local workforce, handle specific projects' needs and exert managerial control by the home country over the subsidiaries' activities (Mayrhofer et al., 2012). Short-term assignees have the opportunity to gain international experience early in their careers, but they still might have some problems regarding their social networks, in particular their families (Mayrhofer et al., 2012 referring to Starr, 2009). According to Reiche & Harzing (2008), who refer to Tahvanainen et al., 2005, several studies mention their inability to create good relationships with local colleagues and customers, as well as the risk they occur to have conjugal problems.

Frequent flyer assignments (or international business travelers, IBT) – As the name suggests itself these employees travel frequently among the home and the host countries, but do not relocate abroad and their families don't do it too (Meyskens et al., 2009; Mayhofer et al., 2012, Vasquez & McGaughey, 2016). Communication with the headquarters is regular and the work is done both in the home office and the subsidiaries abroad. Meyskens et al. (2009), referring to Mayrhofer et al. (2004), mention the case of German textile industry to better illustrate the role of frequent flyers. According to them, such employees travel often to the various production locations of the multinationals operating in this industry, in order to assure quality and time coordination across these facilities.

Collings et al. (2007) referring to Welch and Worm (2006) argue that IBTs are more suitable to be transferred to developing countries because they might hesitate to relocate there for a long-time period, also they are suitable in the European context, because of short distances between European capitals (1 to 3 hours of flight). Their main task is developing new networks in foreign markets, but other important tasks are annual budgeting meetings or production scheduling in MNCs, too. Also, the IBT's role for the organization is crucial during the establishment or closing of an operation abroad.

The use of this type of assignment abroad has its positive and negative effects on both the organization and the individuals. The positive side is related to cost reduction for the MNCs, because of their presence during the business transactions without the requirement for their relocation, which on the other hand minimizes the impact of international work on dual career couples. Other advantages include personal development because of expanded knowledge and horizons, the creation of new connections and the enlargement of social networks (Collins et al., 2007 referring to DeFrank et al., 2000; Westman, Etzion, & Gattenio, 2008; Welch et al., 2007).

However, there exist some negative effects too. Sometimes it is difficult for the organization to stay in contact with IBTs due to their frequent trips, which may bring problems related to their performance appraisal, career development, and leadership (Collings et al., 2007). Moreover, due to the huge amount of work they are involved in, cases of burnout and health problems, both physical and mental, among IBTs are of concern, (Collings et al., 2007; Meyskens et al., 2009), such as family issues too. Despite the fact that IBTs are not relocated to other countries, there are still chances for them to be faced with family problems due to short and frequent trips. In addition, according to Meyskens et al., 2009, the management of taxes and immigration laws they are exposed to, as well as their cost, are critical issues the company should carefully pay attention to.

Commuter assignments – the employees move back and forth on a weekly or bi-weekly basis to the same host country, generally without the need for the commuters' families to relocate (Meyskens et al., 2009; Vasquez & McGaughey, 2016 referring to Mayerhofer et al., 2004a & Collings et al., 2007).

While IBTs are suitable in a European context, commuter assignments are seen more useful in a Chinese context and are more common on oilrigs cases (Collings et al., 2007). But, there are some concerns related to these assignments too, such as compensation, taxation and security (Collings et al., 2007 referring to Dowling and Welch, 2004: 68), as well as burnout and family issues, due to the difficulty to achieve the right work-life balance (Meyskens et al., 2009).

Flexpatriates – These assignees travel also for short-time periods, do not relocate and do not take their spouses or other family members with them during their trips. Instead, what distinguishes them from other forms is the flexible nature of their business trips, in terms of locations, schedule, and their social relations (Vasquez & McGaughey, 2016).

Virtual assignments – in the era of globalization, virtual assignments might be helpful to use the best talents wherever they are located (Maznevski et al., 2006). These assignments are particular international assignments in the sense that they do not actually involve relocation of the assignees. In fact virtual teams are created with members situated in different locations communicating with each other among the latest communication technologies (Collings et al, 2007; Mayhofer et al., 2012, Vasquez & McGaughey, 2016).

Virtual teams represent an interesting solution to many organizations; particularly they are appropriate in routine activities. At first they save money to the companies which do not need to spend for international transfers of their employees. Second, they help coordinate local operations to the global perspective of the multinationals and speed decision making across borders through instant virtual team meetings (Collings et al, 2007). Also, virtual assignees can gain international experience working in cross-border virtual teams (Mayrhofer et al., 2012 referring to Mockaitis, Rose, & Zettinig, 2009).

Nevertheless, some disadvantages are associated to these type of assignments too. First of all, they exclude face to face communication among team members, which is critical in certain situations (Reiche & Harzing, 2008). Besides, they find it difficult to cooperate with each other since they are continuously influenced by their subsidiary, superiors and/or local customers (Mayrhoher et al., 2012 referring to Zimmermann & Sparrow, 2007). Third, cultural differences and the virtual dimension itself can impact the interpersonal relationships within the teams (Mayrhofer et al, 2012 referring to Hardin et al., 2007) and raise the possibility of misunderstanding (Mayrhofer et al., 2012) among members.

Inpatriates – Inpatriates on the other hand represent host or third country employees transferred to the head office of a multinational (Sarabi et al., 2017) with the intent to facilitate knowledge flow among the headquarters and the subsidiaries. Their contribution is particularly important during the transfer of knowledge from the subsidiaries to the headquarters, since their ability to understand, interpret and report information on host countries' business environments is greater than that of other international assignees, because of their familiarity with such environments (Boriçi et al., 2013). This is also confirmed by Harzing et al., 2016, who, on their study of 800 subsidiaries operating in 13 countries, revealed that knowledge transfer from the subsidiaries to the headquarters is significantly higher in the cases of subsidiaries with former inpatriates. Likewise, the employment of former inpatriates resulted to be more strongly related to knowledge transfer than that of expatriates, for both sides of knowledge transfer.

According to Mayrhofer et al., 2012, who refer to a study of Collings et al. (2010), there is a model that shows four categories of factors for organizational use of inpatriates. These categories are: a) headquarters factors (nationality, sector, size of the MNC); b) subsidiary factors (age and size, relationship with the headquarters, foundation through merger and acquisition or not); c) structural factors (integration of the MNC, organizational structure); and d) HR systems' factors (the level of sophistication of the respective HR systems for spotting and developing international talent). It is also interesting to mention that European companies consider appropriate the use of inpatriate managers when enlarging their activity into formerly communist countries in Eastern Europe (Mayrhofer et al., 2008).

Self-initiated expatriates (SIEs) –These employees represent individuals who move abroad with the intent to find better job opportunities in foreign countries. Differently from the traditional expatriates, who are transferred by their respective organizations to fulfill specific tasks abroad, they decide by themselves to move outside their own country in order to progress in their career, according to their personal aspirations (Mayhofer et al., 2012; Halim et al., 2018). Reasons for moving abroad are exploration, seeing other cultures, social attraction etc. Reiche & Harzing, (2008), referring to Suutari & Brewster (2006), identify some characteristics which distinguish SIEs from the traditional expatriates. SIEs are usually younger, female or single and may be stipulated to expatriate due to their interest on internationalism or lack of appropriate jobs at their home country. They also used to work for organizations with a lower focus on international business or performed low-hierarchical tasks before undertaking expatriation (Reiche & Harzing, 2008).

SIEs represent a particular opportunity to organizations from a cost effectiveness and career planning prospective, and represent a flattering option due to their international experience, very highly appreciated nowadays (Reiche & Harzing, 2008). Companies do not need to go through a long and costly process to recruit and select them. Also, they do not pay them the expensive allowances they are obligated to pay to traditional expatriates. On the other hand, SIEs have lower expectations regarding long-term career planning by the organizations, since their transfer abroad was their initiative and not the organizations' necessity (Mayhofer et al., 2012). For individuals this type of assignment offers independence, openness for new experiences, application of knowledge in a variety of situations etc.

There are also some negative sides related to self-initiated expatriation, both for the organizations and the individuals involved. These drawbacks are related to the SIEs' lack of experience with the headquarter and/or home country organization, the traditional risks characterizing the recruiting process in an external labor market, the problems of integration into the organizational structure, the overestimation of the ability to transfer knowledge and skills, and the lack of career support from the home organization (Mayrhofer et al., 2012 referring to Suutari & Brewster, 2000; Banai & Harry, 2004).

Interesting findings about SIEs are also those of Richardson (2006), who designed and conducted a qualitative study of 30 British lecturers teaching in universities in 4 foreign countries. She discovered that family, in particular the SIEs' spouses and children, have a particular influence on the decision to expatriate. Even more, previous social experiences and relationships, including those of the childhood, may be significant when individuals decide to undertake this career path.

Permanent international transferees – Employees pertaining to this category move continuously from country to country, performing various international assignments on behalf of the company they work for, and, may return or not briefly to the home country. Because of that, in this case, the classical differentiation amongst the home, host and third country nationals' concepts is not anymore important. Permanent international transferees lose over time their attachment to any specific country (Mayhofer et al., 2012). These assignees are very appropriate in the diplomatic service. The creation of members with international orientation is essential for organizations (Mayrhofer et al., 2012 referring to Harvey, Price, Speier, & Novicevic, 1999b). They can use these international assignees (for example technical specialists with international orientation) wherever staffing needs arise worldwide.

3. Cases of international assignments in foreign companies in Albania

As mentioned previously in the abstract of this paper, the issue of global staffing is rarely discussed in the Albanian literature, even if the number of foreign companies investing and operating in Albania is growing. Therefore, the major purpose of this work is to explore if cases of international transfers exist and if they do, which forms do they take, in the case of foreign companies in Albania. Because of the exploratory nature of the study, the instrument used to collect this information was the semi-structured interview conducted with HRM officials working to the headquarters or the subsidiaries of foreign companies in Albania. Companies operating in several sectors, such as banking, production, insurance, telecommunication and education, were involved in the interviewing process, nevertheless, only a part of them provided valuable information for the purposes of this paper. Following are presented the interviewing process results, focusing on more details on the results from two case studies, Intesa San Paolo Bank Albania and Andritz Group.

3.1. General interview results

The interviewing process revealed that all companies involved had had cases of international transfers. Expatriation resulted to be the main used form, mostly for the purpose of increasing control and coordination among the headquarters and the subsidiaries. In all cases of expatriation, the biggest difficulty encountered by the transferred employees was reported to be the adjustment to a new way of solving and managing business problems in Albania. Also, the high cost of expatriates was mentioned as well as an important drawback associated with this practice. In fact, in the case of Albtelecom[2], this was emphasized as the primary reason for the reduction of Turkish employees working in the Albanian subsidiary and their replacement over time with Albanian ones. As a consequence, in the case of this company, only top-level managerial positions in the Albanian subsidiary are currently held by Turkish nationals.

Sporadic examples of short-term assignments or inpatriation were found respectively in the cases of Shqipëria Trikot[3] and Intersig Vienna Insurance Group[4]. Production supervision, job rotation and exchange of experience on new developed products were the major reasons for such transfers. Meanwhile, in the case of Albtelecom, there have been rare cases of virtual teams mainly built for particular projects and usually for the intent of reducing transfer costs. Also in some occasions, Albanian employees in this company have been transferred for short-time periods, such as 1-2 months at the headquarters in Turkey, to fill empty positions in different departments. These movements have been considered beneficial from the employees involved and Albanian subsidiary's viewpoint due to their possibility to gain experience and knowledge directly at the headquarters. However, the most interesting cases, resulting from the interviews were that of Intesa San Paolo Bank Albania and Andritz Group. In these cases, companies were applying several forms of international transfers, which reflect the

[2] Albtelecom represents a leader telecommunication company currently offering four major services: fixed and mobile telephony, internet and IPTV. It was previously owned by the state and the only company operating in this sector. It was officially privatized in 2007 and is actually owned by ÇETEL a.s Company (Ankara), member of CALIK Holding, with headquarters in Istanbul, Turkey in consortium with Turk Telekom. (Information about the company is obtained from the interview and the official website of the company: https://www.albtelecom.al/en/about-albtelecom/about-us/history/).

[3] Shqiperia Trikot (SHTR), located in Shkodra, is a subsidiary of Cotonella B.V. Netherlands, which produces intimate outfit with raw materials, provided by the ordering company, Cotonella SPA Italy. (Information about the company is obtained from the interview).

[4] Intersig Vienna Insurance Group, is part of Vienna Insurance Group (VIG) which owns 75%.INTERSIG shares since 2011 and provides insurance services to the Albanian market. (Information about the company is obtained from the interview).

characteristics and the motives for using them mentioned in the first and second part of the paper.

3.2. The Case of Intesa San Paolo Bank Albania

Intesa San Paolo Group[5]

Intesa San Paolo represents a banking group established by the merger of two prestigious Italian financial institutions, respectively Banca Intesa and San Paolo IMI, with the intent to better serve to both familiar and business clients. Today the group ranks through the firsts in the Eurozone market, with a market capitalization of 34 billion Euros[6]. It is also a leader in the Italian market in all product offerings, such as, retail, corporate and wealth management services. The Group serves to a number of 11,9 million clients throughout a network of 4.400 branches spread all over the Italian territory, each of which covers at least 12% of the market in the majority of the regions[7]. As far as its international expansion is concerned, Intesa San Paolo is present in 12 countries of Central and Eastern Europe, Middle East and North Africa, offering services to a total number of 7,5 million clients, both individuals and businesses, among a network of 1.100 branches. It also provides support to corporate businesses amid a network of specialists present in 25 countries, including those in North Africa and Middle East, as well as those where Italian companies operate the most, such as USA, Brasil, Russia, India and China[8].

Intesa San Paolo Bank Albania[9]

Intesa San Paolo Bank Albania started its activity in the year 2008 and today represents one of the leading retail banks in Albania. Its offerings encompass a range of financial services provided to individuals, SMEs and corporate businesses by its Head Office in Tirana and a network of 34 branches covering the entire Albanian territory[10]. Innovations and product improvements at Intesa San Paolo Bank are inspired by its clients. The bank applies the “We hear you 100%” program as well as an annual survey in order to track on the continuous customer satisfaction and build its business strategy and respective action plans[11].

3.2.1. Interview results

In order to learn about staffing policies and international transfers’ cases at Intesa San Paolo Bank Albania, several interviews were conducted with managers and employees at the Head Office of Intesa San Paolo Group in Milan. The interviews revealed that the policy applied in Albania was generally aligned with the Group’s policies used in other European markets. There was not a specific policy for the Albanian market. Nevertheless, the staffing policy at Intesa San Paolo Bank Albania was in compliance with the Albanian Civil Code requirements.

As far as the nationality of managers at the Albanian subsidiary is concerned, it resulted that only the CEO and the Vice CEO were foreigners, sent by the Head Office to supervise the activity in Albania, as shown below in the latest organizational structure of Intesa San Paolo Bank Albania. The rest of the top and medium level managers were Albanians. However, as the interviewed managers reported, this was not always the case. In other countries where the Group was operating, the CEO could also be a local staff, while other top and medium level managers could be international.

Various forms of international transfers were used at Intesa San Paolo Bank Albania, but, as in the case of other interviewed companies, expatriation resulted to be the main one. The need to increase control and coordination among the Head Office in Milan and the subsidiary in Albania, as well as the need to enhance international experience of managers, were

[5] https://www.group.intesasanpaolo.com/scriptIsir0/si09/

[6] https://www.group.intesasanpaolo.com/scriptIsir0/si09/

[7] https://www.group.intesasanpaolo.com/scriptIsir0/si09/

[8] https://www.group.intesasanpaolo.com/scriptIsir0/si09/

[9] https://www.intesasanpaolobank.al/retail/footer/rreth-nesh.html

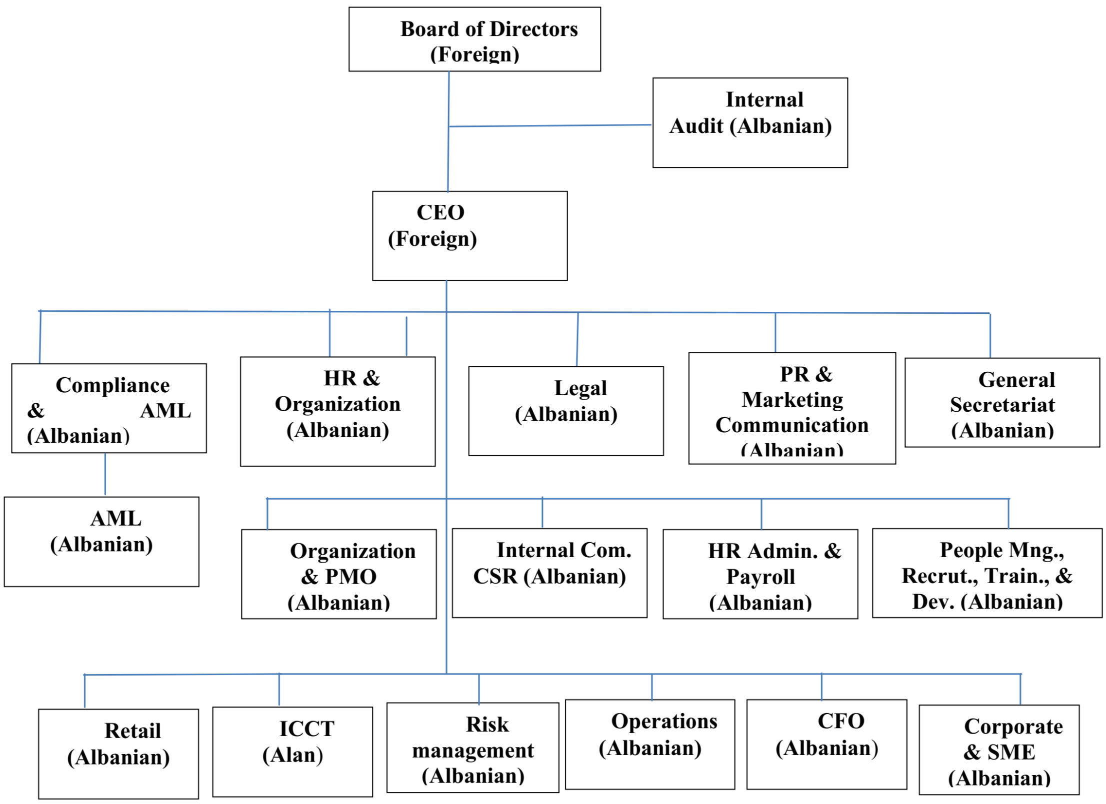
[10] https://www.intesasanpaolobank.al/retail/footer/rreth-nesh.html and interview with the HRM official at the headquarters

[11] https://www.intesasanpaolobank.al/retail/footer/rreth-nesh.html

reported to be the major reasons for having a foreign CEO and a foreign Vice CEO. On the other hand, the lack of familiarity and difficulty of adjustment of foreign managers with the Albanian environment, as well as their high cost, were evaluated to be equally important in deciding to staff the rest of the managerial positions with Albanians.

Usually expatriated managers were contracted for a period of 3-5 years. During the history of Intesa San Paolo Bank activity in Albania, all expatriated managers were repatriated after finishing the contract. There were no cases of premature returns. However, interviews revealed that all these expatriates had had difficulty to adjust to the Albanian way of solving and managing business problems, as was mentioned too by other interviewed companies. There were also cases of replacement of foreign managers with Albanian ones, but always after the later had finished their managerial task in Albania. Several reasons for these replacement cases were mentioned, which are all in line with the literature on staffing policies for multinational companies.

Intesa San Paolo Bank Albania organizational structure[12]



At one case the replacement took place because the contract of the foreign manager had finished and the company was able to find a qualified and experienced Albanian manager to take over the task. Also in this case, due to the previous work of the foreign manager, the company's expectations had been achieved and it was judged that the strategic business instructions could be implemented without the need for the presence of a foreign manager. The familiarity and a better knowledge of the Albanian business environment was emphasized as another reason, especially in cases when foreign managers were unable to build up the required contacts within this market. As mentioned above, actually, only the CEO and Vice CEO positions are held by foreigners, while the other managerial structures are covered by Albanians, for the purpose of being closer to the market and its particular challenges.

Besides expatriation, other forms of international transfers, among Albania and Italy (where the Head Office is located), are mentioned to be used as well in the case of San Paolo Group Albania. Short-term assignments, commuter and frequent flyer assignments, were

[12] Retrieved at http://www.intesasanpaolobank.al/web/About_Intesa_Sanpaolo_Bank_Albania.php on October 2018

reported to be applied for two main purposes. At first, these forms seemed to be very helpful in transferring the specific know-how for the specific projects where the company was engaged to. Second, the implementation of new business strategies formulated by the Head Office, resulted to be very effective through managers' transfers form the headquarters to the subsidiary in Albania for short time periods.

Furthermore, the establishment of virtual teams for developing and implementing specific projects led by the headquarters, is another example of using alternative forms to expatriation to transfer knowledge and coordinate work among the San Paolo Group's Head Office and its subsidiaries, including the one located in Albania. The Project Manager, working usually at the headquarters, cooperates with managers in the Albanian subsidiary and those in other subsidiaries around the world, who are responsible for different stages of the project, through the use of virtual networks. Many of the Group's systematic and operative systems, as well as some of the services provided by the Group, have been developed this way. In some cases, to support the virtual team work, short-term trips of managers involved, have been applied too, mainly for meeting purposes.

Inpatriation has also been part of the international staffing policy used by Intesa San Paolo Group, and Intesa San Paolo Bank Albania has not been exclusion to this. Nevertheless, the frequency of such staff movements has been lower as compared to that of HQ staff movements towards the subsidiaries. Albanian employees, with good performance and experience in certain positions, have been sent to the HQ, with the intent to enhance cooperation and coordination of work among the Head Office and the local subsidiary. Their local knowledge has been particularly helpful for the HQ to evaluate the Albanian market needs and for building of the right strategies to achieve them. On the other hand, the transferred employees have had the opportunity to see things from the HQ viewpoint and share experiences with employees from other countries (also transferred to the Head Office), therefore developing professionally.

A lot of cases of permanent transferees have been reported as well at Intesa San Paolo Group. These employees are distinguished for their particular skills, qualifications and experiences, which render them appropriate for various managerial positions and the implementation of certain headquarters strategies in different subsidiaries. Their contribution has also helped to strengthen the bond among the HQ and the subsidiaries, including the Albanian one.

3.3. The Case of Andritz Group

Andritz Group[13] and Andritz activity in Albania

Andritz Group represents an Austrian based multinational providing a variety of products and services to several industries, such as, the hydropower, the pulp and paper as well as the metal and steel working industry. It is also considered the world's leading separation specialist14, providing to customers worldwide the latest knowledge, equipment and services that help them solve environmental, energy based, nutrition and health challenges.

Andritz Group's headquarters is located in Graz, Austria, with the rest of operations expanded in more than 280 locations or in over 40 countries of the world. It has an experience of 170 years in the market and the number of its employees worldwide amounts to 29,60015.

Andritz Group is present in Albania since the year 2010, providing among Andritz Hydro Branch Albania its supporting services for the building and reconstruction of hydro power plants in our country. During this period it has been the main subcontractor for the building of Ashta hydropower plant, by providing the necessary mechanical and electrical equipment for this project, while from the year 2013 up to now it is assisting in the reconstruction of Komani hydro power plant16. This project is also known as Andritz Hydro Branch Albania (Komani Site).

[13] https://www.andritz.com/group-en/about-us
[14] https://www.andritz.com/separation-en
[15] https://www.andritz.com/group-en/about-us
[16] Information retrieved from the interview

3.3.1. Interview results

The identification of staffing policies at Andritz Hydro Branch Albania (Komani Site) was made possible through the assistance provided by the Andritz Hydro Branch Albania (Komani Site)'s Commercial Administrator, who helped in answering the interview questions. He revealed an interesting fact about this project, all managers of almost all levels were foreigners, mainly from the headquarters and they were as well recruited at the headquarters. In fact, only three operational managerial positions were actually held by Albanians.

The main reason for having managers from the headquarters or other foreign managers in the various levels of management is related to the need to transfer technical and managerial knowledge to Albania and the need to maintain a certain level of control and coordination among the headquarters in Graz and the project in Albania. In the meantime, the three Albanians holding the operational level positions, where chosen for their familiarity with the Albanian market and business environment.

There are no cases of replacing foreign managers with Albanian ones, except for the period of summer and winter holidays. Nevertheless, even in these situations, the Albanians chosen to make the replacement were those who had been working closely with the foreign managers during the rest of the year.

As far as the duration of foreign managers staying in Albania is concerned, it is quite variable, from a few days to 5 years (i.e. till the end of the project). For those staying for a period longer than one year, the main difficulty encountered resulted to be their distance from the family, since they normally do not take their families with them on these transfers.

There has been only one case in which the manager decided to interrupt its task in Albania. This happened because the manager wanted to pursue another project in another country, since his knowledge about that country was greater than that about Albania. This decision was supported by the headquarters and judged as beneficial for both, the company and the manager itself.

Short-term transfers are also applied in the case of Andritz Hydro Branch Albania (Komani Site). These transfers are typically two months long and are used primarily when the volume of work is large. In such cases the presence of a second person is necessary to assist the actual manager effectively perform its function. Such transfers have resulted to be quite effective for the company and the assignees are not accompanied by their families.

Particular cases of building virtual teams are not mentioned in the case of Andritz Hydro Branch Albania (Komani Site), but online communication among it and the headquarters is continuous, helping to solve several problems in a shorter time and at a lower cost. Nevertheless, in some instances managers from Andritz Hydro Branch Albania have travelled to the headquarters to participate in important meetings, discussions and/or in training sessions, which have contributed positively to their future performance and the performance of the Albanian branch.

Being a globally expanded company, Andritz Group has continuously based its success, among other things, in attracting a globally diverse staff. For that purpose, it has been open to accept and evaluate applications from, as well as to employ individuals of different nationalities, who, in the attempt to find better job opportunities have travelled abroad, the so-called self-initiated expatriates. By attracting and employing such individuals, the company has built a great pool of international managers who are able to first, break cultural barriers among the company's different affiliates and second, to transfer knowledge and good practices among them. A part of this group of managers is in continuous movement from a project to a project, from a country to another, representing therefore another category of international assignments mentioned above, i.e., that of the permanent international transferees. Some of the foreign managers of Andritz Group working at Andritz Hydro Branch Albania (Komani Site) belong to both categories, the self-initiated expatriates and the permanent international transferees.

Another particular international transfer used by Andritz Group is that of groups of engineers who are sent from the headquarters to other countries to do the pretests of finished projects, before the later are put to efficiency. Such transfers last some weeks, depending on the type and the complexity of the project pretested.

4. Conclusions

The effective management of international human resources (IHRM) has been identified by many authors as one of the key factors influencing the ability of an MNC to compete successfully in today's global market. In particular, their work has emphasized on the issue of global staffing. During the last three decades the main focus of research has been the study of expatriates' management, but in the recent years new forms of international transfers have been discussed and suggested by the researchers, such as, short-term assignments, frequent flyer assignments, commuter assignments, flexpatriates, inpatriates, virtual teams, permanent international transferees and/or self-initiated expatriates.

However, the Albanian literature on IHRM and specifically on the issue of global staffing continues to be quite scarce, even though the foreign direct investments in the country are increasing over time. Based on this, the aim of this paper was to make a first contribution, by exploring the various forms of international assignments actually applied by foreign companies operating in Albania. For this purpose semi-structured interviews were conducted with HRM officials at the headquarters of some companies or, in other cases, with the HR department manager of the companies' subsidiaries in Albania. Companies included in the interviewing process were selected from different sectors of economy, such as banking, production, insurance, telecommunication, education, etc. Nevertheless, only a part of the realized interviews provided valuable information for further analysis. In particular, interesting and valuable information was provided in the case of Intesa San Paolo Bank and Andritz Group.

International transfers resulted to be a practice followed by all companies included in the interviewing process, with expatriation prevailing as the most used form. All companies revealed that the main reason for using expatriates was their headquarters' necessity to increase control and coordination with their respective Albanian subsidiaries. They also emphasized that their expatriates faced big difficulties to adjust to the Albanian way of solving business problems.

But, in the cases of San Paolo Bank Albania and Andritz Group, companies were applying additional forms of international transfers, besides expatriation. For that reason they have been discussed in more details during the paper. Short-term assignments, commuter and frequent flyer assignments, as well as virtual teams were mentioned to be used occasionally in the case of San Paolo Bank Albania, mainly for the purpose of developing and implementing specific projects or that of implementing new business strategies. Also some movements of Albanian staff to the headquarters of the company in Italy for a period of time have been reported to be beneficial for both parts, by improving cooperation and coordination among the head office and the Albanian subsidiary as well as by enhancing global awareness and viewpoint about the company of the Albanian staff members. In this regard particularly helpful has been too the contribution of permanent transferees, as another category of international assignments applied by Intesa San Paolo Group.

Andritz Group and its Andritz Hydro Branch Albania (Komani Site) project represent another interesting case as far as international staff transfers are concerned. As mentioned above almost all managerial positions are covered by expatriates, no matter which level they belong. This reflects the high necessity of the headquarters to maintain strong control and supervision over the Albanian project. But, some situations of short-term transfers are found in this case too. They take place primarily when the work volume is large and actual foreign managers need assistance from other transferees from the headquarters to successfully face the workload. An additional interesting fact in the case of Andritz Group is the propensity of the company to attract staff from different nationalities, willing to get job opportunities abroad and to move from one country and/or culture to the other, also equipped with large international experiences. These individuals actually refer to the categories of self-initiated expatriates and permanent transferees. In fact many of the foreign managers working at the Albanian project belong to these two categories.

Besides the value of the aforementioned conclusions, they still represent a first attempt to explore the issue of international transfers applied by foreign companies in Albania. They are also based on a limited number of cases and on the elaboration of information provided by semi-structured interviews. Therefore a deeper exploration on the issue is necessary in the future. At first a larger number of companies should be included in the study. And second, in relation to this, a deeper analysis of the specific factors influencing companies' choices of particular forms of international assignments. A survey procedure and a quantitative methodology of data analysis might be necessary in order to identify and confirm the relationship among a set of factors determining the choice of a particular form.

References

Bonache, J. & Pla-Barber, J. (2005), "When are international managers a cost effective solution? The rationale of transaction cost economics applied to staffing decisions in MNCs", Article in Journal of Business Research, Vol. 58, No. 10. 1320-1329, October 2005

Boriçi (Begani), A., Boriçi, A. & Dergjini, A., (2013), "Inpatriates (HCNs or TCNs) as an alternative for the establishment of communication channels between the headquarters and subsidiaries of MNCs", European Scientific Journal, Vol. 9, No. 10, April, 2013. ISSN: 1857-7431 online dhe ISSN: 1857-7881 Print. https://eujournal.org/index.php/esj/article/view/959/988

Boriçi (Begani), A. & Çelepija, J. (2014), "Expatriates difficulties and failure in foreign companies operating in Albania" International Journal of Economics, Commerce and Management, Vol. 2, No. 1, November 2014, Publikuar online, Rochester, Britani e Madhe. ISSN: 2348 0386 online. http://ijecm.co.uk/wp-content/uploads/2014/11/21124.pdf

Boriçi (Begani), A., (2017), "Inteligjenca emocionale si faktor ndikues në suksesin e menaxherëve nga vendi amë-rishikim literature (Emotional intelligence as a factor impacting expatriates' success-A literature review)" Buletini Shkencor i Universitetit "Luigj Gurakuqi" të Shkodrës, Seria e Shkencave Ekonomike Viti XI i Botimit, Nr.1, Fq. 5-24 (The Scientific Journal of the University of Shkodra, The Series of Economic Sciences, XIth Edition, pg. 5-24, 2017.

Collings, D.G., Scullion, H., and Morley, M.J. (2007), 'Changing Patterns of Global Staffing in the Multinational Enterprise: Challenges to the Conventional Expatriate Assignment and Emerging Alternatives,' Journal of World Business, 42, 198– 213.

Collings D.G., Sculliona, H. and Dowling, P.J., (2009), "Global staffing: a review and thematic research agenda", The International Journal of Human Resource Management, Vol. 20, No. 6, June 2009, 1253–1272

Czinkota, M.R., Ronkainen, I.A., and Moffet, M.H. (2011), "International Business", 8th Edition, John Wiley & Sons.

Erogul, M.S., & Rahman, A. (2017), "The impact of family adjustment in expatriate success", Journal of International Business and Economy, Vol. 18, No.1, Spring 2017, 1-23.

Gong, Y. (2003), "Subsidiary staffing in multinational enterprises: Agency, resources, and performance", Academy of Management Journal, 46, 728–739.

Halim, H., Abu Bakar, H. and Mohamad, B (2018), "Measuring multicultural effectiveness among self-initiated academic expatriates in Malaysia", Malaysian Journal of Communication, Vol. 34., No. 2, 1-17.

Harzing, A.W. (2001), "Of bears, bumble-bees, and spiders: The role of expatriates in controlling foreign subsidiaries", Journal of World Business, 36, 366–379.

Harzing, A.W., Pudelko, M. and Reiche, S. (2016), "The bridging role of expatriates and inpatriates in knowledge transfer in multinational corporations", Human Resource Management, Vol. 55, No 4. 2016, 679-695, ISSN 0090-4848.

https://www.albtelecom.al/en/about-albtelecom/about-us/history/

https://www.andritz.com/group-en/about-us

https://www.andritz.com/separation-en

https://www.group.intesasanpaolo.com/scriptIsir0/si09/

https://www.intesasanpaolobank.al/retail/footer/rreth-nesh.html

Mayerhofer, H., Hartmann, L.C., Michelitsch-Ried, G. and Kollinger, I. (2004), "Flexpatriate assignments: a neglected issue in global staffing", International Journal of Human Resource Management, Vol. 15, No. 8, December, 2004, 1371–1389.

Mayrhofer, W., Sparrow, P. and Zimmerman, A., 2008, "Modern forms of international working", IN: Dickmann, M., Sparrow, P. and Brewster, C. (eds). International Human Resource Management: A European Perspective. London: Routledge, pp. 219 – 239.

Mayrhofer, W. Reichel, A. and Sparrow, P.R. (2012), Alternative forms of international working. In G. Stahl and I. Björkman (eds.) Handbook of Research into International HRM 2nd Edition. London: Edward Elgar.

Maznevski, M., Davidson, S. C. and Jonsen, K. (2006), "Global virtual team dynamics and effectiveness", Stohl, G. K. and Björkman, I., Handbook of Research in International Human Resource Management, Edward Elgar Cheltenham, UK • Northampton, MA, USA. Retrieved at: http://www.untagsmd.ac.id/files/Perpustakaan_Digital_2/PERSONEL%20%20MANAGEMENT%20Handbook%20of%20Research%20in%20International%20Human%20Resource%20Management%20(Elgar%20Origi.pdf

McDonnell, A. and Scullion, H. (2013), “Self-Initiated Expatriate’s Adjustment: A Neglected Terrain”, Book chapter accepted for forthcoming book, ‘Managing Talent of Self-Initiated Expatriate, pp. 136-155, January 2013. Retrieved at: https://www.researchgate.net/profile/Anthony_Mcdonnell2/publication/304687397_Self-Initiated_Expatriate's_Adjustment_A_Neglected_Terrain/links/591186a50f7e9bfa06dc2b78/Self-Initiated-Expatriates-Adjustment-A-Neglected-Terrain

McNulty, Y. and Brewster, C. (2016), “The concept of business expatriates”, In Yvonne McNulty and Jan Selmer (eds.), Research Handbook of Expatriates, Cheltenham, Edward Elgar (FORTHCOMING). Retrieved at: https://www.researchgate.net/publication/305592950_The_concept_of_business_expatriates

Meyskens, M., Von Glinova, M.A, Werther Jr, W.B. and Clarke, L., (2009), “The paradox of international talent: alternative forms of international assignments”, The International Journal of Human Resource Management, Vol. 20, No. 6, June 2009, 1439–1450.

Mitrev, S., Austin, S. F. and Culpepper, R. (2012), “Expatriation in Europe: Factors and Insights”, The Journal of International Management Studies, Vol. 7, No. 1, April, 2012, 158-167. Retrieved at: http://www.jimsjournal.org/17%20Robert%20Culpepper-1.pdf

Petković, M. and Đorđević, B. (2013), “Global talent management in multinational companies as their response to global competition”, International Scientific Conference “The global economics crisis and the future of future of European integration”, Faculty of Economics, University of Niš, 18 October 2013. Retrieved at: http://isc2013.ekonomskifakultet.rs/ISCpdfs/ISC2013-02.pdf

Reiche, B. S. (2006), “The inpatriate experience in multinational corporations: An exploratory case study in Germany”, International Journal of Human Resource Management, 17, 1572–1590

Reiche, B. S., Kraimer, M. L. and Harzing, A. W. (2008), “Inpatriates as agents of cross-unit knowledge flows in multinational corporations”, Published in P. Sparrow (Ed.), Handbook of International Human Resource Management: Integrating People, Process, and Context, pp. 151-170. Oxford: Wiley-Blackwell.

Richardson, J. (2006), “Self-directed expatriation: family matters”, Personnel Review, Vol. 35, No. 4, 469-486.

Sarabi, A., Froesea, F.J. and Hamori, M., (2017), “Is inpatriate assignment experience a ticket to the top of a foreign subsidiary? The moderating effect of subsidiary context”, Journal of World Business, Vol. 52, No.5, September, 2017, 680–690.

Tarique, I., Schuler, R. & Gong, Y., (2006), “A model of multinational enterprise subsidiary staffing composition”, International Journal of Human Resource Management, Vol.17. No. 2, February, 207-224.

Tharenou, P. (2013), “Self-initiated expatriates: an alternative to company-assigned expatriates?”, Journal of Global Mobility, Vol. 1, No. 3, 336-356.

Vazquez, L.M. and McGaughey S.L. (2016),”Non-traditional international assignments, knowledge and innovation: an exploratory study of women’s experiences”, Prometheus. http://dx.doi.org/10.1080/08109028.2015.1122952

Wild, J. J., & Wild, K. L. & (2016), „International Business“, 8th Edition, Pearson.

Zheng, C. (2011), “Critiques and extension of strategic international human resource management framework for dragon multinationals”, Asia Pacific Business Review, Vol. 19, No. 1, January 2013, 1–15

HOW CITIES IN INDIA CAN ATTRACT MORE RURAL POPULATION?

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Abstract
The low level of rural to urban migration needs to boost up for a higher rate of urbanization and economic development in India. In this paper, we use cross-section data models to investigate the relevant determinants of rural to urban migration at the city level in India in 2001. City-level analyses show that employment opportunities and availability of infrastructure facilities pull people from rural areas to urban areas; however, a higher level of living cost, poverty, and inequality discourage migration. India's abundant rural resources such as land and labor need to reallocate to the urban areas to increase productivity and economic growth. In this context, we suggest that management of poverty, inequality, job creation, provision of better infrastructural facilities are essential at the city level to promoting rural to urban migration in India.
Keywords: Urbanization, rural to urban migration, urban economic growth, India
JEL classification: R12, O10, O15

1. Introduction

A developing country such as India is going a huge transformation from rural-based economy to industry and service-based urban economy. However, India's urbanization rate though increasing but it is slower than other developed countries such as United States, United Kingdom, the Netherlands, etc. The urbanization rate in India is slower than in other developing countries such as China, Brazil, and the Russian Federation. After independence, the rate of urbanization began to rise continuously; the urban population in India was 17.97 percent in 1961, which increased to 31.16 percent in 2011. Growing urbanization has helped the country to achieve higher economic growth (Tripathi, 2013; Tripathi and Mahey, 2017), which means urbanization is the engine of economic growth in India. In India, the urban population increases due to mainly the natural growth of population which has contributed about 43.8 percent from 2001 to 2011. The rural to urban migration has contributed about 21 percent during the same period. Among the cities, the migrant population in Mumbai was 17.32 percent, 13.82 percent in Delhi, 8.84 percent Kolkata, 4.88 percent in Chennai, and 4.85 percent in Hyderabad, which is quite higher than other million-plus cities in 2001, on a timescale of 10 years and more. This shows that the contribution of rural to urban migration to urbanization in India is very low.

In this backdrop, we try to understand the factors that contribute to rural to urban migration at the city levels in India. We consider large cities, as per the 2001 Census. There are several reasons for the selection of such large cities (750,000 or more inhabitants) as the units of analysis. First, because of the unavailability of city-specific data for a large number of variables used in this study (e.g., city income data), the city district (where the sample city is located) is used as a proxy for the city.[1] Larger cities are a good proxy for a city district as they cover a larger part of a district than the smaller cities. Second, as India's urbanization (i.e., the share of urban population) is mainly centered around Class I cities (population more than 1 lakh). We source data from the Census of India and National Sample Surveys (NSS) conducted by the Government of India. We find that city-level job opportunities,

[1] However, NSS data does not provide information about what proportion of city districts are made up of the cities themselves.

infrastructure facilities, and economic conditions matter for pulling rural people to a large city.

The structure of the paper as follows. The second section highlights the brief review of literature. The third section highlights the empirical framework and estimated results. The fourth section, the conclusions, provides a summary and it suggests the policy implications drawn from the results in section three.

2. Brief review of literature

Various economic theories institute that structural change is an unavoidable component of economic growth. In the Lewis (1954) model, both internal and external agglomeration economies are generated due to structural changes that occur through shifting of the labor force from primitive agriculture sector to manufacturing which triggers growth by generating an investible surplus. Harris and Todaro (1970) described rural-urban migration as a function of income differential adjusted for the probability of finding a job. Harris and Todaro (1970) explained the phenomenon of accelerating rural-urban labor migration despite the existence of positive marginal products in agriculture and significant levels of urban unemployment. Empirical literature such as McCatty (2004) argued that rural to urban migration in developing countries depends on job opportunities, education, medical facilities, high per capita income, transport facilities, and high living standard. Haurin's (1980) model explained that climatic differences with improved area matter for migration. Issah et al. (2005) found that infrastructure matters for migration decisions.

In the context of India, Mitra and Murayama (2009) found that the intrastate migration rate is much higher in magnitude than the interstate migration rate in India. The social and cultural differences in India stand as a major limitation to population mobility. Banerjee (1986) argued that the underlying objective of migration is to maximize the family rather than individual welfares. Bird and Deshingkar (2009) found that circular migration rates are high in remote rural areas, particularly among the chronically poor in India. Chauvin et al. (2017) argued that India's rural-urban migration is limited by strong place-based preferences such as those related to cast-based social networks in India. Moscona (2017) and Jacob (2012) confirmed that the green revolution has adversely affected India's rural to urban migration. Ahuja et al. (2011) found that the National Rural Employment Guarantee Act, 2005 which was launched to create more rural employment could not able to check the rural migration.

Sridhar et al. (2013) argued that an increasing level of education of the migrants acts as the main pull factor for migration in Bengaluru. Banerjee (1984) found that one-half of the surveyed migrants had moved to Delhi after lining up specific jobs. Mitra's (2017) study confirmed that with an increase in the city size, the migration rate rises mainly because employment prospects are better in large cities due to agglomeration effects. Agasty and Patra (2013) stated that migration is mainly based on the lower-income opportunities of the rural worker. It also depends on the debt, poor access to credit, declining access to common property resources, or commodity price crashes [Deshingkar, 2003]. Banerjee and Kanbur (1981) found that migration tends to rise first and then falls as rural income rises. Akram (2015) argued that an increase in per capita Net State Domestic Product tends to decrease the number of out-migrants from the rural areas of that state. Bhagat's (2014) study stated that migrants are more vulnerable and subject to various kinds of exclusions in urban areas.

The above review of literature suggests that though we have a good number of migration studies, however what factors attract city level rural to urban migration are not known. In this paper, we try to fill this gap.

3. Empirical Framework and Results of the Estimation of Determinants: city level

To empirically investigate the determinants of rural to urban migration in large cities in India, the following Ordinary Least Square (OLS) regression model is used for estimation:

$$\text{Migrant} = \alpha_0 + \sum_{i=1}^{19} \alpha_i X_i + \epsilon \qquad \text{………………… (1)}$$

Here, the dependent variable "Migrant" in equation (1) has two different forms: first, it is measured by percentage of rural to urban migration in large cities in India and second, it is measured in terms of the total number of rural to urban migrants. City-specific percentage migration is defined by the total number of migrants from India's rural areas to a particular city with duration of residency from less than one year to more than 10 years divided by the total population of that city. On the other hand, the total number of migrants from India's rural areas to a particular city with duration of residency from less than one year to more than 10 years is measured as the total number of rural to urban migrants. X_is are independent variables. Based on the review of literature in Section 2, we mainly consider four types of independent variables: employment opportunities, infrastructure availability, economic conditions, and favorable climate. Most of the variables are considered according to availability of data. Based on Palei (2015) and Tripathi (2018), school, colleges, universities, and hospitals are considered as low-level capital-intensive institutional infrastructure. All these factors pull people from rural areas to urban areas. It considers the arguments in support of the proposition that rural to urban migration is a necessary part of the development process and does not necessarily have to result in an adverse impact on rural areas. It is relevant to investigate the pull factors in India rather than the push factors as several policies such as NREGA have tried to hold people in the rural areas rather than inducing them to go to the urban areas.

Cities with 750,000 or more inhabitants are defined as large cities. The report "World Urbanization Prospects: The 2018 Revision" indicates that there are about 61 cities in India in 2010 having this population. However, due to limitation in data availability, we only consider 51 cities for the regression analysis. To measure city-level employment, we consider self-employment, casual workers, and regular wage/salaried employed persons separately for male and female.[2] We use unit- and individual-level NSS data of the 61st Round survey on employment and unemployment situation in India in 2004–05.[3] We expect that better employment opportunities pull excess laborers from rural areas to urban areas. The economic level is measured by per capita income, monthly per capita expenditure, tax and revenue receipt from municipal properties, poverty, and inequality. We consider that better economic conditions attract more rural people to urban areas. The NSS 61st Round survey on consumption expenditure in 2004–05 data is used to measure city-level monthly per capita expenditure, poverty, and inequality. However, as city-specific poverty lines are not available, we use the state-level poverty line to calculate city-level poverty. Chaudhuri and Gupta (2009) also used the state-level poverty line to measure the district-level poverty in India. To measure the effect of infrastructure on rural to urban migration, we consider education facilities measured by colleges and universities, health facilities, electricity connections, and nearest distance to railway stations from the census of India. Finally, average city rainfall and city-wise temperature differences are used to measure the impact of climate on rural to urban migration. We expect a positive effect of climate on rural–urban migration.

Table 1 Description of data used in the regression equation

Variables	Mean	Standard deviation	Minimum	Maximum	Coefficient of variation
Dependent variables					
Percentage of rural to urban migration in 2001 (prum)	18.6	12.2	2.7	47.4	65.59
Total number of rural to urban migrants (trum) (in thousands)	383.1	794.9	25.7	4651.5	207.49
Independent variables					
City-wise total self-employed male in 2004–05 (selfm)	328.4	94.6	188.8	615.8	28.81
City-wise self-employed female in 2004–05 (selff)	91.0	71.8	7.4	348.2	78.90

[2]All the definitions of the different class of laborers are followed from NSS.

[3]Though, 55th round for 1999–2000 is available but only this particular round uses different methodology (recall periods) and creates the problem of comparison with other rounds of survey. Also district-level estimations are more reliable only after the 61st Round of NSS survey, which has a different sample survey design. Therefore, we consider NSS 61st Round survey on consumer expenditure in 2004–05.

Variables	Mean	Standard deviation	Mini-mum	Maxi-mum	Coefficient of variation
City-wise total regular wage/salaried employed male in 2004–05 (regularm)	314.05	85.71	132.70	483.90	27.29
City-wise total regular wage/ salaried employed female in 2004–05 (regularf)	82.79	47.26	2.00	196	57.08
City-wise total casual worker male in 2004–05 (casualm)	104.3	60.4	9.3	300.9	57.91
City-wise total casual worker female in 2004–05 (casualf)	37.01	36.10	0.00	138.70	97.54
Level of inequality in 2004–05 (Gini)	0.3	0.1	0.1	0.6	33.33
Per capita city output in 2001, in Indian rupees (ddp)	16597.8	7614.6	797.2	38412.6	45.88
City-wise monthly per capita consumption expenditure in Indian Rupees (mpce)	1471.46	442.64	801.82	2610.36	30.08
City-wise percentage of poverty headcount ratio in 2004–05 (fgt0)	12.2	12.5	0.2	57.8	102.46
City-wise percentage of squared poverty headcount ration in 2004–05 (fgt1)	2.3	3.1	0.0	16.1	134.78
Road distance to railway station from the city in 2001, in kilometers (rail dist)	0.4	1.4	0.0	8.0	350.00
City-wise total number of universities in 2001 (univ)	1.1	1.2	0.0	5.0	109.09
City-wise total number of medical facilities in 2001 (medi)	187.4	213.8	2.0	781.0	114.09
City-wise total number of colleges (ctc) in 2001	41.5	49.0	1.0	195.0	118.07
City-wise total number of electricity connections in 2001 (elect) (in thousands)	461.4	1222.2	0.0	8560.3	264.89
City-wise total receipt through taxes and revenue derived from municipal properties, in lakhs of Indian rupees (trmp) in 2001	14.9	53.2	0.0	380	357.05
City-wise average rain fall in 2001 (rain)	1075.3	570.2	266.0	3053.0	53.03
City-wise temperature differences in millimeter (temp)	20.78	11.00	7.00	43.00	52.94

Source: Author's calculation based on 51 observations/cities.

Appendix Table A1 lists all the cities that are considered for the study. Summarized in Appendix Table A2 are the descriptions, measurements, and data sources of all the variables used in estimation of OLS regression of equation (1). Table 1 explains the means, standard deviations, minimum, maximum, and coefficient of variation (CV) values for the variables used for regression analysis. Most importantly, the CV aims to describe the dispersion of the variables in a way that does not depend on the variable's measurement unit. The higher values of CV for the railway station distance from the city and the total number of electricity connections indicate a greater dispersion in these variables. On the other hand, city-level inequality, city-wise monthly per capita expenditure, and city-wise total number of self-employed males show a lower dispersion in these variables. Table 2 presents the row correlation coefficients. The estimated values of correlation coefficients quantify the direction and strength of the linear association between the variables. The results show that the percentage of rural to urban migration has a higher positive correlation with self-employed females, casual employed females, and total rural to urban migration. On the other hand, it has a negative association with self-employed males, level of inequality, and poverty headcount ratio. It also shows that collinearities among the independent variables are not very high, which is required for proper regression estimation.

Table 3 presents the estimated regression results from equation (1). Regression 1 reports the full model where all the independent variables for OLS estimation are considered. On the other hand, regression models 2–5 represent the parsimonious model by excluding the explanatory variables that did not show statistically significant results due to collinearity of independent variables. Regression models 1–5 consider the robust standard errors (to control for heteroskedasticity).

The significant values of F statistics for regressions 1–5 indicate that the overall model is statistically significant. The higher values of R^2 indicate that regressions 1–4 explain a good percentage of total variation in the dependent variable. The study has also calculated the adjusted R^2, as it adjusts for the number of explanatory terms in a model, i.e., it incorporates the model's degrees of freedom. The multicollinearity problem does not seem to be troublesome, as the mean variance inflation factors (VIF) values do not exceed 10 for regressions 1–5. Regression results are also free from omitted-variables bias as Ramsey RESET test show the satisfactory results. The p-values of Ramsey RESET test are higher than the usual threshold of 0.05 (95 percent level of significance); therefore, we fail to reject the null hypothesis and conclude that we do not need more variables to explain the determinants of rural to urban migration at the city level.

Table 2 Correlation coefficient of determinants of rural to urban migration in large cities in India

	prum	trum	selfm	self	Gini	rail dist	elect	univ	casualm	ddp	fgt0	fgt1	medi	rain	trmp	ctc	regular	regularf	casualf	temp	mpce
prum	1.00																				
trum	0.39	1.00																			
selfm	-0.16	-0.09	1.00																		
selff	0.33	0.16	0.54	1.00																	
Gini	-0.23	0.08	-0.20	-0.09	1.00																
rail dist	0.03	-0.03	-0.04	-0.22	-0.04	1.00															
elect	0.15	-0.05	-0.16	-0.21	-0.16	-0.07	1.00														
univ	-0.14	-0.15	-0.05	-0.04	-0.06	-0.23	0.11	1.00													
casualm	0.09	0.20	-0.26	0.03	-0.14	-0.19	0.22	0.24	1.00												
ddp	0.04	-0.03	-0.28	-0.22	0.01	-0.01	-0.07	-0.12	-0.03	1.00											
fgt0	-0.11	0.08	-0.10	-0.08	0.17	-0.06	-0.07	-0.13	0.28	-0.18	1.00										
fgt1	-0.05	0.08	-0.18	-0.09	0.15	0.06	-0.05	-0.15	0.30	-0.12	0.93	1.00									
medi	0.06	-0.03	-0.17	-0.23	-0.11	0.29	0.10	0.02	0.04	0.22	-0.08	0.01	1.00								
rain	0.03	-0.19	-0.09	-0.19	0.10	0.06	-0.03	-0.03	-0.21	-0.03	-0.15	-0.14	0.03	1.00							
trmp	0.08	-0.03	0.08	-0.08	-0.16	-0.07	0.27	0.13	0.06	-0.01	-0.06	-0.08	0.32	0.26	1.00						
ctc	-0.03	-0.08	-0.11	-0.19	-0.13	-0.11	0.61	0.17	0.19	0.11	0.02	0.04	0.48	0.04	0.50	1.00					
regularm	0.10	-0.09	-0.51	-0.30	0.21	-0.11	-0.18	-0.05	-0.40	0.42	-0.23	-0.20	0.07	0.26	0.00	-0.09	1.00				
regularf	0.17	0.28	-0.50	-0.22	0.08	-0.20	-0.03	-0.06	0.03	0.54	-0.28	-0.23	-0.05	0.10	0.05	-0.09	0.56	1.00			
casualf	0.30	0.25	0.04	0.39	-0.06	-0.14	0.09	0.08	0.43	-0.21	0.29	0.31	-0.19	-0.06	0.01	-0.07	-0.33	0.02	1.00		
temp	-0.14	-0.07	0.07	0.00	-0.02	-0.01	-0.10	-0.06	0.04	-0.24	0.23	0.15	-0.28	-0.20	-0.17	-0.18	-0.15	-0.22	0.08	1.00	
mpce	-0.02	0.02	-0.13	0.03	0.43	-0.09	-0.07	-0.04	-0.15	0.29	-0.52	-0.49	0.02	0.08	-0.03	-0.11	0.40	0.37	-0.16	-0.21	1.00

Note: See Table 1 for variable definitions. The correlation coefficients are based on 51 observations.

Source: Author

Regressions 1–5 show that better employment opportunities in a city promote higher rural to urban migrations. Regression 1 shows that city-wise total self-employed males have a negative impact on the percentage of rural to urban migration. In particular, a 100 percent increase in city-wise total of self-employed males decreases rural to urban migration by 6 percentage points. However, city-wise total of self-employed females has a positive impact on the percentage of rural to urban migration. This indicates that cities having a higher number of self-employed females attract higher rural to urban migration whereas cities having a higher percentage of self-employed males discourage rural to urban migration. It may be the case that if women have the chance to make them self-employed in the city, more women from rural households may migrate to urban areas to earn more. The possible increases in income of the households make rural to urban migration easier and attractive. But, in case the male workers from rural areas want to be self-employed, they may not choose to migrate from rural to urban areas. Regressions 2–5 show that city-wise regular wage/salaried employed males, regular wage/salaried employed females, casual male workers, and casual female workers have a positive and statistically significant effect on the volume of rural to urban migration. For instance, in regression 4, a 100 percent increase in city-wise total of regular wage/salaried employed males leads to a 5 percent increase in the percentage of rural to urban migration. This clearly indicates that the job opportunity in the city acts as a magnet to pull rural people into urban areas. Therefore, cities need to provide a higher number of regular jobs in the formal sector and casual work to attract a higher level of rural to urban migration. The results support the findings of Iversen (2006), McCatty (2004), and Banerjee (1984).

When economic conditions of the cities are taken into account, the results from regressions 1 to 5 indicate that they have an adverse effect on the percentage of rural to urban migration. The city-wise per capita income does not have any statistically significant effect on the volume of rural to urban migration. Regression 4 shows that city-wise monthly per capita consumption expenditure has a statistically significant (at a 10 percent level) negative effect on the percentage of rural to urban migration. This means that if a city has higher monthly per capita expenditure (i.e., richer city), it discourages rural to urban migration. It therefore indicates that a richer city may be more expensive for a person to migrate from a rural to an urban area. It is very tough to manage daily essential expenditure, housing rent, and other expenditures by migrant people in the richer city. The estimated result does not support the findings of Arzaghi and Rupasingha (2013).

Table 3: Determinants of rural to urban migration in large cities in India

Independent variables	Dependent variable						
	Percentage of Rural to Urban Migration						Log of Total Migrants from Rural to Urban
	OLS					IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employment opportunities						
City-wise total no. of self-employed male	-0.064**					-0.0651***	-0.00572***
	(0.026)					(0.0194)	(0.00187)
City-wise self-employed female	0.122**		0.084***	0.0739**		0.113***	0.00534*
	(0.0489)		(0.027)	(0.0332)		(0.0388)	(0.00314)
City-wise regular wage/ salaried employed male	0.0182	0.0388		0.0529*			
	(0.0337)	(0.0267)		(0.0280)			
City-wise regular wage/ salaried employed female			0.086**				
			(0.033)				
City-wise casual male worker	-0.0009			0.0503*			
	(0.0346)			(0.0269)			
City-wise casual female worker		0.122**					
		(0.0460)					
	Economic conditions						
City-wise level of inequality	-21.77	-31.68**					-0.803
	(22.82)	(12.26)					(1.559)
City-wise per capita output	0.867	-0.0182					-0.209
	(2.322)	(1.817)					(0.192)
City-wise per capita monthly consumption expenditure	-0.00399		-0.00485	-0.0068*			
	(0.00517)		(0.00454)	(0.0039)			
City-wise poverty headcount ratio	0.0570		-0.162	-0.172	-0.478*		0.000665
	(0.341)		(0.400)	(0.154)	(0.283)		(0.0162)
City-wise squared poverty headcount ration	-0.437		0.659		1.673		
	(1.482)		(1.631)		(1.406)		
Road distance to nearest railway station from a city	0.901					1.489**	0.0538
	(1.061)					(0.658)	(0.0818)
	Infrastructure availabilities						
City-wise total number of universities	-1.458				-1.535		-0.255**
	(1.325)				(1.708)		(0.115)
City-wise total number of medical facilities	0.00732		0.0162*				
	(0.0100)		(0.00917)				
City-wise total number of colleges	-0.078**	-0.0417	-0.077**		-0.061*	-0.0504**	
	(0.032)	(0.0278)	(0.037)		(0.035)	(0.0236)	
City-wise total number of electricity connections	0.357***	0.206***	0.401***		0.255***	0.233**	0.0008
	(0.110)	(0.067)	(0.0818)		(0.062)	(0.0967)	(0.007)
City-wise total receipt through taxes and revenue derived from municipal properties	0.036**					0.0484***	
	(0.016)					(0.00786)	
	Favorable climate						
City-wise average rain fall	0.0016	-0.0002		0.0014			
	(0.0028)	(0.002)		(0.002)			
City-wise temperature differences	-0.0574	-0.157				-0.0888	
	(0.152)	(0.147)				(0.113)	
Intercept	35.33	16.95	9.780	0.591	23.08***	31.32***	14.31***
	(23.49)	(15.15)	(9.738)	(14.30)	(3.467)	(6.325)	(1.098)
No. of observations	51	51	51	51	51	51	51
R^2	0.481	0.249	0.317	0.229	0.112	0.379	0.230
Adjusted R^2	0.2142	0.1061	0.1869	0.1243	-0.009	0.2804	0.0835
F Statistics/ Wald χ^2	7.38***	8.59***	9.81***	2.28*	6.68***	104.92***	1.99*
Mean VIF	3.26	1.36	3.47	1.38	3.64	1.47	1.27
Ramsey RESET test	1.78	0.39	1.07	2.40	0.33		0.96
	(0.17)	(0.76)	(0.37)	(0.08)	(0.80)		(0.42)

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. p-values for the null hypotheses of the Ramsey RESET tests are reported in the parentheses after the values.

Finally, the distance by road to the nearest railway station, which indicates economic potential, does not have any statistically significant effect on the percentage of rural to urban migration. The results indicate that a richer city with a higher level of poverty and inequality does not attract people from rural areas to urban areas. The estimated result does not support the findings of Haurin (1980).

Now, we assess the effect of infrastructure on the percentage of rural to urban migration. The city-wise availability of a higher number of electricity connections has a positive impact on rural to urban migration. Regression 1 shows that a 10 percent increase of total number of electricity connections in the host city increases rural to urban migration by about 3.6 percent. Regression 3 indicates that the city-wise higher number of medical facilities also attracts people from rural to urban areas. An increase of 100 percent in the total number medical facilities leads to 1.6 percent increase in rural to urban migration. The result indicates that better infrastructure has a positive impact on rural to urban migration. However, the city-wise total number of colleges has a negative impact on the percentage of rural to urban migration, which is not expected. The city-wise number of universities also does not have any impact on rural to urban migration. This indicates that the educational facilities do not much attract people from rural areas to a large city. Or, it may be the case that we need to consider other variables to measure the educational facilities of a city. However, the city-wise total receipt through taxes and revenue derived from municipal properties has a positive effect on the percentage of rural to urban migration. This indicates that a higher amount of taxes and revenue derived from municipal properties, which is basically spent to increase the public services delivered to the city dwellers, attracts more people from rural to urban areas. Overall, the infrastructure has a positive effect on rural–urban migration. The estimated result does not support the findings of Issah et al. (2005). Finally, city-wise climatic conditions, which are measured by average rainfall and temperature differences, have no statistically significant effect on the percentage of rural to urban migration. The result does not support the findings of Haurin (1980). This could be because of the vast majority of movement to urban areas comes from geographically close rural areas (i.e., within state migration is very high), and there is very little variation in climate within a region.

Regression 7 considers the logarithm of the total number of rural to urban migrants as the dependent variable. The regression model represents the log-linear model as the dependent variable, which is assumed to be the logarithmic form. The results show that the city-wise total number of self-employed females have a positive effect and the city-wise total number of self-employed males have negative effects on the total number of rural to urban migrants. The results are consistent with the results of regressions 1–5. The city-wise number of universities has a negative and statistically significant effect on the log of total rural to urban migrants. However, economic conditions do not have any effect on the total number of rural to urban migrants. This result contradicts with the results obtained in regressions 1–5. It shows that job opportunities are more important than economic conditions of city to increase rural to urban total migration. For example, 41 percent of total rural to urban migration in Mumbai happened due to work and employment reasons in 2001.

3.1.1. Robustness check

The causality between rural to urban migration and employment (or economic conditions) is not very important as economic conditions do not have stronger effect on rural to urban migration. On the other hand, urban India has failed to create enough jobs for its increasing rural migrants. However, India's limited urban policies (e.g., JNNURM and Smart city mission) only focused on infrastructure development of the cities, so causality test is important.

A serious concern about the relationship between infrastructure facilities and the volume of rural to urban migration is the question of reverse causality. Does a higher level of infrastructure increase rural to urban migration, or, does higher rural to urban migration increase infrastructure facilities? The answer is possibly a mix of both. By considering this phenomenon, we use instrumental variable (IV) regression model to check the robustness of our regression results.

Although we have measured several variables to assess the impact of infrastructure on rural to urban migration, we consider only city-wise number of electricity connections as endogenous variables for the estimation of IV regression as it has a very consistent and strong effect on rural to urban migration. The suitable instruments are considered in such a way that they have a very strong relationship with the number of electricity connections, which is measured by correlation coefficients (r) but are exogenous, i.e., not anyway associated with rural to urban migrations. Keeping in mind all these issues, we find the following instruments for the estimations: first, the size of city populations that have a strong relationship with the number of electricity connections as a higher level of population demands a higher number of electricity connections, but this may not have anything to do with rural to urban migration. It is important to note here that from 1991 to 2001, the 79 percent increase in urban population was due to natural increase, expansion of boundaries, and net reclassification. The correlation coefficients of the percentage of rural to urban migration with the size of city populations is about –0.002.

Second, the number of banks city-wise, which have a strong relationship with the number of electricity connections, indicates a higher level of population but it has a very low relationship with the volume of rural to urban migration, as the migrants may have accounts in the rural banks and partially use the urban banks. So rural to urban migration does not necessarily increase the bank branches as they do not become customers of the urban bank branches in the city. The correlation coefficient between the number of banks and the number of electricity connections is 0.62, whereas the correlation coefficient between the number of banks and the percentage of rural to urban migration is 0.04.

We estimated the model using a 2SLS estimator. The regression model 6 in Table 3 presents the estimated results of the parsimonious model as we find that the results are more satisfactory than running the full model. Our instruments work well as first-stage *F* statistics comfortably passes the rule of thumb threshold for strong instrument (Staiger and Stock, 1997) and exceeds the Hausman et al. (2005) threshold values.

The results of regression model 6 show that the city-wise number of self-employed males has a negative effect on the percentage of rural to urban migration. The number of city-wise self-employed females has a positive effect on the percentage of rural to urban migration. These results are statistically significant (at the 1 percent level) and consistent with the regression results of regressions 1–5. Also, a positive effect of the city-wise receipt through taxes and revenues and a negative effect of the city-wise number of colleges on the percentage of rural to urban migration are similar to the results obtained in regressions 1–5. Most importantly, the number of electricity connections has a positive and statistically significant effect on the percentage of rural to urban migration. These results substantiate our earlier claim that electricity connections, which is used as a proxy for infrastructure, increases the percentage of rural to urban migration in India. However, the positive effect of distance by road to the nearest railway station on of rural to urban migration indicates that lower economic potential increases rural to urban migration. This result supports our earlier claim that cities with higher economic conditions do not attract rural people to urban areas.

4. Conclusions and policy implications

This paper attempts to investigate the relevant determinants of rural to urban migration in large cities in India based on the 2001 Census and National Sample Survey data. OLS and IV approach models are used for the analysis.

The city-level OLS and IV regression results show that the city-wise total number of self-employed males has a negative effect on the percentage of the total number of rural to urban migrants in India. But the city-wise self-employed females, regular wage/salaried males, and females, the total number of male and female casual labor have a positive effect on the percentage of rural to urban migration. City-level poverty, inequality, and per capita monthly consumption expenditure have a negative effect on rural to urban migration. However, the total receipt received through taxes and revenue derived from municipal properties has a positive effect on it. The results also show that a favorable climate does not have any effect on rural to urban migration. The results imply that employment and infrastructure remain very important factors behind the city-level rural to urban migration in India.

Based on the analysis we suggest that Indian cities have to provide more job opportunities to facilitate higher rural to urban migration. Indian cities are lacking urban infrastructure facilities. Therefore, improvements in infrastructure availabilities are essential to increase rural to urban migration. Urban poverty and inequality have to reduce so that it rises rural to urban migration. Finally, control of living costs in the cities is important for this purpose. However, how small cities or towns can attract more rural population and consideration of other variables such as family income diversification, social networks, and caste affinities, and employment growth to explain rural to urban migration in the large cities forms the topic for research.

References

Agasty, M.P. and Patra, R.N. (2013), “Rural–Urban Migration: Selectivity, Determinants and Destination”, Indian Journal of Research 2(2), pp. 84-86.

Ahuja, U. R., Tyagi, D., Chauhan, S., Chaudhary, K. R., (2011), Impact of MGNREGA on Rural Employment and Migration: A Study in Agriculturally-backward and Agriculturally-advanced Districts of Haryana, Agricultural Economics Research Review, Vol. 24 (Conference Number), pp 495-502.

Akram, M. (2015), “An Analysis of Rural to Urban Labour Migration in India with Special Reference to Scheduled Castes and Schedules Tribes”, International Journal of Interdisciplinary and Multidisciplinary Studies 2(10), pp. 53-58.

Arzaghi, M. and Rupasingha, A. (2013), “Migration as a way to diversify: evidence from rural to urban migration in the U.S”, Journal of Regional Science 53(4), pp. 690-711.

Banerjee, B. (1984). Information flow, expectations and job search: rural-to-urban migration process in India. Journal of Development Economics, 15(1–3), 239–257.

Banerjee (1986). Rural to urban migration and the urban labour market (a case study of Delhi). Bombay, India, Himalaya Publishing House, xviii, 285 p. (Studies in Economic Development and Planning No. 41).

Banerjee, B., & Kanbur, S. M. (1981). On the specification and estimation of macro rural–urban migration functions: with an application to Indian data. Oxford Bulletin of Economics and Statistics, 43(1), 7–29.

Bhagat, R. B. (2014), “Urban migration trends, challenges and opportunities in India” World Migration Report 2015, Background paper, International organization for migration. Available at http://www.solutionexchange-un-gen-gym.net/wp-content/uploads/2016/01/WMR-2015-Background-Paper-RBhagat.pdf.

Bird, K., & Deshingkar, P. (2009). Circular Migration in India. Policy Brief No 4, prepared for the World Development Report 2009.

Chaudhuri, S. and Gupta, N. (2009). “Levels of Living and Poverty Patterns: A District-Wise Analysis for India”, Economic and Political Weekly, 44(9): 94-110.

Chauvin, J. P., Glaeser, E., Ma, Y., & Tobio, K. (2017). “What is different about urbanization in rich and poor countries? Cities in Brazil, China, India and the United States.” Journal of Urban Economics, 98: 17-49.

Deshingkar, P. (2003). Improved livelihoods in improved watersheds: can migration be mitigated? In Watershed management challenges: improving productivity, resources and livelihoods. Colombo: International Water Management Institute.

Government of India (2011), “High Powered Expert Committee Report on Urban Infrastructure and Services”, Available at www.niua.org/projects/hpec/finalreport-hpec.pdf.

Harris, J., & Todaro, M. (1970). Migration, unemployment and development: a two-sector analysis. American Economic Review, 1, 126–142.

Haurin, D.R. 1980. The Regional Distribution of Population, Migration and Climate. Quarterly Journal of Economics 95, 294–308.

Hausman, J., Stock, J. H., Yogo, M. (2005). “Asymptotic properties of the Hahn-Hausman test for weak-instruments”,Economics Letters 89, 333-342.

Imoru, A-R I, King, R. S. (2017), The Contribution of Rural Urban Migration to Migrants’ Economic Development in Tamale, Research on Humanities and Social Sciences, 7(24): 1-14.

Issah, I., Khan, T. Y., Sasaki, K. (2005), Do migrants react to infrastructure difference between urban and rural areas? Development of an extended Harris–Todaro model, Review of Urban and Regional Development Studies, 17(1), 68-88.

Iversen, V. (2006), “Segmentation, Network Multipliers and Spillovers: A Theory of Rural Urban Migration for a Traditional Economy”, Working Paper T9, Centre for Migration Research, Sussex University. Available at: http://www.migrationdrc.org/publications/working_papers/WP-T9.pdf.

Jacob, N. (2012), The Impact of NREGA on Rural-Urban Migration: Field survey of Villupuram District, Tamil Nadu, Centre for Public Policy Research.

Lewis, W. A. (1954). "Economic development with unlimited supplies of labor." The Manchester School of Economic and Social Studies 22, pp.139-191.

Mc Catty, M. (2004), The Process of Rural-Urban Migration in Developing Countries. Carleton University, Ottawa, Ontario.

Mitra, A. and Murayama, M. (2009), “Rural to Urban Migration: A district level Analysis for India”, International Journal of Migration, Health and Social Care, 5 (2), pp. 35-52.

Mitra, A. (2017), Rural to Urban Migration and Urban Labour Market, Working Paper 02/2017, National Institute of Labour Economics, Research and Development, Delhi, India. Available at http://www.iamrindia.gov.in/writereaddata/UploadFile/Urban%20Migration.pdf

Moscona, J. (2017), "The impact of India's green revolution: An empirical investigation of modern agricultural development." Unpublished Manuscript.
Palei, T. (2015), "Assessing the impact of infrastructure on economic growth and global competitiveness", Procedia Economics and Finance, 23, 168-175.
Saracoglu, D. Ş., and Roe, T. L. (2004). Rural-urban migration and economic growth in developing countries. Society for Economic Dynamics 2004 Meeting Paper 241, New York University, New York.
Sridhar, K. S., Reddy, V, Srinath, P. (2013), "Is it push or pull? Recent evidence from migration into Bangalore, India", International Migration and Integration, 14: 287–306.
Staiger, D., Stock, J. H. (1997). "Instrumental variables regression with weak instruments", Econometrica 65(3), 557-586.
Times News Network (Times). (2018a). "Unemployment Rate in India: Nearly 31 million Indians are jobless", Mar 6, 2018.
Times News Network (Times). (2018b) "Mumbai is India's most expensive city for expatriates: Survey", Jun 26, 2018
Todaro, M. P. (1969). A model of labor migration and urban unemployment in less developed countries. American Economic Review, 59(1), 138–148.
Tripathi, S. (2013), "Do large agglomerations lead to economic growth? Evidence from urban India", Review of Urban and Regional Development Studies 25(3), 176–200.
Tripathi, S. (2018), Does A Higher Level Of Infrastructure Increase Population In Large Agglomerations? Evidence from India, Review of Urban & Regional Development Studies 30 (2), 145-168.
Tripathi, S., and Mahey, K. (2017). "Urbanization and Economic Growth in Punjab (India): An Empirical Analysis." Urban Research & Practice 10 (4), 1-24.
Tripathi, S., and Rani, C., (2018), The impact of agricultural activities on urbanization: Evidence and implications for India, International Journal of Urban Sciences 22 (1), 123-144.
United Nations (UN) (2014), "World Urbanization Prospects: The 2014 Revision, Highlights, New York", United Nations, Population Database, Population Division, Department of Economic and Social Affairs, accessed on 15 June 2014 from http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf.
Zhang, Y. (2013), China's Rural-urban Migration and Its Impact on Economic Development, M.A. Dissertation, Department of Economics of the University of Ottawa, Available at https://ruor.uottawa.ca/bitstream/10393/30619/1/YuzheZhang.mrp.pdf.

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), Chennai (Chennai), Coimbatore (Coimbatore), Delhi,[1] 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 (Ludhiana), 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 is located) is used as a proxy of a city to measure some of the variables used in estimation of regressions by considering urban sample persons of that district. Name in parentheses indicates the name of the district in which the city is located.

[1]Delhi as a whole is considered a proxy of a city district.

Appendix A2: Variable sources and definitions used in city-level regression model

Workforce participation rate (WPR) (as given in National Sample Survey(NSS): The number of persons employed in *usual status* (*principal and subsidiary status*) per 1,000 persons is referred to as the work force participation rate (WFPR) or worker population ratio (WPR).

Self-employed, Regular wage/salaried employee, and casual worker: As defined by NSS.

City-wise per capita output: Per capita non-primary Net District Domestic Product (NDDP) of 2001–02 at 1999–2000 constant prices is taken as a measure of city output. *Source*: Directorate of Economics and Statistics (DES), various State Governments, GoI.

City-level poverty: We use the state-level urban poverty line as suggested by Tendulkar Committee to estimate the city level poverty by considering the urban sample persons of that district. Poverty head count ratios of the large city districts are calculated to measure the city level poverty. *Source*: NSS unit level data on "consumption expenditure" of 61st Round in 2004–05.

City inequality level: Gini coefficient of the large city districts (i.e., the district in which the sample city is located) by considering urban sample persons of that district. *Source*: NSS unit level data on "consumption expenditure" of 61st Round in 2004–05.

City-level monthly per capita consumption expenditure (MPCE): MPCE is taken from the large city districts (i.e., the district in which the sample city is located) by considering urban sample persons of that district. *Source*: NSS unit level data on "consumption expenditure" of 61st Round in 2004–05.

Rainfall: City-wise average rainfall in 2001. *Source*: Census of India.

Temperature: City-wise temperature differences from maximum to minimum (in degrees centigrade) in 2001. *Source*: Census of India.

Medical facilities (Numbers): City-wise Total Number of Hospitals + Number of Dispensaries + Number of Health Centers + Number of Family Welfare Centers + Number of TB Clinics + Number of Nursing Homes + Number of Other Medical Institutions in 2001. *Source*: Census of India.

Total university and colleges (Numbers): City-wise total number of universities and colleges in 2001. *Source*: Census of India.

Electrification (Number of Connections): City-wise Total number of connection by Domestic + Industrial + Commercial + Road Lighting (Points) + Others in 2001. *Source*: Census of India.

Total receipt: Total money (in Rs.) receipts through taxes and revenue derived from municipal properties and power apart from taxation in 2001. *Source*: Census of India.

Railway Station distance: Shortest road distance to nearest railway station (in km) from a city. *Source*: Census of India.

ASSESSMENT OF INNOVATIVE POTENTIAL AS A CRITERION FOR EVOLUTION OF THE MESOECONOMIC SYSTEM

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Abstract

Under current conditions of economic development a constant and timely research into the ongoing internal and external changes, affecting the accumulation of innovative potential, as well as degree of its utilization, will speed up the processes connected with upgrading competitive advantages and economic growth rate.

The aim of the work is offer methodological tools employed to estimate the innovative potential of the mesoeconomic system as a criterion which ensures development in a given direction. The results of research proved that the ability and determination to develop innovative activity is determined by the accumulated aggregate potential of the mesoeconomic system as a whole, which can be estimated across the sections including infrastructure and legal regulations, innovation and production, education and research, as well as finance and investment. The results of research were tested based on the analysis of innovation potential of Saratov region as a mesoeconomic system.

Keywords: Innovation potential, infrastructure and law, production and innovation, scientific and educational, investment and finance

JEL classification: O10, O52

1. Introduction

At the present stage of the country's economic development (the Russian Federation did not retain its position in the Global Innovation Index (GIL) ranking, and moved down from No. 43 spot in the GIL 2016 to No. 46 in the GIL 2018, yielding its positions to innovation achievers, including Thailand and Vietnam (Global Innovation Index 2018), it is vital not only to react to the rapid changes in the business environment, but also be prepared for the upcoming changes in order to maintain the competitive advantages and resources of the system revealed through the analysis of the system potential. Recently, there have been numerous scientific publications devoted to the research into commitment and ability to business development. However, determination and ability of enterprises for further growth, including innovation development, is largely determined by the policies pursued by the government of the region.

This includes not only laws adopted by the local municipalities, regulations and programs referred to support and creation of favorable conditions for the development of innovative activities in the region, but, in the first place, the infrastructure, funds, disbursement of money for grants, etc. Additionally, to stimulate development of the regions, it is important to encourage development of the regional strategies related to “smart specialization”. However, these strategies “must be individualized; they cannot be developed exceptionally on the national level” (Carayannis and Campbell 2010), since we must take into account a special character, advantages and potential of a region.

As noted in (Carayannis and Grigoroudis 2016; Carayannis and Campbell 2010; EBRD 2013; Carayannis, Meissner, and Edelkina 2017; Drucker 2014; Carayannis and Grigoroudis 2014; Makarov et al. 2016; Carayannis et al. 2014), it is important to consider intrinsic regional diversity of the business environment, since business conditions even in the neighboring regions can vary considerably. The regions form the meso levels of a country's economic system (the macro level) (Kleyner 2015a; 2015b), whereas a system is "a relatively discrete or stand-alone and stable part of economic time and space continuum, characterized by external integrity and internal diversity" (Kleyner 2015a; 2015b). Thus, the regions represent the mesoeconomic systems characterized by different development rates, and have a direct impact on the performance of a system at the macro level.

Therefore, we assume it is critically important to determine the true state of business in the region, and identify the factors and resources required to improve the region's economic situation and competitiveness, which cannot be achieved without the growth of innovative activity. Hence, there is a need to estimate the level of a region's readiness for development as a mesoeconomic system. Assessment of innovative potential as a criterion for the region's readiness for development was conducted in 2010-2017 in Saratov region. This is the territory with more than 47,000 enterprises providing various types of business activity, about ten universities involved in research and development activities. The given research was based on the methodology developed by the authors, in order to estimate the ability and readiness for development of any region.

2. Theoretical Research

The analysis of numerous scientific articles revealed that many scientists, while doing their research into determination of various economic systems to develop innovation activity, identify this activity with the innovation potential. At the same time, they have not provided an unambiguous definition for the "innovative potential" as an economic category. As an example, K. Freeman considers that the innovative potential ensures advancement of a system due to innovations (Freeman 1995). P. Drucker assumes that the innovation potential is of practical importance and must be analyzed to be used effectively (Golova and Sukhovey 2018). According to O.V. Vasyukhina and E.A. Pavlov, the innovation potential is one of the system attributes of a large and sophisticated socio-economic system, which allows the latter to adapt through commercialization of new knowledge to the changes in the environment (Vasyukhin and Pavlova 2010). In our view, conclusions of the above mentioned scholars totally comply with the principles behind the mesoeconomic system and development of its innovative parameters.

However, in theory the innovation potential should not be limited to a set of financial and economic resources, or objects of intellectual property and staff composition promoting innovations (Nikolaiva 2014). In fact, to facilitate innovation activity we need not only human resources, intellectual property, or financial and economic resources, but a whole set of these resources, including business potential.

A comprehensive approach to the components constituting the innovation potential is presented in the works by A. A. Rudichev, E.A. Nikitina, S.P. Gavrilavskaya, A.A. Getmantsev (Abdrakhmanova et al. 2017), where the innovation potential incorporates the resource, internal and performance components, each based on the framework of its own constituents. Thus, such component as resources includes material and technical, informational and financial constituents; the internal component incorporates the resources of state support and infrastructure; whereas the performance component is based on the growth of efficiency of the economic system. However, we assume that this approach does not take into account other components (such as ability of the economic system to commercialize and promote the results of innovation activity), and secondly, the latter component is the result of innovation activity rather than accumulated capacity, means and terms required for its implementation.

The conducted analysis of scientific papers revealed that the scholars distinguish between three main approaches in assessment of the advancement potential of the mesoeconomic system: the resource-based, performance-based, and target-based approaches. However, they are mainly used to identify and estimate the potential of socio-economic development of a region.

Additionally, the authors highlight various elements within the estimated potential. Thus, E.V. Andrianova and L.V. Konovalova place an emphasis on the component dealing with economy (considering that it implies availability of only natural resources, which, in our view is incorrect, since these are not identical concepts, and secondly, economic potential is a much wider concept), financial and organizational components (Andrianova and Konovalova 2015). M.A. Bochkov and O.P. Salegina assume that to assess the potential of a region, it is necessary to estimate its reserves incorporating the natural, investment, and scientific-technical reserves (Bochkov 2013).

A worth-while approach to assessment of a region's potential is presented in the work by K.O. Vinogradova and O.A. Lomtseva. The authors suggest to distinguish between three sections consisting of specific potentials: material and technical (including manufacturing, economic and geographical, and demographic potentials), financial and economic (including labor, manufacturing, social infrastructure, budget, and export-import potentials), and innovative -institutional (including scientific innovations, investment potential, and regulatory and legal expertise) (Vinogradova and Lomovtseva 2013). However, the authors note that the existing methods do not provide appropriate tools for assessment of highlighted potentials of a region's advancement.

The proponents of the performance-based approach are A. A. Rudichev, E.A. Nikitina, S.P. Gavrilavskaya, A.A. Getmantsev (Rudychev et al. 2015), who interpret the potential as a capability of the economic system to ensure a certain outcome based on utilization of available resources. Moreover, the authors do not investigate the issues related to assessment methodology.

The third, target-based approach to defining the potential is followed by M. Yu. Nikolaeva Nikolaeva, 2014. They consider the potential as ability to achieve the set goals in the face of limited resources. However, the author do not present the ways for estimating the given potential, or show how the given potential should correlate with the ways to achieve the set goals, and accordingly, how to outline the directions needed to utilize and shape the potential.

In our view, determination and ability of a region to develop innovation activity is based on the accumulated aggregate potential, which includes financial, investment, informational, intellectual, logistic, production, marketing, human, research and development, organizational and management potentials of both individual enterprises and the region's economy as a whole. Each potential is associated with its own specific risk types, which requires an additional assessment procedure of the risk rate relating particular and general directions, and ability to confront the risks and vulnerability factors.

Thus, determination of a region to advance innovation activity is a comprehensive phenomenon associated with ability to implement effective innovation activity by the entities of a region, including availability of accumulated resources, performance capacity, ways and methods to encourage the innovation processes. Meanwhile, an effective demand for innovative goods and services is of no small importance in the given process.

3. Research Methodology

It should be noted that the region's determination and ability to develop innovative activity is formed both on the regional level, and on the level of individual enterprises. The first level allows for a comprehensive assessment of the whole set of potentials across the region conducted by four interlinked sections. The second level relates individual enterprises and organizations of a region which implement or have the capacity to introduce innovation projects into various spheres of activity (manufacturing, organizational, managerial, marketing, informational, etc.). This is associated with the fact that enterprises determine the main share of the region's capacity to enhance innovation development.

Building a model for estimation the region's capability to develop innovation activity is based on the fact that present-day model of innovative development of the regions requires interaction between the government, business and universities (Etzkowitz 2008) in order to create an innovation development strategy taking account of the production and technological potential of a region (Golova and Sukhovey 2018).

From this perspective, in order to conduct a comprehensive assessment of the innovation potential as a criterion of capacity of the mesoeconomic system for advancement, we place a special emphasis on the following sections:

- infrastructure and law;
- innovation and production;
- science and education,
- funds and investments.

The first section, dealing with infrastructure and law, is responsible for the readiness of the mesoeconomic system in terms of creation and effective operation of the legal and regulatory framework, innovation and investment policy, advisory centers, market and innovation infrastructure (audit, consultancy, insurance, leasing, and logistics, technology transfer and information agencies, etc.). The components of this section are local/regional governments, as well as departments and agencies. A competent implementation of an innovation policy can encourage innovation activity at the level of individual firms, which, in its turn, can trigger a chain reaction at the macro level. A culmination of this process may become a considerable degree of competitiveness (Carayannis and Rakhmatullin 2014).

The quality of the innovation and investment policy is characterized by such indicators as availability and quality of the regulatory and legal framework for the innovation activity in the region (a strategy for the advancement of innovation activity, particular legislative provisions, development programs, prioritized development areas, clusters, a particular level in the development of a specialized infrastructure).

The organizational and legal support implies availability of a coordination centre for the innovation policy supervised by the regional government, specialized organizations targeting to support the entities involved in innovation activities of a region (funds, agencies, information and advisory centres, etc.).

Business development, including innovative businesses, is largely determined both by the features and development degree of the institutional environment (Marcelin and Mathur 2015; Volchek, Henttonen, and Edelmann 2013; Welter and Smallbone 2011; Yukhanaev et al. 2015), which in our view means that this section should be distinguished as a separate component when assessing the rate of a region’s determination and readiness for advancement.

The assessment procedure in this section is conducted using the expert method, where each indicator is given the scores from 0 to 1 defining the outcome index.

The second section, dealing with innovation and manufacturing, ensures accumulation of production, marketing, intellectual and research potentials. The elements of the section include innovative technology parks, incubators, research institutes, R&D and design-and-experimental departments of enterprises, universities, as well as enterprises and organizations engaged in the manufacture and sales of innovation products and services.

The third section, related to the scientific and educational potential, ensures the manpower training (workers, managers of all levels, experts, researchers, scientists, etc.), shaping the intellectual, research and human capacity of the mesoeconomic system. The components of this section are professional colleges, technical schools, and universities.

The fourth section, relating finance and investments, deals with accumulation and availability of financial and investment resources, and includes the following elements: government (within the framework of allocating funds from the regional budget, attracting federal aid to finance innovation programs and projects), departments and agencies (allocating funds for research and development, and supporting innovative entrepreneurship), credit organizations, various investment funds, and private investors (providing funds for innovation projects), enterprises and organizations (using the owned capital to develop innovative activities).

Apart from that, each section forms the types of potentials aimed at increasing the readiness of the mesoeconomic system to develop innovation activities:

- strategic;
- tactical;
- operational.

The strategic potential testifies that the mesoeconomic system pursues an effective innovation policy, the legal framework and infrastructure have been shaped, the results of scientific research, intellectual property objects and investments have been accumulated; the tactical potential is based on production, human resources, logistics and financial elements, whereas operational potential incorporates informational, organizational, managerial and marketing elements.

A comprehensive assessment of the readiness of the mesoeconomic system to develop innovation activity includes estimation of the accumulated potential within each section and is based on a multi-level hierarchy of indicators revealed using the quantitative and qualitative methods, as well as integrated indicators. This approach might be effective in finding the strengths and weaknesses of the mesoeconomic system, and defining the trends for its further development.

In providing the evidence relating the ability of the mesoeconomic system to develop innovation activity, the integrated indicators which characterize each section receive their weight criteria determined by the correlation and regression analysis method, and taking into account the factors which facilitate the given trend in the development of the system's economy. Additionally, these indicators provide a possibility to find out the closeness of the ties and impact of these factors on the creation and introduction of technological innovations. The estimates suggest that investments and financial support of innovation activity are critically important. Similar results are presented in (Kleyner 2015a; 2015b), where the CGE-models helped to identify that an increase in funding innovation activities, science and education by 30%, compared to the present-day level, due to proportional decrease in the spendings within other economy sectors, is most effective for economic development of a region on a long-term horizon.

The partial assessment criteria can score from zero up to the value of the corresponding weight coefficient, where the minimum value of the complex criterion equals 0, and the maximum value is at 0.298. If the complex criterion is lower than 0.007, then the mesoeconomic system has a low level of readiness; when the scores equal from 0.08 to 0.15, the system has the medium readiness level, with the scores from 0.16 to 0.22 it has a moderate level, and with the scores from 0.22 to 0.298, it has a high level of readiness for the development of innovative activity.

4. Research Results

The proposed methodology employed to assess the innovation potential of the mesoeconomic system as a criterion of readiness for advancement is presented in Table 1.

Table 1. Assessment criteria of the mesoeconomic system readiness level to develop innovation activities

Potentials	Evaluation formula	Characteristic	Entity providing realization
	1. Infrastructure and law-based section		
Organization and management Information	$К_1 = \frac{\sum B_i}{n}$ B_i – scores *i*- an expert; *n* – number of experts	Quality of innovation and investment policy in the region	Departments and agencies of a region
Organization and management Information	$К_2 = \frac{\sum B_i}{n}$ B_i – scores *i*- an expert; *n* – number of experts	Organizational and legal support of a region	Departments and agencies of a region
Organization and management Information Logistics	$К_3 = \frac{\sum B_i}{n}$ B_i – scores *i*- an expert; *n* – number of experts	Logistical support of a region	Departments and agencies of a region
	$К_{б1} = 0,165\sqrt[3]{К_1 \cdot К_2 \cdot К_3}$		

Potentials	Evaluation formula	Characteristic	Entity providing realization
	2. Innovation and production section		
Production	$К_4 = \frac{C_a}{C}$ C_a – cost of adopted fixed industrial assets in the region, RUB; C – cost of fixed industrial assets, RUB	Renovation rate of industrial and production assets	Departments and agencies of a region, and enterprises
Production Innovation Human resources	$К_5 = \frac{Z_{ie}}{Z}$ Z_{ie} – number of persons employed in high technology industries; Z – number of persons employed in the economy of a region, pers.	Share of employed at high-tech and medium-tech enterprises	Industrial enterprises
Production Human resources Innovations Information Marketing	$К_6 = \frac{Z_{is}}{Z}$ Z_{is} – number of persons employed in knowledge-intensive services, pers.; Z – number of persons employed in the economy of a region, pers.	Share of employed at knowledge-intensive service industries within the total number of employed in the economy of a region	Knowledge-intensive service-oriented companies
Research and development Knowledge-based Innovations Human resources	$К_7 = \frac{Z_{rd}}{Zг}$ Z_{rd} – number of persons employed in R&D, pers. $Z_г$ – average annual number of employed in the economy of a region, pers.	Share of employed in R&D within the average annual number of employed in the economy of a region	Universities, R&D institutes, enterprises and organizations, technology parks, incubators, innovation clusters
Knowledge-based Innovations Research and development Information	$К_8 = \frac{P_t}{P}$ P_t – number of industrial enterprises involved in technological innovations, units; P – number of industrial enterprises, units	Share of industrial enterprises involved in technological innovations within the total number of industrial enterprises of a region	Industrial enterprises
Knowledge-based Innovations R&D Information Marketing Organization and management	$К_9 = \frac{P_{nt}}{P}$ P_{nt} – number of organizations involved in non-technological innovations (marketing and /or organizational), units	Share of enterprises involved in non-technological (marketing and/or organizational) innovations within the total number of industrial enterprises of a region	Industrial enterprises

Potentials	**Evaluation formula**	**Characteristic**	**Entity providing realization**
Knowledge-based Innovations Information Production	$К_{10} = \frac{P_{fi}}{P}$ P_{fi} – number of organizations having self-engineered finished technological innovations, units	Share of enterprises with self-engineered finished technological innovations within the total number of industrial enterprises of a region	Industrial enterprises
Knowledge-based Innovations R&D Information Production	$К_{11} = \frac{P_{pp}}{P}$ P_{pp} – number of organizations participating in joint R&D projects, units.	Share of enterprises participating in the joint R&D projects within the total number of industrial enterprises of a region	Industrial enterprises
Knowledge-based Innovations Information Production	$К_{12} = \frac{M_{ti}}{M}$ *Mti* – number of small business enterprises involved in technological innovations, units; *M* – number if small business enterprises, units	Share of small business enterprises involved in technological innovations within the total number of small industrial enterprises	Small industrial enterprises
Innovations Production Funds	$К_{13} = \frac{T_i}{T}$ *Ti* – volume of innovative goods, amount of work and services, RUB; *T* – volume of shipped goods, performed operations and services by industrial enterprises, RUB	Share of innovative goods, works and services within the total volume of shipped goods, performed works and services provided by industrial enterprises of a region	Industrial enterprises
Innovations Production Funds	$К_{14} = \frac{T_{te}}{T}$ T_{te} – volume of newly introduced or undergone significant technological changes goods, works, services, new for the market, RUB; *T* – volume of shipped goods, performed works and services by industrial enterprises, RUB	Share of newly introduced or undergone significant technological changes innovative goods, works and services which are new on the market, within the total volume of shipped goods, performed works and services provided by industrial enterprises of a region	Industrial enterprises

$$К_{б2} = 0{,}399\sqrt[11]{К_4 \cdot К_5 \cdot К_6 \cdot К_7 \cdot К_8 \cdot К_9 \cdot К_{10} \cdot К_{11} \cdot К_{12} \cdot К_{13} \cdot К_{14}}$$

Potentials	Evaluation formula	Characteristic	Entity providing realization
	3. Science and education section		
Human resources	$K_{15} = \frac{Ch_{he}}{Ch}$ Ch_{he} – number of population of 25-64 years having higher education, pers. Ch – number of population in the region of 25-64 years, pers.	Share of population under 25-64 years having higher education within the total number of population of the relevant age group in the region	Ministry of Science and Education of the Russian federation, universities, enterprises and organizations (employer-sponsored education)
Human resources	$K_{16} = \frac{S_{he}}{Ch}$ S_{he} – number of students enrolled higher education programs, pers.	Share of students enrolled in higher education programs (bachelor, specialist, and master degree programs) within the total number of population in the region	Ministry of Science and Education of the Russian federation, universities, enterprises and organizations (employer-sponsored education)
Human resources Knowledge-based R&D	$K_{17} = \frac{I_y}{Ch_r}$ I_y – number of researchers under 39 years, pers. Ch_r - total number of researchers in the region, pers.	Share of employed under 39 years in the total number of researchers in the region	Universities, R&D institutes, enterprises and organizations, technology parks, incubators, innovation clusters
	$K_{63} = 0{,}226\sqrt[3]{K_{15} \cdot K_{16} \cdot K_{17}}$		
	4. Investments and funds section		
Funds Investments	$K_{18} = \frac{Z_t}{VRP}$ Z_m – expenditures on technological innovations, RUB; VRP – gross regional product, RUB	Share of technological innovations within the volume of gross regional product	Regional government
	$K_{19} = \frac{B_g}{Z_g}$ B – regional budget funds directed on financing R&D works, RUB; Z – expenditures on R&D, RUB	Share of regional funds in the total volume of financial expenditures on R&D works	Regional government

Potentials	Evaluation formula	Characteristic	Entity providing realization
Funds Investments	$K_{20} = \frac{S_f}{B}$ S_f – federal budget funds attracted to develop innovation activities and infrastructure of a region, RUB; B – regional budget funds directed for the development of innovation activities, RUB	Share of federal budget funds within the total volume of regional budget directed for the development of innovation activity	Regional government, departments and agencies
Funds R&D	$K_{21} = \frac{Z_{ie}}{VRP}$ Z_{ie} – internal expenditures on R&D, RUB	Share of internal expenditures on R&D within the volume of gross regional product	Regional government, departments and agencies, enterprises and organizations
Funds R&D	$K_{22} = \frac{Z_{fo}}{Z_{п}}$ Z_{fo} – funds of business sector organizations, RUB; Z_n - internal expenditures on R&D for business sector organizations of a region, RUB	Share of funds of business organizations in the total volume of internal expenditures for R&D	Enterprises and organizations of a region
Funds Investments	$K_{23} = \frac{Z_t}{T_{to}}$ Z_t – expenditures on technological innovations, RUB; T_{to} – total volume of shipped goods and performed works and services of industrial enterprises of a region, RUB	Intensity of expenditures on technological innovations by industrial enterprises of a region	Industrial enterprises

$$K_{64} = 0{,}533\sqrt[6]{K_{18} \cdot K_{19} \cdot K_{20} \cdot K_{21} \cdot K_{22} \cdot K_{23}}$$

A complex criteria of the region's determination to develop innovation activity

$$K_{cc} = \sqrt[4]{K_{61} \cdot K_{62} \cdot K_{63} \cdot K_{64}}$$

5. Testing the Method

The evolved methodology was tested in Saratov region being as a mesoeconomic system based on the outcome of its development in 2017 (see Table 2).

Table 2. Estimation of the region's readiness and ability to pursue innovative tasks

Section	Indicator characterization	Criterion value
Infra-sstructure and law	Quality of innovation and investment policies of a region	0.1
	Organizational and legal support of a region	0.3
	Logistic support of a region	0.1
	Partial criterion	**0.024**
Investments and production	Intensive renovation of production assets	0.63
	Share of employed at enterprises with high- and medium-technology production level	0.0004
	Share of employed in knowledge-intensive services within the total number of employed in the economy of a region	0.001
	Share of employed in R&D within the average annual number of employed in the economy of a region	0.004
	Share of industrial enterprises involved in technological innovations within the total number of industrial enterprises of a region	0.97
	Share of enterprises involved in non-technological (marketing and /or organizational) innovations within the total number of industrial enterprises in the region	0.01
	Share of organizations having self-engineered finished technological innovations in the total number of industrial enterprises of a region	0.1
	Share of organizations involved in the joint R&D projects within the total number of industrial enterprises of a region	0.002
	Share of small business enterprises involved in technological innovations within the total number of small industrial enterprises	0.048
	Share of innovative goods. works and services within the total volume of shipped goods. performed works and services within the total volume of shipped goods. performed works and services by industrial enterprises of a region	0.082
	Share of newly introduced or undergone significant technological changes innovative products. works and services. which are new on the market within the total number of shipped goods. performed works and services by industrial enterprises of a region	0.05
	Partial criterion	**0.0085**
Science and education	Share of population at 25-64 years having higher education within the total number of population of a relative age group in the region	0.3
	Share of students enrolled in higher education programs (bachelor. specialist and master degree programs) within the total number of population of a region	0.11
	Share of employed under 39 years within the total number of researchers in the region	0.2
	Partial criterion	**0.0423**
Funds and investments	Share of expenditures on technological innovations within the volume of gross regional product	0.12
	Share of the regional budget funds within the total volume of R&D funding	0.02
	Share of attracted the federal budget funds within the volume of the regional budget funds directed for R&D development	0.041
	Share of internal expenditures on R&D within the gross regional product	0.001
	Share of funds of industrial enterprises of a region within the total volume of internal expenditures on R&D	0.143
	Intensity of expenditures on technological innovations by the industrial enterprises of a region	0.012
	Partial criterion	**0.0125**
Complex criterion		**0.0180**

Thus, Saratov region as a mesoeconomic system where innovation activity is conducted primarily at industrial enterprises, small business organizations, academic research organizations and universities, has an average readiness rate for advancement innovative activities.

The infrastructure and law section, having a slight impact on the region's readiness and ability to develop innovative activity, is characterized by low efficiency of the pursued policy. This is despite the fact that Saratov region was one of the first in the Russian Federation to develop and adopt the Law “On Innovations and Innovation Activity” (1997, amended in 2017), the laws on state support to specialty entities to realize innovative activities. Saratov region was among those that pioneered an innovative scientific-and-technological program encouraging development of high technologies, set up the Governor Council for science and innovations, created clusters on radio electronics and nanotechnologies, initiated development of incubators, technology parks, and technology transfer centers.

The innovation and production section, which has a primary impact on the rate of innovation activities in the region, is characterized by the lowest potential, which is due to insufficiency of the equity funds (section 4) of enterprises needed to revolve funds and introduce innovations. The share of outdated worn-out facilities within the fixed assets in the industry of Saratov region is high. The average wear and tear degree of the main industrial and production assets by the end of 2017 equaled to 54.1% (2009 - 46.3%). The coefficient of assets renewal was at 0.063 (2009 - 0.18), and the liquidity ratio was at 0.06 (2009 - 0.01). The bulk of industrial production assets was introduced to enlarge their volume, but not to replace the worn out ones. The current volumes of renewal and retirement of fixed industrial assets are insufficient to overcome the wear and tear of those under operation.

In 2017 only 4.8% of organizations conducted innovation activities. It should be noted that the number of such organizations is decreasing (in 2009 - 55, and in 2017 - 51) (Saratovstat 2018a; 2018b).

The science and education section, which demonstrates the readiness and ability of the region to pursue innovative activity, is shaped by the university science (represented by nine universities that provide not only training, but also research and development activities linked with manufacturing; three universities set up scientific and technological centres, technology transfer centres, and technology parks), academic science (represented by Saratov Scientific Center of the Russian Academy of Sciences including eight scientific institutions), sectoral science (represented by 51 organizations), and scientific departments at industrial organizations.

However, many industrial enterprises emphasize that there is a shortage of qualified staff and little opportunity to solve the problem due to financial challenges (section 4). A rather favourable situation with highly qualified personnel is observed at mixed ownership enterprises with external assets, where specialists go through retraining at foreign firms or in-house training conducted by foreign experts.

In the recent decade, we observe a tendency to aging and significant reduction in the number of staff members engaged in R&D activity: more than 69 % are aged 40 and older, and about 8 % are under 35 years old (Saratovstat 2018a; 2018b). The main reason for the given situation is the drift of young professionals to other areas of activity, which as a rule is interconnected with low salaries and low status of the profession. The challenges with insufficient influx of young people to the areas of scholarly endeavor have remained relevant for over fifteen years and are becoming critical.

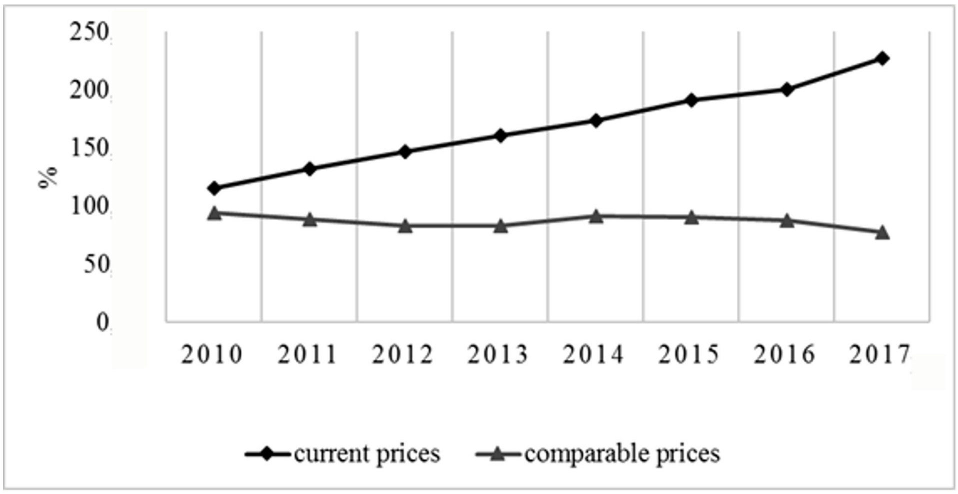
The investment and funds section has a decisive impact on advancement of innovation activities in the region, since conducting scientific research and introducing innovations require considerable resources. Research and innovation funding is primarily provided from the own funds of organizations (44.1%), the federal budget (6.5%), or the regional budget (11.0%).

44.6% of industrial enterprises in Saratov region point out that a decisive factor which discourages development of their innovative activity is insufficiency of equity funds, and 32.5% of enterprises place an emphasis on insufficiency of the government aid. At the same time, 32.8% of enterprises are discouraged by the fact that innovations require high expenditures, and 22.4% of enterprises emphasize high economic risks.

While doing this research using the presented methodology, we estimated the innovation potential as a criterion for the readiness of the mesoeconomic system for advancement within the period of 2009-2017. The calculations were made in terms of two variants of cost indicators: the current prices and comparable prices (Figure 1). The results revealed the opposite trends. Thus, if we conduct an assessment based the comparable prices, then the readiness for development within the estimated period constantly goes up (the integrated indicator increased by almost 2 times), and if estimation is based on comparable prices, then it has decreased by 11.7%.

Therefore, to obtain the real estimates of the innovation potential as a criterion of the mesoeconomic system readiness for advancement, the indicators having a monetary value must be calculated based on the comparable prices, whereas all the indicators must be assessed in dynamics.

Figure 1: Dynamics of the integrated innovation potential index of the mesoeconomic system as a development readiness criterion



Source: calculated by (Saratovstat 2018a; 2018b)

6. Discussion

In their academic papers, economists emphasize that innovations are key drivers of a nation's competitiveness (Carayannis and Grigoroudis 2014). We further agree that the given statement can be regarded acceptable for separate regions, which finally determine the competitive ability of a whole nation.

In order to upgrade the level of economic advancement, stimulate and increase innovative activity and competitive advantages of the regions as mesoeconomic systems, it is important to work out a robust strategy which might be able to ensure a long-term and significant outcome. Stimulating dynamic development of the regions, defining priorities for the future, overcoming uncertainties and growing risks resulting from the global challenges (Kotsemir 2012), all this requires assessment of readiness and ability of the regions to advance in the given direction.

This, in turn, shows the need for development of new methods and tools used to shape the regional strategies taking into account the quantitative and qualitative estimates of a dynamically changing environment and readiness for development, which are determined by the accumulated innovative potential. Despite the growing number of research articles in the field of innovative potential of individual enterprises and regions, so far there has been no single approach to understanding the category "innovative potential of the system", or to the methods and models used to identify and estimate the category. Moreover, the methodology utilized for estimating the innovative potential as a criterion of the region's readiness for development, as well as the ratio scale for assessing the level of readiness, remain ill-defined and insufficient.

The research articles devoted to this problem emphasize that a significant contribution to the development of innovations on the regional and local levels should be made by universities. However, we do not agree with the given assumption (Cervantes 2017). It should be noted that in order to increase the innovation potential as a criterion of readiness of the mesoeconomic system for development, we need to take into account other components. These components include the investment climate, the normative and legal framework, and the infrastructure required for the innovation activity (Crespo Cuaresma, Oberhofer, and Vincelette 2014).

A more comprehensive approach is associated with assessment of the various aspects of regional innovation systems. This approach can be utilized based on the concept of the triple helix, which serves for the analysis and estimation of the existing strategies (Carayannis and

Sipp 2010). However, this approach does not take into account the impact of demand for creation and exposure to the new knowledge areas, technologies and products.

To a certain degree, this makes it possible to avoid extrapolation of a three-tier model to the four-tier one (Virkkala, Mäenpää, and Mariussen 2014), which represents an integrated approach to assessment of the results obtained on the regional level, and development of effective mechanisms for introducing innovations.

Improvement of the monitoring and evaluation systems on the regional level (Carayannis and Grigoroudis 2014; Carayannis and Rakhmatullin 2014) requires application of multi-level techniques, which take into account both the chronological and spatial dynamics.

The readiness of the mesoeconomic system for development using the accumulated innovation potential can and should be based on a comprehensive assessment of existing opportunities and prospects for its advancement with account for the effective demand, accumulated resources, methods and ways needed for the development of innovative processes.

In this research, we propose a method for a comprehensive assessment of the innovation potential of the mesoeconomic system as a criterion of readiness for advancement which has a universal character, since a significant part of indicators are formed with account for international standards. The methodology can be applied for the regions with various degrees of economic activity to identify the "bottlenecks" in improving competitive abilities through innovations. A complex nature of the developed methodology consists in carrying out assessments using four modules that show different perspectives of the component parts of the overall potential. The latter includes: organizational, managerial, informational, logistic, knowledge-based, research, innovative, industrial, workforce, marketing, investment and financial potentials. Each module is evaluated in terms of quantitative and qualitative aspects of the particular criteria. The cost indicators are given in comparable prices, which allows for an unbiased assessment of the innovation potential and, as a result, the ability and readiness of the mesoeconomic system for development.

The weakness of the proposed methodology is connected with unavailability of a unified scale for assessing the level of readiness for development using the innovative potential, since it is based on the values of weight coefficients. Each region has its individual weight coefficients which are identified using the method of correlation and regression analysis of impact of various factors on the innovative potential of a region as a criterion of readiness for development. To develop the given approach used to estimate the readiness of a region for advancement of innovative activities, it important to find the weighing criteria universal for all the regions. Therefore, our further research will involve the analysis and assessment of the rate of an innovative potential, and finding the weighing criteria for the federal districts across the whole Russia.

7. Conclusion

In order to boost economic activity and economic stability, it is vital to identify their factors and reserves, which requires progressive advancement of innovation activities. This, in turn, requires assessment of the region's innovation potential and readiness level for steady growth as a mesoeconomic system. The provided research established that the development readiness level of the mesoeconomic system is a comprehensive characteristic which shows the ability of the system to effectively implement innovative processes using the accumulated resources, possibilities, ways and methods. The accumulated aggregate potential includes the financial, investment, informational, knowledge-based, logistic, production, marketing, staff, research and development, organizational and management potentials of both individual enterprises and mesoeconomic system as a whole.

A comprehensive assessment of the readiness of the mesoeconomic system to develop innovative activities can be based on multi-level hierarchical parameters using the quantitative and qualitative methods, as well as integrated indicators. To justify the assessment data, the integrated indicators should be supplemented by the weight criteria defined by the correlation and regression analysis method with account for the factors which influence the mesoeconomic system advancement, and have their own individual characteristics for each of these systems. The given approach will reveal the strengths and weaknesses of the mesoeconomic system, and identify the directions for its further development.

References

Abdrakhmanova, G.I., P.D. Bakhtin, L.M. Gokhberg, et al., and L.M. Gokhberg. 2017. Reyting innovatsionnogo razvitiya sub"yektov Rossiyskoy Federatsii [Rating of innovative development of the constituent entities of the Russian Federation]. Issue 5. Moscow: Higher School of Economics. (in Russian)

Andrianova, E. V., and Lyudmila Konovalova. 2015. "Ocenka Potenciala Regiona Kak Osnova Formirovaniya Programm Social"no-Ehkonomicheskogo Razvitiya v Usloviyah Globalizacii (Na Primere Arhangel"skoj Oblasti [Evaluation a Region"s Potential of as a Basis for Developing the Programs of Socio-Economic Development under Conditions of Globalization (as Exemplified by the Arkhangelsk Region)]". Russian Business 16 (3): 381–88. (in Russian)

Bochkov, M.A. 2013. "Social"no-ehkonomicheskij potencial regiona: sushchnost" i struktura [The socio-economic potential of the region: essence and structure]". In Economics and modern management: theory and practice: Conference articles collection of XXIII Int. Scientific Pract. conf., 76–80. Novosibirsk: SibAK. https://sibac.info/conf/econom/xxiii/32175 (accessed February 20, 2020). (in Russian)

Carayannis, Elias, and David F.J. Campbell. 2010. "Triple Helix, Quadruple Helix and Quintuple Helix and How Do Knowledge, Innovation and the Environment Relate To Each Other?: A Proposed Framework for a Trans-Disciplinary Analysis of Sustainable Development and Social Ecology". International Journal of Social Ecology and Sustainable Development 1 (1): 41–69. doi:10.4018/jsesd.2010010105.

Carayannis, Elias, and Evangelos Grigoroudis. 2014. "Linking Innovation, Productivity, and Competitiveness: Implications for Policy and Practice". The Journal of Technology Transfer 39 (2): 199–218. doi:10.1007/s10961-012-9295-2.

———. 2016. "Quadruple Innovation Helix and Smart Specialization: Knowledge Production and National Competitiveness". Foresight and STI Governance 10 (1): 31–42. doi:10.17323/1995-459x.2016.1.31.42.

Carayannis, Elias, Evangelos Grigoroudis, Stavros Sindakis, and Christian Walter. 2014. "Business Model Innovation as Antecedent of Sustainable Enterprise Excellence and Resilience". Journal of the Knowledge Economy 5 (3): 440–63. doi:10.1007/s13132-014-0206-7.

Carayannis, Elias, Dirk Meissner, and Anastasia Edelkina. 2017. "Targeted Innovation Policy and Practice Intelligence (TIP2E): Concepts and Implications for Theory, Policy and Practice". The Journal of Technology Transfer 42 (3): 460–84. doi:10.1007/s10961-015-9433-8.

Carayannis, Elias, and Ruslan Rakhmatullin. 2014. "The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond". Journal of the Knowledge Economy 5 (2): 212–39. doi:10.1007/s13132-014-0185-8.

Carayannis, Elias, and Caroline M. Sipp. 2010. "Why, When, and How Are Real Options Used in Strategic Technology Venturing?" Journal of the Knowledge Economy 1 (2): 70–85. doi:10.1007/s13132-010-0011-x.

Cervantes, Mario. 2017. "Higher Education Institutions in the Knowledge Triangle". Foresight and STI Governance 11 (2): 27–42. doi:10.17323/2500-2597.2017.2.27.42.

Crespo Cuaresma, Jesus, Harald Oberhofer, and Gallina Andronova Vincelette. 2014. "Firm Growth and Productivity in Belarus: New Empirical Evidence from the Machine Building Industry". Journal of Comparative Economics 42 (3): 726–38. doi:10.1016/j.jce.2013.07.004.

Drucker, P.F. 2014. Biznes I Innovatsii [Business and Innovation]. Moscow: Williams Publishing House. http://www.management.com.ua/books/view-books.php?id=438. (in Russian)

EBRD. 2013. "The Business Environment and Enterprise Performance Survey The Russian Regions: Results". The European Bank for Reconstruction and Development (EBRD). 2013. http://www.ebrd.com/downloads/research/factsheets/beeps.pdf (accessed February 20, 2020).

Etzkowitz, Henry. 2008. The Triple Helix: University-Industry-Government Innovation in Action. 0 ed. Routledge. doi:10.4324/9780203929605.

Freeman, C. 1995. "The 'National System of Innovation' in Historical Perspective". Cambridge Journal of Economics 19 (February): 5–24. doi:10.1093/oxfordjournals.cje.a035309.

Global Innovation Index. 2018. "Global Innovation Index". Global Innovation Index. 2018. https://www.globalinnovationindex.org/Home (accessed February 20, 2020).

Golova, I.M., and A.F. Sukhovey. 2018. "Threats to the Innovative Security of Regional Development in a Digital Society". Economy of Region 14 (3): 987–1002. doi:10.17059/2018-3-21. (in Russian)

Kleyner, G. B. 2015a. "State — Region — Field— Enterprise: Framework of Economics System Stability of Russia. Part 1". Economy of Region 2: 50–58. doi:10.17059/2015-2-4. (in Russian)

———. 2015b. “State — Region — Field— Enterprise: Framework of Economics System Stability of Russia. Part 2”. Economy of Region 3: 9–17. doi:10.17059/2015-2-4. (in Russian)

Kotsemir, Maxim N. 2012. “The Transition from Factor Driven Economies to Innovation Driven Economies - the Case of BRIC and GCC Countries”. High School of Econimics. September 2012. https://lsts.hse.ru/data/2012/09/26/1245374879/M.%20Kotsemir%20EACES%202012%20presentation.pdf (accessed February 20, 2020).

Makarov, Valery, Sergey Ayvazyan, Mikhail Afanasyev, Albert Bakhtizin, and Ashkhen Nanavyan. 2016. “Modeling the Development of Regional Economy and an Innovation Space Efficiency”. Foresight and STI Governance 10 (3): 76–90. doi:10.17323/1995-459X.2016.3.76.90. (in Russian)

Marcelin, Isaac, and Ike Mathur. 2015. “Privatization, Financial Development, Property Rights and Growth”. Journal of Banking & Finance 50 (January): 528–46. doi:10.1016/j.jbankfin.2014.03.034.

Nikolaiva, M.J. 2014. “Research of General Methodical Questions of Analysis of Productive Potential of Commercial Organization on the Modern Stage of Development of Economic Relations”. TSU Science Vector. Series: Economics and Management 1 (16): 50–52. (in Russian)

Rudychev, A.A., E.A. Nikitina, S.P. Gavrilovskaya, and A.A. Getmantsev. 2015. Problemy Formirovaniya Modeley Otsenki Innovatsionnogo Sotrudnichestva Kak Faktora Povysheniya Konkurentosposobnosti Promyshlennogo Predpriyatiya. Monografiya [Problems of Forming a Model for Assessing Innovative Potential as a Factor in Increasing the Competitiveness of an Industrial Enterprise. Monograph]. Belgorod: Belgorod State Technological University. http://www.iprbookshop.ru/66672.html (accessed February 20, 2020). (in Russian)

Saratovstat. 2018a. Statistical Yearbook of the Saratov Region 2017: Statistical Collection of 2 Volumes. Vol. 1. 2 vols. Saratov: Saratovstat. https://search.rsl.ru/ru/record/01004899062 (accessed February 20, 2020). (in Russian)

———. 2018b. Statistical Yearbook of the Saratov Region 2017: Statistical Collection of 2 Volumes. Vol. 2. 2 vols. Saratov: Saratovstat. https://search.rsl.ru/ru/record/01004899062 (accessed February 20, 2020). (in Russian)

Vasyukhin, O.V, and E.A. Pavlova. 2010. Development of the Innovative Potential of an Industrial Enterprise. Moscow: Academy of Natural Sciences. https://www.monographies.ru/ru/book/view?id=89 (accessed February 20, 2020). (in Russian)

Vinogradova, K.O., and O.A. Lomovtseva. 2013. “The Essence and Structure of the Region”s Development Potential”. Modern Problems of Science and Education 3. https://www.science-education.ru/pdf/2013/3/471.pdf (accessed February 20, 2020). (in Russian)

Virkkala, S., A. Mäenpää, and A. Mariussen. 2014. The Ostrobothnian Model of Smart Specialization (Proceedings of the University of Vaasa, Reports 195). Vaasa: University of Vaasa. http://www.uva.fi/materiaali/pdf/isbn_978-952-476-577-0.pdf (accessed February 20, 2020).

Volchek, Daria, Kaisa Henttonen, and Jan Edelmann. 2013. “Exploring the Role of a Country”s Institutional Environment in Internationalization: Strategic Responses of SMEs in Russia”. Journal of East-West Business 19 (4): 317–50. doi:10.1080/10669868.2013.851140. (in Russian)

Welter, Friederike, and David Smallbone. 2011. “Institutional Perspectives on Entrepreneurial Behavior in Challenging Environments”. Journal of Small Business Management 49 (1): 107–25. doi:10.1111/j.1540-627X.2010.00317.x.

Yukhanaev, Andrey, Grahame Fallon, Yevhen Baranchenko, and Alexandra Anisimova. 2015. “An Investigation into the Formal Institutional Constraints That Restrict Entrepreneurship and SME Growth in Russia”. Journal of East-West Business 21 (4): 313–41. doi:10.1080/10669868.2015.1092190. (in Russian)

AGGLOMERATION ECONOMICS AND ASYMMETRIC INFORMATION: ROLE OF INSTITUTIONS[1]

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Abstract

This paper constructs the model that links agglomeration economics with information asymmetries. It extends the literature by launching the concept that explains influence of the asymmetric information on agglomeration economies by emphasizing the role of the transaction cost under institutional framework. Consequently, the predictions of the model suggesting that impact of agglomeration economies depends on stages of development highlight the importance of different approach to the agglomeration economies phenomena in developing and developed countries.

Keywords: agglomeration economics, asymmetric information, transaction costs, institutions

JEL classification: R1, O4, D8

1. Introduction

Over the past 30 years, economists have been fairly successful at documenting and quantifying agglomeration phenomena. Yet, understanding the causes of agglomeration economies is still open process without clear results (Puga, 2010).

Stories about the causes of agglomeration economies are as old as the realization that such advantages exist. The literature has offered three broad classes of mechanism explaining the existence of agglomeration economics (e.g. Duranton and Puga, 2004; Puga, 2010).

First, a larger market allows for a more efficient sharing of local infrastructure and facilities, a variety of intermediate input suppliers, or a pool of workers with similar skills. Second, a larger market also allows for a better matching between employers and employees, buyers and suppliers, or business partners. This better matching can take the form of improved chances of finding a suitable match, a higher quality of matches, or a combination of both. Finally, a larger market can also facilitate learning, for instance by promoting the development and widespread adoption of new technologies and business practices (Puga, 2010).

This paper chooses different approach. It follows literature that recognize that the asymmetric information in the economy deeply affects some of the basic characterization of a market economy and could provide explanations of economic and social phenomena that otherwise would be hard to understand (p. 1441, Stiglitz, 2000). Additionally, despite being focused on the investigating the sources of the agglomeration economics in last decays, the literature provide much less attention on the asymmetric information as a source of agglomeration economics. As a result, among notable exceptions (e.g. Tropeano, 2001; Berliant and Kung, 2008; Berliant and Ming Yu, 2010, Venables, 2011) there is no theoretical model that is going deep enough understanding influence of information asymmetry on agglomeration economies and fits empirical evidence.

Therefore this paper extends the literature by developing the basic model that emphasizes the role of the transaction cost under institutional framework.

[1] The short running title: Agglomeration economics: the role of institutions
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The basic motivation for the model is huge difference in institutional environment among developing and developed countries and the fact that imperfect information environment leads to Pareto inefficient competitive markets (Greenwald and Stiglitz, 1986). More precisely, actions by which individuals reveal information about themselves or others can improve market efficiency and stimulate growth rates of the economy if the value of the information is greater than expenditure involving in acquiring that information. Therefore, if the spatial concentration of individuals can reveal information which value is higher than expenditure of the action, the agglomeration could enhance market efficiency and growth rates. In case that the presence of imperfect information is high, the impact is bigger. Therefore the quality of the institutional environment as a determinant of imperfect information is critical for defining the level of the final impact.

2. Literature review

The literature introduces information asymmetries as source of agglomeration in paper by Tropeano (2001) where has been argued that firms use a location as a quality signal. Higher innovation size and competition are centripetal forces in this model. The article also shows that a decrease in transportation costs can encourage spatial concentration. Berliant and Kung (2008) using screening model demonstrate that increased mobility of the low skill labor and skill biased technological change increase the geographical sorting of workers by skills. Berliant and Yu (2010) offer signaling model claiming that the function of location is a limited in that there is no complete sorting of the high and low-skill workers like in screening model. They indicate that link between workers' price elasticity and their productivity determines existence and stability of the core-periphery equilibrium. Moreover, they suggest that when location signals workers' productivity and the signaling cost is determined by the housing market at a location, location can be at best a reference for, rather than a guarantee of, workers high productivity. Last but not the least, Venables (2011) offers two concepts based on the ability of cities to reduce market failures associated with information asymmetries in the workforce. The author outlines a models in which expensive locations will attract a higher proportion of high ability workers than a locations with a low cost of living. The benefit of forming a partnership with someone of high ability is greater for those with high ability and therefore high cost locations will have higher productivity both because of direct effect of the ability mix of the population and also because of the better matches.

Although above mentioned papers tackle the relationship between the imperfect information environment and agglomeration economies from different perspectives, there is no theoretical concept which is in line with the empirical evidence suggesting that agglomeration matters most at early stages of development (e.g. Brulhart and Sbergami, 2009). This non-linear relation between the agglomeration and growth introduced by Williamson (1965) and known as "Williamson hypothesis" underlines the huge difference between the economic environment in developing and developed countries that has to be included in theoretical model.

The theoretical model presented herein utilizes widely accepted notion that institutions are important for economic development (e.g. North, 1990, 1995; Rodrik, Subramanian and Trebbi 2004, Acemoglu, Johnson and Robinson, 2005). Following this, the paper introduces a concept in which the institutions are introduced as a mechanism that explains the difference between the economic environment in developing and developed countries.

The idea behind this model is motivated by three widely accepted notions: (i) asymmetric information is a part of the transaction cost (Coase, 1960, Nolan and Trew, 2011), (ii) transaction costs are linked with institutional quality (Coase, 1960; North, 1993 and 1994; Nolan and Trew, 2011) and (iii) institutional quality differ regarding the level of development (North, 1994; Williamson, 2009).

Transaction costs is defined as a costs of collecting information, bargaining, communicating, decision making, and enforcing contracts between individuals, firms and the state (Coase, 1960). Thus, information asymmetry can be easily recognized as a missing part of the complete information puzzle and linked with the higher transaction cost.

Although the literature has highlighted the various favorable effects of institutions on economics (e.g. North, 1995; Jutting, 2003; Stimson, Stough Salazar, 2005; Andriesse, 2008; Rodriguez – Pose 2010, Furceri & Mourougane, 2012, Stein, 2012, O'Hara, 2013) the paper focuses on one particularly mechanism: the cost of information is the key to the costs of transacting, which represents sources of social, political, and economic institutions (North, 1990). On this basis almost all approaches on institutional economics use transaction costs as criteria for efficiency of institutions (Marinescu, 2010).

Finally it is easily to recognize that the institutions has become the focus of recent development and growth literature (e.g. North, 1990; Rodrik, Subramanian and Trebbi 2004, Acemoglu, Johnoson and Robinson, 2005, O'Hara, 2013). The researches indicate that institutions defined "as a humanly devised constraints that shape human interaction" (North, 1990, p. 3.) affect the path of its economic development by structuring political, economic and social interactions among members. The importance of the institutional framework for the growth has also empirical confirmation implying that countries that have strongest institutions achieve higher level of development (e.g. Williamson, 2009).

Although a consensus that institutions "matter" has now emerged, the discussion on the causality of the various links and channels of influence between the institutional set-up and development outcomes is still open. Therefore, this paper focuses on the establishing mechanism under institutional framework that will be in line with the empirical evidence suggesting that agglomeration economies have greater positive impact at early stages of development (e.g. Henderson, 2003; Brulhart and Sbergami, 2009).

3. Model, results and discussion

The three widely accepted and previously explained notions has been foundation for our model founded on the basic model of Venables (2011). The basic model describes how the spatial concentration has ability to reduce market failures, and shows that this is associated with information asymmetries in the workforce. Following notions (i)-(iii) described earlier, we take into account the role of institutions, and extend basic model with Institution quality variable. The rest of the section describes the main settings inherited from the basic model and introduces novel variable incorporated in the model.

Similar to the basic model the model presented herein observes one sector or profession that has fixed number of workers of whom L are low ability (type L) and H high ability (type H). There are two locations, 1 and 2, and workers decide to locate in one or the other. The proportions of type H and type L workers who choose location 1 are θ_H and respectively θ_L, so the total numbers of workers in each location are:

$$N^1 = H\theta_H + L\theta_L \qquad \textit{location 1} \tag{1}$$

$$N^2 = H(1-\theta_H) + L(1-\theta_L) \qquad \textit{location 2} \tag{2}$$

Pairs of workers who form a partnership are producing the output. If two high ability workers form a partnership the value of their output is $2q_{HH}$, two low-ability $2q_{LL}$ and one of each ability level $2q_{HL}$. Considering their ability the following relation is valid:

$$q_{HH} > q_{HL} > q_{LL} \tag{3}$$

The model also incorporates the super modularity condition that Venables (2011) explains by introducing the examples from other economic areas (e.g. Paul Milgrom and John Roberts, 1990). It means that the benefit of forming a partnership with someone of high ability is greater for those with high ability than for those with low ability:

$$q_{HH} - q_{HL} > q_{HL} - q_{LL} \tag{4}$$

Asymmetric information is incorporated in the model by assuming that individuals know their own type but cannot directly observe that of the partner with whom they undertake the project. Since ability is unobserved before partnerships are formed matches take place randomly, and within each location (This could be explained by observing the location as a broader area which makes daily commuting impossible, e.g. –NUTS II or III regions in EU). Therefore, the probability of matching with a high-ability worker depends on location and it is denoted:

$$\mu^1 = \frac{H\theta_H}{H\theta_H + L\theta_L} \tag{5}$$

$$\mu^2 = \frac{H(1-\theta_H)}{H(1-\theta_H)+L(1-\theta_L)} \quad (6)$$

The total output of a partnership is divided equally between the two partners. The expected returns to a match made by type-H and type-L individuals in each location is defined:

$v_H^i = q_{HH}\mu^i + q_{HL}(1-\mu^i)$ for H type and location i (7)

$v_L^i = q_{HL}\mu^i + q_{LL}(1-\mu^i)$ for L type and location I (8)

Locating in location 1 implies an additional cost attached to it, denoted c. It includes (the rent or commuting) cost differential of location 1 compared to location 2 and in the basic model by Venables (2011) is treated as exogenous. Therefore, the location 1 is chosen by H-type workers if:

$$v_H^1 - v_H^2 \geq c \quad (9)$$

and L type if:

$$v_L^1 - v_L^2 \geq c \quad (10)$$

Using the conditions (7) and (8) with conditions (9) and (10) it follows:

$$v_H^1 - v_H^2 = (q_{HH} - q_{HL})(\mu^1 - \mu^2) \geq c \quad (11)$$

$$v_L^1 - v_L^2 = (q_{HL} - q_{LL})(\mu^1 - \mu^2) \geq c \quad (12)$$

The equilibrium location of workers is where values of θ_H and θ_L have adjusted to make workers indifferent between locations (in the relations (11) and (12) left and right side should be equal), or at a corner solution where all workers of a particular type are in their preferred location.

The presented specification indicate the crucial role of the cost c. If the cost c is zero, then two locations should be identical. In case when c > 0 and super-modularity condition holds separating equilibrium is possible. What level of costs supports the separating equilibrium? The level that ensures that the costs are higher than a benefits of locating in location 1 for L type, and lower for the H type workers:

$$c > v_L^1 - v_L^2 \quad (13)$$

$$c < v_H^1 - v_H^2 \quad (14)$$

Relations (13) and (14) imply:

$$c > q_{HL} - q_{LL} \quad (15)$$

$$c < q_{HH} - q_{HL} \quad (16)$$

Defining $\Delta q_H = q_{HH}$ - q_{HL}, and $\Delta q_L = q_{HL}$ - q_{LL} indicates that separating equilibrium exists if following condition is fulfilled:

$$c \in \left[\frac{\Delta q_L H}{H+L}, \Delta q_H\right] \quad (17)$$

Social efficiency of separating equilibrium requires comparing values of the separating and the pooling equilibrium for both types of workers. The real incomes (values) of workers in the pooling equilibrium are:

$$v_H^p = \frac{q_{HH}H + q_{HL}L}{H+L} \quad (18)$$

$$v_L^p = \frac{q_{HL}H + q_{LL}L}{H+L} \quad (19)$$

In the separating equilibrium, when θ_H = 1, type L workers get:

$$v_L^2 = q_{LL} \quad (20)$$

and H-type workers get:

$$v_H^1 - c = c\left(\frac{q_{HH}}{\Delta q_L} - 1\right) \quad (21)$$

Comparison of these values indicates that type L workers are certainly worse off with separating equilibrium than with pooling equilibrium. Type H workers are in same position if the value c takes the lowest value that supports separation $\frac{\Delta q_L H}{H+L})$

At higher levels of the costs c, the results for H – type workers is ambiguous (depends on the size of the two groups in overall population).

In sum, if the costs c are low then both type of workers are in better position with pooling equilibrium and in the case of the high costs c than separating equilibrium is better solution for H type workers. Evidently, social efficiency is determined by value of the costs c and therefore it is quite restrictive to treat costs c as exogenous as in the basic model of the Venables (2011)[3].

Thus, this paper extends the literature by introducing the new model in which institutions is a mechanism that determines the value of c. Thus, better quality of the institutions implies lower cost differential (c) of location 1 compared to location 2. Briefly, higher quality of institutions allows lower transactions cost. Lower transaction costs permit better and easier flow of the information and all other inputs that stabilize the cost difference among locations. Consequently, cost differential of location 1 compared to location 2 becomes lower. Technically, this introduces the new relation in the model (I stands for Institutional quality)

$$c' = \frac{c}{I} \tag{22}$$

New separating equilibrium exists if following condition is fulfilled:

$$c' \in \left[\frac{\Delta q_L H}{(H+L)\cdot I}, \frac{\Delta q_H}{I}\right] \tag{23}$$

The relations (22) and (23) indicate that higher quality institutional environment implies pooling equilibrium as a social efficient situation for both type of workers. However, in case of the lower institutional quality and higher costs c, the H type workers could be better off with separating equilibrium and it could also be social efficient equilibrium. The social efficient dimension of the separating equilibrium can be explained by higher probability for better quality matching (among H-type workers) and super modularity condition.

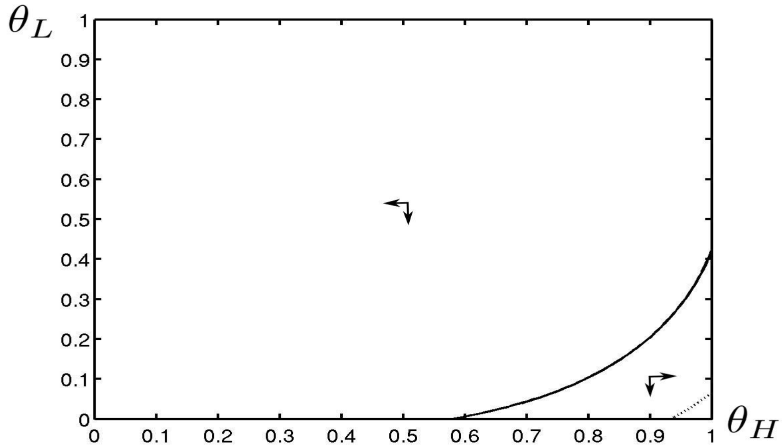
For more accurate presentation the role of institutional quality in our model we proceed with simulations. For easier comparison with the basic model by Venables (2011), the simulations are done with the same assumptions and parameters. To recall, we assume that the super modularity condition holds and observe the ratio of (H-type) and (L-type) ability workers that commute between location 1 and 2, with parameters H=L=1, $q_{HH} = 0.8$, $q_{HL} = 0.4$, $q_{LL} = 0.1$, c =0.225. Figures 1-5 show the simulation results for different Institutional quality parameter, namely: I = 0.8, 1, 1.2, 1.4 or 1.6. For I=1 our model correspondents to the basic model.

In each of the figures along the solid and dashed curves workers of types H and L respectively are indifferent between two locations. Above solid curve H-type workers prefer to be in location 2 and below in location 1. The identical interpretation stands for dashed curve and L-type workers. Thus, the area between solid and dashed curves represents the space for separating equilibrium. The bigger the area between the curves the higher is probability for establishing the separating equilibrium.

In line with our model predictions we expect that higher institutional quality will decrease the area between the curves and therefore the probability for separating equilibrium and direct our attention on the separating equilibrium area on the Figures 1 to 5.

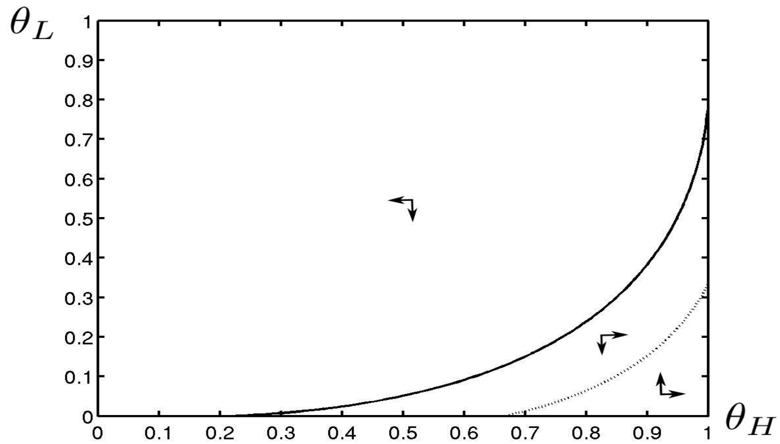
[3] Although Venables (2011) relates the costs c with the city size indicating that bigger city implies higher commuting costs and rent it does not incorporates the huge difference between the economic environment in developing and developed countries as empirical findings suggests (e.g. Brulhart and Sbergami, 2009).

Figure 1. Self-selection for locations 1 and 2 for I=0.8



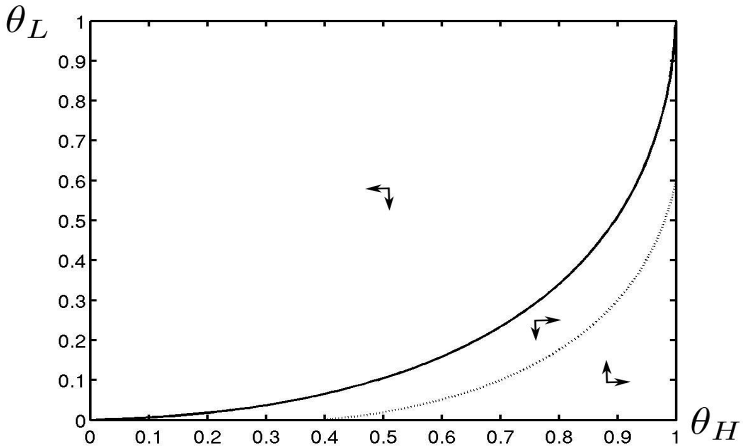
Source: Authors calculations

Figure 2. Self-selection for locations 1 and 2 for I=1



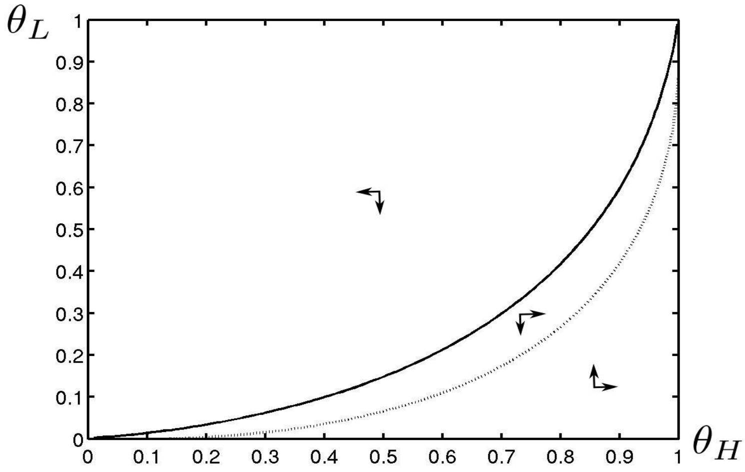
Source: Authors calculations

Figure 3. Self-selection for locations 1 and 2 for I=1.2



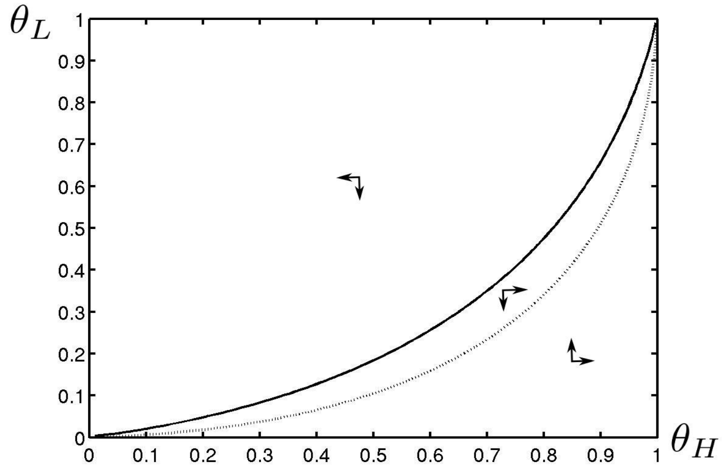
Source: Authors calculations

Figure 4. Self-selection for locations 1 and 2 for I=1.4



Source: Authors calculations

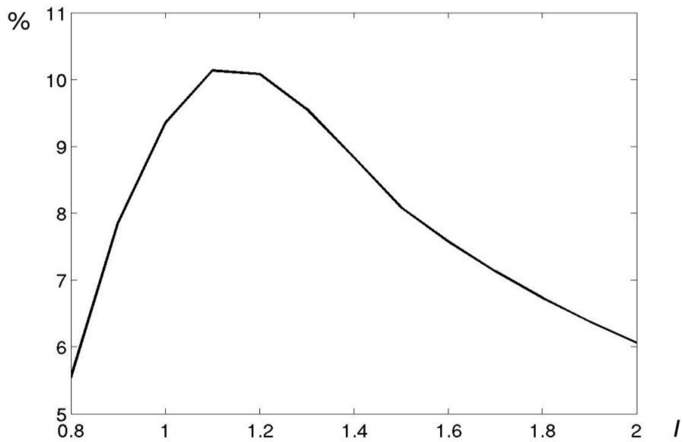
Figure 5. Self-selection for locations 1 and 2 for I=1.6



Source: Authors calculations

The figures 1 to 5 shows that higher quality of institutions result with bigger area between solid and dashed curve indicating easier establishing of separating equilibrium. To confirm the prediction we introduce the Figure 6. It more clearly represents the relation between the possibility of establishing the separating equilibrium and the institutional quality. It expose non-linear relation between mentioned variables by showing that curve that stands for separating equilibrium probability is downward sloping after Institutional quality reaches values bigger than 1. It also reveals than curve is upward sloping on the lower values of the Institutional quality.

Figure 6. Possibility for separating equilibrium and Institutional quality



Source: Authors calculations

Taking into consideration that the social efficient dimension of the separating equilibrium can be explained by higher probability for better quality matching (among H-type workers) and super modularity condition our model has strong predictions.

It indicates that at the early stages of the development when Institutional quality is low and costs c high separations and spatial concentration can be recognized as a efficient situation that encourages growth on the national level. In case of the higher quality of institutional environment, the model predicts negative influence of the spatial concentration on national growth.

This is not only in line with empirical findings (e.g. Henderson, 2003; Brulhart and Sbergami, 2009) but it could also be used as a micro foundation for the Williamson hypothesis (1965) underling the importance for carefully shaped policy that will include this difference among agglomeration economies phenomena in developing and developed countries.

Finally, our model extends the literature by presenting theoretical model that offers better explanation of the mechanism of the agglomeration economies influence on economy and crucial first step for empirical testing in future.

4. Conclusion

An extensive body of empirical research indicates that spatial concentration involves relatively high levels of earnings, high levels of productivity, a high cost of living, a high proportion of high skilled workers (e.g. Puga, 2010; Venables, 2011). Although these effects cover a wide range of explanations understanding the causes of agglomeration economies is still open process without clear results (Puga, 2010).

Therefore, this paper focuses on the link between asymmetric information and the agglomeration economics. The new model develops basic model presented by Venables (2011) which shows how the ability of spatial concentration to reduce market failures is associated with informational asymmetries in the workforce. The basic model by Venables (2011) indicates that social efficiency is determined by value of the cost differential of location 1 compared to location 2 (costs c) and therefore it is quite restrictive to treat costs c as exogenous as in the basic model. Although Venables (2011) in the next phase fragmentally relates the costs c with the city size it does not explain the huge difference between the economic environment in developing and developed countries.

Thus, the paper by introducing the transaction costs and institutions as a mechanisms that explain the relation between agglomeration economies and asymmetric information attacks disability of the above mentioned researchers to incorporate the stage of development as a key feature of the relation.

The idea behind this model is motivated by three widely accepted notions: (i) asymmetric information is a part of the transaction cost (Coase, 1960, Nolan and Trew, 2011), (ii) transaction costs are linked with institutional quality (Coase, 1960; North, 1993 and 1994;

Nolan and Trew, 2011) and (iii) institutional quality differ regarding the level of development (Williamson, 2009). Consequently, higher Institutional quality allows lower transactions cost. Lower transaction costs permit better and easier flow of the information and all other inputs that stabilize the cost difference among locations. As a result, cost differential of location 1 compared to location 2 becomes lower. This new relation indicates that at the early stages of the development when Institutional quality is low and costs c high separations and spatial concentration can be recognized as a social optimal (efficient) situation that encourages growth on the national level. In case of the higher quality of institutional environment, the effect fades away.

To sum it, the model is not only in line with empirical findings (e.g. Henderson, 2003; Brulhart and Sbergami, 2009) and can be used to open work on micro foundations of the Williamson hypothesis (1965), it also encourages the policy instruments that will consider the difference among agglomeration economies phenomena in developing and developed countries.

As we already indicated, our model extends the literature by presenting theoretical model that offers better explanation of the mechanism of the agglomeration economies influence on economy and crucial first step for empirical testing in future.

References

Acemoglu, D.- Johnson, S. - Robinson, J. A. 2002.: Reversal of fortune: geography and institutions in the making of the modern world income distribution. Quarterly Journal of Economics 117(4), 1231–94.

Acemoglu, D.- Johnson, S. - Robinson, J. A. 2004., "Institutions as the fundamental cause of long-run growth," NBER Working Paper No. W10481, Available at SSRN: http://ssrn.com/abstract=541706

Acemoglu, D.- Johnson, S. - Robinson, J. A. 2005. "Institutions as a Fundamental Cause of Long-Run Growth,"Handbook of Economic Growth, in: Philippe Aghion & Steven Durlauf (ed.), Handbook of Economic Growth, edition 1, volume 1, chapter 6, pages 385-472 Elsevier.

Berliant, M. -Kung, F. 2008.: "Can Information Asymmetry Cause Agglomeration?,"MPRA Paper 7414, University Library of Munich, Germany.

Berliant, M.- Yu, C. M. 2010.: "Locational signaling and agglomeration,"MPRA Paper 24155, University Library of Munich, Germany.

Brülhart, M. - Sbergami, F. 2009.: Agglomeration and Growth: Cross-Country Evidence, CEPR Discussion Papers 6941, C.E.P.R. Discussion Papers

Coase, R.. H. 1960.: The Problem of Social Cost., Journal of Law and Economics 3: 1.44.

Duranton, G.- Puga, D. 2004.: “Micro-Foundations of Urban Agglomeration Economies,” in V. Henderson and J.-F. Thisse (eds.), Handbook of Regional and Urban Economics, Vol. 4. Amsterdam: North-Holland, pp. 2063–2117.

Fukuyama, F. 2006.: "Development and the Limits of Institutional Design," paper presented to the annual conference of the Global Development Network, St. Petersburg, Jan. 20, 2006.

Furceri, D. and Mourougane, A. 2012. : How Do Institutions Affect Structural Unemployment in Times of Crises? Panoeconomicus 2012 Volume 59, Issue 4, Pages: 393-419 doi:10.2298/PAN1204393F

Glaeser, E. L. 1999. “Learning in Cities,” Journal of Urban Economics, 46(2), 254–277.

Greenwald, B. C., Stiglitz, J. E. .1986.: “Externalities in economies with imperfect information and incomplete markets”, Quarterly Journal of Economics 101(2):229–264.

Henderson, J. V. 2003: “The urbanization process and economic growth: The so-what question.” Journal of Economic Growth 8 (1), 47–71.

Jutting, J. 2003.: “Institutions and development: A critical review, OECD Development Centre”, Working paper 210

Marinescu, N. 2010.: “On significance of transaction cost in institutional economics”, available at :http://ideas.repec.org/a/rau/journl/v1y2006i1p75-84.html (accessed 17.06.2012)

Milgrom, P. - Roberts, J. 1990.: ‘The Economics of Modern Manufacturing: Technology, Strategy, and Organization.’ American Economic Review 80: 511–28

Nolan, C. - Trew, A. 2011.: " Transaction Costs and Institutions,"CDMA Working Paper Series 1103, Centre for Dynamic Macroeconomic Analysis

North, D. C. 1990.: “Institutions, Institutional Change and Economic Performance” Cambridge University Press, 1990.

North, D. C. 1993.: "Institutions, Transaction Costs and Productivity in the Long Run,"Economic History 9309004, EconWPA

North, D. C. 1994.: "Transaction Costs Through Time," Economic History 9411006, EconWPA

North, D. C. 1995.: “The New Institutional Economics and Third World Development”, London : Routledge.
O’Hara, P. A. 2013. : Policies and Institutions for Moderating Deep Recessions, Debt Crises and Financial Instabilities Panoeconomicus 2013 Volume 60, Issue 1, Pages: 19-49, doi: 10.2298/PAN1301019H
Puga, D. (2010.: "The Magnitude And Causes Of Agglomeration Economies,"Journal of Regional Science, Wiley Blackwell, vol. 50(1), pages 203-219.
Rodrik, D., Subramanian, A. - Trebbi, F. 2004.: “Institutions rule: the primacy of institutions over geography and integration in economic development” Journal of Economic Growth, 9, 131–165.
Rodríguez-Pose, A. 2010.: “Do Institutions Matter for Regional Development?,” [Online], [Retrieved January 20, 2012], http://ideas.repec.org/p/imd/wpaper/wp2010-02.html,
Stein, H. 2012.: The Neoliberal Policy Paradigm and the Great Recession, Panoeconomicus 2012 Volume 59, Issue 4, Pages: 421-440 doi:10.2298/PAN1204421S
Stiglitz, J. E. 2000.: The Contributions Of The Economics Of Information To Twentieth Century Economics,"The Quarterly Journal of Economics, MIT Press, vol. 115(4), pages 1441-1478, November.
Stimson, G. V., Stough R., R. - Salazar, M. 2005.: “Leadership and Institutional Factors in Endogenous Regional Economic Development,” Investigaciones regionales, no. 7, Asociacion Espanola de Ciencia Regional, pp.23-52.
Tropeano, J. P. 2001.: “Information Asymmetry as a Source of Spatial Agglomeration”, Economics Letters, 2001.
Venables, A. J. 2011.: “Productivity in cities: self-selection and sorting”, Journal of Economic Geography,11, (2011), 241-252
Williamson, C. R. 2009.: “Informal institutions rules: Institutional arrangements and economic performance”, Public Choice, 2009, Volume 139, Numbers 3-4, Pages 371-387
Williamson, J. G. 1965.: “Regional inequality and the process of national development” Economic Development and Cultural Change 13 (4), 3–45.

INVESTIGATING THE QUALITY OF PRODUCTS OF DIFFERENTIATED TRADEMARK PRODUCERS (GAME THEORY APPROACH)

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Abstract

Quality, as one aspect of product differentiation, is the main factor in survival and sustainability of producing firms. In this paper, two main producing firms are considered, one being the main producing firm offering high quality trademarks and the other producing low quality trademarks. Then, the game is designed for these two firms, the implications of this game are referred to, and the strategies for producers of high-quality and low-quality trademarks in terms of equilibrium price, quality, and profit are discussed. The results indicate that by increasing the production costs of each producer lead the producer of high quality trademarks to increase their quality. In addition, an increase in production costs for a low quality producer lead them to reduce their quality; however, an increase in production costs for a high quality producer leads the producer of low quality trademarks to increase their quality. Finally, the relationship between the profits of a high quality producer is directly related to the quality of its own trademark and inversely related to the low quality trademark.

Keywords: Quality, Vertical differentiation, Market entrance, Game theory
JEL classification: L15, L22, L42, C73

1. Introduction

Product differentiation in economy and marketing refers to the process of differentiation of a product or service from others for competition purpose and making it more attractive for a special target market. This differentiation is possible for the products of competitors or the company. The product differentiation models are classified into two groups: spatial and non-spatial models. The latter is classified to a fixed number trademark model and diversified model which is endogenously determined. From another point of view, differentiation in economy is classified into horizontal and vertical differentiations, which are, respectively, defined as the products of the same quality and products of different quality. In fact, horizontal differentiation is taken to refer to the situation, when in the case of promoting the distinct feature of the product, there is a consumer with increased desirability and another consumer with decreased desirability. The vertical differentiation is taken to refer to the situation when the promotion of the district feature of a product is to the benefit of all consumers (Shy, 2014).

Quality in economy is taken to mean desirability; i.e., the set of characteristics of a product and its services, which makes it demandable and therefore, able to be sold. The word quality has several different meanings. Quality in economy has two complementary concepts: First, quality means the presence of some features in the product (quality features) which respond to the customers' needs and leads to customers' satisfaction. The objective is to have higher quality, increase the customers' satisfaction and income level. Increasing the quality and creating better quality features require investment and increased costs. Therefore, higher quality is costly; however, for higher income and revenue. Here, quality is related to revenue. Second, quality means lack of defect and failure. Defect and failure lead to damages, repair, reworking, returned products, complaints, fine and loss of customers; which are all costly. Therefore, higher quality includes lower defect and error and consequently, less cost. Here, quality is related to cost (Hill, 2006). Thus, the products can be divided into two groups:

products of original trademark (high quality products) and products of non-original trademark (low quality products). Those of original trademarks are valuable for consumers for two reasons: first, they reduce the consumers' risk and second, they save the decision making costs. Nowadays, trademarks are very advantageous for consumers; e.g. a) Reducing the consumers' sense of risk: reduced sense of risk is one of the main advantages of trademarks for consumers who, at the time of purchase, are concerned that the product or services might not conform to their expectations or what the firm claims or even that it might not really be as good as it seems; however, the presence of high quality trademarks reduce this risk. b) Reducing the search: the consumer always investigates and searches to find the best goods or services proportionate to the purchase conditions and his needs and demands (Mansuri et al, 2016).

Products of non-original trademarks (low quality products) are highly similar to the original ones; however, they are of a lower level in terms of function, quality and durability (Kwong et al., 2009).

When a consumer take action to purchase a product; they indeed purchase the values associated with it. This is more obvious especially with the products of original trademarks where the consumers prefer the associated values of the product to its functions and features.

Undoubtedly, if a firm has a strong trademark it is considered as its main asset; however, unfortunately, a trademark which has succeeded in the market and dominated a main portion of the target market can lead to production of low quality products not up to the usual standard of that trademark (Maldonado & Hume, 2005). In this regard, producers of low quality products copy the original trademarks and this has become widespread throughout the world. Unfortunately, low quality products with original trademarks are known as a substation for original products and drive the consumers towards purchasing such products (Wilcox, 2008).

Customers and consumers are always in search of suppliers who provide higher quality and better goods and services. On the other hand, economy can only flourish and grow when the groundwork is laid including efficient and well-thought-out human resources programs, sufficient material capital, management and planning, high quality production, proper provision of services and so on. The quality of products and proper provision of services are the most important factors in economic growth in so far as they promote the public trust in goods and services and, therefore, the highest capital of society, i.e. trust in products and services will be achieved. In this way, economy would flourish and grow. Quality, as one of the product differentiation aspects, is the main factor in survival and sustainability of manufacturing firms. There are usually some firms that produce original goods or trademarks and others that produce lower quality trademarks and therefore take over the market from the original producers. Based on this, the main aim of present study is to investigate the competition between two producers, one presenting high quality and the other low quality products. Some questions are raised here: What strategy should a high quality producer, who is competing with a low quality producer, follow concerning equilibrium price, equilibrium quality and equilibrium profit to maximize its profit? How do the production costs affect the equilibrium quality and profit? What would the demand of consumers be like for high quality and low quality products concerning their desirability function?

Concerning the abovementioned points and due to the role and significance of product quality in the economic and industrial growth of countries, as well as, the individual’s need to study academic researches and investigate the models on how to compete in markets with various types of producers, this study was deemed necessary.

This paper is organized into four parts. The first part includes the introduction and then experimental literature is presented in the second part. The model is presented in the third part and in two subsections. The fourth and final part includes the conclusion and recommendations.

2. Literature review

To follow, some of the studies which have investigated the quality of product as one of the aspects of product differentiation in the market are presented:

Beath & Katsoulacos (1991) in a study entitled, "The economic theory of product diversity" have explained and systematically analyzed the spread of this main category of products. This study focuses on the models with endogenous product selection process which predict the differentiation level of the product that appears in a market equilibrium condition. This market equilibrium is first compared with certain distinctive products and then with desirability of social welfare. Special attention to the difference between horizontal and vertical differentiation and the issues related to product quality and durability are the other features of this study.

Motta et al. (1997) in his paper entitled, " On the Persistence of Leadership or Leapfrogging in International Trade " showed the significance of internal conditions for international trade in vertically differentiated products. Their standard model includes two firms in two countries with the same population. The consumers are determined according to their taste and this includes paying quality costs that vary in different countries. The quality is taken as a cost for production. The firms that produce a product with quality index strategically compete for international market share in a two-stage game. In the first stage, the firms simultaneously select quality for supply. In the second stage, they compete in Bertrand competition or the non-cooperative Cournot competition. The results indicate that in equilibrium, mutual trade occurs; however, multiple Nash equilibria exists. Although, "mutation" balance cannot emerge if the difference between the tendency of two countries for paying for high quality is big enough.

Jansen & Faria (2002) in their paper entitled, "Product labeling, quality and international trade" showed that in asymmetric data environment where the consumers are unable to recognize the quality of products without a label, the higher quality products incline toward disappearance. The results indicate that if the quality costs for production are high but the consumers are unable to recognize low quality product the results will not be appealing or desirable. This shows how low quality products could overcome the free markets.

Malaval & Benoroya (2005) showed that personalization (which is the source of differentiation and innovation) is more compatible especially with high quality products. The other example can be found among equipment and suppliers of workpieces in the automobile industry. Among the manufacturers of workpieces, Siemens developed the customization strategy for high quality vehicles which facilitates customers' satisfaction especially concerning geographical location. Siemens has designed a variety of injection chips for Renault Safrane that are different depending on the engine and geographical destinations. These chips are designed to take into account differences such as atmospheric pressure.

Furthermore, customization shows its limitations where it is difficult to make enough adjustments to differentiate or innovate, and here the benefits of using a standard product become highlighted. For example, in the automotive industry, a good example would be airbags. Likewise, earlier models of cars used standard equipment to a greater extent.

Sandmeier (2008) in his study entitled, "Merging customer in innovative projects of industry" has referred to Hilti as a global leader in construction and construction devices. By presenting high quality products (a widespread method in steel production in US), Hilti created a customization strategy which considered construction specialists in various countries with common designs through local knowledge. For example, one mechanical device used in steel making reflects this strategy. Although this device was first developed for use in the European market, it was necessary to redesign it for the American market taking into consideration various working methods. Therefore, Hilti succeeded in selling his new product in the US and considerably increase his market share. Of course, it does not mean that all firms that are active in such a sector should necessarily use the same strategy. While Hilti used the strategy of responding to special needs of customers and his main rivals tried to compete with him in terms of cost by presenting standard but low quality products, he sold his products with a higher premium of up to 20 percent to 40 percent more than the price of his competitors.

Gaussens et al. (2009) in a paper entitled, "Personalization versus standardization: International merging and consumer surplus" dealt with the impact of international merging of oligopolistic markets on the consumer surplus. The results indicate that in the first stage, merging might reduce the competition and consumer surplus and but in the second stage, it might reduce the consumer surplus and even increase the competition.

Petropoulou (2013) in his paper entitled, "Vertical differentiation of product, minimum quality standards and international trade, two-seller monopoly" created vertical differentiation to analyze the motivations to make minimum qualitative standards in an open economy. The markets are divided and the national firms compete in both markets which constitutes an international two-seller monopoly. The firms tolerate the costs of dependent variables on quality and the local and foreign products for sale could benefit from the certain amount of quality; while the national quality standards are endogenously determined. According to the results, the trade flows indicate that minimum Nash equilibrium standards are less than maximum international standards. In addition, if the firms are specialist in products with various qualities, maximum international standards would not be accessible because of mutual adjustments in national standards. This is indicative of limitation in effectiveness of international negotiations regarding minimum quality standards.

Halim et al. (2014) in a study entitled, "The effect of products' quality, the trademark sign and quality of services on customer trust and loyalty (the study of electronic products of SHARP customer trademark in South Kalimantan)" investigated the following objectives: 1) The impact of product quality, trademark signs and quality of services on customer's trust, 2) The impact of products' quality, trademark image and quality of services on customers' loyalty, 3) The customer's trust is used in research design in the reasons for customer's loyalty to investigate the effects between variables. 200 electronic customers of SHARP trademark were randomly selected in a sample and data was collected using questionnaires. The structural model hypothesis was tested through GeSCA The results indicate that there is a significant effect on the quality of product, trademark image and quality of services on customer's trust and the quality of product has a significant effect on customer's loyalty, while, the trademark sign does not have a significant effect on the customer's loyalty. Moreover, customer trust has a significant effect on customer loyalty.

Calmette et al. (2016) in a study entitled, "An international trade model with vertical differentiation and Stackelberg" utilize a two-seller monopoly international trade model to study in which condition the entrance of a big country in international markets can create less diversity for consumers rather than more consumption. The results indicate that the quality of the self-sustaining economy is directly related to the willingness to pay for the quality and size of the domestic market, and is inversely related to the quality cost. They strategically formed interacted firms and identified areas in which a low-quality producer could expel high-quality producers from the market. This is more likely in areas where the emerging exporter is very large and when the difference in willingness to pay for quality between countries is not too large.

Baumann & Klymak (2017) in their study entitled, "Low quality dominance in a search market with complete consumer information, identified a consumer search market where firms are vertically differentiated and consumers are heterogeneous in entrance to the domestic market. The results indicate that in asymmetric information, high quality and low quality firms achieve equal sales and high profits in this market. Conversely, when complete information is available, search sensitivities create an unexplained mechanism that results in a unique equilibrium in which all consumers approach low-quality firms and high-quality firms make no sales or profits.

In foreign studies, the market for goods of different qualities has been examined in a closed economy within a country, and if it had been carried out internationally, they would not have reached a single conclusion. Therefore, how the firms entered these markets, consideration of two countries and an open economy and examination of the ways of entering these markets in a foreign country, taking into account the effects of vertical differentiation of goods in foreign markets have not been studied. Moreover, there is no local study in this area. Concerning the literature, as observed, to date no study has been carried out on how manufacturers behave in the markets of products with different quality taking into consideration vertical differentiation features that these firms could have. Therefore, this study seeks to analyze these cases through game theory to pave the way for more researches in this area and be able to be used by individuals, producers and policy makers. It should be reminded that the main focus of this study is on vertical differentiation of products.

3. Designing model

The problem solving method in this study is game theory. There are two firms shown by A and B, each presenting a different high quality product. A produces high quality products, shown by qH, which requires cost CH. B produces low quality products shown by qL, which requires cost CL. Therefore, $C_H > C_L > 0$ and $q_H > q_L > 0$. θ is uniformly considered in [0, 1] and shows the consumer's inclination to pay for quality. If consumers do not purchase a product, they will achieve desirability of zero; otherwise, they will have desirability of $u = \theta q - p$. The total number of consumers is normalized to 1. There is a two-period game, where the firms select (q_H) or (q_L) for first period and (p_H) or (p_L) for the second period.

This game is solved through backward induction method such that firstly, the firms select the price at the first stage and then quality at the second stage.

3.1. The competition between two firms (high quality producer and low quality producer)

The model taken in this study is Hotelling vertical differentiation model. Assume the firms are uniformly and continuously distributed at [0, 1]. The two firms are shown by A and B that are respectively located at a and b points from the source ($0 \le a \le b \le 1$). It is assumed here that the high quality producer firm solely produces high quality trademarks and the low quality producer firm solely produces low quality trademarks. Moreover, assume that each consumer purchases one unit of the produced products by two companies. The production cost for high quality producer is C_H unit for each unit of product and it is C_L for low quality producer. In these circumstances, it is possible to find indifference of consumer in purchasing each trademark according to figure 1:

Figure 1: Vertical differentiation

To this end, the desirability function of consumers (equation 1) in [0, 1] is specified when purchasing from high and low quality producers.

$$Ux(i)=\begin{cases}\theta q_L - p_L & i = L\\ \theta q_H - p_H & i = H\end{cases} \qquad \text{Equation (1)}$$

Where p_L is the price offered by the low quality producer and p_H is the price offered by the high quality producer.

The threshold limit, $\hat{\hat{\theta}}$, for consumer (who does not purchase the product) is determined from the following equation:

$$\theta q_L - p_L \le 0 \Rightarrow \hat{\hat{\theta}} \le \frac{p_L}{q_L}$$

Now, the indifference of the consumer is determined as follows, concerning equation 1:

$$\theta q_L - p_L = \theta q_H - p_H$$

Thus, if

$$\hat{\theta} = \frac{p_H - p_L}{q_H - q_L},$$

then the consumer shows indifference in purchasing high quality and low quality trademarks. This can be taken as corresponding to the indifferent consumer's location.

By achieving the indifferent consumer, the demand functions of high quality producer $(1-\hat{\theta})$ and low quality producer $\left(\hat{\theta}-\hat{\hat{\theta}}\right)$ is determined as follows:

$$\rightarrow Z_L = \hat{\theta} - \hat{\hat{\theta}} = \frac{p_H - p_L}{q_H - q_L} - \frac{p_L}{q_L}, \quad Z_H = 1 - \hat{\theta} = 1 - \frac{p_H - p_L}{q_H - q_L} \qquad \text{Equation (2)}$$

It can be concluded that in the range of $\hat{\hat{\theta}}$ indifferent consumers, all consumers achieve more desirability from purchasing low quality products compared to high quality products. Moreover, the consumers after indifferent consumer prefer the trademark produced by the high quality producer to low quality producer.

Now, the profit functions achieved for high and low quality trademarks will be determined as follows:

$$\begin{cases} \pi_L = (p_L - C_L)\left(\hat{\theta} - \hat{\hat{\theta}}\right) = (p_L - C_L)\left(\frac{p_H - p_L}{q_H - q_L} - \frac{p_L}{q_L}\right) \\ \pi_H = (p_H - C_H)(1 - \hat{\theta}) = (p_H - C_H)(1 - \frac{p_H - p_L}{q_H - q_L}) \end{cases}$$ Equation (3)

By putting the final costs as zero and replacing the demand values of each firm (equation 2) in related profit function (equation 3) and then differentiating in respect to costs, it is possible to obtain equilibrium prices. First, the optimum reaction functions are calculated as follows:

$$P_L = \frac{q_L P_H}{2q_H}$$

$$P_H = \frac{q_H + P_L - q_L}{2}$$

Then, the equilibrium prices will be calculated as follows by solving two equations; two unknown systems.

$$\begin{cases} P_L^e = \frac{q_L(q_H - q_L)}{4q_H - q_L} \\ P_H^e = \frac{2q_H(q_H - q_L)}{4q_H - q_L} \end{cases}$$ Equation (4)

3.2. The presented theorems

Furthermore, concerning the price, quality and profit functions, six theorems will be presented concerning the equilibrium price, equilibrium quality and equilibrium profit of high and low quality producers:

Theorem 1: The price of a low quality trademark is directly related to the quality of a high quality trademark (increase in quality by high quality producer lead to increase in price of low quality producer). This theorem is reverse for high quality producer.

Proof: To prove this theorem, equation 4 should be differentiated in terms of equilibrium qualities and then solved. First, in order to prove the first part of theorem 1, see comments below:

$$\frac{\partial P_L^e}{\partial q_H} = \frac{3{q_L}^2}{(4q_H - q_L)^2}$$

The above equation indicates that this relation is always positive. Therefore, the more the high quality producer increases the quality; the more the low quality producer will increase their price.

To prove the second part of theorem 1, see comments below:

$$\frac{\partial P_H^e}{\partial q_L} = -\frac{6\,{q_L}^2}{(4q_H - q_L)^2}$$

This equation shows that this relation is always negative. Moreover, the higher the quality of the low quality producer, the less the equilibrium price of high quality trademark would be.

To follow, the relation between the prices of high quality trademarks will be studied:

Theorem 2: The price of high quality trademarks is directly related to its quality; however, this is not specified for the low quality producer.

Proof: To prove this theorem, only equation 4 should be differentiated in terms of equilibrium qualities and then solved. First, to prove the first part of theorem, see comments below:

$$\frac{\partial P_H^e}{\partial q_H} = \frac{2\,(4{q_H}^2 - 2q_H\,q_L + {q_L}^2)}{(4q_H - q_L)^2}$$

The above equation shows that this relation is always positive; thus, the more the high quality producer increases their quality, the more the equilibrium will increase the equilibrium price.

For proving the second part of the theorem, see comments below:

$$\frac{\partial P_L^e}{\partial q_L} = \frac{4{q_H}^2 - 8q_H q_L + {q_L}^2}{(4q_H - q_L)^2}$$

Concerning the above equation, it is not definitely specified whether the equation is positive or negative. The relation between low quality trademarks and their quality is not clear.

By substituting equilibrium prices (relation 4) in profit functions (relation 3),

$$\pi_L = \left(\left(\frac{q_L(q_H - q_L)}{4q_H - q_L}\right) - C_L\right)\left(\frac{\left(\frac{2q_H(q_H - q_L)}{4q_H - q_L}\right) - \left(\frac{q_L(q_H - q_L)}{4q_H - q_L}\right)}{q_H - q_L} - \frac{\left(\frac{q_L(q_H - q_L)}{4q_H - q_L}\right)}{q_L}\right)$$

$$\pi_H = \left(\left(\frac{2q_H(q_H - q_L)}{4q_H - q_L}\right) - C_H\right)\left(1 - \frac{\left(\frac{2q_H(q_H - q_L)}{4q_H - q_L}\right) - \left(\frac{q_L(q_H - q_L)}{4q_H - q_L}\right)}{q_H - q_L}\right)$$

and then differentiating in terms of quality, the equilibrium qualities will be obtained in two equations of two unknowns. Finally, by solving this system, the Nash values of equilibrium quality will be as follows:

$$q_L = -\frac{2((5C_L + 2C_H)\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L} + (C_L - 2C_H)(17C_L + 2C_H))}{3(7\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L} - 5C_L - 14C_H)} \quad \text{Equation (5)}$$

$$q_H = -\frac{-\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L} - C_L + 2C_H}{12} \quad \text{Equation (6)}$$

Now, the relationship between production costs and quality will be examined:

Theorem 3: Increase in production costs for each manufacturer (low quality and high quality manufacturers) makes the high quality producer increase its quality.

Proof: To prove this, it is sufficient to differentiate equation 6 in terms of costs. Then the following equation will be achieved after solving it:

$$\frac{\partial q_H}{\partial C_L} = \frac{\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L} - 23C_L + 22C_H}{12\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L}}$$

Given the above equation, it is clear that this relation is always positive. Therefore, the more the costs of the low quality producer increases, the higher the quality producers will increase the quality of its products.

Concerning the following relation, see the comments below:

$$\frac{\partial q_H}{\partial C_H} = -\frac{\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L} - 11C_L - 2C_H}{6\sqrt{23C_L + 2C_H}\sqrt{2C_H - C_L}}$$

The above relation is always positive. Therefore, as the cost of producing high quality products increases, the manufacturer of high quality trademarks increases quality.

Theorem 4: Increase in production costs for low quality producer makes them decrease their quality; however, increase in production costs for the high quality producer makes the low quality producers increase their costs.

Proof: To prove this, it is sufficient to differentiate equation 6 in terms of costs and then solve it. The final results are as follows:

$$\frac{\partial q_L}{\partial C_L} \leq 0 \quad , \quad \frac{\partial q_L}{\partial C_H} \geq 0$$

The following comments are two theories about quality and profit:

Theorem 5: The profit of the low quality producer increases when the quality of their trademark is less than the specified limit or the quality of the high quality producer is more than a specified limit. In other words, the low quality producer profits when:

$$q_L \leq \frac{4q_H(C_L - q_H)}{C_L - 7q_H} \quad or \quad q_H \geq \frac{q_L(C_L - q_L)}{2(2C_L + q_L)}$$

Proof: To prove this, it is sufficient to first replace the prices and equilibrium values (equations 4 and 6) in the profit function (equation 3), and then, differentiate in terms of low quality and simplify the equation. The profit function for the low quality producer will be as follows after substituting and simplifying:

$$\pi_L = \frac{q_H\,(q_L(q_H - q_L) - C_L(4q_H - q_L))}{(4q_H\ -\ q_L)^2}$$

Then, by differentiating this function and then simplifying, it is shown:

$$\frac{\partial \pi_L}{\partial q_L} = \frac{q_H\,(C_L(4q_H - q_L) - q_H(4q_H - 7q_L))}{(q_L\ -\ 4q_H)^3}$$

$$\Rightarrow \frac{\partial \pi_L}{\partial q_L} \geq 0 \;\Leftrightarrow\; q_L \leq \frac{4q_H(C_L - q_H)}{C_L - 7q_H}$$

To prove the second part, as seen below:

$$\frac{\partial \pi_L}{\partial q_H} = \frac{q_L\,(C_L(4q_H - q_L) + q_L(2q_H + q_L))}{(4q_H - q_L)^3}$$

$$\Rightarrow \frac{\partial \pi_L}{\partial q_H} \geq 0 \;\Leftrightarrow\; q_H \geq \frac{q_L(C_L - q_L)}{2(2C_L + q_L)}$$

Theorem 6: The relationship between the profits of the high quality producer and their own trademark is direct, and with low quality trademarks it is reversed.

Proof: To prove this, it is sufficient to first substitute prices and equilibrium values (equations 4 and 6) in the profit function (equation 3), and then, differentiate in terms of low quality and simplify the equation. The profit function for the low quality producer will be as follows after substituting and simplifying:

$$\pi_H = \frac{2q_H\,(2q_H{}^2 - 2q_H(2C_H + q_L) + C_H q_L)}{(4q_H\ -\ q_L)^2}$$

Now, by differentiating this function and then simplifying, we can see the following results:

$$\frac{\partial \pi_H}{\partial q_L} \leq 0 \ , \ \frac{\partial \pi_H}{\partial q_H} \geq 0$$

These results clearly indicate that the relationship between the profits of the high quality producer and their own trademark is direct, and with low quality trademark it is reversed.

4. Conclusion

The concept of product differentiation was first introduced in 1933 by Edward Chamberlain. Product differentiation is known to refer to the process of distinguishing a product or service from other products or services in order to compete and make it more attractive for a specific target market. Undoubtedly, a strong trademark is the main asset of a firm; however, unfortunately when the trademark succeeds in the market and conquers a large part of the target market, it can cause production of a low quality product of that trademark. In this regard, the act of copying original trademarks by producers of low quality products has become widespread throughout the world.

In the contemporary world, there are usually some firms that produce original goods or trademarks, and some that produce low quality variants of the original trademarks and thus, take the market away from the original producer. Accordingly, the main purpose of the present study was to examine the entrance of high quality producers to the market of low quality products. In fact, this study intends to examine whether in a world where firms produce the same or different goods although the quality of goods may differ, will new firms be able to enter the market; and whether the firm producing high quality products may be able to produce both high quality and low quality products. Furthermore, in these cases, if a firm wants to enter the market, whether this entry is in its favor or not.

The results of this study showed that:

1. The price of low quality trademarks is directly related to the quality of high quality trademarks. For the producer of high quality trademarks, this relation is inverse.
2. The relation between the price of high quality products and its quality is direct; however, this is unclear for the producer of low quality trademarks.
3. Increase in production costs for either producer (high quality and low quality producers) leads to the high quality producer increasing their quality.

4. Increase in production costs for low quality producers leads to the low quality producer decreasing their quality; however, increase in production costs for the high quality producer makes the low quality producer increase their quality.
5. The profit of the low quality producer increases when the quality of his own trademark is below a certain limit or the quality of trademarks of the high quality producer is more that the specified limit.
6. The relation between the profit of the high quality trademark producer and their own trademark is direct and with the trademark of low quality producer, it is reverse.

Finally, concerning this study and the presented theorems, it is recommended that the producers of high quality trademarks, with whom the producers of low quality trademarks can always compete as a potential competitor in their trademark markets, utilize the results of this study and keep their equilibrium quality and profit at optimum level concerning the presented theorems.

References

Shy, A.Z (2014). Industrial Organization: Theory and Applications, translated by Kiomars Shahbazi, Tehran: Nashre Daneshgahi publication (1995).

Entezarian, N.; Sanjari, M. (2013). The Impact of Quality on Increased Investment in Production. Social, Economic, Scientific and Cultural Journal of Work and Society, 163, 45-50.

Cutler, Ph.; Gary, A. (2006). Marketing Principles, Translated by Bahman Forouzandeh. Esfahan, Atropat Publishing Center, 7th ed.

Mansouri, H.; Izadi, B.; Sadeghi Boroujerdi, S. (2016). The Sale Position of Secondhand Foreign Brands Sporting Goods from the Consumer Perspective, Journal of Sport Management Studies, 39, 155-170.

Nazari, M.; Abedi, A.; Khorasani Tarighi, H. (2014). Determinants of Intent to Buy Luxury Fake Brands (Case Study: Tehran). Journal of Brand Management, 61-84.

Hill, N. (2006). Measuring Customer Satisfaction, Translators Mohammad Reza Eskandari and Manijeh Eskandari, Rasa Cultural Services Development.

Baumann, S., & Klymak, M. (2017). It's Good to be Bad: A Model of Low Quality Dominance in a Full Information Consumer Search Market. Royal Economic Society.

Beath, J., & Katsoulacos, Y. (1991). The Economic Theory of Product Differentiation. Cambridge: Cambridge University Press.

Calmette, M. F., Kilkenny, M., Loustalan, C., Pechoux, I., &Bernard, C. (2016). A model of international trade with vertical differentiation and Stackelberg leadership.working paper. N 16-708.

Chen, C. F., & Chang, Y. Y. (2008). Airline brand equity, brand reference, and purchase intentions the moderating effects of switching costs. Journal of Air Transport Management, 14(1), 40-42.

Gaussens, O.,& Lecostey, s., & Shahbazi, k.(2009), Customisation vs. Standardisation: International Integration and Consumer Surplus, Annals of Economics and Statistics, No. 93/94, 233-257.

Jansen, M., and de Faria, A.L., (2002), Product Labeling, Quality and International Trade, CEPR Discussion Paper N 3552.

Halim, P.,& Swasto, B., & Hamid, D., & Firdaus, M. R.(2014), The Influence of Product Quality, Brand Image, and Quality of Service to Customer Trust and Implication on Customer Loyalty, European Journal of Business and Management, 29(6), 159-166.

Kotler, P., & Armstrong G. (2006). Principles of Marketing, Translation by Bahman Forouzandeh, Isfahan, Atropat Publishing Center, Seventh Printing(In Persian).

Kwong, K. K., Yu, W. Y. P., Leung, J. W. K. &Wang, K. (2009). Attitude Toward Counterfeits and Ethnic Groups: Comparing Chinese and Western Consumers Purchasing Counterfeits. Journal of Euromarketing, 18(1), 157–168.

Malaval, P. et C. Benaroya (2005): Marketing Business to Business, Pearson education, Paris, 698p. [236].

Maldonado, C., & Hume, E. C. (2005). Attitudes Toward Counterfeit Products: An Ethical Perspective. Journal of Legal, Ethical and Regulatory Issues,8(2), 105-117.

Mansouri, H. , Izadi, B. & Sadeghi Boroujerdi, S. (2016). The position of sales of second-hand sports goods from consumers' point of view, Sport Management Studies Quarterly, 39, 170-155 (In Persian).

Motta, M., Thisse, JF., &Cabrales, A., (1997), On the Persistence of Leadership or Leapfrogging in International Trade, International Economic Review, 38 (4), 809-824.

Nazari, M. , Abedi, A. & Khorasani Toraghi, H. (2014). Determinants of the Intent of Buying Fake Luxury Brands (Case Study in Tehran), Brand Management Quarterly, 2.84-61 (In Persian).

Petropoulou, D.(2013). Vertical product differentiation, minimum quality standards, and international trade,Oxford Economic Papers, 65(2), 372–393.

Sandmeier, P. (2008): Customer Integration in Industrial Innovation Projects, Gabler Edition Wissen schaft, Wiesbaden, 268p. [236].

Shay, Oz (1995). Industrial Organization: Theory and Applications, translation by Kiyomars Shahbazi, Tehran: University Publishing Center (In Persian).

Swindells, Norman ,(995), "Managing the quality of Information Products", Managing Information. 35-37.

Wilcox, K., Kim, H. M. &Sen, S. (2009). Why Do Consumers Buy CounterfeitLuxury Brands?. Journal of Marketing Research, 46 (2), 247–259.

IMPACT OF AUTO INDUSTRY AND ITS SPATIAL SPILLOVER EFFECT ON ALABAMA'S ECONOMIC GROWTH AND DEVELOPMENT

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Abstract

This paper studies the effect of automobile production on Alabama's economy. A spatial panel simultaneous equations model was developed using county data. The empirical findings suggest that automobile production increase the employment growth and per capita income growth of the counties which are closer to the automobile plant while other things equal, but reduce the population growth with closer distance to the automobile plant while other things equal. This may be due to the competition between automotive suppliers clustered around the automobile plant and real estate builders for land and other infrastructure facilities. This study also finds that jobs follow people and also people follow jobs. The existence of spatial lag indicates that growth of population; employment and per capita income are not only dependent on the characteristics of that county, but also on those of its neighbors. These interdependences provide the need of economic development policy coordination among the counties.

Keywords: Spatial effect, Automobile production, Spatial panel simultaneous equations model, Generalized Spatial Three-Stage Least Squares

JEL classification: R300, O120, O150

1. Introduction

Strategies to improve living conditions in the rural South are receiving increased attention (Wimberley et al, 2002). Local economic development becomes a major concern of state policy makers and local government (Isserman 1994). Since the Alabama state government has expanded economic incentives to attract auto industry to create additional employment and generate personal income, large auto mobile firms and its input suppliers migrated into several Alabama counties. The net impact of these industries on local employment, income and living standard become important for state policy makers and local leaders. Prior to 1997, Alabama produced not a single automobile. Due to the aggressive recruiting efforts by the state, auto production and its ancillary industries account for over 16% of the state's employment with an annual payroll of some \$5.2 billion (Ahn 2005; AAMA 2008). In addition to providing jobs to offset losses in mining, agriculture, and textiles, the jobs are better paying: in 2004, the average weekly wage for auto manufacturing workers in the state was \$ 1,318 compared to \$761 for all manufacturing and \$643 for all industries (EDPA 2008). Jobs in 40 of the state's 67 counties now are tied directly or indirectly to auto manufacturing (AAMA 2008).

Despite its growing importance, little scholarly work has been done to assess the impact of the auto industry on the state's economy or living standards. Gadzey et al. (2003) have estimated an econometric model, using 30 years of county – level data to determine whether state assistance to private firms increased the real value of manufacturing output. Results based on data through 1999 showed the subsidy effect to be positive as expected, and statistically significant. However, the measured effect was too small for the subsidies to be remunerative. This finding is important because it affirms charges of critics (Buchholz 2008) that the incentive packages given to auto companies were excessive. (Mercedes-Benz, Honda, and Hyundai each received incentive packages worth between \$100 and \$300 million (Ahn

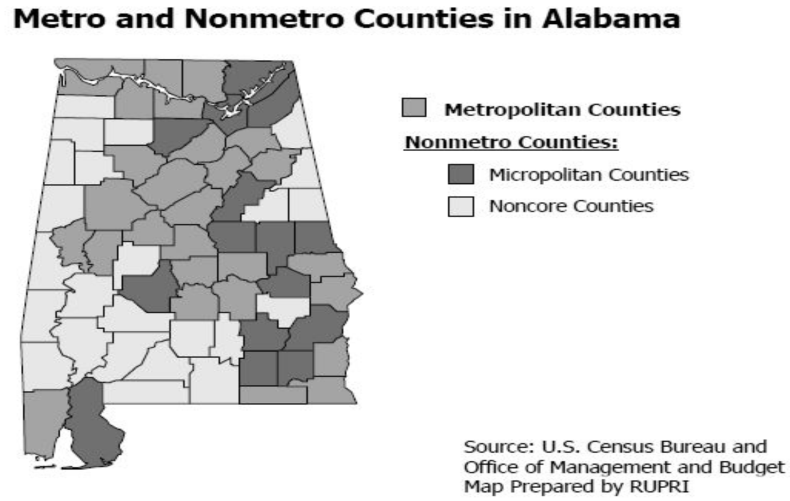
2005).) More generally, it raises questions about whether industrial policies to lure industry are a cost effective way to improve the living standards of rural residents, a major focus on this research.

Gadzey et al.'s findings are consistent with the substitution view of industrial subsidies (Wren 1996). This analysis terminates in 1999, and thus covers only two full years of auto production. The ripple effects of the industrial production were not considered in this analysis. Ripple effects of particular interest to students of rural development include employment, population, and income growth (Duffy-Deno 1998; Deller et al., 2001: Kim et al., 2005; Saint Onge et al., 2007; Hammond and Thompson, 2008; and Wu and Gopinath, 2008). Enlarging the analysis to include income, population, and employment effects, as proposed in this research, provides a more complete picture of the industry's impact on the state. The subsidy is measured as transfers of government funds to counties as recorded by the US Census Bureau and thus is non-specific to the auto industry. To circumvent this problem, and to provide a direct measure of impact, we propose using a simple count of auto production as the causal variable. Between 1998 and 2007 car and light truck production in the state increased from 68,800 to 739,019 units (EDPA, 2008), which provides sufficient variation to measure the impacts reliably using variable.

The purpose of the research is to determine the economic impact of automobile production on income, population, and employment growth in the Alabama's counties. This research improves on existing research in many ways. First, a simultaneous model permits us to pick up feedback effects among population, employment and per capita income. Second, we include the initial level of employment, per capita income and population, which allow us to test whether the each equation in the system converge with the respective to dependent variable. Third, we are able to estimate the differential impact of automobile production on income, population and employment growth in the distressed black belt counties by introducing interaction term of automobile production and these counties. Finally, we incorporate spatial components to capture the role of population, employment and per capita income of neighboring counties. A major goal of this research is to determine whether distressed counties in the state's Black Belt benefited from the auto boom. Of the 17 counties in the Black Belt, Governor Riley's Black Belt Action Committee has identified 12 as "distressed" as follows: Bullock, Choctaw, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Perry, Pickens, Sumter, and Wilcox.

A recent study by Kinnucan et al. (2006) suggests industrial policies aimed at increasing employment or family income could have important effects on rural education. In Carlino and Mills' (1987) classic study, it was speculated that since "jobs follow people," in slow growing or declining regions, "public funds may be better spent on educating the resident population than used to lure employment". A purpose of this research is to shed light on the validity of this hypothesis by examining the extent to which growth in the auto industry benefited the state's slow growing or declining region, namely the Black Belt. Based on county Core Based Statistical Area classifications, figure 1 shows that there are 28 metropolitan counties, 15 micropolitan counties, and 24 noncore counties in Alabama. Approximately seventy one percent of Alabama's population resides in metropolitan counties, 18.4 percent resides in micropolitan counties, and the remaining 10.8 percent live in noncore counties (RUPRI, 2007). In many Alabama counties, the African American population accounts for a significant portion of total population. African Americans are majority population in eleven counties in Alabama.

Figure 1: Metro and Non-Metropolitan Counties in Alabama



The greatest spillover benefit of automobile plant in Alabama is the movement of input suppliers to Alabama counties. These input suppliers cluster around automobile plants and create additional employment and generate personal income. The multiplier effects of this income through consumer spending generate additional employment and income. One of the external economies of an automobile plant is the increasing attractiveness of Alabama to other automobile firms. One of the major advantages of industry clustering is the potential for labor pooling (Krugman, 1991). Workers usually locate near to the place where there are several firms and high demand for their skills because if they lose job in one firm there may be another firm to hire them. Firms also want a pool of skilled workers to hire easily more labor during high demand for their products. Another reason for the intra and inter industry clustering is the technological spillovers benefits (Romer, 1986: Krugman, 1991). Financial institutions and supporting service firms moves near to these industries and creates additional employment and personal income.

There might be negative spillovers of automobile firms on other industries. These large automobile firms increase the market demand for inputs and then increase the wages, rents and price of other inputs. These increased input costs deter new firms to migrate to and expansion of existing firms in the counties where these large firms locate. The congestion of public services and infrastructure due to the large firms and population increase is another reason for deterring new firms and expansion of existing firms. This congestion may force the local government to raise the tax rates and then deter the entering of new potential firms.

2. Methodology and Data

The point of departure in this analysis is the regional growth model estimated by Deller et al. (2001). This model extends the classic two-equation country growth model of Carlino and Mills (1987) to include income as an additional endogenous variable. It is based upon the assumption that utility-maximizing households migrate in search of utility derived from consumption of market and non-market goods, and profit maximizing firms become mobile when looking for regions that have lower production costs or higher market demand. Importantly, the extended model retains the essential character of the CM model by permitting household and firm location choices to be interdependent. The basic specification is a simultaneous-equation system of the form:

$$POP_t^* = f_1\ \left[(PCI_t^*, (I \otimes W)\ PCI_t^*), (EMP_t^*,\ (I \otimes W)\ EMP_t^*),\ (I \otimes W) POP_t^*,\ A_{t-i},\ BA_{t-i}, \left|X_{t-i}^{pop}\right]\right. \quad (1)$$
$$PCI_t^* = f_2\ \left[(POP_t^*, (I \otimes W)\ POP_t^*), (EMP_t^*,\ (I \otimes W)\ EMP_t^*),\ (I \otimes W) PCI_t^*,\ A_{t-i},\ BA_{t-i}, \left|X_{t-i}^{pci}\right]\right. \quad (2)$$
$$EMP_t^* = f_3\ \left[(POP_t^*, (I \otimes W)\ POP_t^*), (PCI_t^*,\ (I \otimes W)\ PCI_t^*),\ (I \otimes W) EMP_t^*,\ A_{t-i},\ BA_{t-i}, \left|X_{t-i}^{emp}\right]\right. \quad (3)$$

The equilibrium levels of population, per capita income and employment are assumed to be functions of the equilibrium values of the endogenous variables included in right hand and their spatial lags, and the vectors of the additional exogenous variables. Where, POP_t^*, PCI_t^*, and EMP_t^* are vectors of dimension NT x 1 of the equilibrium levels of population, per capita income and employment respectively; t denotes time. **I** is an identity matrix of dimension T and, W is a row standardized N x N spatial weights matrix with zero diagonal values. Each element of this spatial weights matrix, w_{ij} , represents a measure of proximity between observation i and observation j. Based on the queen based adjacency criteria, w_{ij} equal to $1/k_i$, where k_i is the number of nonzero elements in row i, if i and j are adjacent, and zero otherwise. Therefore, and $(I \otimes W)PCI_t^*$ stand for the equilibrium values of neighboring counties' effect . A_{t-i} is vector of dimension NT x 1 of automobile production. BA_{t-i} is the interaction term of the distressed black belt county and automobile production. Where i is 7 years. The matrices of additional exogenous variables that are included in the population, per capita income and employment equations are given by X_{t-i}^{pop} , X_{t-i}^{pci}, and X_{t-i}^{emp} respectively. These additional exogenous variables are included in the equations to control their effects on the dependent variables. This controlling makes estimates on the relationship between the variables we are interested more precise. Mills and Price (1984) who suggest that equilibrium employment, population and median household income are likely to adjust to their equilibrium values with a substantial lag. A lagged adjustment is introduced into our model. This partial-adjustment process replaced unobservable equilibrium then model takes the general form as follows:

$$\begin{aligned} POPG_t = {} & \propto_1 + \beta_{11} EMPG_t + \beta_{12} PCIG_t + \lambda_{11}\big((I \otimes W) POPG_t\big) + \lambda_{12}(I \otimes W) PCIG_t \\ & + \lambda_{13}(I \otimes W) EMPG_t + \delta_1 lnA_{t-i}^{pop} + \theta_1 BA_{t-i}^{pop} + \textstyle\sum_{k=1}^{K_1} \gamma_{1k} \ln (X_{t-i,k}^{pop}) \\ & - \eta_{11} \ln(POP_{t-i}) - \eta_{12} \ln(PCI_{t-i}) - \eta_{13} \ln(EMP_{t-i}) + u_{t,1} \qquad (4) \end{aligned}$$

$$\begin{aligned} PCIG_t = {} & \propto_2 + \beta_{21} POPG_t + \beta_{22} EMPG_t + \lambda_{21}\big((I \otimes W) POPG_t\big) + \lambda_{22}(I \otimes W) PCIG_t \\ & + \lambda_{23}(I \otimes W) EMPG_t + \delta_2 lnA_{t-i}^{pci} + \theta_2 BA_{t-i}^{pci} + \textstyle\sum_{k=1}^{K_1} \gamma_{2k} \ln (X_{t-i,k}^{pci}) \\ & - \eta_{21} \ln(POP_{t-i}) - \eta_{22} \ln(PCI_{t-i}) - \eta_{23} \ln(EMP_{t-i}) + u_{t,2} \qquad (5) \end{aligned}$$

$$\begin{aligned} EMPG_t = {} & \propto_3 + \beta_{31} POPG_t + \beta_{32} PCIG_t + \lambda_{31}\big((I \otimes W) POPG_t\big) + \lambda_{32}(I \otimes W) PCIG_t \\ & + \lambda_{33}(I \otimes W) EMPG_t + \delta_3 lnA_{t-i}^{emp} + \theta_3 BA_{t-i}^{emp} + \textstyle\sum_{k=1}^{K_1} \gamma_{3k} \ln (X_{t-i,k}^{emp}) \\ & - \eta_{31} \ln(POP_{t-i}) - \eta_{32} \ln(PCI_{t-i}) - \eta_{33} \ln(EMP_{t-i}) + u_{t,3} \qquad (6) \end{aligned}$$

Where $\propto_r$, β_{rq} , λ_{rl}, δ_r , , γ_{rk} , η_{rl} for k=1,….,K_r ; r, l = 1,2, 3; and q= 1,2 are the parameter estimates of the model and K_r is the number of exogenous variables in the respective equations. $POPG_t$, $PCIG_t$ and $EMPG_t$ represent the log differences between the end and beginning period values of population, per capita income and employment respectively. Then, they represent the growth of respective variables. The variable, automobile production (***lnA$_{t-i}$***), was constructed as ***ln*** (automobile production/ distance). The subscript t-i denotes to the variable lagged seven years, and η_r for r =1,2,3 are the speed of adjustment coefficients, the rate at which population, per capita income and employment adjust to their respective steady state equilibrium levels. $\mathbf{u}_{t,r}$ for r=1,2,3 are NT x 1 vectors of disturbances. A Moran's I test statistic suggested that there is the existence of spatial autocorrelation in the errors. The test results are given in Table 1.3. Therefore, the disturbance vector in the r^{th} equation is generated as:

$$\boldsymbol{u}_{t,r} = \rho_r \,(\boldsymbol{I}_T \otimes \boldsymbol{W})\, \boldsymbol{u}_{t,r} + \boldsymbol{\varepsilon}_{t,r}\,, \quad r = 1,2.3 \qquad (7)$$

This specification relates the disturbance vector in the r^{th} equation to its own spatial lag. A one-way error component structure was utilized to allow the innovations $(\boldsymbol{\varepsilon_1(t,r}\ \boldsymbol{))}$ to be correlated over time, following Baltagi (1995). Therefore, the innovation in the rth equation is given by

$$\boldsymbol{\varepsilon}_{t,r} = \boldsymbol{Z}_{\mu}\, \boldsymbol{\mu}_r + \boldsymbol{\omega}_{t,r}\ , \quad r = 1,2,3. \tag{8}$$

Where $\boldsymbol{Z}_{\mu} = (I_N \otimes \iota_T)$, $\mu_r' = (\mu_{1r}, \mu_{2r},, \mu_{Nr})$, $\omega_{t,r}' = (\omega_{11r}, \omega_{12r},., \omega_{1Tr},, \omega_{N1r},., \omega_{NTr})$

I_T and I_N are identity matrices of dimension T and N, respectively, ι_T is a vector of ones of dimension T, and $\otimes$ denotes the Kronecker product. $\boldsymbol{\mu}_r$ and $\boldsymbol{\omega}_{t,r}$ are random vectors with zero means and covariance matrix (suppressing the time index):

$$E\begin{pmatrix}\mu_r\\ \omega_r\end{pmatrix}(\mu_r'\ \omega_r') = \begin{bmatrix}\sigma_{\mu rr}^2\ I_N & 0\\ 0 & \sigma_{\omega rr}^2\ I_{NT}\end{bmatrix} \tag{9}$$

Where, $\boldsymbol{\mu}_r$ denotes vector of unit specific error components and $\boldsymbol{\omega}_r$ contains the error components that vary over both the cross- sectional units and time periods. The innovations $\boldsymbol{\varepsilon}_{t,r}$ are not spatially correlated across units but they are auto-correlated over time. However, this specification allows innovations from the same cross sectional unit to be correlated across equations. Therefore, the vectors of disturbances are spatially correlated across units and across equations as given in (10) the same specification was used by Kapoor, Kelejian, and Prucha (2007); Baltagi, Song, and Koh (2003)).

$$\boldsymbol{u}_{t,r} = \rho_r\, (\boldsymbol{I}_T \otimes \boldsymbol{W})\, \boldsymbol{u}_{t,r} + (\boldsymbol{I}_N \otimes \boldsymbol{\iota}_T)\boldsymbol{\mu}_r + \boldsymbol{\omega}_{t,r}\ , \quad r = 1,2,3 \tag{10}$$

The intercepts ($\propto_r$ $for\ r = 1,2,3$) in equations (4) – (6) represent the combined influences of changes in the suppressed exogenous variables; the $\boldsymbol{\beta}_r$ for $r = 1,2,3$ coefficients are structural elasticities corresponding to the endogenous variables. A basic hypothesis to be tested is that the δ_r coefficients are positive, i.e., an increase in automobile production causes population, employment, and income to increase, ceteris paribus. We add the interaction terms to test whether the automobile production boom differentially affected economic growth in the distressed Black Belt counties. We incorporate spatial components to capture the role of population, employment and per capita income of neighboring counties. This system of spatial equations control spatial spillover effect of neighboring counties (Nzaku and Bukenya, 2005; Trendle, 2009; Gebremariam,2010). Generalized Spatial Three-Stage Least squares (GS3SLS) approach outlined by Kelejian and Prucha (2004) into a panel data setting was used to estimate the model.

An important issue in regional development policy is whether "people follow jobs" or "jobs follow people." For example, if people follow jobs then policies to lure industry would be appropriate. Conversely, if jobs follow people, public funds might be better spent educating the resident population. The chicken or egg question can be tested by simple inspection of the t- ratios associated the $\boldsymbol{\beta}_{11}$ and $\boldsymbol{\beta}_{31}$ coefficients in equations (4) and (6). For example, if $\boldsymbol{\beta}_{11} = 0$ and $\boldsymbol{\beta}_{31} > 0$, then people follow jobs and the state should emphasize industrial development. Conversely, if $\boldsymbol{\beta}_{31} = 0$ and $\boldsymbol{\beta}_{11} > 0$, then jobs follow people and the state should emphasize educating the resident population. If $\boldsymbol{\beta}_{11} > 0$ and $\boldsymbol{\beta}_{31} > 0$ migration and employment are interrelated. In this instance, both development approaches are relevant and their relative effectiveness would depend on the relative size of the coefficients.

Data for sixty seven counties in Alabama are drawn from several sources (Table 1). These data were collected for study period from 1970 to 2007. We construct growth of population, employment and per capital income, using 7 years interval between the beginning and end period, like 1970-1977, 1980-1987, 1990-1997 and 2000-2007. We used 7 years interval to construct these growths because the latest data for automobile production was available in 2007 during this study period and census data were used for other variables. Independent variables include demographic, human capital, labor market, housing, amenity, automobile production, interaction term of automobile production and distressed black belt county and policy variables. McGranahan (1999) developed the Economic Research Service (ERS) natural amenities index, which combines the attractiveness of mild climate, varied topography, and proximity to surface water into one measure.

The initial values of the independent variables are used as 7 years lagged value. This formulation reduces the problem of endogeneity. All independent variables are in log form except those that can take negative or zero values. Automobile plants locate in only four counties of Alabama, namely Tuscaloosa, Talladega, Madison and Montgomery. The distance between the major city of these four counties and major city of all other counties were obtained from MapQuest. Ratio of automobile production and distance for each county were constructed by dividing automobile production of each plant by distance between major city of county where plant locates and the major city of each county. Then, sum of ratio of automobile production and distance were obtained by adding ratio of every company. The monetary value of per capita income, per capita property tax and local tax were deflated, using CPI. The descriptive statistics of the variables are given in Table 2.

A panel model for the study period is estimated. This model contains four time periods and 67 counties. Then, 268 observations are used in the panel model. Panel model can be used to control unobserved heterogenity and to investigate inter-temporal changes. Since the panel data provide more information and variables, the degree of freedom and efficiency increases and multicollinearity is less likely to occur. Following Baltagi (1995), one way error component structure model was utilized for the panel data in this empirical study. This system of equations has econometric issues regarding feedback simultaneity, spatial autoregressive lag, and spatial cross-regressive lag simultaneity with spatially autoregressive disturbances. These simultaneities create problems in estimation and identification of each equation. The order condition for identification in a linear simultaneous equations model is that the number of dependent variables on the right hand side of an equation must be less than or equal to the number of predetermined variables in the model but not in the particular equation. Lagged dependent variables also can be considered as predetermined variables. Kelejian and Prucha considered that the spatially lagged dependent variables can be treated as predetermined (Kelejian and Prucha, 2004). The order condition for each equation of the system in (4) – (6) is fulfilled.

Table 1: Variable Description and Data Sources

Variable	variable Description	unit	Source
POPG	Population Growth	%	A, B
PCIG	Per capita income Growth	%	A, B
EMPG	Employment Growth	%	A, B
pop	population	number	B
pci	per capita income	$/person	B
emp	employment	number	B
auto	No. of automobile/distance	Number/mile	A, J, K
autoblack	Interaction of auto and Black Belt county		
unemp	unemployment rate	%	E
17years	% of population below 17years	%	C, D
65years	% of population above 65years	%	C, D
hsch	% of high school degree or above	%	C, D
bach	% of bachelor degree or above	%	C, D
pov	poverty rate	%	D
protax	per capita property tax	$/person	D
tax	per capita local tax	$/person	D
owner	owner occupied housing in percent	%	D
farm	% employed in farming	%	B
manu	%employed in manufacturing	%	B
serv	%employed in other sectors	%	B
amenity	Natural Amenities Index	ERS index	H
anfpin	average nonfarm proprietor's income	$	B
hway	road density	mile/square mile	I
dista	distance from metro area	mile	J
metro	dummy variable for metro area	dummy value	
$(I \otimes W)POPG$	Spatial lag of POPG	%	A, B
$(I \otimes W)PCIG$	lag of PCIG	%	A, B
$(I \otimes W)EMPG$	Spatial lag of EMPG	%	A, B

A- Computed, B- US Department of Commerce, Bureau of Economic Analysis (REIS database), C- County & City Data Book, D- U.S Census Bureau, E- Bureau of Labor Statistics, F- American Medical Association, G-Federal Bureau of Investigation, H- Economic Research Service, USDA, I – US Bureau of Transportation Statistics, J- Map Quest, K - Mercedes-Benz U.S. International, Tuscaloosa, AL, Honda Manufacturing of Alabama, Lincoln, AL, Hyundai Motor Manufacturing Alabama, Montgomery, AL, Toyota Motor Manufacturing Alabama, Huntsville, AL, Automotive News Market Data Book

Hausman test (1983) for overidentification was done to investigate whether the additional instruments are valid in the sense that they are uncorrelated with the error term. That is $E(\mathbf{Q'u}_r) = 0$, Where E is the expectation operator and **Q** is an instrument matrix that consist of a subset of linearly independent columns **X, WX, W²X,** where **X** is the matrix that includes the control variables in the model. All equations are appropriately identified because the hypothesis of orthogonality for each equation cannot be rejected even at P= 0.05 as indicated by the NR_u^2 test statistic in Table 3. A Moran's I test statistic for each single equation suggested that there is the existence of spatial autocorrelation in the errors. The test results are given in Table 3.

Table 2: Descriptive Statistics for Alabama Counties

Variable	Description	Mean	Std Dev
POPG	Population Growth, t	1.05	0.09
PCIG	Per capita income Growth, t	1.14	0.1
EMPG	Employment Growth, t	1.1	0.14
pop	population, t-i	59149.84	93442.84
pci	per capita income, t-i	18225.76	4978.4
emp	employment, t-i	28441.48	55516.72
auto	No. of automobile/distance, t-i years	494.7	4892.61
autoblack	Interaction of auto and Black Belt county	55.24	283.85
unemp	unemployment rate, t-i years	8.8	4.93
17years	% of population below 17years, t-i	30.03	4.99
65years	% of population above 65years, t-i	12.74	2.53
hsch	% of high school degree or above, ,t-i	53.37	14.97
bach	% of bachelor degree or above, t-i	9.95	5.61
Pov	poverty rate, t-i	23.09	10.33
protax	per capita property tax, t-i	81.21	80.5
tax	per capita local tax, t-i	208.02	181.56
owner	owner occupied housing in percent, t-i	72.97	7.1
Farm	% employed in farming, t-i	9.03	6.69
manu	%employed in manufacturing, t-i	25.4	10.42
serv	%employed in other sectors, t-i	16.98	5.87
amenity	Natural Amenities Index, t-i	1.87	1.79
anfpin	average nonfarm proprietor's income, t-i	11312.53	4988.92
hway	road density, t-i	0.13	0.03
dista	distance from metro area	34.72	25.18
metro	dummy variable for metro area	1.31	0.66
$(I\otimes W)$POPG	Spatial lag of POPG, t	1.05	1.06
$(I\otimes W)$PCIG	Spatial lag of PCIG, t	1.13	1.07
$(I\otimes W)$EMPG	Spatial lag of EMPG, t	1.09	1.07

i is 7 years

When the spatial autoregressive lag and spatial cross-regressive lag simultaneities are present, the conventional three-stage least squares estimation to handle the feedback simultaneity would be inappropriate. Therefore, the Method of Moments approach was used rather than maximum likelihood because maximum likelihood would involve significant computational complexity. Generalized Spatial Three-Stage Least squares (GS3SLS) approach outlined by Kelejian and Prucha (2004) into a panel data setting was used to estimate the model.

3. Results and Discussion

The parameter estimates of the system were given in Table 3. In general, the results are consistent with previous studies on regional growth model. The results show the existence of simultaneities among endogenous variables. This indicates that there are strong interdependences among population growth, per capita income growth and employment growth. The negative and significant coefficient of lagged dependent variable in each equation indicates the conditional convergence with respect to the respective endogenous variable of each equation. This also implies that growth of population, per capita income and employment were higher in counties that had low initial level of population, per capita income and employment, respectively, compared to counties with high initial levels. In the equation of population growth, the coefficient of employment growth is positive as expected and significant at 1% level. The coefficient of employment growth (0.59) indicates that an increase in employment growth may result in-migrants and hence increase the population growth, other things being equal. The previous studies (Carlino and Mills, 1987 and Clark and Murphy, 1996) reported the same relationship that changes in employment are driving population. This is interpreted as people follow jobs. Coefficient for the ratio of automobile production to distance indicates that an increase in automobile production of a plant reduce the population growth with closer distance to the automobile plant. When automobile production in a given plant increases, number of automotive suppliers cluster around automobile plant. The competition for land and other infrastructure facilities between automotive suppliers and real estate builders deter people migration closer to automobile plant. Since the coefficient of the interaction term of automobile production and distressed Black County is insignificant, there is no differential impact of automobile production on population growth in distressed black counties.

The coefficient of spatial autoregressive lag is positive and significant. This indicates that population growth in neighboring counties positively influence the population growth of a given county through immigration due to the low housing and land value. The coefficient of cross-regressive lag with respect to employment growth is negative. This may be explained that people are moving to neighboring countries for jobs. These results show that the growth of population and employment in neighboring counties has spillover effect on the growth of population in a given county. Global Moran's I statistic and ρ_1 indicate there is spatial spillover effect with respect to the error terms. This indicates that random shocks to the system affect not only the country where the shock originates and its neighbors, but also create shock waves across the study area, because of the structure of the autoregressive errors.

In employment growth equation coefficients of population and per capita income growth indicate that employment growth in a given county is positively and highly associated with population growth and per capita income growth. The coefficient of population growth (1.42) indicates that an increase in the population growth is associated with the increase in the employment growth. This supports the hypothesis that jobs follow people. The coefficient of per capita income growth (0.58) shows that there is an increase in employment growth for the increase in per capita income growth. Carlino and Mills (1987) found that population is driving employment growth and also the increase in income led to employment growth. Coefficient of the automobile production is positive and significant at 5% level. This coefficient suggests that when automobile production of a given plant increases, the employment growth of a county increases, while other things being equal. Since the coefficient of the interaction term of automobile production and distressed Black County is insignificant, there is no differential impact of automobile production on employment growth in distressed black counties.

Table 3: Population, Employment and Per Capita Income Growth Equations

	POPG Equation		EMPG Equation		PCIG Equation	
Variable	*Coeff.*	*z-stat*	*Coeff.*	*z-test*	*Coeff.*	*z-test*
POPG			1.424	17.38	-0.148	-1.42
PCIG	-0.173	-2.02	0.587	5.13		
EMPG	0.594	16.01			0.377	6.33
pop	-0.069	-2.68	0.133	3.83	-0.077	-2.38
pci	-0.02	-0.46	0.139	2.24	-0.289	-5.68
emp	0.052	2.34	-0.102	-3.39	0.056	2
auto	-0.007	-4.18	0.006	2.39	0.007	3.1
autoblack	-0.002	-1.05	0.001	0.29	0.004	1.62
unemp	-0.049	-5.91	0.084	6.89	-0.054	-5.22
17years	0.001	0.02	-0.03	-0.54	0.063	1.23
65years	-0.06	-2.55	0.064	1.81	0.035	1.14
hsch	-0.028	-0.81	-0.001	-0.02	0.082	1.8
bach	-0.008	-0.62	0.022	1.14	-0.016	-1.01
pov	0.004	0.29	-0.009	-0.44	0.012	0.67
protax	0.005	0.55	-0.003	-0.25	-0.019	-1.77
tax	0.033	2.44	-0.06	-3	0.055	3.31
owner	0.011	0.4				
farm	0.008	1.35	-0.003	-0.35	-0.017	-2.41
manu	-0.005	-0.59	0.01	0.86	-0.009	-0.92
serv	-0.008	-0.6	0.02	1	-0.022	-1.24
amenity	0.013	3.89	-0.018	-3.7	0.001	0.34
anfpin	-0.029	-2.07	0.058	2.88	-0.052	-3.24
hway	0.025	2.25	-0.042	-2.59	0.032	2.28
dista	-0.008	-1.36	0.01	1.16	-0.002	-0.2
metro	-0.032	-1.44	0.033	1.01	0.019	0.68
$(I\otimes W)$ POPG	0.469	4.02	-0.812	-4.86	0.131	0.85
$(I\otimes W)$ PCIG	0.017	0.25	-0.147	-1.49	0.267	2.95
$(I\otimes W)$ EMPG	-0.376	-4.13	0.713	5.67	-0.283	-2.66
Constant	0.967	2.15	-2.529	-4.11	3.121	6.1
RHO(ρ)	-0.321	-8.33[b]	-0.538	-3.88[b]	-0.121	-1.18[b]
SIG V	0.001	29.1[b]	0.003	7.3[b]	0.003	12.24[b]
SIG 1	0.002	16.59[b]	0.004	3.52[b]	0.002	6.82[b]
NR^2 - $\chi 2$ (39,41,40)	31.77	0.7877[c]	31.283	0.8364[c]	44.135	0.3405[c]
Moran I	0.149	0.022	0.065	0.244	0.144	0.027
N	268		268		268	

b: t-static value, c: p-value

In the employment growth equation, coefficients of spatial auto regressive lag effect are positive and significant at 5% level. This implies that employment growth in a given counties depends on the averages of employment growth of neighboring counties. This positive autoregressive lag effect implies that the spillover effect of employment growth in neighboring counties positively affect the employment growth in a given county. New jobs may be created due to the positive spillover effect of industrial clustering and availability of supporting services. Employment growth in neighboring counties attracts job seekers to commute from a given county. The coefficient of cross regressive lag with respect to the population growth is negative. This means that population growth in neighboring counties may attract more firms from a given county. These results indicate that the population and employment growth in neighboring counties have spillover effect on the employment growth of a given county.

In the per capita income growth equation, the coefficient of employment growth (0.38) implies that an increase in the employment growth is associated with the increase in per capita income growth. This result is consistent with theoretical expectations. Nzaku and Bukenya

(2005) found that employment has a strong positive effect on per capita income. Coefficient of automobile production of a plant positively influences the per capita income of the county. When automobile production of a given plant increases, the per capita income growth of a county increases. Since coefficient of the interaction term of automobile production and distressed Black County is significant at 10% level, there might be differential impact of automobile production on per capita income growth in distressed black counties. Interaction term suggests that per capita income of distressed Black County may rise for an increase in automobile production. The coefficient of spatial auto regressive lag effect is positive and significant. The per capita income growths in neighboring counties have positive spillover effect on the per capita income growth of a given county. The coefficient of cross regressive lag effect with respect to employment growth is negative. The higher employment growth in neighboring counties makes neighboring counties more attractive to new firms and existing firms. These results imply that the per capita income growth of a particular county depends on the average of employment growth and per capita income growth of neighboring counties. This is important from policy perspectives because the per capita income depend not only on the characteristics of that county, but also on the characteristics of its neighbors.

4. Conclusion

This study concludes that automobile production increase the employment growth and per capita income growth of the counties which are closer to the automobile plant, but reduce the population growth with closer distance to the automobile plant. This study also finds that jobs follow people and also people follow jobs. The existence of spatial lag indicates that growth of population, employment and per capita income are not only dependent on the characteristics of that county, but also on those of its neighbors. These interdependences provide the need of economic development policy coordination among the counties.

References

Ahn, YoungKyoo. 2005. " Alabama's Automotive Industry and Direct Foreign Investment".http://www.umich.edu/~econdev/alabama auto/ index.html (accessed 20 June 2008).

Alabama Automotive Manufacturers Association. 2008. " Alabama's Automotive Manufacturing Industry Continues to Grow". Press Release. February 1.

Baltagi, Badi. H, 1995, Econometric Analysis of Panel Data, New York: John Wiley and Sons.

Baltagi, Badi H., Seuck Heun Song, and Won Koh, 2003, "Testing Panel Data Regression Models with Spatial Error Correlation," Journal of Econometrics, 117: 123-150.

Barkley DL, Henry MS, Bao S (1998) The Role of Local School quality and Rural Employment and Population Growth. Rev Reg Stud 28(1): 81-102.

Buchholz, David E. 2008 " Business Incentive Reform Case Study: Mercedes – Benz: The Deal of the Century." Corporation for Enterprise Development: Washington, D.C. http://www.cfed.org/focus.m?parentid=34siteid=1629&id=1653 (accessed 20 June 2008).

Carlino, Gerald A., and Edwin S. Mills. 1987. " The Determinants of County Growth," Journal of Regional Science, 27, 39-54.

Clark, D. E. and C. A. Murphy. 1996. "Countywide Employment and Population Growth: An Analysis of the 1980s," Journal of Regional Science, 36, 235–256.

Deller, Steven C., Tsung-Hsiu Tsai, David W.Marcouiller, and Donald B.K. English. 2001. " The Role of Amenities and Quality of Life in Rural Economic Growth," American Journal of Agricultural Economics, 83, 352-365.

Duffy-Deno, Kevin T.1998. "The Effect of Federal Wilderness on County Growth in the Intermountain Western United States," Journal of Regional Science, 38, 109-136.

Economic Development Partnership of Alabama. " Alabama Automotive Industry Profile." http://www.edpa.org/docs/automotive-industry-profile.pdf (accessed 28 June 2008).

Gadzey, Anthony, Henry Thompson, and Osie Agyeman Yeboah. Undated. " Industrial Subsidies in Alabama: Economic Impact Across Counties", Southern Economics & Business Journal, 2003. http://www.aum.edu/uploadedfiles/Upload_Vol26_%203_4.pdf (accessed 20 June 2008)

Hammond, George W. and Eric C. Thompson 2008. " Determinants of Income Growth in Metropolitan and Nonmetropolitan Labor Markets." American Journal of Agricultural Economics. 90. 783-793.

Isserman, A.M. 1994. State economic development policy and practice in the United States: A survey article. International Regional Science Review 16,1&2: 49-100.

Kapoor, M., Kelejian, H.H. and I. R. Prucha (2007). Panel data models with spatially correlated error components, Journal of Econometrics, 140, 97-130.

Kelejian HH, Prucha IR (2004) Estimation of Simultaneous Systems of Spatially Interrelated Cross Sectional Equations. J Econ 118(1):27-50.

Kim, Kwang-Koo, David W. Marcouiller, and Steven C.Deller. 2005. " Natural Amenities and Rural Development: Understanding Spatial and Distributional Attributes." Growth and Change, 36,273-297.

Kinnucan, H.W., Y.Zheng, and G.Brehmer. 2006. State Aid and Student Performance: A Supply-Demand Analysis. Education Economics, 13, 486-509.

Krugman, Paul 1991. Geography and Trade. Cambridge, MA: MIT Press.

McGranahan, D.A. 1999. Natural Amenities Drive Rural Population Change. Food and Rural Economics Division, Economic Research Service, US Department of Agriculture. [AER-781], 1–24

Mills, E., Price, R., 1984. Metropolitan suburbanization and central city problems. Journal of Urban Economics 15, 1–17.

Nzaku, Kilungu and James O. Bukenya. 2005. "Examining the Relationship between Quality of Life Amenities and Economic Development." Review of Urban and Regional Development Studies, 17, 89-103.

Romer, Paul. 1986. "Increasing Returns and Long Run Growth, "Journal of Political Economy, 94, 1002- 1037.

RUPRI, 2007. Rural Policy Research Institute, http:// www.rupri.org (accessed February 2011)

Saint Onge, Jarron M., Lori M. Hunter and Jason D. Boardman.2007. Population Growth in High-Amenity Rural Areas: Does it Bring Socioeconomic Benefits to Long-Term Residents?" Social Science Quarterly. 88, pp.366-381.

Wimberley, Ronald C. and Libby V.Morris.2002. " The Regionalization of Poverty: Assistance for the Black Belt South?" Southern Rural Sociology. 18, 294-306.

Wren, Colin.1996. "Fund Substitution and the Incentive Effect of Public Investment Subsidies. " Scottish Journal of Political Economy. 43, 534-548.

Wu, Junjie and Munisamy Gopinath.2008. What Causes Spatial Variations in Economic Development in the United States?" American Journal of Agriccultural Economics. 90,pp.392-408.

IS THERE A LONG RUN NEXUS AMONG MENTAL DISORDER AND SOCIO-ECONOMIC INDICATORS? : EXPERIENCES FROM AN ECONOMETRIC STUDY ACROSS 40 COUNTRIES

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Abstract

Are there evidences of an association between poor mental health and the experience of poverty and socio-economic deprivation? To explore it, we try to relate all sorts of mental disorders with the per-capita GDP (PCGDP), the level of per-capita CO2 emissions as a measure of pollution (PCCO), usage of Internet (IU) as a measure of social behaviour, and Globalization Index (GI), for all the major countries in the world. Applying Vector Autoregression (VAR) model the results reveal that most of the high income countries in the selection have produced the result that mental disorder is cointegrated to the four socio economic indicators. The short run causality tests unambiguously backs up the sustainability of the long run cointegration relations derived for countries like Argentina, Australia, Canada, France, Germany, and UAE. Hence, mental disorder is not a problem to the lower income countries but to the high income countries as well.

Keywords: Mental health; poverty gap; CO2 emissions; terrorism; internet; gender; globalization

JEL classification:

1. Introduction

As is defined by the World Health Organization, mental health is,

"a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community".

As the WHO Commission on Social Determinants of Health reports, there is a growing evidence showing that many common mental health outcomes and disorders are a consequence of social, economic and environmental factors (WHO, 2013). It is important to take actions keeping in mind where people are born, grow, live and work and accordingly target them at improving the conditions of everyday life. As Bell et al. (2013) points out, a basic multilevel framework for understanding these social determinants of mental disorders includes factors like — violence /crime & neighbourhood deprivation, attributes of the natural environment, health care, access to clean water and sanitation, policies targeted at poverty reduction and inequality, gender based discrimination, issues in governance, human rights, etc. that are universal and proportionate to need. There is a building up of a scientific consensus that every child should get the best possible start that will generate the greatest societal and mental health benefits. The prevalence and social distribution of mental disorders has been reasonably well documented in high-income countries but not so in the lower and middle income countries. Furthermore, there is a lack of strategic measurability issue and hence a gap in policy formulation to prevent such mental disorders. Herein, comes the role of the social determinants of health. The objectives of the paper in this context are to make associations among all sorts of mental disorders i.e. Schizophrenia (per cent) plus Bipolar disorder (per cent) plus Eating disorders (per cent) plus Anxiety disorders (per cent) plus

Drug use disorders (per cent) plus Depression cases (per cent) plus Alcohol use disorders (per cent) with per-capita GDP, the level of CO2 emissions, internet usage, and Globalization index (high openness means high globalization and low on socialistic nature) for all the major income levels (i.e. High, Middle, Low). Policy-making at all levels of governance can make a positive difference is what we will be arguing out.

The paper is organized as follows. The following section highlights the variables used in this study followed by the empirical model, the econometric methodology used, information on the dataset used and discussions on the derived results. The paper ends with a conclusion.

There is growing interest in the relation between socio-economic status and mental health, especially in low and middle-income countries. We contribute to the literature by examining how multiple indicators of socio-economic status, as already has been mentioned, along with a focus on anxiety and depression. To begin with a broader perspective, as Allen et al. (2104) points out, systematic differences in mental health occurs on account of variation in factors like gender, age, ethnic identity, income levels, education level and area of residence are inequitable and can be reduced by comprehensive action targeted on these social determinants. Like, the authors point out how depression and anxiety varies disproportionately across the different income groups in UK. This actually motivated us to consider the same in our 40 country set-up to come to more meaningful conclusions. Voicing out almost the same concern, Glymour et al. (2014) argues the importance of community's social hierarchy, money and power in influencing mental disorders. They measure the socio-economic position in terms of income, expenditure, education level and assets. On a similar ground, Ruiz-Perez et al. (2018) performed multinomial logistic regression model to analyze the impacts of socio-demographic (age, socio-professional class, level of education, nationality, employment situation, marital status), psycho-social (social support) and financial (as measured by GDP per capita, risk of poverty, income per capita per household), public welfare services (health spending), labour market (employment and unemployment rates, percentage of temporary workers) on psychic morbidity as a measure of mental health for Spain. The findings in Dolan et al. (2008) support the claims by Ruiz-Perez et al. (2018) in the context of a British household panel data. However, pointed out the difficulty in establishing a causal relation between mental disorders and socio-economic factors. Bringing in the poverty factor, for high income countries, the existing literature has documented a clear improvement in the mental health position, the more an individual moves up the society's hierarchical ladder (Hemingway et al., 1997). Moving on, a discussion of poverty includes indicators like living on less than US$1 or US$2 per day, home overcrowding, extent of food insecurity, not having at least a basic minimum level of education (i.e. primary level are commonly correlated with mental disorders (see Smith, 1776; Murali & Oyebode, 2004 among others). Two of the most famous studies in this context are from UK, and includes the New Haven study (Hollingshead & Redlich, 1964) and the Midtown Manhattan Study conducted in 1963 (Langner & Michael, 1963) indicated that a direct relationship between the experience of poverty and a high rate of emotional disturbance. From poverty to inequality, in a recent study, Yu (2018) investigated — "the association among the ratio of female to male depressive disorder rates, gross domestic product, the GINI Index, and the gender inequality index for 122 countries". Some of the key findings are the existence of a significant correlation between gender inequality and mental health. Second, the significant variation in values of GINI coefficient associated with male but not female depressive disorder rates. Most studies in the literature have shown an association between indicators of poverty and the risk of mental disorders, the most common being with low levels of education and income. People living below the poverty line lack in financial resources to maintain a basic minimum standard of living and have inadequate access to educational opportunities; thereby, leading to lack of employment opportunities, hence, low income and thus, access to poor quality health care which increases the risk of developing a mental disorder under stressful conditions. Thus, the authors here consider per capita income levels and internet usage as a proxy for poverty levels. A high level of per capita income or high levels of internet usage are good indicators signifying non-existence of higher levels of poverty. This study, unlike its predecessors, will not explicitly consider poverty ratios or for that matter inequality levels but rather make use of these proxy variables, namely, level of per capita income or level of internet usage to measure such forms of association between poverty (or inequality) with mental disorders.

Also, from the policy makers' perspective, programmes like investment in education, health and provision of microcredit may have unanticipated benefits in reducing the risk of mental disorders in an unequal society (see for details Reiss, 2013; Patel & Kleinman, 2003). Also, unemployment levels have been found to be significantly correlated in influencing mental disorders but the issue of causality remains unexplored in the literature (see Linn et al, 1985; Dooley et al., 1994; Batic-Mujanovic, 2017). Even internet usage has been found to have a significant impact. As Hokby et al. (2016) puts it,

"Adolescents and young adults are among the most frequent Internet users, and accumulating evidence suggests that their Internet behaviors might affect their mental health.".

Some studies on different aspects of health and environment and socio-economic factors are addressed here to make an indirect impact upon mental health. Feshari and Hosseinzadeh (2018) investigate the correlation between health care and international tourism over the time period of 1971-2016 and reveal that there is a long-run relationship between health care and tourism for Iranian economy and so the implication policy of the study is that policy makers should adopt policies to improving health care and attract more international tourists. Having indirect link of health expenditure with mental health through poverty reduction, the study of Idaryani et al (2019), during 2006-17, shows that in the short term, health expenditures do not affect poverty in the three autonomous regions, Aceh, Papua, and West Papua, in Indonesia.

It is also possible that excessive use, regardless of the content, be it say, pornographic, computer games, magazines, social networking, surfing, etc. produces negative consequences, such as neglect of protective offline activities." (also see Niemz, 2005; Tripathi, 2017). Hruska-Tvrdy and Foldynova (2011) studied on identifying new social risks for sustainable development in the urban area of Ostrava in Czech Republic. It argued that currently new social risks which were caused by changes in a society appeared more frequently than before and also while previously the groups of underprivileged were counted in endangered groups, now the middle class can be affected as well. This report showed a spatial distribution of these risks. This study has strong implications with respect to the socio-economic determinants of mental health.

The literature with regards to the impact of CO2 emissions on mental health is limited to a few recent studies. Das (2018) attempts to test whether the BRICS nations are converging in terms of per capita CO2 emission over time for the period 1992-2014 and observes no convergence across the members of the group indicating diverging nature of environmental pollution that may lead to mental illness. The study by Obradovich et al. (2018) using meteorological data on a daily basis coupled with collected information from about two million randomly selected US residents highlights that hotter temperatures along with added precipitation each worsen mental health, and also that exposure to tropical cyclones is likely to intensify the worsening of mental health in the future. Studies similar in spirit to Obradovich et al. (2018) but in different contexts voice similar concerns include the works by — Searle and Gow (2010), Simpson et al. (2011), Gifford and Gifford (2016) among others. In their study, Jayanti et al (2019) examines the extent to which the quality of life has contributed towards achieving the SDGs in Indonesian provinces and it documented significant positive effects of the income level, tertiary education level, and formal employment status on the reduction on the poverty and hunger index. Further, both the tertiary level of education and income positively contributed to the increase in clean water access. In this paper, we take a step forward and bring together, as already discussed, all these socio-economic factors simultaneously to see the impact on mental health disorders across a large panel of 40 countries, so far unexplored.

2. Variable Description

The present study works with five endogenous variables, — mental disorder, per capita GDP (PCGDP), extent of globalization, internet use and pollution. Mental disorder is captured by the percentage of total population affected by Schizophrenia, Bipolar disorder, Eating disorders, Anxiety disorders, Drug use disorders, Depression and Alcohol use disorders. Leading factors in this head are Anxiety disorders and Depression. PCGDP is the per head income measured in current US Dollars. Extent of globalization measures the cross country movements of economic, political and social factors. A value of zero means no exchange of these three factors and a value of 100 means full flow of these three factors of a country to other countries. While, internet use is captured by the percentage of population using internet for personal or business uses, pollution has been confined by the magnitude of CO_2 emission in kilo tones.

3. Material and Empirical Methodology

The study has covered the period of 1996-2016 and 40 countries from six different regions, namely North America (USA, Canada), Western Europe (Germany, France, UK, Italy, Spain, Netherlands, Norway, Portugal & Ireland), Central, South and Eastern Europe (Russia, Greece & Czech Republic), Asia Pacific (China, India, Japan, Australia, S. Korea, Indonesia, Thailand, Malaysia, Philippines & New Zealand), Caribbean and Latin America (Brazil, Mexico, Argentina, Venezuela, Chile, D. Republic, Costa Rica, Trinidad & Tobago) and Middle East and Africa (Turkey, S. Arabia, S. Africa, UAE, Egypt, Nigeria, Algeria & Morocco). The data on the selected variables are borrowed from the World Bank. The primary objective of grouping the countries is to see whether mental disorder is specific to income levels or not. In specific terms it is required to examine whether mental disorder is a disease to the high income, middle income or low income countries.

Since the 21 data points may have stochastic trends we need to test for stationarity or unit roots of the four series for all the selected countries. We have tested for unit roots by Augmented Dickey-Fuller (ADF) (1979). The ADF test is based on the assumptions that the error terms are serially independent and have constant variance. For a data set of variable, y (y_t, t = 1, 2, ...,T), where t denotes time, let us consider the following linear regression set up for unit root test for two versions of the ADF(p) regression for the situations of *without and with time trend*–viz.,

$$\Delta y_t = \alpha + \beta y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$\Delta y_t = \alpha + \delta t + \beta y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (2)$$

If β = 0 is rejected by the ADF statistic then we say that the series is stationary. If this property holds for the series of all the selected variables, then we can run regression without the chances of getting spurious results. If not, we need to test whether the series are integrated of order one (I(1)) or first difference stationary. If we get the result that all the series are I(1) (that is integrated of same order), or non stationary at level values, then we can test for cointegration between the series to establish long run relations. We apply Johansen cointegration test.

Since we have five endogenous variables we can run vector auto regression (VAR) model and if we find cointegration among them then we apply vector error correction model (VECM). If VECM provides usual signs and statistically significant results then there are long run causal relations from any of the four independent variables to any one of the dependent variables. If we do not then there are no long run associations among all the five variables. In that case we test for short run causality in line with Wald test. If we get significant causality results then we test for the fitness of the model. We test for residuals to justify whether there is any serial correlation exists among the error terms (by LM test), whether there is the presence of heteroskedasticity (by Breusche-Pagan test) and whether the residuals are normally distributed (by JB test).

Let us structure a VAR model with five endogenous variables, mental disorder (M), growth of PCGDP (Y), globalization (G), internet use (I) and pollution (P).

$$M_t = \alpha_1 + \sum_{j=1}^{n} \beta_{1j} M_{t-j} + \sum_{j=1}^{n} \gamma_{1j} Y_{t-j} + \sum_{j=1}^{n} \delta_{1j} G_{t-j} + \sum_{j=1}^{n} \theta_{1j} I_{t-j} + \sum_{j=1}^{n} \phi_{1j} P_{t-j} + u_{1t} \quad (3)$$

$$Y_t = \alpha_2 + \sum_{j=1}^{n}\beta_{2j}M_{t-j} + \sum_{j=1}^{n}\gamma_{2j}Y_{t-j} + \sum_{j=1}^{n}\delta_{2j}G_{t-j} + \sum_{j=1}^{n}\theta_{2j}I_{t-j} + \sum_{j=1}^{n}\phi_{2j}P_{t-j} + u_{2t} \quad (4)$$

$$G_t = \alpha_3 + \sum_{j=1}^{n}\beta_{3j}M_{t-j} + \sum_{j=1}^{n}\gamma_{3j}Y_{t-j} + \sum_{j=1}^{n}\delta_{3j}G_{t-j} + \sum_{j=1}^{n}\theta_{3j}I_{t-j} + \sum_{j=1}^{n}\phi_{3j}P_{t-j} + u_{3t} \quad (5)$$

$$I_t = \alpha_4 + \sum_{j=1}^{n}\beta_{4j}M_{t-j} + \sum_{j=1}^{n}\gamma_{4j}Y_{t-j} + \sum_{j=1}^{n}\delta_{4j}G_{t-j} + \sum_{j=1}^{n}\theta_{4j}I_{t-j} + \sum_{j=1}^{n}\phi_{4j}P_{t-j} + u_{4t} \quad (6)$$

$$P_t = \alpha_5 + \sum_{j=1}^{n}\beta_{5j}M_{t-j} + \sum_{j=1}^{n}\gamma_{5j}Y_{t-j} + \sum_{j=1}^{n}\delta_{5j}G_{t-j} + \sum_{j=1}^{n}\theta_{5j}I_{t-j} + \sum_{j=1}^{n}\phi_{5j}P_{t-j} + u_{5t} \quad (7)$$

where $\alpha_1, \beta_{1j}, \gamma_{1j}, \delta_{1j}, \theta_{1j}$ *and* φ_{1j} stand for the intercept and slope coefficients when M is the dependent variable. The notations with numbers will change accordingly from 2 to 5 for Y, G, I and P as the dependent variables. Once the optimum lag is selected then the VAR model will have to be modified.

Once it is tested that the series are cointegrated, we will go for modeling the VECM. VECM is a restricted VAR model and it has cointegrating relation built into the specification so that it restricts the long run behaviours of the endogenous variables to converge to their long run equilibrium relations while allowing for the short run dynamics. The cointegrating term is known as the error correction (EC) term since the deviation from the long run equilibrium is corrected gradually through a series of short run dynamic adjustments. Here an additional explanatory variable, $\eta \hat{e}_{t-i}$, is added which is the estimated error terms with lagged values as the error correction terms. The equations are not shown here.

A negative and significant 'η' means errors are corrected and the series are back to the equilibrium relation and also justifies long run causality from any of the four endogenous variables to the rest of the endogenous variable.

Short run causality, say in equation (3), from Y, G, I and P to M can be examined on the basis of null hypothesis, H_0: $\gamma_{1j} = \delta_{1j} = \theta_{1j} = \varphi_{1j} = 0$. If the null hypothesis is accepted with probability values less than 0.05 then there is no causality running from Y, G, I and P to M. Wald test ensures the results.

4. Results

To begin with, in Table 1 the authors present the results of augmented Dickey–Fuller test (ADF) (see Cheung & Lai, 1995 for details). The results indicate that the variables under consideration have attained stationarity either at level or first difference or second difference values. Carrying out the tests separately for the countries, we see that first difference level of stationarity happens — for Argentina, it is the globalization index and mental disorder; for Australia, Egypt, Italy and Brazil, it is mental disorder, PCGDP and pollution; for Philippines it is mental disorder and globalization; for Canada it is mental disorder, globalization and internet use; for France it is only mental disorder. Only in case of Czech Republic, mental disorder is represented through trends and intercepts format of the ADF unit root test. All the endogenous variables have attained stationarity at their levels of second difference in majority of the countries like — Chile, China, Greece, India, Ireland, Malaysia, Mexico, Morocco, Netherlands, Nigeria, Norway, UK, New Zealand, Portugal, Russia, South Africa, South Korea, Spain, Thailand, Trinidad & Tobago, and Turkey. Apart from these countries, the endogenous variables in the remaining countries are stationary at their level values. Accordingly, we have applied the procedure of Johansen and Juselius (1990) in every individual country, separately. The basis is to look into the possibility of cointegration between the focus variables. In this study, given the AIC criteria, an optimum lag of 1 to 4 has been considered.

Table 1. Unit root test results of first differences unless otherwise specified

Country	Mental Disorder	PCGDP	Globalization	Internet Use	Pollution

	ADF	*Prob*	*ADF*	*Prob*	*ADF*	*Prob*	*ADF*	*Prob*	*ADF*	*Prob*
Algeria	-3.14	0.04	-3.85	0.00	-4.94	0.00	-2.76	0.08	-3.04	0.05
Argentina	-1.82*	0.06	-3.69	0.01	-2.23*	0.05	-4.34	0.00	-2.81	0.07
Australia	-2.14*	0.03	-2.70*	0.00	-3.92	0.00	-4.32	0.00	-3.01	0.05
Brazil	-1.81*	0.06	-3.18*	0.00	-4.08	0.00	-2.95	0.07	-1.99*	0.05
Canada	-1.77*	0.07	-3.13	0.04	-2.23*	0.04	-1.84*	0.07	-3.60	0.03
Ch. Repub.	-4.78**	0.00	-3.73	0.01	-2.82	0.07	-2.92	0.06	-4.37	0.00
Chile#	-3.82	0.01	-4.39	0.00	-3.30	0.04	-4.21	0.00	-4.64	0.00
China#	-4.44	0.00	-4.02	0.00	-5.39	0.00	-2.86	0.06	-2.98	0.06
Costa Rica	-3.45	0.02	-3.23	0.03	-3.42	0.03	-2.98	0.06	-3.85	0.01
D. Repub.	-2.92	0.06	-4.22	0.00	-5.05	0.00	-4.14	0.00	-4.30	0.00
Egypt	-1.74*	0.08	-1.88*	0.05	-4.29	0.00	-3.65	0.04	-3.42	0.03
France	-1.80*	0.06	-3.67	0.01	-2.99	0.06	-3.73	0.04	-3.61	0.02
Germany	-4.31	0.00	-3.37	0.02	-5.62	0.00	-3.59	0.04	-3.90	0.00
Greece#	-5.00	0.00	-4.51	0.00	-2.85	0.07	-4.85	0.00	-5.71	0.00
India#	-4.17	0.00	-5.89	0.00	-4.13	0.00	-4.80	0.00	-4.74	0.00
Indonesia	-3.98	0.00	-3.07	0.04	-3.12	0.04	-3.19	0.04	-5.88	0.00
Ireland#	-6.68	0.00	-4.56	0.00	-3.05	0.05	-5.55	0.00	-5.67	0.00
Italy	-1.79*	0.06	-3.46*	0.00	-3.03	0.00	-2.99	0.06	-2.98	0.06
Japan	-6.86	0.00	-3.40	0.02	-4.27	0.00	-3.66	0.01	-4.06	0.00
Malaysia#	-4.27	0.00	-5.44	0.00	-6.19	0.00	-4.53	0.00	-6.86	0.00
Mexico#	-4.24	0.00	-3.48	0.02	-6.29	0.00	-3.10	0.05	-5.39	0.00
Morocco#	-5.56	0.00	-5.75	0.00	-3.79	0.03	-3.97	0.01	-5.84	0.00
Netherlands#	-4.47	0.00	-6.45	0.00	-5.07	0.00	-13.4	0.00	-5.61	0.00
Nigeria#	-3.44	0.02	-7.93	0.00	-5.83	0.00	-2.93	0.06	-4.70	0.00
Norway#	-5.25	0.00	-5.20	0.00	-7.81	0.00	-5.50	0.00	-6.09	0.00
N. Zealand#	-4.38	0.00	-5.53	0.00	-4.02	0.00	-5.14	0.00	-3.92	0.01
Philippines	-1.82*	0.07	-3.11	0.04	-2.28*	0.03	-3.05	0.05	-3.47	0.03
Portugal#	-5.52	0.00	-6.60	0.00	-5.79	0.00	-5.15	0.00	-6.93	0.00
Russia#	-6.10	0.00	-4.65	0.00	-4.88	0.00	-3.77	0.02	-4.23	0.00
S. Africa#	-4.30	0.00	-3.40	0.02	-2.99	0.06	-3.19	0.05	-5.45	0.00
S. Arabia	-3.81	0.01	-3.84	0.00	-4.13	0.00	-2.97	0.06	-4.19	0.00
S. Korea#	-5.31	0.00	-6.56	0.00	-4.79	0.00	-5.35	0.00	-6.39	0.00
Spain#	-4.46	0.00	-5.87	0.00	-4.88	0.00	-4.86	0.00	-5.34	0.00
Thailand#	-4.38	0.00	-6.11	0.00	-5.15	0.00	-3.11	0.05	-3.81	0.01
Tri &Tob#	-4.72	0.00	-5.81	0.00	-3.80	0.00	-2.97	0.06	-4.09	0.00
Turkey#	-4.12	0.00	-4.83	0.00	-4.64	0.00	-4.45	0.00	-5.46	0.00
UAE	-3.05	0.04	-4.44	0.00	-3.11	0.05	-2.77	0.08	-4.06	0.00
UK#	-3.36	0.05	-5.63	0.00	-5.07	0.00	-4.51	0.00	-6.86	0.00
USA	-4.37	0.00	-2.94	0.06	-3.92	0.00	-2.83	0.07	-3.05	0.05
Venezuela#	-3.05	0.05	-11.3	0.00	-2.97	0.06	-3.84	0.01	-5.72	0.00

Notes : * mark is for 1st difference with no intercepts and trends. ** indicates tests for trends and intercepts. # represents stationary at 2nd differences. Mainly the series for Mental disorders and Internet use are stationary at second differences in most of the cases.
Source : Authors' own estimates

As from the results in Table 2, there is a strong evidence of a cointegrating relation in countries like Algeria, Argentina, Australia, Brazil, Canada, Czech Republic, Costa Rica, Italy, Dominican Republic, Egypt, France, Indonesia, Japan, Philippines, Saudi Arabia, UAE, USA and Germany where the test statistic values lie in the critical region (be it the right-hand tail or left-hand tail) and the null hypothesis of 'no cointegration' gets resoundingly rejected.

Table 2. Johansen Cointegration test results

Country	Whether Cointegration present*	No. of CEs*

Algeria	Yes	2
Argentina	Yes	4
Australia	Yes	5
Brazil	Yes	4
Canada	Yes	3
Ch. Repub.	Yes	3
Chile#	-	-
China#	-	-
Costa Rica	Yes	4
D. Repub.	Yes	1
Egypt	Yes	5
France	Yes	3
Germany	Yes	1
Greece#	-	-
India#	-	-
Indonesia	Yes	2
Ireland#	-	-
Italy	Yes	2
Japan	Yes	2
Malaysia#	-	-
Mexico#	-	-
Morocco#	-	-
Netherlands#	-	-
Nigeria#	-	-
Norway#	-	-
N. Zealand#	-	-
Philippines	Yes	2
Portugal#	-	-
Russia#	-	-
S. Africa#	-	-
S. Arabia	Yes	2
S. Korea#	-	-
Spain#	-	-
Thailand#	-	-
Tri &Tob#	-	-
Turkey#	-	-
UAE	Yes	2
UK#	-	-
USA	Yes	4
Venezuela#	-	-

Note: * mark indicates that the results are based on Trace statistics and Maximum-Eigen values.
Source: Authors' own estimates

It is an alarming result that most of the high income countries in the selection have produced the result that mental disorder is cointegrated to the four socio economic indicators.

Moving on to Table 3, using the VECM modelings one can clearly check for the significance of the long-run cointegrating relation that exists for the concerned countries. The model developed in this paper where mental disorder has been expressed as a function of PCGDP, Globalization, Internet use, CO2 emissions sustains in the long run going by the long run causality significance for 11 countries like Argentina, Australia, Canada, Costa Rica, Dominican Republic, France, Germany, Italy, Japan, Saudi Arabia and UAE (see Table 3 for the summary results and the coefficients of the error correction term in column 4).

Table 3. Results of error correction and long run causality test through VECM

Country	Dependent Variables	Independent Variables	EC term(η)	Prob.	Remarks
Algeria	Ment	PCGDP, Glob, Inter, Co2	0.025	0.94	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	-0.297	0.37	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-1.372	0.01	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.432	0.01	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-1.00	0.09	Ment, PCGDP, Glob, Inter→CO2
Argentina	Ment	PCGDP, Glob, Inter, Co2	-0.31	0.04	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-1.26	0.00	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-0.58	0.09	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.32	0.06	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.42	0.27	No LR causality
Australia	Ment	PCGDP, Glob, Inter, Co2	-0.41	0.00	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-0.39	0.06	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-1.05	0.01	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.33	0.06	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.54	0.14	No LR causality
Brazil	Ment	PCGDP, Glob, Inter, Co2	-0.19	0.23	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	-0.14	0.56	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-2.17	0.00	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.06	0.74	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	-0.78	0.01	Ment, PCGDP, Glob, Inter→CO2
Canada	Ment	PCGDP, Glob, Inter, Co2	-0.28	0.02	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-0.13	0.59	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-0.14	0.59	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	-0.27	0.09	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-1.33	0.00	Ment, PCGDP, Glob, Inter→CO2
Ch. Repub.	Ment	PCGDP, Glob, Inter, Co2	-0.05	0.83	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	-0.22	0.26	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	0.06	0.68	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	-0.47	0.08	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.33	0.42	No LR causality
Chile#	-	-	-	-	-
China#	-	-	-	-	-
Costa Rica	Ment	PCGDP, Glob, Inter, Co2	-0.46	0.04	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	0.36	0.04	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-0.68	0.15	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	-0.97	0.03	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.47	0.17	No LR causality
D. Repub	Ment	PCGDP, Glob, Inter, Co2	-0.06	0.01	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-0.005	0.91	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-0.05	0.73	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	-0.07	0.00	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.16	0.02	Ment, PCGDP, Glob, Inter→CO2
Egypt	Ment	PCGDP, Glob, Inter, Co2	-0.10	0.30	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	-0.54	0.00	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-1.09	0.00	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.13	0.57	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	-1.71	0.00	Ment, PCGDP, Glob, Inter→CO2
France	Ment	PCGDP, Glob, Inter, Co2	-0.17	0.02	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-1.03	0.04	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-0.80	0.43	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	0.18	0.73	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	-0.61	0.31	No LR causality
Germany	Ment	PCGDP, Glob, Inter, Co2	-0.02	0.08	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-0.06	0.89	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-0.13	0.47	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	0.16	0.03	No LR causality

Country	**Dependent Variables**	**Independent Variables**	**EC term(η)**	**Prob.**	**Remarks**
	Co2	Ment, PCGDP, Glob, Inter	-0.41	0.07	Ment, PCGDP, Glob, Inter→CO2
Greece#	-	-	-	-	-
India#	-	-	-	-	-
Indonesia	Ment	PCGDP, Glob, Inter, Co2	-0.006	0.93	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	-0.51	0.20	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	0.03	0.70	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	0.09	0.32	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	-1.67	0.00	Ment, PCGDP, Glob, Inter→CO2
Ireland#	-	-	-	-	-
Italy	Ment	PCGDP, Glob, Inter, Co2	-0.26	0.00	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-0.36	0.20	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-0.22	0.03	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.13	0.33	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	0.05	0.61	No LR causality
Japan	Ment	PCGDP, Glob, Inter, Co2	-0.20	0.00	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	-0.93	0.00	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-0.81	0.18	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	-0.16	0.15	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	-0.12	0.72	No LR causality
Malaysia#	-	-	-	-	-
Mexico#	-	-	-	-	-
Morocco#	-	-	-	-	-
Netherlands#	-	-	-	-	-
Nigeria#	-	-	-	-	-
Norway#	-	-	-	-	-
N. Zealand#	-	-	-	-	-
Philippines	Ment	PCGDP, Glob, Inter, Co2	-0.01	0.73	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	0.15	0.47	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-0.16	0.41	No LR causality
	Inter	Ment, PCGDP, Glob,Co2	0.009	0.96	No LR causality
	Co2	Ment, PCGDP, Glob, Inter	-2.96	0.00	Ment, PCGDP, Glob, Inter→CO2
Portugal#	-	-	-	-	-
Russia#	-	-	-	-	-
S. Africa#	-	-	-	-	-
S. Arabia	Ment	PCGDP, Glob, Inter, Co2	-0.14	0.01	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	0.16	0.74	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-1.05	0.03	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.19	0.03	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.88	0.00	Ment, PCGDP, Glob, Inter→CO2
S. Korea#	-	-	-	-	-
Spain#	-	-	-	-	-
Thailand#	-	-	-	-	-
Tri &Tob#	-	-	-	-	-
Turkey#	-	-	-	-	-
UAE	Ment	PCGDP, Glob, Inter, Co2	-0.43	0.07	**PCGDP, Glob, Inter, Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	0.04	0.21	No LR causality
	Glob	Ment, PCGDP, Inter, Co2	-0.69	0.02	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.10	0.09	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-0.26	0.45	No LR causality
UK#	-	-	-	-	-
USA	Ment	PCGDP, Glob, Inter, Co2	-0.12	0.17	No LR causality
	PCGDP	Ment, Glob, Inter, Co2	-0.36	0.02	Ment, Glob, Inter, CO2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	-1.11	0.01	Ment, PCGDP, Inter, CO2→Glob
	Inter	Ment, PCGDP, Glob,Co2	-0.84	0.00	Ment, PCGDP, Glob, CO2→Inter
	Co2	Ment, PCGDP, Glob, Inter	-1.11	0.00	Ment, PCGDP, Glob, Inter→CO2
Venezuela#	-	-	-	-	-

Source: Authors' own estimates

It is further noted that out of these 11 countries, where long run causal relations are observed from all the four socio-economic indicators to mental disorder, eight are from the high income earning group. Hence, mental disorder is a real problem for the developed countries.

It should be noted here that the results in Table 4 relates to the significance of the causal relations in the short run. In other words, to draw a parallel, Granger causality is more about short run (i.e. results in Table 4) while long run causality depends upon significance of the long run relations and has been tested through the lagged error correction term (see column 4 of Table 3) derived from the long run equilibrium relationships in Table 3. The results of the short run causality tests in Table 4 unambiguously backs up the sustainability of the long run cointegration relations derived for countries like Argentina, Australia, Canada, Costa Rica, Dominican Republic, France, Germany, Italy, Japan, Saudi Arabia and UAE, as already mentioned above along with Egypt.

Table 4. Short run causality test results (Wald test)

Country	**Dependent Variables**	**Independent Variables**	**Chi Square Value**	**Prob.**	**Remarks**
Algeria	Ment	PCGDP, Glob, Inter, Co2	3.56	0.46	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	2.32	0.61	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	2.25	0.68	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	6.36	0.17	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	3.92	0.41	No SR causality
Argentina	Ment	PCGDP, Glob, Inter, Co2	11.96	0.01	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	18.28	0.00	Ment, Glob, Inter, Co2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	9.23	0.05	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	3.43	0.48	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	13.49	0.00	Ment, PCGDP, Glob, Inter→ Co2
Australia	Ment	PCGDP, Glob, Inter, Co2	6.68	0.15	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	4.69	0.32	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	7.24	0.12	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	5.50	0.22	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	4.93	0.29	No SR causality
Brazil	Ment	PCGDP, Glob, Inter, Co2	8.67	0.06	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	3.29	0.50	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	1.25	0.86	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	11.85	0.01	Ment, PCGDP, Glob, Co2→ Inter
	Co2	Ment, PCGDP, Glob, Inter	6.81	0.14	No SR causality
Canada	Ment	PCGDP, Glob, Inter, Co2	19.88	0.00	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	3.09	0.54	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	10.20	0.03	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	8.20	0.08	Ment, PCGDP, Glob, Co2→ Inter
	Co2	Ment, PCGDP, Glob, Inter	13.12	0.01	Ment, PCGDP, Glob, Inter→ Co2
Ch. Repub.	Ment	PCGDP, Glob, Inter, Co2	2.08	0.72	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	0.38	0.98	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	19.22	0.00	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	3.83	0.42	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	10.36	0.03	Ment, PCGDP, Glob, Inter→ Co2
Chile#	Ment	Co2	2.75	0.09	d(d(Co2)) →d(d(Ment))
	PCGDP	None & All	0.24	0.99	No SR causality
	Glob	None & All	2.91	0.57	No SR causality
	Inter	Glob	2.95	0.08	d(d(Glob)) →d(d(Inter))
	Co2	None & All	5.46	0.24	No SR causality
China#	Ment	None & All	2.96	0.56	No SR causality
	PCGDP	None & All	2.17	0.70	No SR causality
	Glob	Ment	2.80	0.09	d(d(Ment))→d(d(Glob))
	Inter	None & All	0.67	0.95	No SR causality
	Co2	PCGDP	2.97	0.08	d(d(PCGDP))→d(d(Co2))
Costa Rica	Ment	PCGDP, Glob, Inter, Co2	6.32	0.17	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	16.64	0.00	Ment, Glob, Inter, Co2→PCGDP

Country	Dependent Variables	Independent Variables	Chi Square Value	Prob.	Remarks
	Glob	Ment, PCGDP, Inter, Co2	6.90	0.14	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	3.74	0.44	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	0.72	0.94	No SR causality
D. Repub	Ment	PCGDP, Glob, Inter, Co2	3.24	0.66	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	13.61	0.01	Ment, Glob, Inter, Co2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	9.97	0.09	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	22.83	0.00	Ment, PCGDP, Glob, Co2→ Inter
	Co2	Ment, PCGDP, Glob, Inter	13.67	0.01	Ment, PCGDP, Glob, Inter→ Co2
Egypt	Ment	PCGDP, Glob, Inter, Co2	8.35	0.07	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	8.05	0.08	Ment, Glob, Inter, Co2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	13.38	0.00	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	0.93	0.91	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	13.25	0.01	Ment, PCGDP, Glob, Co2→ Inter
France	Ment	PCGDP, Glob, Inter, Co2	22.53	0.00	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	4.75	0.31	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	4.55	0.33	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	2.33	0.67	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	4.98	0.29	No SR causality
Germany	Ment	PCGDP, Glob, Inter, Co2	14.98	0.01	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	4.67	0.45	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	6.61	0.25	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	17.11	0.00	Ment, PCGDP, Glob, Co2→ Inter
	Co2	Ment, PCGDP, Glob, Inter	12.66	0.02	Ment, PCGDP, Glob, Inter→ Co2
Greece#	Ment	None & All	4.72	0.31	No SR causality
	PCGDP	None & All	0.61	0.96	No SR causality
	Glob	Ment, Co2	2.92, 4.13	0.08, 0.04	d(d(Ment& Co2))→d(d(Glob))
	Inter	Ment, Glob	2.82, 4.58	0.09, 0.03	d(d(Ment& Glob))→d(d(Inter))
	Co2	PCGDP	3.05	0.08	d(d(PCGDP))→d(d(Co2))
India#	Ment	None & All	2.47	0.64	No SR causality
	PCGDP	None & All	4.57	0.33	No SR causality
	Glob	All	64.35	0.00	d(d(All))→d(d(Glob))
	Inter	Glob	3.93	0.04	d(d(Glob))→d(d(Inter)) Bilateral between Glob and Inter
	Co2	Inter	4.00	0.04	d(d(Inter))→d(d(Co2))
Indonesia	Ment	PCGDP, Glob, Inter, Co2	4.09	0.39	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	2.21	0.69	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	3.51	0.47	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	3.01	0.55	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	13.18	0.01	Ment, PCGDP, Glob, Inter→ Co2
Ireland#	Ment	PCGDP	3.69	0.05	d(d(PCGDP))→d(d(Ment))
	PCGDP	None & All	5.94	0.20	No SR causality
	Glob	None & All	1.92	0.74	No SR causality
	Inter	Ment& All	5.74, 8.36	0.01, 0.07	d(d(Ment))→d(d(Inter)) d(d(All))→d(d(Inter))
	Co2	Ment, Inter & All	10.04, 10.25, 22.23	0.00, 0.00, 0.00	d(d(Ment& Inter))→d(d(Co2)) d(d(All))→d(d(Co2))
Italy	Ment	PCGDP, Glob, Inter, Co2	17.59	0.00	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	6.52	0.16	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	2.72	0.60	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	1.05	0.90	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	5.27	0.25	No SR causality
Japan	Ment	PCGDP, Glob, Inter, Co2	11.34	0.02	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	6.24	0.18	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	2.40	0.66	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	1.81	0.77	No SR causality

Country	Dependent Variables	Independent Variables	Chi Square Value	Prob.	Remarks
	Co2	Ment, PCGDP, Glob, Inter	0.60	0.96	No SR causality
Malaysia#	Ment	Glob & All	5.97, 10.96	0.01, 0.02	d(d(Glob))→d(d(Ment)) d(d(Jointly))→d(d(Ment))
	PCGDP	None & All	2.80	0.59	No SR causality
	Glob	Ment, Inter & All	3.10, 3.21 & 12.36	0.07, 0.07, 0.01	d(d(Ment& Inter))→d(d(Glob)) d(d(Jointly))→d(d(Glob))
	Inter	None & All	1.19	0.87	No SR causality
	Co2	Glob	2.79	0.09	d(d(Glob))→d(d(Co2))
Mexico#	Ment	None & All	0.95	0.91	No SR causality
	PCGDP	None & All	3.86	0.42	No SR causality
	Glob	Inter & All	6.56, 10.0	0.01, 0.04	d(d(Inter))→d(d(Glob)) d(d(Jointly))→d(d(Glob))
	Inter	None & All	0.87	0.92	No SR causality
	Co2	PCGDP	4.07	0.04	d(d(PCGDP))→d(d(Co2))
Morocco#	Ment	Glob	5.14	0.02	d(d(Glob))→d(d(Ment))
	PCGDP	None & All	0.72	0.94	No SR causality
	Glob	None & All	2.01	0.73	No SR causality
	Inter	None & All	0.57	0.96	No SR causality
	Co2	Glob, Inter & All	2.89, 9.57 & 10.69	0.08, 0.00& 0.03	d(d(Glob, Inter))→d(d(Co2)) d(d(Jointly))→d(d(Co2))
Netherlands#	Ment	Co2 & All	5.41 & 9.35	0.02 &0.05	d(d(Co2))→d(d(Ment)) d(d(Jointly))→d(d(Ment))
	PCGDP	Co2	3.00	0.08	d(d(Co2))→d(d(PCGDP))
	Glob	PCGDP & All	9.03 & 13.2	0.00 &0.01	d(d(PCGDP))→d(d(Glob)) d(d(Jointly))→d(d(Glob))
	Inter	None & All	3.39	0.49	No SR causality
	Co2	PCGDP & All	10.24 &14.3	0.00 &0.00	d(d(PCGDP))→d(d(Co2)) Bilateral Causality d(d(Jointly))→d(d(Co2))
Nigeria#	Ment	PCGDP, Co2, Inter & All	6.02, 8.82, 4.12 & 26.4	0.01, 0.00, 0.04 & 0.00	d(d(PCGDP, Co2, Inter))→d(d(Ment)) d(d(Jointly))→d(d(Ment))
	PCGDP	Co2	3.62	0.05	d(d(Co2))→d(d(PCGDP))
	Glob	PCGDP	5.13	0.02	d(d(PCGDP))→d(d(Glob))
	Inter	PCGDP	2.74	0.09	d(d(PCGDP))→d(d(Inter))
	Co2	Ment	2.94	0.08	d(d(Co2))→d(d(Ment)) Bilateral Causality
Norway#	Ment	PCGDP & All	14.98 & 18.41	0.00, 0.00	d(d(PCGDP))→d(d(Ment)) d(d(Jointly))→d(d(Ment))
	PCGDP	None & All	1.37	0.84	No SR causality
	Glob	Co2	3.08	0.07	d(d(Co2))→d(d(Glob))
	Inter	None & All	1.79	0.77	No SR causality
	Co2	Ment	3.12	0.07	d(d(Ment))→d(d(Co2))
N. Zealand#	Ment	None & All	2.10	0.71	No SR causality
	PCGDP	None & All	4.81	0.30	No SR causality
	Glob	None & All	0.67	0.95	No SR causality
	Inter	None & All	2.31	0.67	No SR causality
	Co2	PCGDP	2.87	0.09	d(d(PCGDP))→d(d(Co2))
Philippines	Ment	PCGDP, Glob, Inter, Co2	1.47	0.83	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	2.26	0.68	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	3.00	0.55	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	37.46	0.00	Ment, PCGDP, Glob, Co2→ Inter
	Co2	Ment, PCGDP, Glob, Inter	19.50	0.00	Ment, PCGDP, Glob, Inter→ Co2
Portugal#	Ment	None & All	2.31	0.68	No SR causality
	PCGDP	None & All	2.39	0.66	No SR causality

Country	Dependent Variables	Independent Variables	Chi Square Value	Prob.	Remarks
	Glob	Ment& Inter	2.99 & 2.85	0.08, 0.09	d(d(Ment&Inter))→d(d(Glob))
	Inter	None & All	1.78	0.77	No SR causality
	Co2	Ment	2.72	0.09	d(d(Ment))→d(d(Co2))
Russia#	Ment	None & All	1.26	0.86	No SR causality
	PCGDP	None & All	4.58	0.33	No SR causality
	Glob	PCGDP	6.20	0.01	d(d(PCGDP))→d(d(Glob))
	Inter	None & All	1.84	0.76	No SR causality
	Co2	PCGDP & Glob	2.91 & 3.69	0.08 &0.05	d(d(PCGDP & Glob))→d(d(Co2))
S. Africa#	Ment	Co2	2.84	0.09	d(d(Co2))→d(d(Ment))
	PCGDP	Glob	4.56	0.03	d(d(Glob))→ d(d(PCGDP))
	Glob	Ment	2.96	0.08	d(d(Ment))→d(d(Glob))
	Inter	None & All	2.46	0.65	No SR causality
	Co2	None & All	1.34	0.84	No SR causality
S. Arabia	Ment	PCGDP, Glob, Inter, Co2	18.13	0.00	**PCGDP,Glob,Inter,Co2→Ment**
	PCGDP	Ment, Glob, Inter, Co2	1.91	0.75	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	3.62	0.45	No SR causality
	Inter	Ment, PCGDP, Glob,Co2	5.22	0.26	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	26.29	0.00	Ment, PCGDP, Glob, Inter→ Co2
S. Korea#	Ment	PCGDP & Co2	2.98 &2.78	0.08 &0.09	d(d(PCGDP&Co2))→d(d(Ment))
	PCGDP	Co2	3.64	0.05	d(d(Co2))→d(d(PCGDP))
	Glob	Co2 & Inter	2.97 &2.70	0.08 &0.10	d(d(Co2 & Inter))→d(d(Glob))
	Inter	Co2	3.31	0.06	d(d(Co2))→d(d(Inter))
	Co2	PCGDP & All	4.32 &8.14	0.03 &0.08	d(d(PCGDP))→d(d(Co2)) Bilateral Causality d(d(Jointly))→d(d(Co2))
Spain#	Ment	PCGDP & Co2	3.18 &2.62	0.07, 0.10	d(d(PCGDP & Co2))→d(d(Ment))
	PCGDP	Ment, Co2 & All	11.13, 2.79 & 13.53	0.00, 0.09, 0.00	d(d(Ment,Co2))→d(d(PCGDP)) Bilateral Causality d(d(Jointly))→d(d(PCGDP))
	Glob	Co2	5.08	0.02	d(d(Co2))→d(d(Glob))
	Inter	None & All	0.66	0.95	No SR causality
	Co2	None & All	3.54	0.47	No SR causality
Thailand#	Ment	None & All	2.37	0.66	No SR causality
	PCGDP	Ment, Inter & All	6.35, 8.76 & 13.95	0.01, 0.00, 0.00	d(d(Ment, Inter))→d(d(PCGDP)) d(d(Jointly))→d(d(PCGDP))
	Glob	None & All	0.91	0.92	No SR causality
	Inter	Co2	2.87	0.09	d(d(Co2))→d(d(Inter))
	Co2	None & All	3.40	0.49	No SR causality
Tri &Tob#	Ment	None & All	2.29	0.68	No SR causality
	PCGDP	None & All	3.76	0.43	No SR causality
	Glob	Co2	3.02	0.08	d(d(Co2))→d(d(Glob))
	Inter	None & All	3.76	0.43	No SR causality
	Co2	Ment, PCGDP, Inter & All	3.73, 8.85, 4.72 & 14.89	0.05, 0.00, 0.02 & 0.00	d(d(Ment, PCGDP& Inter))→d(d(Co2)) d(d(Jointly))→d(d(Co2))
Turkey#	Ment	None & All	1.09	0.89	No SR causality
	PCGDP	None & All	2.32	0.67	No SR causality
	Glob	Inter & All	10.13 &16.63	0.00 &0.00	d(d(Inter))→d(d(Glob)) d(d(Jointly))→d(d(Glob))
	Inter	Ment, Glob & All	14.20, 3.35 &	0.00,	d(d(Ment, Glob))→d(d(Inter))

Country	Dependent Variables	Independent Variables	Chi Square Value	Prob.	Remarks
			17.45	0.06 & 0.00	d(d(Jointly))→d(d(Inter))
	Co2	None & All	1.97	0.73	No SR causality
UAE	Ment	PCGDP, Glob, Inter, Co2	4.75	0.31	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	8.92	0.06	Ment, Glob, Inter, Co2→PCGDP
	Glob	Ment, PCGDP, Inter, Co2	8.41	0.07	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	3.54	0.47	No SR causality
	Co2	Ment, PCGDP, Glob, Inter	1.21	0.87	No SR causality
UK#	Ment	PCGDP & All	3.74 & 8.62	0.05 & 0.07	d(d(PCGDP))→d(d(Ment)) d(d(Jointly))→d(d(Ment))
	PCGDP	None & All	0.23	0.99	No SR causality
	Glob	None & All	1.20	0.87	No SR causality
	Inter	Ment	5.09	0.02	d(d(Ment))→d(d(Inter))
	Co2	None & All	0.52	0.97	No SR causality
USA	Ment	PCGDP, Glob, Inter, Co2	7.19	0.12	No SR causality
	PCGDP	Ment, Glob, Inter, Co2	5.88	0.20	No SR causality
	Glob	Ment, PCGDP, Inter, Co2	7.91	0.09	Ment, PCGDP, Inter, Co2→ Glob
	Inter	Ment, PCGDP, Glob,Co2	9.34	0.05	Ment, PCGDP, Glob, Co2→ Inter
	Co2	Ment, PCGDP, Glob, Inter	14.40	0.00	Ment, PCGDP, Glob, Inter→ Co2
Venezuela#	Ment	None & All	0.71	0.94	No SR causality
	PCGDP	Co2, Inter & All	5.29, 4.06 & 11.41	0.02, 0.04, 0.02	d(d(Co2,Inter))→d(d(PCGDP)) d(d(Jointly))→d(d(PCGDP))
	Glob	None & All	1.96	0.74	No SR causality
	Inter	None & All	2.30	0.68	No SR causality
	Co2	Glob & Inter	3.03 & 2.76	0.08 &0.09	d(d(Glob &Inter))→d(d(Co2))

Source: Authors' own estimates

Combining the long run and short run results of the study it is inferred that mental disorder is not a problem specific to the lower income countries as the existing literatures claim but also to the high income countries as well. But the interpretations and the factorial roles are very different. In the lower income countries low income levels, pollution, poverty and inequality lead to mental disorder, whereas, for the higher income countries, it is more of affluence that lead to mental disorder through a move towards globalization, internet use and exposure to pollution.

To justify the feasibility and applicability of the model developed in this paper, we test for the normality of the residuals and to what extent the models can be a good fit. The derived results have been also scanned for diagnostic checking on whether thee errors are normally distributed and are heteroscedastic. We observed that the countries for which the significant long run and short run results are observed satisfied the diagnostic checking. We did not place the table in the text as it is very large in size. The different models specified against the criteria of serial autocorrelation, heteroskedasticity and normality checks of the residuals for the countries were tested for validating the existence of a cointegrating relationship for countries like, Algeria, Argentina, Australia, Brazil, USA, UAE, Canada, Costa Rica, Italy, Dominican Republic, Egypt, France, Indonesia, Czech Republic, Japan, Philippines, Saudi Arabia, and Germany.

Going back to the basic model where mental disorder has been expressed as a function of per capita GDP (PCGDP), extent of globalization, internet use and pollution, we see that the relationship is somewhat stable and significant, mostly for the developing countries as reported in Table 3. In this rapidly changing world, one of the most alarming issues is mental ill health increasingly occupying a larger proportion of the world disease burden. Starting off with per-capita GDP, it is clear that the myth of mental disorder being prevalent only in low income countries gets broken (see Allen et al., 2014; Ruiz-Perez et al., 2018; Dolan et al., 2008). Since high income countries like Italy, France, Germany and Japan very much suffer from mental disorders (see Table 2 - 4) as per the predictions of the model. One of the reasons why globalization has an impact on mental health is the change in social and psychological dimensions of work accompanying patterns of globalization bringing about a growth of an informal sector of employment (Zulfiqar, 2016), defined by “low earnings, the absence of contracts, unstable working conditions, poor access to social services, low rates of union affiliation and growing levels of irregular and quasilegal labour” (Bhavsar & Bhugra, 2008). It is how individuals, societies, and governments respond to such consequences in terms of self-esteem, resilience, anxiety, etc. seems to have an impact on level of mental health (Sharma, 2016). But, surprisingly, this reason is not true for the cross-section of middle and low income countries that we have considered here in this paper. For the developed countries the experience of mental disorder actually stems from the market deregulation mechanism creating huge inequalities in the income distribution leading to worsening the problem of “poverty, inequality and social injustice” (Bhavsar & Bhugra, 2008) further. Coming to internet use and pollution, our results support the claims existing in the literature, as already discussed and are found to be significant determinants of mental disorders. What needs to be mentioned here is that for both excessive internet use and pollution, there can be observed behavioural changes like spending less time outside and not socializing, or leading a more deskbound daily life can be a cause psychological distress or social isolation.

5. Conclusion

In a nutshell, not only has this study highlighted mental disorder as a problem specific to the lower-middle income countries, but also for the countries under consideration in the high income bracket. There is a rich literature on the subject of mental health being a cause of concern in the developing world consistent to what we have pointed out. However, there is no proper reference in the literature of a possibility that developed countries also face the stigma of mental health disorder and its consequential impacts. Herein, lies our major contribution. As emphasized, out of the eleven countries where long run causal relations have been observed from all the four socio-economic indicators to mental disorder, eight come from the high income earning group. We expect that this paper will be a benchmark to initiate further cross-country research at the micro level and necessitate urgent action across the globe to curb the menace of mental disorder. Irrespective of the income classification the country belongs to, policy making is essential at all the levels of governance to make a positive difference to mental health outcomes.

For the purpose of future research, given the availability of data, it would be worth investigating the role played by other indicators like gender, caste or race, ethnicity, social security schemes available etc., besides, the ones considered here, that affect the relationship between a stressful life situation and mental health across both developed and developing countries. Also, the whys and hows of childrens’ mental health given socio-economic considerations like per-capita GDP, the level of per-capita CO2 emissions, usage of Internet, etc., again across both developed and developing countries is an unexplored area of research. In terms of opportunities for intervention and prevention, the aspect of parental education needs to be thoroughly examined in this regard. Even on the basis of the age distribution, the proportion of mental health cases is something that remains to be comprehended but getting sufficient data on the decile or percentile classification of mental health disorders among children, middle-aged and older people is the real challenge. Another exercise at the macro level can be exploring the public health infrastructure provisions like, number of public healthcare centers, public hospitals, doctors available, etc. and to what extent these influence mental health conditions. Last, but not the least, carrying out a micro level study by collecting data on smoking habits, alcohol use, jogging, cycling, gymming or any other intense physical activity, etc. at all age levels using a primary survey and trying to relate it with the mental health conditions will add in another dimension to the mental health literature as a part of our future course of action.

List of Abbreviations

ADF: Augmented Dickey-Fuller

GI: Globalization Index
GINI: A measure of inequality
Glob: Globalization
Inter: Internet
IU: Internet Use
LR: Long run
Ment: Mental Disorder
PCCO: Per capita CO2
PCGDP: Per capita Gross Domestic Product
Prob.: Probability
SR: Short run
UAE: United Arab Emirates
UK: United Kingdom
USA: United States of America
VAR: Vector auto regression
VECM: Vector error correction model
WHO: World Health Organization

Declarations

Ethical Approval and Consent to participate: We as authors of the submitted title hereby disclose that we have no funding source behind the research, have no conflict of interests and the manuscript has been developed originally and has not been submitted elsewhere.

Consent for publication: We put our consent to publish the article if accepted.

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References

Batic-Mujanovic, O., Poric, S., Pranjic, N., Ramic, E., Alibasic, E., & Karic, E. (2017). Influence of unemployment on mental health of the working age population. Materia Socio-Medica, 29(2), 92-96.

Bell, R., Donkin, A., & Marmot, M. (2013). Tackling structural and social issues to reduce inequities in children's outcomes in low-to middle-income countries, Retrieved from https://www.unicef-irc.org/publications/pdf/marmot_layout5.pdf

Bhavsar, V., & Bhugra, D. (2008). Globalization: Mental health and social economic factors. Global Social Policy, 8(3), 378-396.

Das, R. C. (2018). "Analysis of Growth And Convergence Of Co2 Emissions In BRICS Nations," Regional Science Inquiry, Hellenic Association of Regional Scientists, 10(1), 27-36

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. Journal of Economic Psychology, 29(1), 94-122.

Dooley, D., Catalano, R., & Wilson, G. (1994). Depression and unemployment: panel findings from the Epidemiologic Catchment Area study. American Journal of Community Psychology, 22(6), 745-765.

Feshari, M. & Hosseinzadeh, H. (2018). "The Relationship Between Health Care And Tourism Demand In Iranian Economy," Regional Science Inquiry, Hellenic Association of Regional Scientists, 10(2), 173-180

Gifford, E., & Gifford, R. (2016). The largely unacknowledged impact of climate change on mental health. Bulletin of the Atomic Scientists, 72(5), 292-297.

Glymour, M. M., Yen, J. J., Kosheleva, A., Moon, J. R., Capistrant, B. D. & Patton, K. K. (2012). Elevated depressive symptoms and incident stroke in Hispanic, African- American, and White older Americans. Journal of Behavioral Medicine, 35, 211–220.

Hemingway, H., Stafford, M., Stansfeld, S., Shipley, M., & Marmot, M. (1997). Is the SF-36 a valid measure of change in population health? Results from the Whitehall II study. Bmj, 315(7118), 1273-1279.

Hökby, S., Hadlaczky, G., Westerlund, J., Wasserman, D., Balazs, J., Germanavicius, A., & Varnik, P. (2016). Are mental health effects of internet use attributable to the web-based content or perceived consequences of usage? A longitudinal study of European adolescents. JMIR mental health, 3(3), e31 – e47.

Hollingshead, A. B., & Frederick, C. (1964). Social Class and Mental Illness : A Community Study. American Behavioral Scientist, 8(3), 30-30.

Hruska-Tvrdy, L. & Foldynova, I. (2011). "New Social Risks And Sustainable Development Of Urban Area," Regional Science Inquiry, Hellenic Association of Regional Scientists, 10(2), 77-93

Idaryani, RAJA, M., Aliasuddin & Muhammad, N. (2019). "The Effectiveness Of Health Budget In Reducing Poverty: Evidence In Indonesia," Regional Science Inquiry, Hellenic Association of Regional Scientists, 11(3), 21-36

Jayanti, E., Muhammad, S., Nazamuddin, B.S., Zulham, T. & Majid, M. S. A. (2019). "Does Quality Of Life Matter For Achieving Sustainable Development Goals In Indonesia?" Regional Science Inquiry, Hellenic Association of Regional Scientists, 11(3), 119-132

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. Oxford Bulletin of Economics and statistics, 52(2), 169-210.

Langner, T. S., & Michael, S. T. (1963). Life stress and mental health : II. The midtown Manhattan study. Retrieved from https://psycnet.apa.org/record/1965-02390-000

Linn, M. W., Sandifer, R., & Stein, S. (1985). Effects of unemployment on mental and physical health. American Journal of Public Health, 75(5), 502-506.

Murali, V., & Oyebode, F. (2004). Poverty, social inequality and mental health. Advances in psychiatric treatment, 10(3), 216-224.

Niemz, K., Griffiths, M., & Banyard, P. (2005). Prevalence of pathological Internet use among university students and correlations with self-esteem, the General Health Questionnaire (GHQ), and dis-inhibition, Cyberpsychology & Behavior, 8(6), 562-570.

Obradovich, N., Migliorini, R., Paulus, M. P., & Rahwan, I. (2018). Empirical evidence of mental health risks posed by climate change. Proceedings of the National Academy of Sciences, 115(43), 10953-10958.

Patel, V., & Kleinman, A. (2003). Poverty and common mental disorders in developing countries. Bulletin of the World Health Organization, 81, 609-615.

Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents : a systematic review. Social Science & Medicine, 90, 24-31.

Ruiz-Pérez, I., Rodríguez-Barranco, M., Cervilla, J. A., & Ricci-Cabello, I. (2018). Intimate partner violence and mental disorders : Co-occurrence and gender differences in a large cross-sectional population based study in Spain. Journal of Affective Disorders, 229, 69-78.

Searle, K., & Gow, K. (2010). Do concerns about climate change lead to distress?. International Journal of Climate Change Strategies and Management, 2(4), 362-379.

Sharma, S. (2016). Impact of globalisation on mental health in low-and middle-income countries. Psychology and Developing Societies, 28(2), 251-279.

Simpson, D. M., Weissbecker, I., & Sephton, S. E. (2011). Extreme weather-related events: Implications for mental health and well-being. In I. Weissbecker (Ed.) Climate change and human well-being (pp. 57-78). New York : Springer.

Smith, A. (1776). The wealth of nations. New York : The Modern Library.

Tripathi, A. (2017). Impact of Internet Addiction on Mental Health: An Integrative Therapy Is Needed. Integrative Medicine International, 4(3-4), 215-222.

World Health Organization (2013, January 5). What is mental health? Retrieved from http://www.who.int/features/qa/62/en/.

Yu, S. (2018). Uncovering the hidden impacts of inequality on mental health : a global study. Translational sychiatry, 8(1), 98.

Zulfiqar, S. B. (2017). Does globalisation affect informal employment in low and lower middle income countries? Retrieved from https://pdfs.semanticscholar.org/8d4f/af3a2fc48677617b43c22c8bc82eb7c86de9.pdf

EXPLORING DYNAMICS BETWEEN THE SOCIOECONOMIC SECTORS FROM NORTH OF PORTUGAL AND GALICIA

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Abstract
Cultural and institutional differences could difficult to strengthen the relationships between regions from diverse countries. This situation is a little true for the cooperation among the North of Portugal and Galicia, but present and recent past show that there is promising news for the future. In this scenario, the main objective of this work is to identify the dynamics between the economic sectors of these two regions, stressing the advantages from a closer cooperation. To achieve these objectives, data from the Eurostat for the Portuguese and Spanish NUTS 3 were considered. These data were explored through panel data models from the Keynesian and Neoclassical models, allowing for spatial effects. The main findings stress that there are interesting catching-up effects between the North of Portugal and Galicia that could be explored deeper, namely between the manufacturing industry.

Keywords: Verdoorn law, Convergence Theory, Panel data.
JEL classification: C23, E12, E13, O47, R11
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1. Introduction

The North of Portugal and Galicia benefit from a closer relationship in the several dimensions and domains of the Portuguese and Spanish dynamics and there are, fortunately, several examples where the interlinkages were, are, and will be profitable for both regions (Bouza, Llanes, and Lopez 2019). The two regions have several similarities and differences, that may be potentiated as strengths through adjusted approaches (Fernández and Grela 2003), in a context of territorial cooperation (Outeda 2010), where the companies may share synergies (Ferraz, Galbán, and Villar 2007). These analogies and diversities are visible in various fields, including in the natural conditions and occurrences (Fernandez-Nogueira and Corbelle-Rico 2020). Some macroeconomics problems are identical in Portugal and Spain (Antosiewicz and Lewandowski 2017) and these two countries take advantages from working together, where the universities (Blanco, Bares, and Hrynevych 2019) and the scientific research (Calvo, Fernandez-Lopez, and Rodeiro-Pazos 2019) may have an interesting contribution. Human capital is crucial for any regional development strategy, and here, the universities and the scientific community bring relevant outcomes.

In a regional development perspective, closer relationships between neighbours' regions are crucial for a balanced growth that allows for a more reduced level of asymmetries, with benefits for the local populations and the several stakeholders (Lange 2017). Of course, in these relations, it was vital the Portuguese and Spanish adhesion to the European Economic

Community, because removed the constraints in the borders (Santamaría and González 2011), increased the availability of public financial supports and changed, for instance, the evolution of the transport infrastructures. However, here the strategies adopted by the two countries were different with impacts in relations between the Portuguese and Spanish (Cornado 2018). The transport costs play a determinant role in regional development, namely, because of their implications in the accessibility conditions of the border regions to the great urban concentrations (Condeco-Melhorado and Christidis 2018). For a balanced regional development, it is essential to reduce the transport costs and in these contexts, maybe the benefits from the railroad should be highlighted.

It seems that there are, indeed, several opportunities for relationships between the North of Portugal and Galicia. However, the realities are, in certain aspects, different and need a deeper analysis that brings more insights for the diverse stakeholders to create conditions for a more balanced development between the both regions (Anuario Galicia-Norte de Portugal 2018).

For example, in the Galician (for the year 2017) textile, clothing, fashion, and construction are relevant sectors with remarkable contributions for the total gross value added. On the other hand, tourism was one of the sectors with higher growth rates relative to 2016. The tourism is, indeed, an important sector for the Portuguese and Spanish contexts (Dimitric, Zikovic, and Blecich 2019). The Galician labour productivity growth, in 2017, had, also, interesting growth rates (Consorcio de la Zona Franca de Vigo 2019). In any case, other socioeconomic sectors have, also, its importance in Portugal and Spain, as the agricultural sector, where, the productivity problems continue to be real (Escribano et al. 2016). The labour productivity performance is crucial for the economics dynamics (Santos and de Waal 2019). However it is a variable that depends on several factors (Ferreira et al. 2019), as, for example, the foreign direct investment (Galanos and Poufinas 2018), or the regional institutions quality (Ganau and Rodriguez-Pose 2019), or the monetary policies and the capital allocation (Gopinath et al. 2017), or companies size (Marques 2019), or labour market characteristics (Murtin and Robin 2018), or technological innovation (Toshevska-Trpchevska et al. 2019).

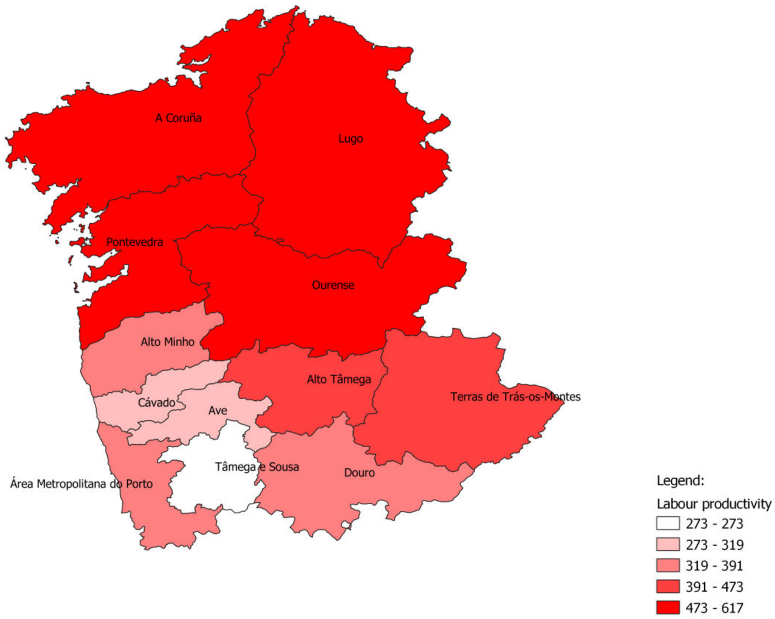
In this context, it is intended in this study to highlight the main socioeconomic dynamics between these two regions, showing opportunities for several actors from Portugal and Spain. For that, it was, first, we explored the data through descriptive analysis, considering the outputs from the QGIS (2020) software, and after through spatial autocorrelation research with the GeoDa (2020) software. Finally, several regressions were performed, considering panel data and spatial approaches, through the Stata (2020) software. The several statistical information and the shapefiles (for the spatial analysis) were obtained from Eurostat (2020) for the NUTS 3. The regressions were performed considering as base the models from the Keynesian theory for the Verdoorn law, and the Neoclassical theory for the convergence approaches.

In the Verdoorn law model, the productivity growth is endogenous and depends on the output growth. This model captures increasing returns to scale (more significant when the coefficient of regression is higher a close to one a lower when the coefficient is inferior and close to zero) and effects of learning-by-doing (Wells and Thirlwall 2003). High increasing returns to scale are evidences of regional divergence through self-reinforced circular and cumulative processes. In the convergence approaches, it was considered the models from (Islam 1995) for panel data, where productivity growth is dependent on the productivity logarithm of the previous year. A negative coefficient of regression shows signs of convergence.

2. Data analysis for the labour productivity

The labour productivity for the all sectors (gross value added at basic prices, euro, deflated - 2015=100, by the number of employees) in the northern Iberian, in average over the period 2010-2016 (figure 1), presents higher performance in the Galician regions and lower values for the Portuguese regions corridor Cávado-Ave-Tâmega e Sousa.

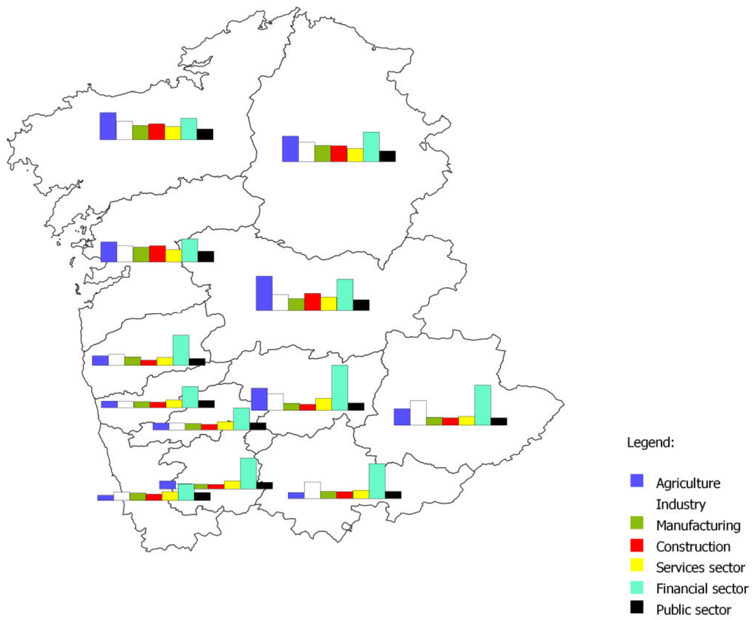
Figure 1. Labour productivity for the all sectors (gross value added at basic prices, euro, deflated - 2015=100 by the number of employees) for the North of Portugal-Galicia NUTS 3, in average over the period 2010-2016



Inversely to what happens in the Portuguese context, in the Galician regions the “Agriculture, forestry and fishing” sector is that with higher levels of productivity, together with the “Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities”. The “Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services” are the activities with lower productivity in the Galician regions (figure 2).

In the North of Portugal regions, the “Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities” sectors are those with higher levels of productivity. On the other hand, of stressing high levels of productivity for the “Agriculture, forestry and fishing” in regions as Alto Tâmega and Terras de Trás-os-Montes.

Figure 2. Labour productivity by sector (gross value added at basic prices, euro, deflated - 2015=100 by the number of employees) for the North of Portugal-Galicia NUTS 3, in average over the period 2010-2016

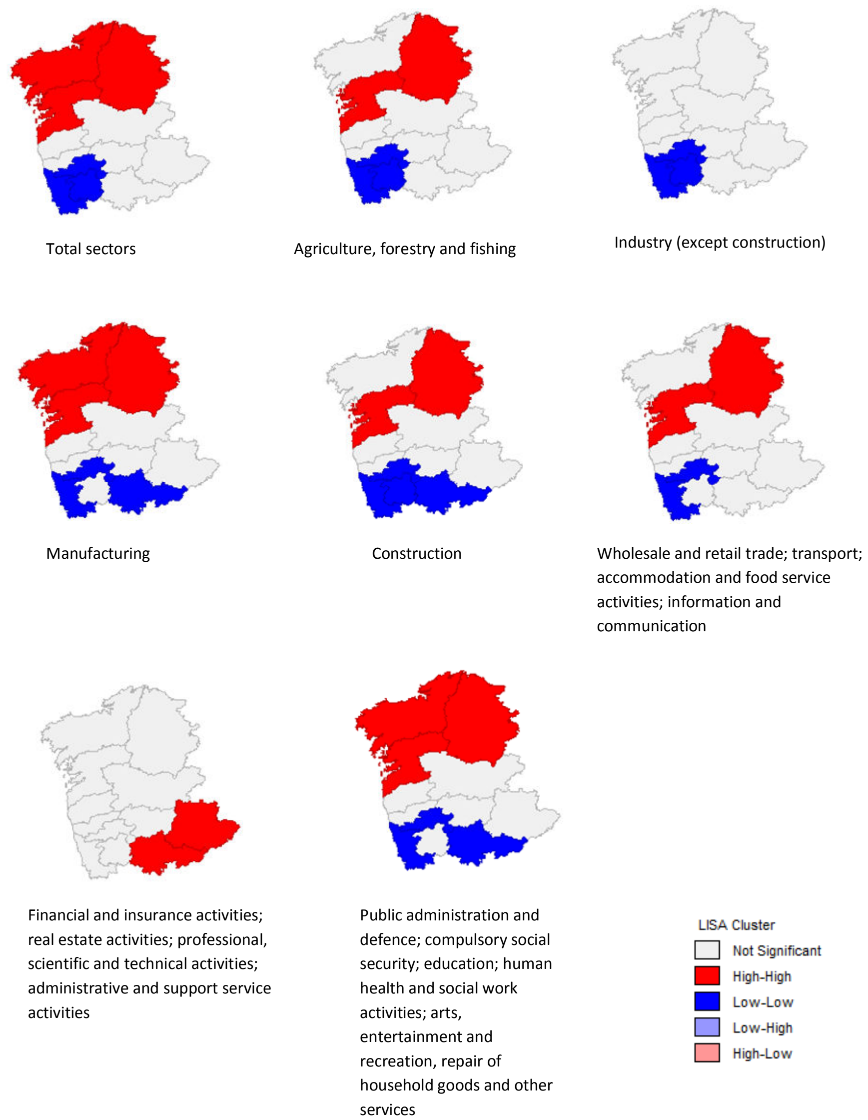


Note: Agriculture - Agriculture, forestry and fishing; Industry - Industry (except construction); Manufacturing - Manufacturing; Construction - Construction; Services sector - Wholesale and retail trade; transport; accommodation and food service activities; information and communication; Financial sector - Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities; Public sector - Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services.

3. Spatial autocorrelation analysis

The spatial autocorrelation research presented in figure 3 was performed with the GeoDa software for several sectors of the northern Iberian regions. In this figure, the clusters high-high and low-low represent positive spatial autocorrelation, for high and low values, respectively, and the clusters high-low and low-high represent negative spatial autocorrelation (GeoDa, 2020).

Figure 3. Local spatial autocorrelation analysis for the North of Portugal-Galicia NUTS 3, in average over the period 2010-2016



The figure 3 reveals that there are positive spatial autocorrelation between the northern Iberian regions, but only between the Galician regions (in general for higher values) and between the North of Portugal regions (in general for lower values). The absence of spatial autocorrelation between the Galician and North of Portugal regions difficult the implementation of common policies for a balanced impact in neighbours regions. This is an aspect that should be addressed deeper in future researches.

4. Results from the several regressions

The results presented in the table 1 for the Verdoorn law model present that increasing returns are higher in the manufacturing (higher coefficient of regression, 0.830) and lower for the "Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities" sectors (0.374, without statistical significance). Construction, also, shows that increasing returns to scale are low, and the result for the coefficient of regression from the "Agriculture, forestry and fishing; Industry" seems exaggerated and not expected by the theory. However, it is usual to obtain this kind of results for this sector, maybe because the changes verified in the last decades for the agricultural sector. For the theory, it is expected to obtain greater increasing returns to scale in the manufacturing, considered the engine of the economy, producing tradable goods.

Table 1. Panel data estimation results based on the Verdoorn law model for the economic sectors, over the period 2010-2016 and across the North of Portugal-Galicia NUTS 3

Sectors	Total sectors	Agriculture	Industry	Manufacturing	Construction	Services	Finance	Public services
Model	Fixed effects	Random effects	Random effects	Random effects	Random effects	Random effects	Random effects	Random effects
Constant		-0.002 (-0.520)	0.002 (1.130)	0.002 (0.840)	0.009 (1.030)	-0.005 (-0.980)	-0.000 (-0.110)	-0.006** (-1.940)
Output growth	0.670* (11.650)	1.029* (9.910)	0.798* (16.220)	0.830* (20.210)	0.456* (7.450)	0.701* (10.180)	0.374 (1.540)	0.760* (13.400)
Independent variable lagged	-0.113 (-0.520)	-0.835* (-4.680)	-0.699* (-8.010)	-0.701* (-8.560)	-0.347* (-2.590)	-0.263 (-1.100)	0.322 (-1.170)	0.366 (1.580)
Dependent variable lagged	-0.415 (-1.530)	0.703* (4.600)	0.770* (7.120)	0.739* (6.240)	0.557* (2.810)	-0.395 (-1.510)	0.711* (5.930)	-0.556** (-1.680)
Error term lagged	0.867* (14.820)	-0.150 (-0.430)	-0.362 (-1.100)	-0.590** (-1.910)	0.051 (0.150)	0.789* (8.650)	-0.744* (-2.570)	0.764* (6.190)
Hausman test	14.150*	0.120	0.100	0.730	1.560	1.060	0.810	1.210

Note: *, statistically significant at 5%; The variables were lagged with a queen contiguity matrix. Agriculture - Agriculture, forestry and fishing; Industry - Industry (except construction); Manufacturing - Manufacturing; Construction - Construction; Services sector - Wholesale and retail trade; transport; accommodation and food service activities; information and communication; Financial sector - Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities; Public sector - Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services.

The spatial effects were considered in this model through the dependent and independent variables lagged spatially through a queen contiguity matrix, following Stata (2020) procedures. There were, too, considered random spatial effects through the error term lagged. In general, the spatial effects from the independent variable lagged are negative, and those from the dependent variable lagged are positive (except for the public sector with a level of significance of 10%). This result means that, for this model, the productivity growth of each region is influenced negatively by the output growth from the neighbours` regions and influenced positively by the productivity of closer regions. The random spatial effects are positive for all regional economies, services, and public sectors and negative for the manufacturing and financial sectors.

The results in table 2 reveal that there are signs of convergence in all sectors, except for the services and public sectors. This convergence is stronger in the industry, agriculture, and manufacturing and weaker the construction and financial sectors. The spatial effects, in this model, are positive for the independent variable lagged and, in general, positive, too, for the dependent variable lagged (exception for the services and financial sectors). The spatial random effects are negative for the economy, industry, manufacturing and public services, and positive for construction, services and financial sectors.

The absence or lower levels of convergence of the more essential sectors for northern Iberian should deserve special attention from policymakers, because this framework may compromise a balanced regional development. This sectors include "Wholesale and retail trade; transport; accommodation and food service activities; information and communication", "Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities", and "Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services". In turn, the sector "Wholesale and retail trade; transport; accommodation and food service activities; information and communication" presents strong signs of increasing returns to scale that favour the asymmetric regional growth.

Table 2. Panel data estimation results based on the convergence model for the economic sectors, over the period 2010-2016 and across the North of Portugal-Galicia NUTS 3

Sectors	Total sectors	Agriculture	Industry	Manufacturing	Construction	Services	Finance	Public services
Model	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Random effects	Fixed effects	Random effects
Constant						-0.037 (-0.320)		-0.019 (-0.410)
Productivity logarithm	-0.708* (-6.470)	-0.743* (-6.070)	-0.807* (-6.400)	-0.651* (-4.690)	-0.297* (-4.410)	0.005 (0.250)	-0.282* (-3.520)	-0.002 (-0.340)
Independent variable lagged	0.531* (3.770)	0.306 (0.690)	0.768* (5.430)	0.622* (3.010)	0.098 (0.410)	0.003 (0.620)	0.010 (0.050)	0.005* (2.610)
Dependent variable lagged	0.837* (12.770)	0.484 (0.910)	0.814* (10.750)	0.670* (4.410)	0.401** (1.710)	-1.061* (-5.350)	-0.716* (-2.390)	0.936* (41.800)
Error term lagged	-0.906* (-3.760)	0.085 (0.110)	-0.983* (-4.190)	-0.677* (-2.060)	0.399** (1.690)	0.810* (8.770)	0.745* (6.160)	-1.226* (-7.780)
Hausman test	40.020*	37.840*	33.130*	19.480*	14.780*	4.960	45.360*	***

Note: *, statistically significant at 5%; **, statistically significant at 10%; ***, results for the regression with fixed effects not statistically robust; The variables were lagged with a queen contiguity matrix. Agriculture - Agriculture, forestry and fishing; Industry - Industry (except construction); Manufacturing - Manufacturing; Construction - Construction; Services sector - Wholesale and retail trade; transport; accommodation and food service activities; information and communication; Financial sector - Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities; Public sector - Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services.

5. Conclusions

This work intended to bring more insights about the socioeconomic growth process in the northern Iberian regions. The analysis was performed by sector considering the data available in the Eurostat for the gross value added (deflated by the Harmonised Index of Consumer Prices, 2015=100) and for the number of employees. These data were explored through descriptive analysis and spatial autocorrelation approaches. Regressions based on the Verdoorn law and convergence theory were performed with panel data and allowing for spatial effects.

The data analysis stresses that the levels of productivity, for the all economy, are higher in the Galician regions and the lower values from the Portuguese context are verified in the regions Cávado, Ave, and Tâmega e Sousa. A significant part of this framework is explained by the lower levels of the productivity, in general, verified in the several sectors of the regions from the North of Portugal, except for the "Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities".

The spatial autocorrelation approach highlight the absence of spatial autocorrelation between the Galician and the North of Portugal regions, which difficult the implementation of common strategies. In fact, in the presence of positive spatial autocorrelation, it could be possible to establish agreements to implement policies in some strategic regions and wait for expected spreading effects for the neighbours regions, saving resources and obtained a more effective implementation.

The regression results show that the sectors with higher relative importance, in these regions, as "Wholesale and retail trade; transport; accommodation and food service activities; information and communication" and "Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services", are those with higher increasing returns to scale and absence of convergence. In turn, the "Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities" sectors are, too, relevant sector with lower levels of convergence.

In conclusion, the visible effects from adjusted policies take time and are lagged in time; however, these frameworks described before could be interesting bases for the several

Portuguese and Spanish stakeholders. In any case, public interventions are needed to correct this unbalanced development between the North of Portugal and Galicia.

References

Antosiewicz, Marek, and Piotr Lewandowski. 2017. 'Labour Market Fluctuations in GIPS - Shocks vs Adjustments'. International Journal of Manpower 38 (7): 913–39. https://doi.org/10.1108/IJM-04-2017-0080.

Anuario Galicia-Norte de Portugal. 2018. '2018 Anuario de La Eurorregión Da Eurorrexión Da Eurorregião Galicia-Norte de Portugal'. Binomio Comunicación. https://www.gnpaect.eu/portal-transfronterizo/cm/files/get?id=20190423150537200_Anuario%202018%20-%20Online.pdf.

Blanco, Miguel, Lydia Bares, and Oksana Hrynevych. 2019. 'University Brand as a Key Factor of Graduates Employment'. Marketing and Management of Innovations, no. 3: 193–208. https://doi.org/10.21272/mmi.2019.3-15.

Bouza, Fernando Groba, Noemi Basanta Llanes, and Pedro Dono Lopez. 2019. 'Twenty Years of the Centro de Estudos Galegos at the Universidade do Minho (1997-2017): Balance and Future Perspectives'. Madrygal-Revista De Estudios Gallegos 22: 269–76. https://doi.org/10.5209/madr.66865.

Calvo, Nuria, Sara Fernandez-Lopez, and David Rodeiro-Pazos. 2019. 'Is University-Industry Collaboration Biased by Sex Criteria?' Knowledge Management Research & Practice 17 (4): 408–20. https://doi.org/10.1080/14778238.2018.1557024.

Condeco-Melhorado, Ana, and Panayotis Christidis. 2018. 'Road Accessibility in Border Regions: A Joint Approach'. Networks & Spatial Economics 18 (2): 363–83. https://doi.org/10.1007/s11067-017-9362-1.

Consorcio de la Zona Franca de Vigo. 2019. 'Ardán Galicia 2019: Directorio e Informe Económico y de Competitividad'. Ardán. http://www.centrallibrera.com/libro/ardan-galicia-2019-directorio-e-informe-economico-y-de-competitividad_433247.

Cornado, Mateo Varela. 2018. 'The unequal impact of railway policies in a cross-border region. The case of the Euroregion Galicia-Norte de Portugal'. Revista De Transporte Y Territorio, no. 18: 354–71.

Dimitric, Mira, Ivana Tomas Zikovic, and Andrea Arbula Blecich. 2019. 'Profitability Determinants of Hotel Companies in Selected Mediterranean Countries'. Economic Research-Ekonomska Istrazivanja 32 (1): 1977–93. https://doi.org/10.1080/1331677X.2019.1642785.

Escribano, A. J., P. Gaspar, F. J. Mesias, and M. Escribano. 2016. 'The Role of the Level of Intensification, Productive Orientation and Self-Reliance in Extensive Beef Cattle Farms'. Livestock Science 193 (November): 8–19. https://doi.org/10.1016/j.livsci.2016.09.006.

Eurostat. 2020. 'Several Statistics and Information'. 2020. https://ec.europa.eu/eurostat.

Fernández, Melchor Fernández, and Manuel Fernández Grela. 2003. 'Comparación de Estructuras Productivas entre Regiones Transfronterizas: Galicia y la Región Norte de Portugal'. Revista Galega de Economía 12 (2): 1–23.

Fernandez-Nogueira, David, and Eduardo Corbelle-Rico. 2020. 'Determinants of Land Use/Cover Change in the Iberian Peninsula (1990-2012) at Municipal Level'. Land 9 (1): 5. https://doi.org/10.3390/land9010005.

Ferraz, M. Pilar Cibrán, Cecilio Huarte Galbán, and Mónica Villanueva Villar. 2007. 'Caracterización estratégica de las empresas de la eurorregión'. Papeles de economía española, no. 22: 135–41.

Ferreira, Aristides I., Merce Mach, Luis F. Martinez, Chris Brewster, Grace Dagher, Amalia Perez-Nebra, and Antonina Lisovskaya. 2019. 'Working Sick and out of Sorts: A Cross-Cultural Approach on Presenteeism Climate, Organizational Justice and Work-Family Conflict*'. International Journal of Human Resource Management 30 (19): 2754–76. https://doi.org/10.1080/09585192.2017.1332673.

Galanos, George, and Thomas Poufinas. 2018. 'Impact of FDI in the Fiscal Adjustment Process'. International Advances in Economic Research 24 (3): 265–77. https://doi.org/10.1007/s11294-018-9692-x.

Ganau, Roberto, and Andres Rodriguez-Pose. 2019. 'Do High-Quality Local Institutions Shape Labour Productivity in Western European Manufacturing Firms?' Papers in Regional Science 98 (4): 1633-+. https://doi.org/10.1111/pirs.12435.

GeoDa. 2020. 'GeoDa: An Introduction to Spatial Data Analysis'. 2020. https://geodacenter.github.io/.

Gopinath, Gita, Sebnem Kalemli-Ozcan, Loukas Karabarbounis, and Carolina Villegas-Sanchez. 2017. 'Capital Allocation and Productivity in South Europe'. Quarterly Journal of Economics 132 (4): 1915–67. https://doi.org/10.1093/qje/qjx024.

Islam, N. 1995. 'Growth Empirics - a Panel-Data Approach'. Quarterly Journal of Economics 110 (4): 1127–70. https://doi.org/10.2307/2946651.

Lange, Emily. 2017. ‘Cross-border Institutional Thickness: From the Iberian Raia to Galicia-North of Portugal’. Geopoliticas-Revista De Estudios Sobre Espacio Y Poder 8 (2): 225–51. https://doi.org/10.5209/GEOP.55308.

Marques, Helena. 2019. ‘Export Activity, Innovation and Institutions in Southern European Nascent Entrepreneurship’. Economics-the Open Access Open-Assessment E-Journal 13 (December): 201953. https://doi.org/10.5018/economics-ejournal.ja.2019-53.

Murtin, Fabrice, and Jean-Marc Robin. 2018. ‘Labor Market Reforms and Unemployment Dynamics’. Labour Economics 50 (March): 3–19. https://doi.org/10.1016/j.labeco.2016.05.025.

Outeda, Celso Cancela. 2010. ‘La Eurorregión Galicia-Norte de Portugal: Un escenario de cooperación territorial’. Razón y palabra, no. 74 (2011): 17.

QGIS. 2020. ‘QGIS: A Free and Open Source Geographic Information System’. 2020. https://www.qgis.org/en/site/.

Santamaría, Juan Manuel Trillo, and Rubén Camilo Lois González. 2011. ‘La frontera como motivo de atracción: una breve mirada a las relaciones Galicia-Região Norte’. Geopolítica(s). Revista de estudios sobre espacio y poder 2 (1): 109–34. https://doi.org/10.5209/rev_GEOP.2011.v2.n1.37900.

Santos, Paulo, and Andre de Waal. 2019. ‘Factors of High Performance in Portugal’. International Journal of Organizational Analysis. https://doi.org/10.1108/IJOA-07-2019-1824.

Stata. 2020. ‘Stata: Software for Statistics and Data Science’. 2020. https://www.stata.com/.

Toshevska-Trpchevska, Katerina, Elena Makrevska Disoska, Dragan Tevdovski, and Viktor Stojkoski. 2019. ‘The Impact of a Crisis on the Innovation Systems in Europe: Evidence from the CIS10 Innovation Survey’. European Review 27 (4): 543–62. https://doi.org/10.1017/S1062798719000218.

Wells, H., and A. P. Thirlwall. 2003. ‘Testing Kaldor’s Growth Laws across the Countries of Africa’. African Development Review-Revue Africaine De Developpement 15 (2–3): 89–105. https://doi.org/10.1111/j.1467-8268.2003.00066.x.

SPATIAL DEVELOPMENT OF THE RUSSIAN EUROPEAN NORTH IN THE POST-SOVIET PERIOD

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Abstract
The article explores the features of the spatial development of the European North of Russia in the post-Soviet period. It is shown that there are processes of polarization and disintegration of the region's space, which is manifested primarily in the concentration of both the population and economic activity in the "nodal" points, which, as a rule, are large cities, administrative and industrial centers, as well as an increase in the area of the economic periphery. The prospects for the development of resettlement systems are substantiated, and an assessment of the connectivity of the northern territories based on an analysis of the level of development of their transport and logistics infrastructure is given. The necessity of forming several reference points in the economic space of the European North of Russia is substantiated, which, in our opinion, should become a kind of "counterbalance" to the large cities of the central regions of the country and will allow to overcome the negative trends associated with the compression of the region's economic space.
Keywords: spatial development, economic space, space connectivity, urban agglomerations, small and medium-sized cities, transport and logistics infrastructure, European North of Russia.
JEL classification: R12

1. Introduction

The collapse of the USSR and the market transformations at the end of the twentieth century led to an increase in destructive, disintegration processes in the spatial development of Russia, a significant violation of existing interregional ties, and a decrease in the development of the domestic market. Thus, the share of interregional turnover in GDP decreased over a short period (1990-1994) from 25% to 16%. In the economy, the export bank focused on the supply of mineral resources to international markets has increased even more; while manufacturing continued to be in a state of prolonged depression.

This led to a violation of the internal cohesion of the country's space: a break in the existing technological ties between the territories led to an increase in the socio-economic crisis in many small and medium-sized cities (primarily single-industry towns) and rural areas. In spatial development, the unprecedented centripetal vector has intensified, manifested primarily in a sharp increase in the economic role of Moscow and several other large regional centers. As a result of these tendencies, the processes of compression of the previously developed space, a noticeable economic consolidation of city centers, have intensified; unprecedented interregional contrasts arose in the practice of foreign federations in terms of the level of socio-economic development of the country's territories.

The problems of ensuring balanced spatial development of Russia are also being updated in connection with the difficult geopolitical and geo-economics situation in which our country is currently located. These necessitates the search for internal sources of economic growth in the regions, one of which is the development of the domestic market, ensuring the deep processing of huge reserves of natural raw materials (oil, gas, timber, iron ore, etc.) and the production of high value-added products (precision engineering, petrochemicals, pharmaceuticals, etc.) based on the effective territorial and spatial organization of economic activity in the country.

In such a situation, the regions of the North and the Arctic, which have significant natural resource and geostrategic potential (significant reserves of gold (40% of all-Russian), oil (60%), gas (60-90%), should play an important role in the spatial development of the country) chromium and manganese (90%), platinum metals (4 7%), diamonds (100%). So, the European North of Russia and its Arctic zone is one of the largest regions of the European part of the country (1,466 thousand sq. km), has a favorable economic and geographical position (in the north it is washed by the Barents and White Seas; in the west, it borders with Finland and Norway; in the east and south - with the economically developed Urals and Central Russia), which opens up enormous opportunities for the development of foreign trade (Figure 1).

Figure 1: European North of Russia (ENR) *

* In this paper, the composition of the ENR is considered within the boundaries, the composition of which is presented in the current All-Russian classifier of economic regions OK 024-95 (approved by the Decree of the State Standard of Russia dated December 27, 1995 No. 640).

Moreover, from the spatial organization view, the European North of Russia, in contrast to the Asian North, is more populated and economically equipped, with a developed frame of settlement and distribution of productive forces, a rather high level of urbanization.

At the same time, an analysis of strategic planning documents for the northern and Arctic territories of the federal, regional and municipal levels suggests that the spatial component in them is largely formal, and the integration factor is taken into account mainly when implementing large investment projects related to the export of hydrocarbons to global markets. The entire implemented policy regarding the northern territories in the post-Soviet period is aimed at the further conservation of the raw material development model.

In such a situation, it is necessary to conduct an objective assessment of the characteristics and socio-economic consequences of the transformation of the space of the European North of Russia (ENR) after the 1990s. at the regional and municipal level, which determined the relevance of the study.

The purpose of the work is to analyze the features of the transformation of the space of the European North of Russia in the post-Soviet period and the socio-economic consequences of these processes at the regional and municipal levels.

Achieving this goal involves solving the following tasks:

1. The study of theoretical approaches to understanding the essence of the economic space and the processes of its transformation.

2. Analysis of the features of the transformation of the space of the European Russian North in the post-Soviet period and the socio-economic consequences at the regional and municipal levels.

3. Scientific substantiation of the priorities for managing the space of the ENR in the development framework of a polycentric model.

In our opinion, the interregional space of the Russian European North should develop along a vector of increasing interconnections and interdependencies of regions based on the use of methods and forms of regional management, as well as the formation of territorial economic complexes and unified infrastructure systems. In this regard, the methodological justification of measures to improve state policy in terms of the spatial and territorial organization of the population and economy of the northern regions will ensure an internal balance of development and effective integration of these territories into a single economic space of the Russian Federation.

2. Literature Review

From the methodological point of view, the tasks of the spatial development of the economies of the country's regions (including the northern territories) were quite successfully solved during the USSR. Despite the high scientific and applied level of many developments of the Soviet period, the results obtained in them have now lost their relevance in connection with the radical transformation of the economic system in the end of the twentieth-century. The approaches, theories, and methods proposed by Soviet scientists, who made it possible to effectively manage the distribution of the productive forces of the northern regions in the interests of developing a single national economic complex of the socialist state, require a certain rethinking and adaptation to market economic conditions.

It is worth noting that various aspects of the spatial structure of modern Russia are in the focus of research by leading domestic researchers: G. Lappo (1983), A. Granberg (2003), A. Tatarkin (2012), P. Minakir (2013), T. Nefedova (2019) and others. Moreover, in the opinion of A. Granberg by the beginning of the XXI century the Moscow's, St. Petersburg's, Ural's, Siberian's and Far Eastern's schools of spatial economics were formed in Russia and are successfully developing. In the international science, the German, French, and Anglo-Saxon schools of spatial economics play a significant role in the works of A. Lyosha (1940), W. Isard (1956), P. Krugman, M. Fujita and E. Venables (1999). Also, the considerable attention is paid to the development of cities and urban agglomerations, the development of their effective interaction with non-urbanized territories in the papers of Shibusawa H., 1999; Uchida H., Nelson A., 2010; Prakash M., Teksoz K., Espey J., Sachs J., Shank M., 2017.

The research problems of Russian scientists in spatial economics are mostly devoted to discussions regarding the essence of the economic space (P. Minakir, 2013, A. Granberg, 2004, etc.), the features of its transformation (B. Grinchel, E. Nazarova, 2014) and various models of effective organization space of the country (N. Baransky (1956), V. Vorobyov (1959), O. Glezer and E. Weinberg (2013), S. Yakovleva (2014).

Moreover, in Russian science, there have been several directions towards the interpretation of the essence of the economic space. So, A. Granberg (2003), one of the leading scientists of the national school of spatial economics, understood economic space as a saturated territory containing a lot of objects and connections between them: settlements, industrial enterprises, economically developed and recreational areas, transport and engineering networks, etc. In this definition, economic space exists within the framework of physical space and is determined primarily through the presence of various socio-economic objects and the links between them.

Another group of Russian researchers considers this category primarily through the prism of relations between economic agents (P. Minakir and A. Demyanenko (2014), N. Gagarina (2013), Y. Krukovsky et al. (2001)) arising from the distribution of resources, funds, wealth. In other words, this approach assumes the formation of an economic space only subject to the existence of stable economic relations between economic agents of the analyzed territory. One way or another, this interpretation is similar to the definitions of space proposed by P. Krugman (Krugman R, 1994).

In this study, we will take as a basis the definition of R. Gataullin, A. Karimov, A. Komarov (2014), who understand the economic space as “a part of the physical space subjectively constructed during reproduction that reflects the process of transactions between economic agents that is territorially isolated and localized in time formed based on the realization of their economic interests.” This definition, in our opinion, more succinctly reflects the nature and essence of the economic space, since it integrates the characteristics of the above approaches.

It should be noted that the problems of the spatial development of modern Russia are the sphere of scientific interests of some foreign researchers. In particular, according to the Brookings Institution (Washington, USA), the annual losses from the inefficient spatial organization of the Russian Federation are estimated at 2.3–3.0% of GDP. Scientists from the Institute for Economic Research of North-East Asia conducted an analysis of some tools for the development of export-oriented industries in the regions of Russia (Hirofumi A., 2019).

Spatial development issues are relevant not only for Russia, which is the largest country in the world but also for the theory and practice of other states. In particular, the framework documents for spatial planning in the EU are the European Spatial Development Perspective, the European Spatial Planning Monitoring Network, and the European Union's Spatial Agenda until 2020, which propose the principles of balanced spatial development for territories European countries and methods for monitoring their use.

Along with this study of the spatial organization of the northern and Arctic territories, several foreign universities are also involved. In particular, an analysis of their main ideas and directions of research showed that the topic of sustainability of the northern and Arctic cities is promising. Two international projects of recent years have been dedicated to her. The ARCSUS (Arctic Urban Sustainability) is associated with the activities of the Barents Institute at the University of Tromsø and the involvement of specialists from Russia. The main goal of the study is to assess the climatic and socioeconomic factors affecting the sustainability of urban communities in the Russian Arctic. The Artic PIRE (Partnerships for International Research and Education) project, carried out by specialists from the USA, Russia, Norway, Canada, Finland, and South Korea with the leading role of George Washington University, developed the Arctic Urban Sustainability Index (AUSI). It is shown that stability is largely predetermined by economic relations with a large system of settlements not only in the Arctic but also in the south of the lying territories.

Thus, it is advisable to use in practice the existing scientific backlog when improving the spatial management of the territories of the Russian European North based on the need to change its place in the system of distribution of the country's productive forces; rethinking the place and role of large, medium and small cities, as well as rural areas in these processes. At the same time, the lag of the existing methodological foundations for managing spatial development from the needs of the regions leads to a decrease in the opportunities for the economic growth of territories and an increase in the standard of living of the population.

3. Research methods

As theory and practice testify, the economic space has several properties or the so-called "Generic" signs, the accounting of which allows for a comprehensive assessment. Moreover, the quality of the economic space is usually determined by many characteristics and parameters. To evaluate it, we can distinguish, according to the approach of A. Granberg (2004), the following parameters:

- density (characterized by the economic and general population density of the territory, the density of communication lines: roads, railways, etc.);
- location (determined through indicators of uniformity, differentiation, the concentration of the population, subjects of economic activity and the presence of economically developed and undeveloped territories);
- connectivity (determined by the intensity of economic relations between parts and elements of space, the conditions of the mobility of goods and services, people, the development of transport and communication networks).

To analyze the level of the city network development, we tested the Zipf's Law (1936) for the Russian economy, which made it possible to assess the balance and development prospects of the largest, large, medium and small cities of the country.

The development of the economic space and ensuring its connectivity largely depends on the level of development of transport infrastructure. Currently, Russia ranks only 75th in the ranking of countries in the Logistics Performance Index behind both developed and developing countries (Germany, Sweden, Belgium, Brazil, Kazakhstan, Ecuador, Slovakia, Serbia, etc.).

To assess the level of the transport infrastructure development (railways, roads, waterways) in the regions of the Russian European North we calculated the coefficients of Engel (1), Holtz (2) and Uspensky (3):

$$K_e = \frac{L}{\sqrt{S \times H}}, \quad (1)$$

where *Ke* - Engel's coefficient; L is the total length of transport routes; S - the area of the territory (country, region); H is the population of the territory.

$$K_h = \frac{L}{\sqrt{S \times P}}, \quad (2)$$

where K_h is the Holtz's coefficient; L is the total length of transport routes; S - area of the territory (country, region); P - the number of settlements.

$$K_u = \frac{L}{\sqrt[3]{S \times H \times t}}, \quad (3)$$

where Ku - Uspensky's coefficient; L is the total length of transport routes; S - the area of the territory (country, region); H is the population of the territory; t is the total weight of goods sent to the territory.

The Holtz coefficient allows a more accurate assessment of the provision of the population with transport infrastructure compared to the Engel coefficient since it takes into account not only the population but precisely the settlements that are connected by the transport network. Uspensky's coefficient, in turn, makes it possible to assess the level of transportation in the industrial sphere of the territory.

4. Results

In the post-Soviet period of Russia's development characterized by sharp liberalization and transformation of the entire socio-economic system, these transformations were especially negatively reflected in the northern territories. The transition to the market led to a sharp decrease in the role of the state in managing the development of these territories. The destruction of existing technological ties with other regions of the country and the decrease in the role of many compensatory instruments had ensured a fairly stable and successful development of these territories under the conditions of the planned economy. At the same time, the northern territories have enormous natural resource potential and still play the most important geostrategic role in the development of the country, which requires increasing the efficiency of managing their development.

One of the key trends in the development of the Russian European North in the post-Soviet period is the reduction in the number of the resident population. In particular, the population of the Murmansk region in 1990-2017 decreased by 26.7%, the Komi Republic - by 22.2%. In general, in the European North of Russia in 1990-2017, the population decreased by more than 1.5 million people. The processes of population decline more rapidly took place in rural areas: over the same period, the number of rural residents in the Murmansk region almost halved, and the Arkhangelsk region fell by 38%.

One of the key reasons for these processes is the high rate of both natural and migratory population decline (due to relocation to more centrally located areas of the country). A significant scale of population decline is observed in small cities specializing in logging, with practically depleted resources of mineral deposits, old industrial areas (the so-called industrial periphery), and in the territories of the rural periphery.

In general, over the past half-century both in Russia and on the European North significant transformational changes have been observed in the system of settlement of residents. So, if in 1959, on average, almost 53% of the population lived in cities across the country, in 2018 - already 74%. In the Vologda and Arkhangelsk regions, urbanization processes proceeded even faster: the share of the rural population in the first period decreased by 37.6 percentage points (from 65.2 to 27.6%), the second - by 24.3 percentage points (from 46.3 to 22%, Kozhevnikov (2019)). Currently, more than ¾ of the population already lives in cities in the European North (Table 1).

Table 1. The share of urban and rural population in the total population of Russia and the European North of Russia in 1959-2018, %

Territory	1959		1989		2010		2018		2018 to1959, +/-	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Russian Federation	52.8	47.2	73.6	26,4	73.7	26.3	74,4	25.6	+21.6	-21.6
Russian European North's regions	55.7	44.3	76.5	23.5	77.8	22.2	79.3	20.7	+23.6	-23.6
Murmansk region	93.6	6.4	92.1	7.9	92.8	7.2	92.3	7.7	-1.3	1.3
Republic of Karelia (Karelian Autonomous Soviet Socialist Republic)	63.9	36.1	81.6	18,4	78.0	22.0	80,4	19.6	+16.5	-16.5
Komi Republic (Komi Autonomous Soviet Socialist Republic)	59.3	40.7	75,5	24.5	76.9	23.1	78.1	21.9	+18.8	-18.8
Arkhangelsk region	53.7	46.3	73,4	26.6	75.7	24.3	78.0	22.0	+24.3	-24.3
Vologda Region	34.8	65,2	65.0	35.0	70.7	29.3	72,4	27.6	+37.6	-37.6

Source: compiled according to the Federal State Statistics Service.

And if the increase in the share of the urban population of the regions of the European North of Russia during the Soviet period was primarily due to the large-scale pace of industrialization of the country, the emergence of new cities, then at present it was due to the migration of the population to large cities from rural areas due to their higher standard of living and quality of life. This conclusion is confirmed by the figures characterizing the population of small and medium-sized cities, for the majority of the functions performed in resettlement, which are intermediate links between a large city and a village.

There are currently 59 small and medium-sized cities in the European North of Russia. Moreover, in all of them (except Naryan-Mar) there is a population decline due to natural and migration reasons in the post-Soviet period. In particular, in 1989-2018 years the population of small towns of the Komi Republic and the Murmansk region decreased by almost 2 times. While in 1989 almost 205 thousand people lived in small and medium-sized cities of the Vologda Oblast, then over the next 30 years, this figure dropped to 167.2 thousand people.

Many of these municipalities are single-industry towns in a state of prolonged depression, and the existing socio-economic problems of the development of these territories are systemic and have been reproducing for several decades (Table 2).

Table 2. Problems of socio-economic development of small and medium-sized cities on the Russian European North

Problem	Content
1. Depopulation due to natural and migration reasons	In all small and medium-sized cities of the ENR in 1989-2018 years (except Naryan-Mar, which is the regional center of the Nenets Autonomous District), the population decreased from 3.5% in the city of Kostomuksha (Republic of Karelia) to 57.7 percentage points. - in the city of Inta (Komi Republic). The most severe processes of population outflow were manifested in the Murmansk region and the Komi Republic.
2. The unstable state of the budget system	In 2018, only 24 city districts and settlements out of 51 of more than half of the budget revenues accounted for their tax and non-tax revenues (from 50.6% in the city of Kirillov to 93.7% in Pechora). The negative point is the fact that more than half (27 of 51) of the budgets of municipalities in 2018 were scarce.
3. The crisis state of enterprises of the leading sectors of the city's economy	Many of these municipalities are single-industry towns in a state of prolonged depression. A high degree of depreciation of fixed assets of enterprises and organizations; low

	investment activity in the development of industrial and agricultural production.
4. The low level of provision of social infrastructure in the field of health, education, culture, and sports	So, in all small and medium-sized cities of the regions of the ENR, there are 32 doctors per 10 thousand inhabitants (the average figure for large cities is 63 doctors). In 2006-2017, in the majority of small and medium-sized cities in the regions of the ENR there was a decrease in the number of general educational organizations. Particularly significant changes in the field of preschool education occurred in Vorkuta, Inta (Komi Republic), Apatity, Kirovsk (Murmansk region) - the number of kindergartens decreased by more than 40%. There was a significant reduction in the number of cultural and leisure organizations.
5. Weak consumer market development	There is a large gap between large and small cities in terms of retail trade and catering per capita. So, on average, in small and medium-sized cities of the ENR, retail trade turnover is 71 thousand rubles / person, and in large cities - 121 thousand rubles / person.

Source: compiled by the author.

In such a situation, it seems important to attract small and medium-sized cities as key participants in cluster projects initiated in large regional and territorial centers and agglomerations. This will make it possible to turn these territories into centers of economic development on a regional scale based on the most efficient use of their competitive positions.

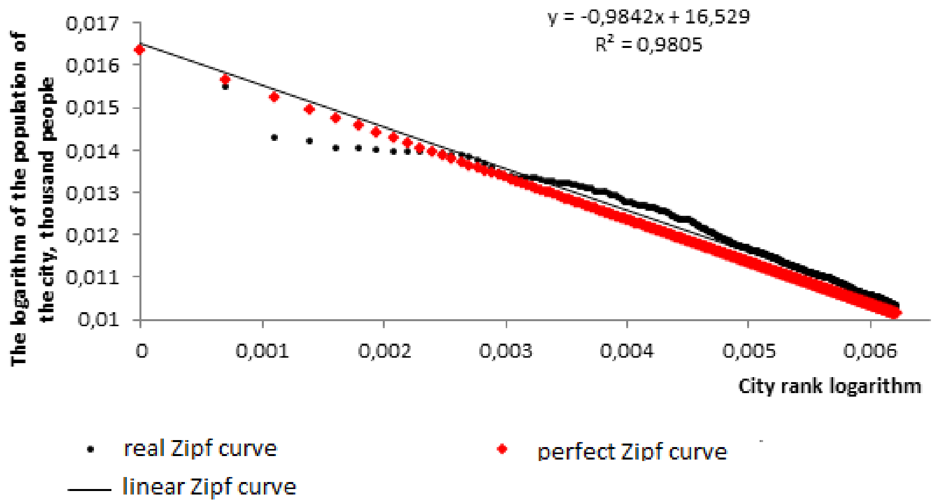
Given the ongoing demographic processes in the northern territories, one of the indicators characterizing the quality of the economic space is the population density of the territory. So, in most of the studied subjects (except the Vologda Oblast), the population density is 2-5 people / sq. кm, which is significantly lower than the average Russian level (8.6 people / sq. кm). These figures indicate an extremely low concentration of human and labor resources in the northern territories, the presence of a focal nature of settlement in large nodes, which are primarily large cities and centers of concentration of industrial production. All this limits the possibilities of ensuring a balanced development of the space of the European North of Russia.

To predict the vector of further urbanization processes in the country and the region, we use the Zipf's law to analyze the urban settlement system in the country, which indicates that there is an inversely proportional pattern between the population of the city and its place in the overall ranking of cities in the territory (relationship “rank”-"size"). The literature on the study of urban development processes in various countries is very extensive: the authors study the development of urban systems in the USA (for example, Black, D. and Henderson, V. 2003), China (Anderson, G. and Ge, Y. 2005), India and Brazil (Soo, KT 2014), Spain and Italy (Gayán-Navarro C., Puente-Ajovin M., Sanz-Gracia F. 2019) and others.

Based on the existing methodological tools, we built the Zipf curve for cities of the Russian Federation with a population of at least 30 thousand as of 2018. In determining these boundaries, we proceeded from the premises traditional for domestic economic geography: cities are the nodal form of space organization, while the smallest nodes (class IV) should have a population of at least 10-15 thousand economically active people, that is, their total number According to our estimates, the population should be at least 30 thousand people (Lazhentsev V.N., 2015: scientists distinguish 4-class economic nodes in space in accordance with the number of economically active population in them: I class - more than 100 thousand people, II class - 60-99 thousand people, III class - 30-59 thousand people the fourth - 10-29 thousand people. At the same time, the rest of the economy has a nodal layout. In addition, in classical Soviet economic geography, a city was considered a city with a population of at least 12 thousand people). Many cities in modern Russia have a population of less than this level since the status of the city was often assigned historically, or this decision was political in nature, not always based on objective laws of economic geography.

The calculations allow us to draw the following conclusions. The obtained values of the coefficient K of the regression equation are less than 1 (0.98), which indicates the concentration of the Russian population in large and largest cities (Figure 2). Similar results were obtained in the study (R. Fattakhov, M. Nizamutdinov, V. Oreshnikov, 2019); the authors showed that since 1959 the number of free members of the presented regression has been constantly increasing, which indicates an increase in the population of the largest cities of the country.

Figure 2: Distribution of Russian cities with a population of more than 30 thousand people (2018, 502 cities; given values)



Source: calculated on the basis of data of Federal State Statistics.

As follows from the schedule, a number of the largest cities in Russia (Novosibirsk, Yekaterinburg, Nizhny Novgorod, Kazan, Chelyabinsk, Omsk, Samara, Rostov-on-Don, Ufa) is below the ideal Zipf's curve, which indicates the presence of a certain potential for further growth in their numbers, including due to the active attraction of human resources of large, medium and small cities, as well as rural areas. The same conclusion is confirmed by existing migration flows from medium and small cities, as well as the fact that a significant part of these municipalities is above the ideal Zipf's curve, which indicates a decrease in the population of these territories in the future. In the European North of Russia, Arkhangelsk and Cherepovets have prospects for population growth.

Thus, we can conclude that the urban settlement system in modern Russia is at the stage of a certain transformation, due, among other things, to the transition to a market economy in the early 1990s. At the same time, the existing system of urban settlement of Russia by its characteristics is currently closer to countries with developing economies, when the first several largest cities by population are significantly displaced by the population from the rest of the mass, and other large cities are below the ideal Zipf's straight line (for example, Uzbekistan, Thailand, etc.)

At the same time, it should be noted that the conclusions of this law should be taken with a certain degree of conditionality, since the presented pattern applies more to countries where the city network is quite well developed, their active economic interaction with each other within the network structures is observed; the largest city in the country does not play the role of a kind of metropolis (for example, Moscow) or the world financial center (for example, London), which can lead to certain distortions of the results.

Besides, as practice and research shows the deviation in the distribution of cities from Zipf's law, cannot be considered as unconditional evidence for making practical decisions while concerning the management of the development of the country's urban system since the findings strongly depend on the size of the sample (the analysis of all cities or only cities with a population of more than 30, 100 thousand people and the study should be carried out only for cities within their administrative borders or as part of an urban agglomeration, etc).

Speaking about the economy of the Russian European North it should be noted that in the structure of gross regional product (GRP) of its subjects, a significant share is occupied by the types of economic activities associated with mining (in 2017 in the Nenets Autonomous

Okrug - 76.2% of its total Komi Republic - 37.2%, Arkhangelsk region - 30.9%). At the same time, manufacturing activities were more developed in the Vologda (38.1%) and Arkhangelsk regions (26.9%). The leading areas of specialization of the ENR are timber industry, ferrous and non-ferrous metallurgy, the chemical industry, and the fuel and energy sector, based on the region's mineral resources base; In the Vologda Oblast, livestock breeding and mixed farming have a rather high level of development. This, in particular, is indicated by the localization coefficients calculated by us for the main types of economic activity of the regions of the Russian European North (Kozhevnikov, 2019)

Therefore, the obtained results also indicate a key feature of the Russian European North's spatial development in the post-Soviet period which is the concentration of the population and economic activity at the “nodal” points and the increase in the area of the economic periphery. So, in the Komi Republic, which is one of the key subjects of the ENR, there is a tendency to concentrate the population near Syktyvkar, the administrative center of the Republic (its share in the total population of the subject increased from 19.8 to 30.6%; similar trends are observed in Syktyvdinsky area); the share of Ukhta increased from 11.3 to 14%, Sosnogorsk - from 5 to 5.2%. At the same time, there is a significant outflow of the population from the territories of the industrial periphery, municipalities of the northeast “corner”, Table 3).

Table 3. The municipalities share Dynamics of the Komi Republic in the total population and industrial production,% (pp)

Population				Industrial output			
Municipality	Share%		2017 to 1990, p.p.	Municipality	Share%		2017 to 1990,p.p.
	1990	2017			1997	2017	
Syktyvkar	19.8	30.6	+10.8	Usinsk	12.7	37.0	+24.4
Ukhta	11.3	14.0	+2.7	Princely Pogost	0.8	2.6	+1.8
Syktyvdinsky	2,3	2,8	+0.5	Pechora	7.9	9.3	+1.4
Sosnogorsk	5,0	5.2	+0.2	Vuktyl	1.7	2,8	+1.1
Izhemsky	2.0	2.1	+0.1	Ust-Vymsky	0.7	1,0	+0.3
Sysolsky	1,6	1,5	-0.1	Syktyvdinsky	0.6	0.7	+0.1
Ust-Tsilemsky	1,5	1.4	-0.1	Priluzsky	0.5	0.4	-0.1
Kortkerossky	2,3	2.2	-0.1	Ust-Tsilemsky	0.3	0.1	-0.2
Koygorodsky	1,0	0.9	-0.1	Trinity-Pechora	0.3	0.1	-0.2
Ust-Vymsky	3.3	3,1	-0.2	Koygorodsky	0.3	0,0	-0.2
Priluzsky	2,4	2.1	-0.3	Izhemsky	0.3	0,0	-0.3
Udora	2,4	2.1	-0.3	Kortkerossky	0.3	0,0	-0.3
Ust-Kulomsky	3.2	2.9	-0.3	Sysolsky	0.3	0,0	-0.3
Usinsk	5,6	5.2	-0.4	Syktyvkar	16.7	16.3	-0.4
Trinity-Pechora	2.0	1.4	-0.6	Ust-Kulomsky	0.6	0,0	-0.6
Princely Pogost	3.0	2,3	-0.7	Ukhta	17.6	16.8	-0.7
Vuktyl	2.1	1.4	-0.7	Udora	0.8	0.1	-0.8
Pechora	7.4	6.1	-1.3	Sosnogorsk	7.0	3.9	-3.0
Inta	5,4	3.4	-2.0	Inta	7.5	0.8	-6.7
Vorkuta	6.5	9,4	-7.1	Vorkuta	23,2	7.5	-15.7

Source: calculated on the basis of data of Federal State Statistics

The leading centers of industrial production in Komi are Usinsk, Syktyvkar, Ukhta, Pechora. Moreover, the role of Usinsk in the last twenty years has increased significantly (its share in the total industrial production of the Republic of Kazakhstan has increased from 12 to 37 percentage points). At the same time, a number of single-industry towns of the republic significantly lost their positions due to the damping of economic activity (Vorkuta, Inta and some other cities of the industrial periphery).

Similar processes are characteristic of the southernmost subject - the Vologda Oblast. Two major cities - the administrative (Vologda) and industrial centers (Cherepovets), as well as the municipal areas bordering them, became its main supporting centers, nodes of the "first-class". So, in these municipalities about 73% of the population of the region live, 93% of industrial and 65% of agricultural products are produced; the same municipalities accounted for 68% of fixed capital investment and 79% of retail sales.

Moreover, in 1990-2017, the share of Cherepovets in the total industrial production of the Vologda Oblast increased from 60.1 to 71.4%; at the same time, there is a decrease in the weight of other municipalities, and at present, the share of most regions in the industrial production of the subject of the Russian Federation does not exceed 1%. In general, the industry is concentrated mainly around large cities (for example, Vologda accounted for 14.2% of the total industrial production of the region, Gryazovetsky district - 1.8%, Sokolsky - 1.7%, Kaduysky district - 1.4%, etc.).

In general, in the economic nodes of the European North of Russia, according to estimates by V. Lazhentsev (2015), 70% of industrial production, a significant part of the available resources, is concentrated.

At the same time, these processes of population concentration and urban space densification are rather negatively reflected in rural areas, while maintaining the manageability and connectedness of Russia's space as the largest country in the world. The fact is that the countryside as a whole, as well as large rural settlements creates a specific support framework for settlement at the local and regional level, connecting remote villages and villages, poorly settled territories with both small and medium-sized cities, and large agglomerations into a single network.

According to the concept of "center-periphery", a significant part of the rural territories of the European North, according to our estimates, belongs to the near periphery of the 3rd order (that is, territories whose center is a small or medium city, 32% of their total number) and distant (rural areas remote from the cities of the region, 37%). Taking into account this specificity, as well as the vector of processes taking place on them, is the basis for developing the priorities of state policy for the development of rural territories.

In this situation, the degradation of the settlement network observed in the post-Soviet period, the polarization of rural settlements, in which due to a fairly large category of medium (from 500 people to 7 thousand people) settlements, the number of small and large (increases up to 500 people and more than 7 thousand people), "pulling" the population into urban areas are factors in reducing Russia's national security.

In particular, the decline in the rural population due to intraregional migration in the Vologda Oblast in 2018 amounted to 1024 people, and interregional - 923 people. As a result, the number of rural settlements decreased by 35 units during the census period, while the sparsely populated ones increased by 506 units. (31.1%, Table 4). According to preliminary data, the number of settlements in the Vologda Oblast in 2018 was already just over 6 thousand.

Table 4. The number of settlements, units

Territory	2002			2010			2010 to 2002,%		
	Urban	Rural	without population	Urban	Rural	without population	Rural	without population	without population
Russia	2940	155289	13086	1386	153124	19416	47.14	98.61	148.37
Vologda Region	27	8041	1625	24	8006	2131	88.89	99.56	131.14

Source: compiled from Results of the All-Russian Population Census 2002, 2010.

Along with the restructuring of the settlement network, there is an increase in the processes of degradation of production and infrastructure potential in small and medium-sized settlements and aggravation of other socio-economic problems. So, according to a survey of residents of rural territories of the Northwestern Federal District (the district completely includes the territories of the European North of Russia) conducted by the VolRC RAS , the key problems of their village are lack of work - 69.7% of respondents; low living conditions - 49.2%; state support of citizens - 47.1%; low quality of social services - 35.7% (Table 5). Their presence limits the attractiveness of these territories for living and causes an increase in the outflow of the population from the village.

Table 5. The main problems of the municipality, % of the number of respondents

Problem	The frequency of choice in response, %
Lack of job opportunities	67,9
Low level of state support for citizens and municipality	50,1
Low standards of living	48,8
Low quality of public services (hospitals, schools, kindergartens, etc.)	38,6
Lack of kindergarten places	26,4
Lack of hospital, first-aid post	25,1
Lack of schools	21,4
Closing of educational institutions	13,8
Other	12,6
Difficult to answer	7,7

Note: the amount in the column exceeds 100% since it was possible to select all the suitable answer options. The sample is representative by gender and age; its total volume was 238 respondents. As part of the study, villagers living in 17 large villages, 12 in medium-size villages, 12 in small villages were surveyed. Among respondents, 42% live in large villages, 34% - in medium-size villages, 24% -small villages, remoteness from the district center - 13% - residents of district centers, 57% - people living in a radius of up to 20 km, 20% - in 21- 50 km, 10% - further 50 km.

It should be noted that the development of transport is one of the conditions for ensuring the internal connectivity of the country's territories. To assess the level of security of the European North of Russia with transport infrastructure using the methodological tools presented above, the coefficients of Engel (Кэ), Holtz (Кг), and Uspensky (Ку) were calculated. There are no established normative or threshold values of these coefficients in science and practice, but it should be noted that the greater their value, the higher the level of regional provision of transport infrastructure.

The calculated Engel coefficient for roads on average in Russia was 0.029 (in the Vologda Oblast - 0.069, the Republic of Karelia - 0.033, the Arkhangelsk Oblast - 0.024, the Komi Republic - 0.013, the Murmansk Oblast - 0.011, Table 6), while in Canada, it is comparable in area with Russia and also the northern country, it is 0.056 (P. Shvalov, 2019). From the data obtained it follows that the highest level of development of the transport system among the regions is characteristic of the Republic of Karelia and the Vologda Oblast.

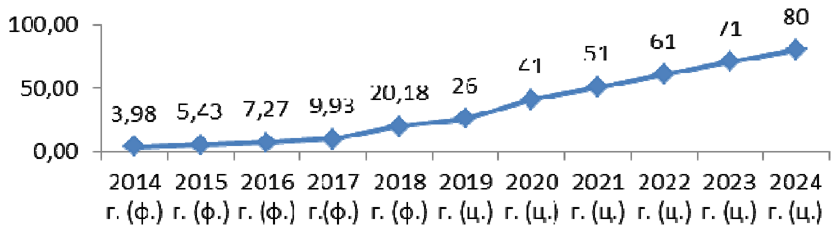
Table 6. Assessment of the level of security of the regions of the European North of Russia with transport infrastructure as of 2018

The subject of the Russian Federation	Total length of transport ways (automobile, railway, internal water, L), *thousand km* (RF - million km)	Area (S), *thousand square meters km (RF - million sq. km)*	Population (H), *thousand people (RF - million people)*	Number of populated points (with residents, P), *units*	Total weight of goods sent to the territory (t), *million tons*	Coefficient		
						Engel (K_e)	Holtz (K_h)	Uspensky (K_u)
RF	1.7	17.1	146.8	136094	6788.2	0,034	0,035	0.007
Vologda Region	31.3	144.5	1167	5899	70.8	0,076	1,072	0.137
Republic of Karelia	16.9	180.5	618	691	36.3	0.051	1,513	0.106
Arkhangelsk region	25.9	589.9	1144	3156	37.8	0,032	0.600	0,088
Komi Republic	13.3	416.8	830	723	42.1	0,023	0.766	0,054
Murmansk region	4.4	144.9	748	126	32.6	0.013	1,030	0,029

Source: calculated on the basis of data of Federal State Statistics

A key trend in the functioning of the transport system of the European North in the post-Soviet period is a decrease in the volume of cargo turnover of the main types of transport (rail, road), despite the fact that in 2000-2018 this indicator increased. The only transport artery, the volume of traffic on which is increasing, is the Northern Sea Route (in 2014-2018 this indicator increased from 3.98 to 20.18 million tons per year), which, in fact, indicates the dominance of the foreign market over domestic in the economy of modern Russia (Figure 3).

Figure 3: Volume of cargo transportation in the waters of the Northern Sea Route (NSR), million tons



Note: ф - actual values; ц - target values according to the Comprehensive Plan for the modernization and expansion of the main infrastructure for the period until 2024.

Source: Data of Federal State Statistics

These circumstances actualize the problem of ensuring internal transport connectivity of the space and the development of logistics in the territory of the regions of the REN.

In this regard, in our opinion, the Vologda Oblast should play an important role in the quality of the outpost of the development of the North and the Arctic. One of the priority areas is the transformation of the city of Vologda into a developed transport and logistics center. This is facilitated by the fact that the following major railway transport corridors pass through the region: “Transsib” (Vladivostok – Chelyabinsk – Bui – Vologda – Cherepovets – Babaevo – Saint Petersburg); “North-South” (Moscow – Danilov – Vologda – Vozhega – Arkhangelsk with a branch to Vorkuta and Murmansk). In addition, there is a Volga-Baltic waterway, two airports (Vologda, Cherepovets).

5. Conclusion

Destructive processes in the post-Soviet period associated with the polarization and compression of the previously developed space of the European North of Russia, the violation of its internal connectivity actualize the tasks of improving the management of the spatial development of these territories. In this situation, in our opinion, it is necessary to create conditions for the development of not only urbanized territories but also the territories of industrial and rural periphery through their inclusion in unified internal production chains.

In other words, in such a situation there is an urgent need for the implementation of regional policies aimed at overcoming destructive trends in the studied territories based on the effective use of their potential and the establishment of inter-municipal cooperation. At the same time, it is necessary to form and develop several reference points in the regions of the European North of Russia, which, in our opinion, should become a kind of "counterweights" to the large and largest cities of central Russia and will allow to overcome the negative trends in the activation of centripetal processes, to preserve the existing supporting spatial framework of the region.

Currently, a whole series of large nodal forms of settlement has been formed in the European North of Russia, the core of which is large and medium-sized cities, which also become centers of attraction for neighboring municipalities (Table 7).

Table 7. Cities of the European North of Russia, which can serve as the basis for a nodal polycentric model of the spatial organization

City	The list of municipalities included in the spatial gravity zone of the city	The population of the city and these municipalities, thousand people
1. Arkhangelsk	City district "Novodvinsk", City district "Severodvinsk", Primorsky municipal district	608.0
2. Vologda	Vologda, Gryazovetsky, Sokolsky municipal areas	455.0
3. Murmansk	City District Aleksandrovsk, City District v. Vidyaevo, City District Severomorsk, Kola Municipal District	450.7
4. Cherepovets	Kaduysky, Cherepovets, Sheksninsky municipal districts	408.4
5. Petrozavods	Kondopoga, Prionezhsky, Pryazhinsky municipal areas	352.3
6. Syktyvkar	Kortekros, Syktyvdinsky, Sysolsky municipal areas	316.2
7. Apatite	City District Kirovsk, City District Monchegorsk, City District Olenegorsk, City District Polyarnye Zori	178.0
8. Uhta	Municipal District Sosnogorsk	163.0
9. Kotlas	Koryazhma City District, Kotlas Municipal District	131.2
10. Vorkuta	Vorkuta City District	80.1

Source: calculated on the basis of data of Federal State Statistics

A previous analysis showed that these nodes of the first and second classes play an important role in the economy of their subjects due to the high density of economic activity and have the potential for further development based on the formation and effective use of agglomeration effects.

Ensuring balanced spatial development, overcoming destructive processes and maintaining the developed space of the northern territories requires the formation of reference points at the intra-regional level. Such a “counterbalance”, for example, the city of Vologda and the city of Cherepovets and the center of gravity in the east of the Vologda region is currently the city of Veliky Ustyug. It has turned not only into an economic hub, but also a kind of center for social services of the neighboring areas.

At the same time, the management of the formation and development of such reference points should be carried out taking into account objective factors that influence the development of the city system. It is worth mentioning the study (Manaeva, Kanishteva 2017), where the authors experimentally, based on the available empirical data, proved that the volume of investments in the city budget and the level of development of transport infrastructure have a significant impact on socio-economic inequality in the development of Russian cities territory.

Thus, the formation of such nodal forms of space organization will allow maintaining the optimal supporting framework in the northern territories, and such group settlement systems themselves can serve as the basis for the formation and development of a polycentric model of spatial organization in the European North of Russia, focused on the revival and development of sustainable socio-economic ties along the line "large city-small city-village".

An important place in these processes, in our opinion, should be played by small and medium-sized cities. At the same time, the strategically important task of their development is, on the one hand, establishing close cooperation with large cities and regional centers, and on the other hand, ensuring the development of the functions of organizational, economic, industrial, and cultural and educational centers of rural areas.

Given the identified characteristics and prospects of socio-economic development, including in the framework of the Spatial Development Strategy of the Russian Federation until 2025, it is advisable to place enterprises and organizations of industries both in the traditional (based on the processing of mineral resources of the territories) and the "new" economy (post-industrial production, including for the needs of the Arctic: biotechnology, electronic industry, and another precision engineering, etc.), which will ensure the revival of many small and medium-sized cities s (primarily single-industry towns) that are now in a systemic crisis (Table 8.).

Table 8. Priority areas for the economic development of small and medium-sized cities in the European North of Russia within the framework of a nodal polycentric model of spatial organizational

"Traditional" economy	"New" Economy
Enterprises and organizations of traditional industries: - producing homogeneous products in activities that are not subject to economies of scale (textile industry, machining of metal, wood, plastics, some chemical industries); - using small reserves of local raw materials for their production needs (enterprises producing construction materials, furniture, peat enterprises, etc.); - on the processing of non-transportable or perishable agricultural products produced in rural areas; - to fulfill the functions of organizing, industrial, economic and service centers of rural areas, gravitating to a small city (repair of agricultural machinery, roads and vehicles, etc.); - to ensure transit transport links between large territorial-economic complexes or elements of one complex; - handicrafts, developing mainly on the basis of the use of skills of the local population.	Post-industrial production, including for the needs of the Arctic: Biotechnology, electronic industry, knowledge-based business services, etc., oriented in its deployment to new factors: knowledge, innovation, entrepreneurial energy, venture capital, staff qualifications, etc.

Source: compiled by the author

This will give a new impetus to the development of small and medium-sized cities, as well as non-urbanized territories, but at the same time, it will require a qualitatively new level of infrastructure development and radical investment decisions on the part of the state. At the same time, technological chains formed within the framework of this model that goes beyond the European North and its Arctic zone, in our opinion, should be focused not on integration into international chains as products of the first redistribution, but on strengthening economic integration with other Russian regions through "North-South". This implies the need for the formation of new forms of territorial organization of the economy in the North, the scientific substantiation of recommendations for reducing territorial imbalances between the allocation of "Arctic" and "Northern" resources and their processing and consumption centers.

Under such conditions, rural territories and rural economies will receive a new impetus for development, suggesting the emergence of new opportunities to increase efficiency and radically change agricultural production technologies, bring agricultural products closer to production, etc. At the same time, the transformation of the existing spatial structure of the economy and the settlement of the European North requires a qualitative review of the principles of federal and regional policy.

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References

Anderson, G. and Ge, Y. 2005. The size distribution of Chinese cities. Regional Science and Urban Economics, vol. 35 (6). 756-776.

Baransky N. 1956. "On the economic and geographical study of cities. Economical geography". Economic cartography. M .: Geografgiz. 168.

Black D., Henderson V. 2003. Urban evolution in the USA. Journal of Economic Geography. vol. 3, iss. 4. 343–372.

Fattakhov R., Nizamutdinov M., Oreshnikov V. 2019. “Analysis and modeling of development trends of the territorial settlement system in Russia.” The economy of the region. T. 15, no. 2. 436-450 doi 10.17059 / 2019-2-10
Fujita M., Krugman P., Venables A. 1999. “The Spatial Economy: Cities, Regions and International Trade.” Cambridge: The MIT Press. 382.
Gagarina G. 2013. “Development of the methodology for managing the spatial integration of the economies of the Russian regions”: dis. ... Doctor of Economics: 08.00.05 [Place of protection: Ros. economy un-t them. G.V. Plekhanov]. M. 328.
Gataullin R., Karimov A., Komarov A. 2014. “Economic space: content, unity and gaps.” Problems of the modern economy. no 4 (52). URL: http://www.m-economy.ru/art.php?nArtId=5194.
Gayán-Navarro C., Puente-Ajovin M., Sanz-Gracia F. 2019. The urban structure of Spain and Italy (1900-2011). Regional Science Inquiry, Vol. XI, (3). 43-54
Glezer O., Weinberg E. 2013. “The space of the life of the population and resettlement as factors and conditions for the modernization of Russia.” Region: economics and sociology. no 3. 21–38.
Granberg A. “Strategies of macro-regions of Russia: methodological approaches, priorities and implementation paths”: under. ed. Academician M .: Science. 2004. 720.
Granberg A. 2003. “Fundamentals of a Regional Economy”. M .: HSE. 495.
Grinchel B., Nazarova E. (2014) “Methods for assessing the competitiveness of regions”: a monograph. SPb .: SUAI. 244.
Hirofumi A. 2019. “New Instruments Attracting Investment into the Russian Far East: Preliminary Assessment”. Spatial Economics. vol. 15, no. 1, 157–169. DOI: 10.14530 / se.2019.1.157-169
Isard W. 1956. “Location and space-economy: a general theory relating to industrial location, market areas, land use, trade, and urban structure.” Cambridge: The MIT Press. 369.
Kozhevnikov S. 2019. “Spatial and Territorial Development of the European North of Russia: Trends and Priorities of Transformation.” Economic and social changes: facts, trends. forecast. T. 12. no. 6.91-109. DOI: 10.15838 / esc.2019.6.66.5
Krugman P. 1994. “Complex landscapes in economic geography. American Economic Association. Papers and Proceeding. " no. 84, 413.
Krukovsky Y. 2001. “A fractal analysis of time series in predicting trends in the development of socio-economic systems. Fractals and systems development cycles. ” Tomsk: IOM SB RAS, 38-41.
Lappo G. 1983. "The concept of the supporting frame of the territorial structure of the national economy: development, theoretical and practical significance." Proceedings of the USSR Academy of Sciences. Geographical series. no.5.16-28.
Lazhentsev V. 2015. “Territorial organization of the population and economy of the European North of Russia.” Region: economics and sociology. no. 2 (86). 3-28.
Lösch A. 1940. “Die räumliche Ordnung der Wirtschaft”: eine Untersuchung über Standort, Wirtschaftsgebiete und internationalem Handel. Jena: G. Fischer. 348.
Manaeva I., Kanishteva A. 2017. Estimation of factors for social and economic inequality of Russia’s towns. Regional Science Inquiry, Vol. IX, (2). 147-158
Minakir P. 2013. “Spatial analysis in the economy.” NEA Magazine. no 1 (17). 176-180.
Minakir P., Demyanenko A. (2014) “Essays on Spatial Economics”; Grew up. Acad. Sciences, Far East. Branch, Institute of Economics. research. Khabarovsk: IEI FEB RAS. 272.
Nefedova T. 2019. “Development of the post-Soviet agricultural sector and polarization of the rural space of the European part of Russia.” Spatial Economics. T. 15. no 4. 36–56. DOI: 10.14530 / se.2019.4.036-056.
Prakash M., Teksoz K., Espey J., Sachs J., Shank M., Schmidt-Traub G. 2017. “Achieving A Sustainable Urban America. The U.S. Cities Sustainable Development Goals Index 2017 ”. Available at: http://unsdsn.org/wp-content/uploads/2017/08/US-Cities-SDG-Index-2017.pdf
Shibusawa H. 1999. “Agglomeration diseconomies of traffic congestion and agglomeration economies of interaction in the information-oriented city economy." Journal of Regional Science. vol. 39, no. 1, 21-49.
Shvalov P. 2016. “Problematic factors in the development of high-speed logistics in macro- and mesological systems.” Socio-economic and humanitarian journal of the Krasnoyarsk State Agrarian University. no. 4.333-142.
Soo, K.T. 2014. Zipf, Gibrat and geography: evidence from China, India and Brazil. Papers in Regional Science, vol. 93(1). 159-182.
Tatarkin A. 2012. “Formation of regional institutions of spatial development of the Russian Federation”. Economic and social changes: facts, trends, forecast. no 6 (24). 42-59.
Uchida H., Nelson A. 2010. “Agglomeration index: towards a new measure of urban concentration”. Working paper. no. 29. 18. Available at: https://www.wider.unu.edu/sites/default/files/wp2010-29.pdf

Vorobiev V. 1959. “Cities of the southern part of Eastern Siberia. Irkutsk ”: Irkut. Prince Publishing House, 147.

Yakovleva S. 2014. “Spatial models in the strategies of socio-e-economic development of Russian regions”. Pskov Regional Journal. no. 17.3-16.

Zipf, G. 1936. “The Psycho-Biology of Language: An Introduction to Dynamic Philology.” London: Routledge. 336.

REGIONAL CONVERGENCE: THEORY AND EMPIRICS

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Abstract
One of the most controversial issues in regional science is regional convergence. Do regions converge? Why the existing inequalities across regions persist overtime, despite some movements towards convergence. Such questions had bred an extensive literature. In this paper, a model of regional convergence focusing on technological factors is developed. This model is tested using data for the EU-27 regions. A possible explanation for these results is offered and suggests that might afford an interesting policy conclusion.
Keywords: Regional convergence, Technological gaps, Technology adoption
JEL classification: R10

1. Introduction

The debate on regional convergence has bred, and continues to do so, dozens of empirical studies. In this fast growing literature technological innovation has been acknowledged to be of critical importance in promoting regional convergence or sustaining existing inequalities across space. The relevant empirical studies have over-emphasised the role of capital accumulation at the *expense* of the diffusion of technology. It is the intention of this paper to develop a model that incorporates technology adoption. The rest of the paper is laid out as follows. The theoretical framework upon which the empirical analysis will be conducted is articulated in Section 2. Data related issues are overviewed in Section 3, and the models are submitted to the usual econometric tests yielding the main findings in Section 4. Section 5 concludes the paper.

2. Technological externalities

A major concern for regional economists is whether regional per-capita incomes tend to converge or diverge over the long-run. Differences in levels of technology concern both the creation of new technology and its adoption. Creation of technology promotes regional growth, since advances in technology are transformed into higher rates of productivity. However, not all regions are able to innovate and for those regions which lag behind, the alternative is the adoption of technological improvements. Thus, there is a possibility that these regions may converge or at least catch-up to some degree. If such regions are able to adopt technology, then they will exhibit a relatively faster rate of growth, ceteris paribus, and thereby experience a technological catch-up effect. Nevertheless a necessary condition for technological catch-up is that technologically lagging economies have an infrastructure and appropriate conditions that will allow the effective adoption of new technology (Abramovitz, 1986). Conditions related to the level of technology might be a satisfactory explanation for the observed fact that economic disparities across regions are persisting in the long-run.

Convergence can be seen as the tendency towards the reduction of income disparities, approximated in terms of GDP per-capita (or worker) or disposable income in a region. A useful starting point is the neoclassical theory, since the assumptions of this theory actually carry implications for the regional convergence/divergence debate. In the neoclassical model, a factor that promotes, and accelerates, regional convergence is the process of technology diffusion; a sort of 'entropic trend' towards spatial homogeneity (Camagni and Capello,

* The findings, interpretations and conclusions are entirely those of the author and, do not necessarily represent the official position, policies or views of the Ministry of Rural Development & Foods and/or the Greek Government.

2010). A central tenant of this model is that all regions are able to absorb technology to the same degree, so that the higher the technological-gap the higher the effect on growth, ceteris paribus. While the 'standard' model predicts absolute convergence, in the 'augmented' model, economies do not necessarily converge to the same 'steady-state' irrespective of their initial conditions. In this light, the 'augmented' neoclassical model introduces a new notion of convergence, conditional convergence. Sala-i-Martin (1996) claims that the concept of conditional convergence is encapsulated in the prediction of the neoclassical model that the growth rate of an economy will be positively related to the distance that separates it from its own steady-state. Generalising across a group of regional economies, the simple proposition that poor economies catch-up with rich economies no longer holds true. The latter prediction relies on the presence of common steady-state, so that initially poor economies which are further away from this steady-state will grow faster. It follows, therefore that, conditional convergence coincides with absolute convergence only if all the economies have the same steady-state.

Both forms of convergence, however, represent movements towards an equilibrium or 'steady-state' position. In order to examine the possibilities for non-convergence across regions, it is necessary to either assume certain conditions in the models do not hold, such as factors are not perfectly mobile, or to turn to alternative approaches to the analysis of regional growth, which do not rely on the concept of equilibrium. Alexiadis (2013) develops a model which implies a disequilibrium process. Whether regions converge towards a high or a low outcome depends on the degree to which infrastructure conditions are appropriate for the adoption of technological improvements.

The key feature in this model is that the rate of diffusion of technology (ε_i) is assumed to be a non-linear function of the technological gap (b_{lf}). Thus, $\varepsilon_i = \rho / b_{lf,i}^{\pi}$, with $\rho, \pi > 0$, implying that the rate of diffusion is not constant but varies across regions, according to the size of the gap. Thus, for a given value of ρ, a high technological gap implies a low capacity to absorb technology. The parameter ρ can be interpreted as a constant underlying rate of diffusion, which would apply to all economies if there were no infrastructure/ resource constraints upon technological adoption. However, the existence of such constraints causes the actual rate to diverge from ρ. In other words, the higher the technological gap, the slower the rate of technological diffusion (ε_i). Of critical importance is the parameter π, which determines the extent to which the existing gap, and implicitly therefore the existing infrastructure, impacts on the rate of diffusion. This parameter can be viewed as a measure of the appropriateness or suitability of regional infrastructure to adopt technology. As $b_{lf,i} \to \infty$, $\varepsilon_i \to 0$, i.e. for a region with a high b_{lf}, the rate of diffusion is low, severely limited by a lack of appropriate infrastructure conditions. Conversely, as $b_{lf,i} \to 0$ then $\varepsilon_i \to \infty$. The implications of modelling the rate of diffusion in this way can be seen by a simple expression for the rate of change in the technological gap: $\dot{b}_{lf} = \gamma\theta_{lf} - \rho b_{lf}^{(1-\pi)}$, where θ is the proportion of output to innovation. In equilibrium $\dot{b}_{lf} = 0$ so that $\gamma\theta_{lf} = \rho b_{lf}^{(1-\pi)}$, implying $b_{lf}^{*} = [(\gamma/\rho)\theta_{lf}]^{1/(1-\pi)}$. If $\pi = 0$, then $\varepsilon_i = \rho$ and the diffusion of technology occurs at a constant autonomous rate (ρ), while if $\pi = 1$ the size of b_{lf} changes in accordance with the rate is unrelated in the process of technological diffusion depends on the productivity of innovation and the constant rate of diffusion (if $\pi = 1$, then $\dot{b}_{lf} = \gamma\theta_{lf} - \rho$). Two distinct patterns of convergence arise when $\pi < 1$ and when $\pi > 1$. When $b_{lf} - b_{lf}^{*} < 0$, the dynamics of the system cause $b_{lf} \to b_{lf}^{*}$, since the rate of innovation outweighs the effect of technology diffusion and $\dot{b}_{lf_i} > 0 \; \forall i \in [0 \;\; b_{lf}^{*}]$. Conversely, when $b_{lf} - b_{lf}^{*} > 0$, there is movement towards equilibrium since $\dot{b}_{lf_i} < 0 \; \forall i \in [b_{lf}^{*} \;\; \infty]$. Convergence towards a single equilibrium is also possible if $\pi < 1$ but regions with unfavourable infrastructure conditions reflected in a large technological gap move towards equilibrium at a slower pace. However, if $\pi > 1$, then convergence towards a unique equilibrium, for all but the leading region, is no longer the case, and b_{lf}^{*} represents a threshold value. Consider an economy divided into three regions, one 'leader' and two followers. Convergence with the leading region at a terminal time (T) requires that $b_{lf,T}=0$. However, a zero gap with the leader is not feasible by definition. Hence, a more realistic condition would be $b_{lf,T-0}\to 0$. For simplicity assume $\theta_1-\theta_2=0$, so that $\theta_{lf,1}-\theta_{lf,2}=0 \wedge \gamma_1=\gamma_2$. It is also assumed that ρ is the same for both regions. If, however, the initial technological gaps differ between these regions ($b_{lf,1}<b_{lf}^{*}<b_{lf,2}$), then region 1 is able to close the technological gap with the leader at a faster rate than region 2. Despite a lower rate of innovation compared to the leader, this region is able to adopt technology from the leading region and it is this latter effect which dominates. However, region 2, with a high gap and hence poor infrastructure conditions exhibits too slow a rate of technology absorption and, as a result, the gap with the leader increases over time. Region 1 and the leading region constitute an *exclusive* convergence-club, which includes any region with a technological gap in the range $(0,b_{lf}^{*}]$ while regions in the range $[b_{lf}^{*},\infty)$ diverge from the leader and the remaining regions. In this light, b_{lf}^{*} is not an 'equilibrium' level for the technology gap, but rather a 'threshold' level, which distinguishes between converging and non-converging regions and spatial inequalities may persist or even increase, so that income distribution becomes polarised. Nevertheless, the important point to grasp is that this model imposes a non-linear process of technological diffusion that depends on infrastructure conditions as embodied in the size of the gap at a point in time. If the adoption of technology is related in a particular way to the size of the initial technological gap and associated infrastructure conditions, then two groups of regions can emerge; one which is a convergence club while a second group that does not exhibit an 'equilibrium'. Whether a region belongs to the convergence-club depends on its capacity to adopt technology, and this capacity declines the higher the initial technology gap. A high technological gap might indicate that they lack the necessary conditions to allow for an effective adoption of technology. Investment in regions with high adaptive abilities will increase their growth rates and the growth of the economy as a whole. Regions with low adaptive ability, on the other hand, will experience a fall in their growth rates, widening the gap in regional incomes.

Convergence theory provides a framework that can be applied empirically in order to give specific answers to specific problems. Convergence regressions can be a valuable tool for policy-making. The fundamental issue behind the convergence debate is the extent to which there is increasing or decreasing inequality among economies. 'Inequality' is typically measured by reference to the distribution of per-capita income or output across countries or regions. In a very broad sense, therefore, one would expect changes in the distribution of income across economies to be a focus for attempts to measure convergence. Barro and Sala-i-Martin (1995) define convergence as a decline in income inequalities over time. This hypothesis can be examined by means of a regression equation. Thus,

$$g_i = a + by_{i,0} + \varepsilon_i \qquad (1)$$

where $y_{i,0}$ is the natural logarithm of output per-worker at some initial time, a is the constant term, which represents the steady-state growth rate, b is the convergence coefficient and ε_i is the random error-term. The parameter b reflects the partial correlation between the growth rate and the initial level of output per-worker and its sign indicates whether economies, on average, are converging or not. The condition for convergence requires that $\partial g_i/\partial y_{i,0}\equiv f'_{g_i,y_{i,0}}=b<0$. Following Barro and Sala-i-Martin (1992) $b=-(1-e^{-\beta T})$, implying $\beta=-[\ln(b+1)]/T$, where T is the number of years included in the period of analysis. If $b<0$ then $\beta>0$, i.e. a higher β corresponds to more rapid convergence. Employing equation (1) using various data sets, Sala-i-Martin (1996) estimates a 'surprisingly' similar rate of convergence across both regional and national economies, and forms the 'mnemonic rule' that 'economies converge at a speed of about two percent per year.' (p. 1326). This means that on average, 2% of the gap in income per capita between two regions is eliminated so that it takes more than 30 years to eliminate one half of the initial gap in per capita incomes.

Another frequently used notion is that of 'conditional convergence' (Barro and Sala-i-Martin, 1992), which is based upon the argument that different regional characteristics will lead to different steady-states: $g_i = a + b_1 y_{i,0} + b_2 \mathbf{X}_i + \varepsilon_i$, where $\mathbf{X}_i$ represents a vector of variables to control for differences across regions[1].

Absolute (unconditional) convergence is signalised by $b_1 < 0 \wedge b_2 = 0$ while conditional convergence $b_1 < 0 \wedge b_2 \neq 0$. Having selected appropriate variables to represent the institutional, structural, preference and environmental variables that characterise the steady-state value of per-capita income it remains the case that convergence is said to be occurring when higher initial levels of per-capita income are associated with lower rates of growth, over a given time period.

As acknowledged by Abramovitz (1986), technological progress is driven not only by indigenous innovation but also by the process of absorption of new technologies. More specifically, the possibility of imitating, at low cost, technologies developed elsewhere should allow poor regions to grow faster than rich ones, ceteris paribus – the 'technological catch-up effect'. In the empirical application, the relative extent of technology adoption capacity is approximated by the share of a region's resources found in such sectors. In other words, this approach involves identifying technically dynamic sectors, which are perceived to be the most receptive to innovation and its utilisation. In this paper a region's level of adoption capacity is measured as the percentage of total employment in technologically dynamic sectors, which include manufacturing activities such as aerospace and services such as computer and related activities. More formally, $ADP_{i,t} = \sum_{\rho=1}^{k} \eta_{i,t}^{\rho} / \sum_{j=1}^{m} L_{i,t}^{j}$, where $\eta_{i,t}^{\rho}$ refers to personnel employed in high-tech manufacturing and knowledge-intensive high-technology services ($\rho = 1, \ldots, k$), while $L_{i,t}^{j}$ is total employment ($j = 1, \ldots, m$) in a region. The presence of technologically dynamic sectors in a regional economy, represents the level of technological development, but also, indicates a capacity for technology adoption, since these are taken to be the most technologically dynamic and advanced sectors. However, the potential for such technology diffusion increases as the technological gap increases, defined as the distance between a region's technological level and that of the most advanced technological region. Consequently, in this context a variable that approximates the technological gap for region i at time t can be defined as $TG_{i,t} = ADP_{L,t} - ADP_{i,t}$, where the subscript L refers to the leading-region, defined as the region with the highest percentage of employment in high-tech manufacturing and knowledge-intensive high-technology services during the initial year of the analysis. Embodied in this variable is the idea of both a gap and the capacity to adopt and implement technological innovations. A model of conditional convergence seems to be a suitable way to test for technological catch-up. Thus,

$$g_i = a + b_1 y_{i,0} + b_2 TG_{i,0} + \varepsilon_i \qquad (2)$$

The presence of a technological-gap alone is not sufficient to promote significant technology diffusion. There has to be an appropriate level of capability to adopt technology. Thus, the bigger the gap the greater the potential for technology adoption, but the lower the capacity to actually achieve this.

In the case of the $TG_{i,0}$ variable, this variable reflects two distinct features, namely the level of 'technological distance' from the leading region and the degree to which existing (initial) conditions in a region allow adoption of technology. A high initial technological gap combined with a high rate of growth may indicate, ceteris paribus, that less advanced regions are able to adopt technology, which is transformed into high growth rates and, subsequently, convergence with the technologically regions. It may be argued, therefore, that the condition $b_3 > 0$ promotes convergence. On the other hand, a high initial value for $TG_{i,0}$ may indicate

1 Usually country dummies are included. The reason for this is country dummies capture country-specific determinants of spatial inequality (e.g. geographic factors such as fragmentations, mountains, coasts, deserts, etc.) which are determinants of spatial inequality, but difficult to consider in an econometric analysis which focuses on the variation in time. In contrast to the cross-section estimations, panel regressions concentrate on within-country variations, which are important because they consider the dynamics of structural changes. Panel data analysis allows considering country fixed effects, eliminating unobserved country heterogeneity (Lessmann, 2014).

that although there is significant potential for technology adoption, initial infrastructure conditions are not appropriate to technology adoption and, therefore, there are no significant impacts on growth. In other words, if $b_3 < 0$, then convergence between technologically lagging and technologically advanced regions is not feasible.

3. Some indicative empirics

Having outlined the empirical context in terms of the methodology and variables to be employed, the next step forward is to apply these to an investigation of the pattern of regional growth in Europe. The spatial units used in this paper are those delineated by EUROSTAT and refer to 270 NUTS-2 regions of 27 member countries in the EU. The EU uses NUTS-2[2] regions as 'targets' for convergence, defined as the 'geographical level at which the persistence or disappearance of unacceptable inequalities should be measured' (Boldrin and Canova, 2001, p. 212).

Despite considerable objections to the use of NUTS-2 regions as the appropriate spatial level for the assessment of convergence, they are nevertheless sufficiently small to be able to capture sub-national variations (Fischer and Stirböck, 2006). The growth of regional economies is measured using data on Gross Value-Added (GVA) per worker since this measure is a major component of differences in the economic performance of regions and is a direct outcome of the various factors that determine regional competitiveness (Martin, 2001).

The time period for the analysis extends from 1995 to 2014. This might be considered as rather short but Islam (1995), and Durlauf and Quah (1999), point out that convergence-regressions are valid for shorter time periods, since they are based on an approximation around the steady-state and are supposed to capture the dynamics toward the steady-state. The cross-section test for absolute is applied to the period 1995-2014. While these techniques have a number of statistical limitations, they are good at pin-pointing general trends and are relatively straightforward to interpret.

All results are presented in Table 1, and include the absolute convergence model and the technological-gap convergence.

Table 1. Regional Convergence, EU-27 NUTS-2 Regions, 1995-2014

	Equation (1)	Equation (2)
Depended Variable: g_i, n = 270 NUTS-2 Regions, Ordinary Least Squares		
a	1.95931**	2.20895**
b_1	−0.388593**	−0.418166**
b_2		−0.131488**
Implied β	2.4599	2.7078
Adjusted R^2	0.652107	0.705145
LIK	37.96280	60.79799
AIC	−71.92561	−115.5960
SBC	−64.72877	−104.8007
Diagnostic tests		
Ramsey RESET specification test[1]	8.0261 [0.0049]	2.55256 [0.11130]
White test for Heteroscedasticity[2]	20.9511 [0.0000]	39.0333 [0.00000]
Breusch-Pagan test for Heteroscedasticity[2]	36.4301 [0.0000]	39.0314 [0.00000]
Koenker test for Heteroscedasticity[2]	20.9455 [0.0000]	38.5747 [0.00000]
Test for Normality of the residuals[3]	18.5151 [0.0000]	10.9272 [0.00423]

Notes: 1. Null Hypothesis: Specification is adequate. 2. Null Hypothesis: Heteroscedasticity is not present. 3. Null hypothesis: Error is normally distributed. For each diagnostic test, the associated statistics together with the p-values are reported. ***, **, * significant at 1%, 5% and 10%, respectively.

[2] NUTS-2 regions differ considerably in terms of. On the one end, there is the Finnish island of Åland with a mere 25,000 inhabitants, and on the other, the Isle de France with a population of more than 10 million. In some cases, one and the same region pertains to NUTS-0, NUTS-1 and NUTS-2.

As can be seen from Table 1, there is a statistically significant inverse relationship between the rate of growth and the level of per-capita income at the start of the period. The estimated rate of convergence is about 2.5 per annum, close to the 'stylised fact' by Barro and Sala-i-martin (1992). While the explanatory variable has the expected sign and the estimated coefficient is highly significant, nevertheless, the various diagnostic tests indicate serious problems. To be more specific, the Ramsey test accepts the Ha hypothesis, i.e. that equation (1) is not adequate to explain the process of regional convergence in the EU. A model of absolute convergence might be of limited value, at least in the case of the NUTS-2 regions, since the heteroscedasticity tests accept the alternative hypothesis. Moreover, the errors are not normally distributed, given that that the test accepts the alternative hypothesis at the usual levels of significance. Based on that evidence, therefore, the property of absolute convergence does not characterise the European regions, irrespective of the primary evidence. This can be considered as evidence that the alternative hypothesis, namely conditional convergence, might explain regional inequalities in the EU in a more appropriate manner. Estimating equation (2) gives some support to this hypothesis. Indeed, both variables have the expected signs. It is important to note that although conditional convergence implies a lower rate of convergence, nevertheless, the introduction of the variable describing technology adoption increases the rate of convergence, although marginally. This is somehow expected given that the $TG_{i,0}$ variable encapsulates the impact of technological gap, which is an obstacle to convergence and the potential for technology adoption, a factor enhancing the process of regional convergence. The variable $TG_{i,0}$ is statistically significant and negative in sign. A high technological gap does not necessarily imply that technologically lagging regions will be able to adopt technology - a large gap may constitute an obstacle to convergence. This proposition is supported by the empirical analysis which suggests that, on average, regions with high technological gaps at the start of the period grow slower than regions with low gaps, ceteris paribus. Clearly, this is a factor that helps to sustain initial differences across regions, constraining any possibilities for sustainable growth. If technologically backward regions were successful in adopting technology, then the estimated coefficient b_2 would be positive. Since $\hat{b}_2 < 0$ this indicates that infrastructure conditions in regions with high technological gaps are inhibiting this process of technology adoption. Another important feature of the estimation procedure is that the superiority of the model described by equation (2) is supported by both the criteria for model selection applied here, namely the Akaike (AIC) and the Schwartz-Bayesian (SBC) information criteria. This provides support to the hypothesis the process of regional convergence in Europe is limited by substantial differences in the levels of technology adoption; a claim that is supported also by the Ramsey test, which accepts the Ho hypothesis that the specification given be equation (2) is adequate. The heteroscedasticiy and Normality tests, however, cast serious doubts on that hypothesis.

The conventional tests for convergence using cross section data is modified to take into account the relative *size* of each region. The population of each region can be used as the diagonal element in a weighting non-singular positive defined matrix $\mathbf{W}_{n\times n}$, with zero off-diagonal elements. Thus,

$$\mathbf{W}_{n\times n} = \begin{bmatrix} p_{11} & 0 & \dots & 0 \\ 0 & p_{22} & \dots & 0 \\ \vdots & \vdots & \dots & \vdots \\ 0 & 0 & \dots & p_{nn} \end{bmatrix}, \text{ where } p_t = p_t / \sum p_i$$

The Weighted Least Square (WLS) estimator defined as $b_{k\times 1}^{WLS} = \left(Y'_{k\times n}\mathbf{W}'_{n\times n}\mathbf{W}_{n\times n}Y_{n\times k}\right)^{-1} Y'_{k\times n}\mathbf{W}'_{n\times n}\mathbf{W}_{n\times n}g_{n\times 1}$, implies an estimated covariance matrix of the form $V(b^{WLS}) = s_{WLS}^2\left(Y'\mathbf{W}'\mathbf{W}Y\right)^{-1}$. Although WLS approach is unable to solve the problems of parameter heterogeneity, omitted variables, outliers and endogeneity, is a powerful test for convergence as regions are allowed to have an influence on regression results analogous to their size, captured by the weight matrix $\mathbf{W}_{n\times n}$. This adjustment is considered to be an important one because the regions vary widely in terms of population within EU countries. In order to account for bias in the estimated variances of the coefficients, heteroscedasticity corrected t-ratios (heteroscedasticity consistent covariance matrix estimator) are used whenever indicated by the tests results (White, 1980). Estimating equations (1) and (2) using WLS gives the results on Table 2.

Table 2. Regional Convergence, EU-27 NUTS-2 Regions, 1995-2014

	Equation (1)	Equation (2)
Depended Variable: g_i , n = 270 NUTS-2 Regions, Weighted Least Squares		
a	1.98642***	2.24374***
b_1	-0.395682***	-0.42633***
b_2		-0.14117***
Implied β	2.5182	2.77853

The rate of absolute convergence implied by the WLS estimator is slightly faster, compared to that obtained by the applying the OLS method, confirming the hypothesis that the NUTS-2 regions of EU are in a process of convergence. Estimating the conditional model implies a rate of convergence almost 3% per annum. Although the process of technology adoption is a source of convergence for the EU regions, nevertheless, the existing technological gaps constrain this process to a considerable extent.

4. Conclusions

Economic geographers and regional economists have long been concerned with regional inequalities and thence with the issue of how far and in what ways policy intervention can help to reduce such inequalities. Regional policies have been in operation for almost fifty years, yet the regional differentials still remain. The convergence-divergence debate is not longer simply an academic debate when viewed in light of policy issues related to growth of the economy as a whole and reducing interregional inequalities. If one accepts the absolute convergence hypothesis, then one can assume that lagging regions will tend to grow faster and inequalities will be resolved in the long-run simply by improving the functioning of the market. If, on the other hand, there are substantial market imperfections, then market inefficiencies will result in interregional inequalities. A strategy for improving the regional distribution of income, along with increasing the growth rate of the economy as a whole depends on the nature of the original source of divergence. In this paper a source of divergence is detected, i.e. technology adoption. Estimating a model of 'technological convergence'; using data for the NUTS-2 regions of the EU-27, yields an important conclusion. The EU regions exhibit a faster rate of convergence after conditioning for regional differences in the degree of technology adoption and overall infrastructure conditions. In case the results can withstand further scrutiny (e.g. when including data for other countries, which may become available in the future), there are certainly important policy lessons to be learned about the working of technology adoption and the role of regional policy.

References

Abramovitz, M. 1986. Catching up, forging ahead and falling behind, Journal of Economic History, 46 (2): 385-406.

Alexiadis, S. 2013. Convergence clubs and spatial externalities: Models and applications of regional convergence in Europe, Springer

Barro, R. and Sala-i-Martin, X. 1992. Convergence, Journal of Political Economy, 100 (2): 223-251.

Barro, R. and Sala-i-Martin, X. (1995) Economic Growth, 2nd edition MIT Press

Boldrin, M. and Canova, F. 2001. Inequality and convergence in Europe's regions: Reconsidering European regional policies, Economic Policy, 16 (32): 207-253.

Camagni, R. and Capello, R. 2009. Knowledge-base economy and knowledge creation: The role of space. in Fratesi, U. and Senn, L. (eds) Growth and Innovation of Competitive Regions: The role of Internal and External Connections, Springer: 145-165.

Durlauf, S. and Quah, D. 1999. The New Empirics of Economic Growth. In J. Taylor and M. Woodford (eds) Handbook of Macroeconomics. Amsterdam: Elsevier, 235-308.

Fischer M. and Stirböck C. 2006. Pan-European regional income growth and club convergence, Annals of Regional Science, 40 (4): 693-721.

Islam, N. 1995. Growth empirics: A panel-data approach, Quarterly Journal of Economics, 110 (4): 1127-1170.
Lessmann, C. (2014) 'Spatial inequality and development – is there an inverted-U relationship?', Journal of Development Economics, 106: 35-51.
Martin, R. 2001. EMU versus the regions? Regional convergence and divergence in Euroland, Journal of Economic Geography, 1 (1): 51-80.
Sala-i-Martin, X. 1996. Regional cohesion: Evidence and theories of regional growth and convergence, European Economic Review, 40 (6): 1325-1352.
White, H. 1980. A heteroscedasticity-consistent covariance matrix and a direct test for heteroscedasticity. Econometrica 48 (4): 817–838

IS STABILITY FOR REGIONAL DISPARITIES OF UNEMPLOYMENT RATES TRULY MYSTERIOUS? AN ANALYSIS FROM STATISTICAL APPROACH

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Abstract

The paper analyzes the peculiar phenomenon of regional disparities brought by the changes in the geographical distribution of US unemployment rates. Specifically, we investigate the characteristics concerning the gap of that regional distribution especially focusing upon the statistical analysis by mainly an exploratory way. *Reduction in disparities* or *Expansion in disparities* usually involves reducing or increasing the overall level of distribution, and the so-called *relative disparity* between all states of the U.S. shows an extremely stable transition of distribution within a certain range. This is a mysterious phenomenon that is also shown in any other country in the world. One of the reasons that the regional distribution of unemployment rates becomes stable is derived from the robustness of that geographical distribution; this is one of the reasons that the unemployment rate does not fluctuate significantly. Even if that robustness deteriorates for some reason, then the unemployment rate updates the values of minimum and maximum, or only just the range of variation expands; the relative disparities between regions tend to be offset by increases or decreases in the same direction as a result. Since that range is usually very limited, the gap frequently fluctuates up and down within a confined extent and it does not necessarily converge or diverge to a specific point; it would constantly change within the allowable fluctuation range depending on the socio-economic situation.

Keywords: unemployment rate, regional disparity, convergence, equilibrium, stability
JEL classification: C13, C15, J69, R12, R19

1. Introduction

The regional disparities concerning the issues of unemployment rates have been one of the central topics in regional economics and the related fields. When the level of national unemployment rate rises, generally the one of unemployment rate in each region also rises, and the regional distribution levels up overall (see Figure 1): Thus, corresponding disparity also enlarges by its increase. The distribution of relative disparities between regions is very stable, and the relative degree hardly changes over time (see Figure 2).

Figure 1. Unemployment rate and their SD based on raw data

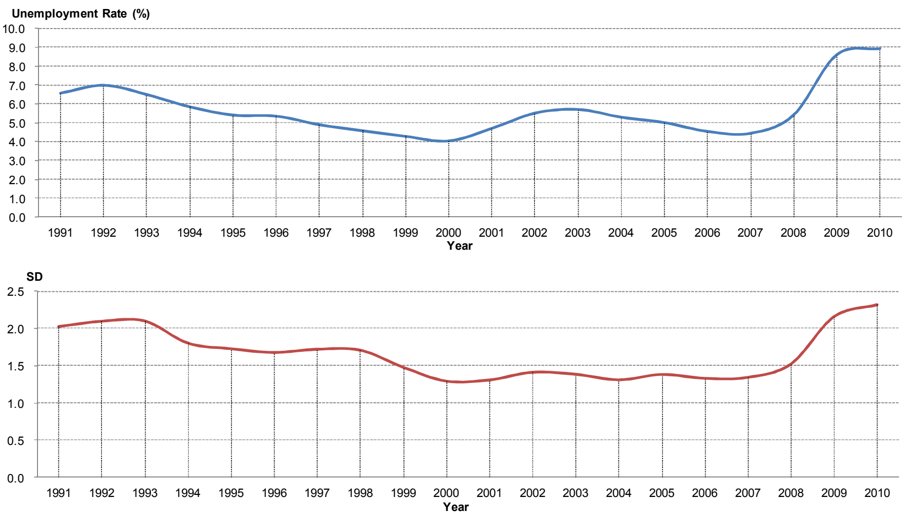
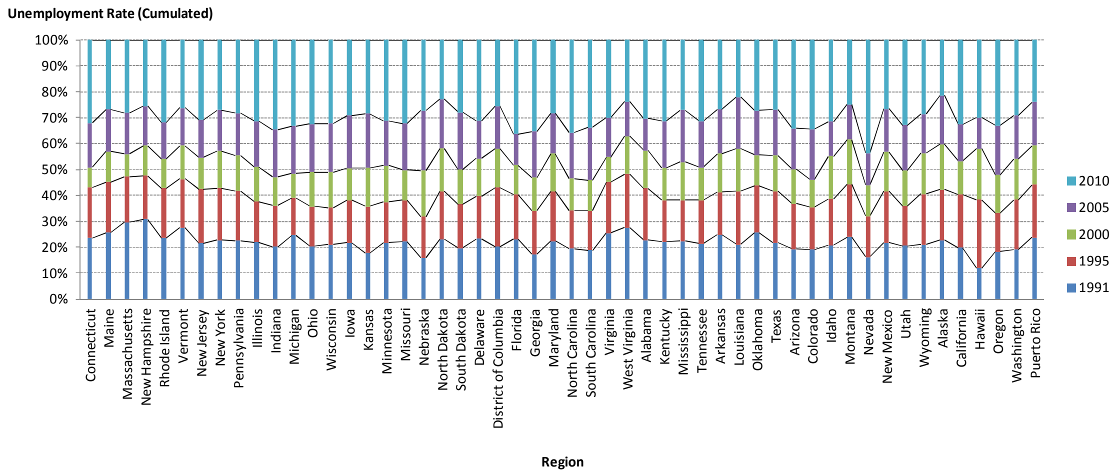


Figure 2. Regional distribution based on raw data



The detailed effects of the geographic distribution observed over a long period have been enigmatic and its causality is still veiled in mystery; however, this topic can be effectively approached from the matter of convergence in the regional distribution. Here we concisely review the previous literature for the regional distribution of unemployment rates, which particularly focuses on the nature of convergence in such a distribution. We introduce the selected list of highly suggestive viewpoints obtained from the existing studies by item as follows.

1.1. Relevant previous research

1.1.1. Opinions indicating conditional convergence

・ Regional unemployment rates generally have strong sustainability; it shows a slow convergence, a conditional convergence, or a convergence to a stable equilibrium distribution (Bayer 2007, for example).

・ The regional disparity of unemployment rates shows a peculiar phenomenon and has a certain fixed pattern; it leads to a region-specific convergence and finally reaches a stable distribution. This suggests the formation of a steady unemployment distribution, which is symbolized by some kind of equilibrium (Kunz 2009, for example).

・ Generally, any regional discrepancy of unemployment rates decreases after a certain period. The process of convergence is guided by factors that bring about an equilibrium status in the local labor market: Therefore, it suggests that the degree of disparities decreases as a result (Rios 2014, for example).

1.1.2. Opinions indicating non-convergence or intermediate states

・ The fluctuation of regional unemployment rates is generally stable and does not normally converge or diverge (Tyrowicz and Wojcik 2010, for example).

・ The conditions of regional unemployment differ depending on the degree of unemployment rates. For example, low, medium, and high unemployment areas have regional differences in sustainability and stability. Therefore, they do not seem to converge uniformly. This suggests that the disparity is led to unstable or expanding tendencies (Tyrowicz and Wojcik 2007, for example).

1.1.3. Other related viewpoints

・ Regional disparities widen when the national unemployment rate rises; the resulting disparities are remarkably persistent (Filiztekin 2009, for example).

・ The socioeconomic shock affects the transition of the unemployment rate, and it will take some time to return to a stable or equilibrium state (Kiral and Mavruk 2017, for example).

・ Shock has a major impact on the region at the outset, and then adversely affects the local labor market if a rapid recovery cannot be expected (D'Apice 2014, for example).

・ The process of adjusting regional unemployment, which is delayed in response to a shock, is not always effective against the persistent unemployment gap (Kunz 2009, for example).

・ The spatial distribution of the unemployment rate is deeply involved in the formation and widening of disparities. Region-specific shocks not only affect the labor market but also spread to neighboring areas as a spillover effect. The unemployment gap is a temporary imbalance phenomenon that is offset by an increase in the inflow of population due to migration and economic integration. Also, the spatial outflow structure and the spatiotemporal transmission process are considered to play an important role in reducing the unemployment gap (Rios 2014, for example).

1.2. Theoretical background and motive

Generally, the *equilibrium theory* and the *disequilibrium theory* are often used as the rationale for dealing with the distribution behavior of the regional unemployment rate. Most of the existing literature for regional disparities is based on the hypothesis of stable equilibria of labor markets (Cracolici and Nijkamp 2007). They argue about whether the values of regional unemployment data ultimately converge to a certain equilibrium point or not (Marston 1985, and others).

Usually, the equilibrium theorists have a theoretical scenario: After big shocks of business fluctuations, the substantial effects by them would remain for a considerably long period and spread widely throughout regions (Blackley 1989; Veder and Gallaway 1996; Aragon et al. 2003, and others). This remaining ripple effect is a cause of the areal persistence of unemployment rates, and it induces a specific rate for unemployment sometimes called the natural ratio of unemployment which would be a targeting equilibrium point.

On the other hand, based on the fact that the differentials of unemployment rates tend to be lost during a certain period, the disequilibrium approach generally assumes a relatively short time. In that sense, this theory is built on the thought that the level of the unemployment rate is always moving, and they never spontaneously converge on a specific rate.

There are several reasons why disequilibrium phenomena occur. As an example, the speed of adjustment for relieving the fluctuation of the unemployment rate plays a key role. Any failure or collapse of this adjustment process would cause a serious problem such as high unemployment rates and/or low economic growth in many areas.

As an alternative idea that could encompass these discussions, the existence of *multiple equilibrium* points was suggested by Fujita, Krugman, and Venables (1999); it claims that such equilibria or disequilibria are tentative or local ones, not global ones, and then the idea seems to become quite a natural compromise proposal of the set of arguments: Incidentally, that idea theoretically supports a part of conclusions of the paper. Although a great deal of theoretical and empirical work has been done so far, we would prove this problem from a different perspective as described below.

2. Data and notes

The data and supplementary matters are as follows: All analyses, definitions, and calculations used are based on published labor unemployment statistics and the US Census of 1991-2010 (see References for details). All tables and figures in the paper are made through these analyses. Some statistical outputs mainly depend on the bootstrap method in addition to the fundamental statistics derived from the data. Finally, some frequently used abbreviations and the notation for symbols are listed up for convenience' sake:

SD (Standard Deviation), σ(Standard Deviation), SV (Standardized Variable), Mean (Arithmetic Mean).

Note: In the paper, the *average* is used in an even more broad sense, and the *mean* stands for just an arithmetic mean by definition.

3. Results

3.1. SD by bootstrap estimates

As the following, we see the result of SD estimation by the bootstrap method with random sampling based on the raw unemployment data from 1991 to 2010; we compare the values of the obtained estimates to the ones of the raw data to evaluate the possibility of fluctuation range (see Table 1 and Figure 3). Specifically, all 52 data are extracted at once to determine the SD estimates, and the operation is repeated up to 1,000,000 times in total.

From the results in Table 1, the bootstrap estimate of SD for the unemployment rates in the entire period from 1991 to 2010 is 0.0241. Note that here we focus only on the data and its distribution and spatiotemporal relationships between the regions are completely excluded in the results by the bootstrap process. Since the distribution of the bootstrap estimates can be assumed to be the symmetric normal distribution this time, the range of the Mean ± 3σbecomes 0.0139 to 0.0343; it means approximately 99.7% of all data is distributed in that range.

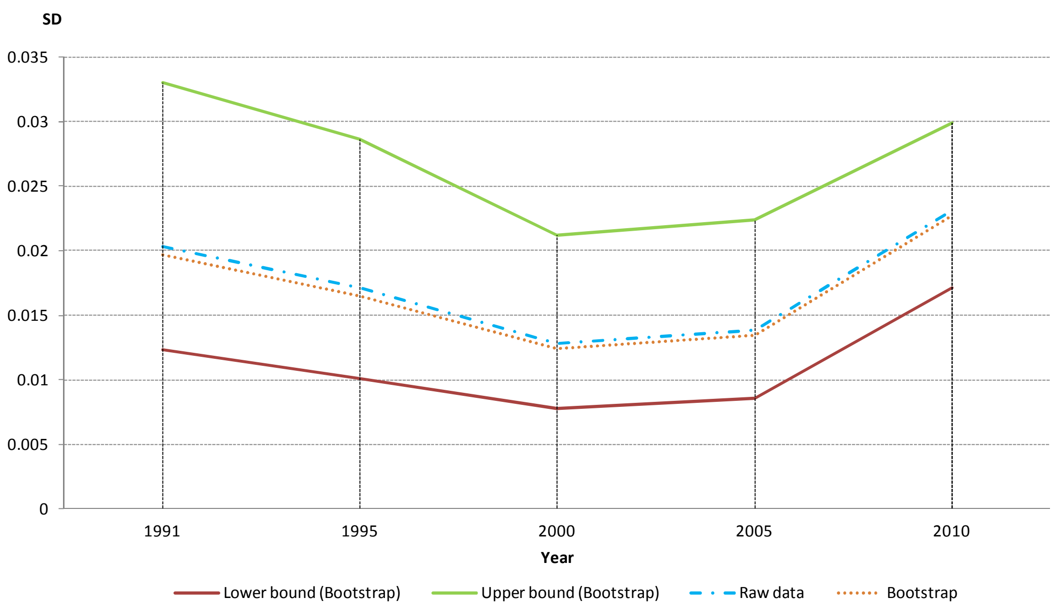
For reference, this time we have run a total of six bootstrap methods (random sampling with permutation, chi-square distribution, normal, fundamental percentile, and BCa) with 95% confidence intervals. As a result, the minimum of the lower bound is 0.0079 obtained by the Normal method, and the maximum of the upper bound is 0.0330 done by the BCa method. Therefore, the allowable range of the lower bound and the upper bound (maximum possible range) is considered to be approximately 0.008 to 0.033 for the Bootstrap method (see Figure 3). Comparing with the above range, it shows that the lower bound might be possible to stretch a little bit downward though the upper bound has almost no potential to increase.

By the way, should the values for the obtained ranges be evaluated as significantly large as a result? Also, what would be the possible range of the regional distribution of unemployment rates? For answering these questions, we further discuss a simulated distribution while maintaining the spatial and temporal relationships of each region in Section 3.3.

Table 1. SD by raw data and bootstrap method

Year	1991	1995	2000	2005	2010	1991-2010
SD (Raw data)	0.0203	0.0171	0.0128	0.0138	0.0231	0.0244
SD (Bootstrap)	0.0196	0.0165	0.0124	0.0134	0.0227	0.0241

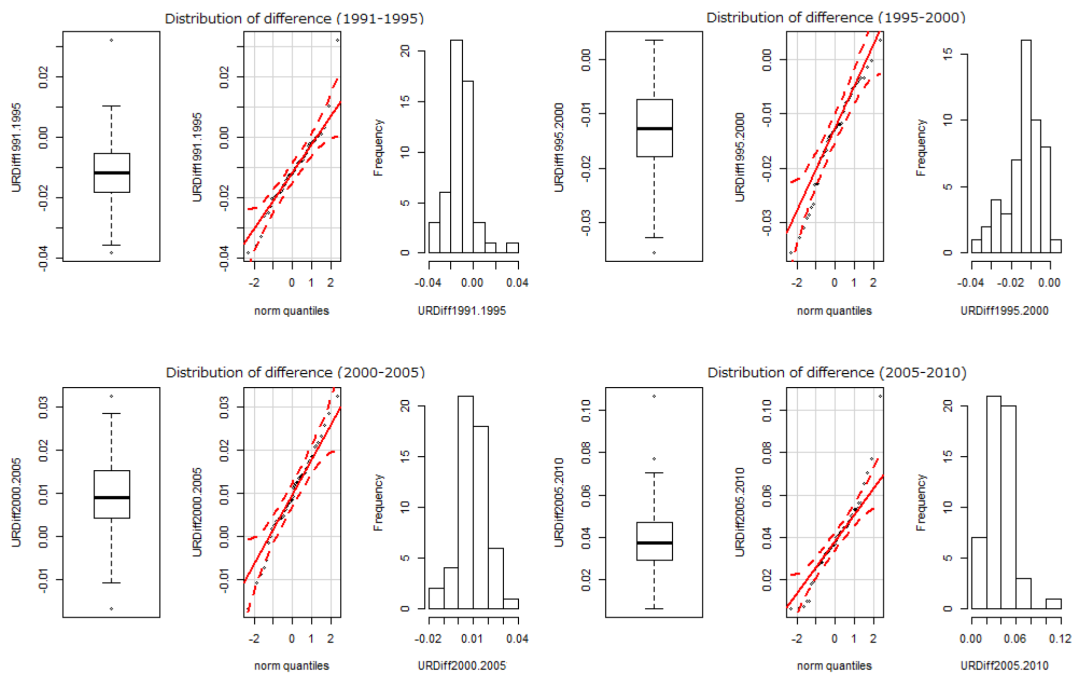
Figure 3. Upper and lower bounds for SD



3.2. Distribution of the simple differences in unemployment rates

We here show some supplemental results to use the technique of standardized variables in Section 3.3. Figure 4 shows the distribution of the simple difference in the unemployment rates for the periods of 1991-1995, 1995-2000, 2000-2005, and 2005-2010. From the left, the graphs of box-and-whisker plots, Q-Q plots, and histograms for 1991-1995, 1995-2000, 2000-2005, and 2005-2010 are displayed. From the results, it shows that the distributions are close to normal ones as a whole although the distributions are skewed by some outliers in each period. Therefore, there would be no problem even if it is assumed that the distribution of the simple difference for unemployment rates in each period is the normal distribution.

Figure 4. Distribution of the simple difference between regions



3.3. Simulated distribution by the standardized variables

Based on the geographic distribution of unemployment rates in 1991 as a baseline, we show how the geographic distribution of unemployment changes in some patterns by simulation. Note that here we simulate the distribution of each area maintaining time-series trends and geographic structure.

Specifically, we examine the simulations in the reduction and expansion directions to determine the lower and upper possible bounds of the distribution. At first, expand the difference between regions equally by adding the scaled SV to the Mean of the simple difference in the unemployment rates for each period of 1991-1995, 1995-2000, 2000-2005, and 2005-2010; we simulate a total of 9 transition patterns for the geographical distribution by sequentially adding the Mean and the scaled SV of the simple difference for each period to the unemployment rate of 1991. We show the possible lower and upper bounds from these patterns. Let's examine the validity and feasibility of the fluctuation range in a series of simulations below (see Figure 5 and Figure 6).

Firstly, we show the lower bound for the reduction direction; this is not so difficult to judge. The SD value of 0.0171 by the Mean + SV / 150 seems to be reasonable for the lower bound since the SD value of any other cases is larger than that level.

Secondary, we evaluate some cases with the large fluctuation range; the Mean + SV / 10 and the Mean + SV / 20 have a couple of regions that indicate the negative values for unemployment rates. These two cases are clearly out of common sense. For the case of the

Mean + SV / 30, the minimum unemployment rate in all US states becomes 0.1%, and thus this is also nonsense. Therefore, only the case where the expansion width is smaller than the Mean + SV / 30 should be considered in the list of simulations; for example, the SD value for the Mean + SV / 40 is 0.0311 which is almost consistent with the upper bound of the results in Section 3.1. And that is considered a practically reasonable level as the upper bound of the SD that can be realistically taken.

Next, evaluate the contribution of the spatiotemporal structure to the potential impact on the lower and upper bounds. According to the results of Section 3.1, about 99.7% of SD estimates of unemployment rates in the U.S. for the observed period would fall in the range of 0.0139 to 0.0343 if the spatial and temporal relationships are not taken into account. If the spatiotemporal relationships are taken into consideration, the regional disparity is likely to be approximately in the range of about 0.0171 to 0.0311 based on the simulation in Section 3.3. Thus, the lower bound has approximately the potential of 23% [(0.0171-0.0139) /0.0139*100] toward the expansion direction. Also, the upper bound has approximately the potential of 9.3% [(0.0311-0.0343) /0.0343*100] toward the reduction direction. Thus, the spatiotemporal relationships appear to reduce the range of regional disparities in this case.

By the way, the results obtained with the two methods are very similar to each other for both upper and lower bounds although the two results above have been created from completely different computational processes. What does this mean? Is it a coincidence? Otherwise, is there any causal relationship? One reasonable answer is the following: As far as the regional disparities in unemployment rates are assessed using the technique of standard deviations, this is only an extremely limited movement within a certain range as described above. In other words, since the disparity phenomenon for unemployment rates is virtually a *relative disparity phenomenon* between regions, it is inevitable that the degree of variance is statistically limited for the regional unemployment rate. It would be reasonable to recognize that the disparity cannot be extremely large.

Figure 5. Regional distribution simulated by SV

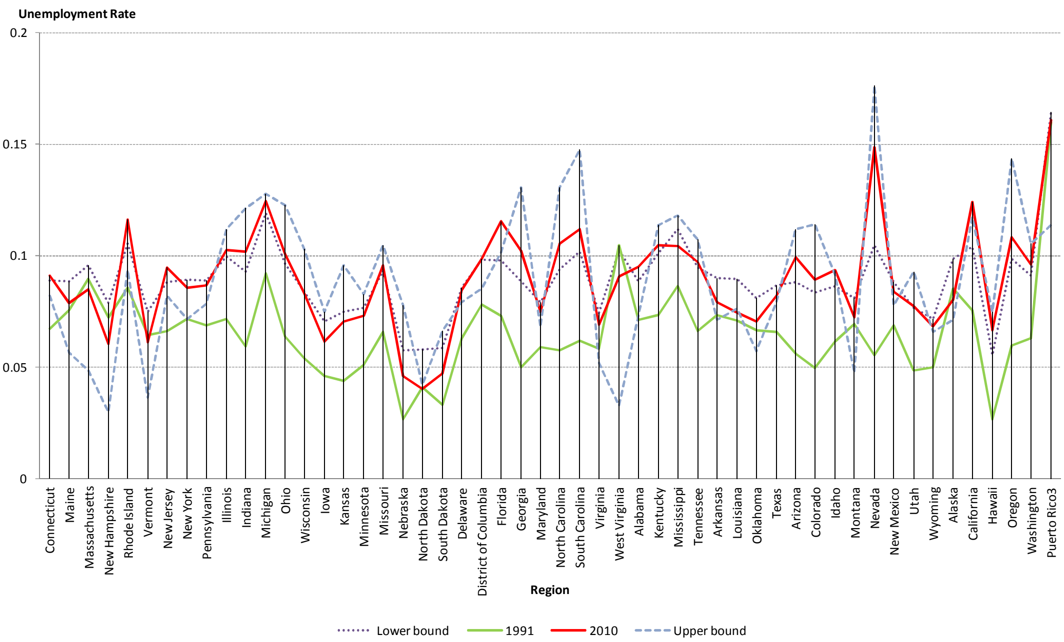
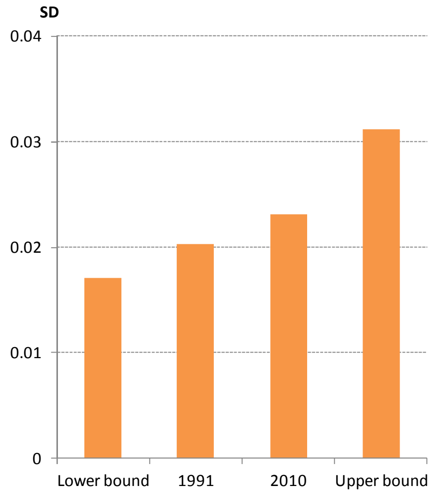
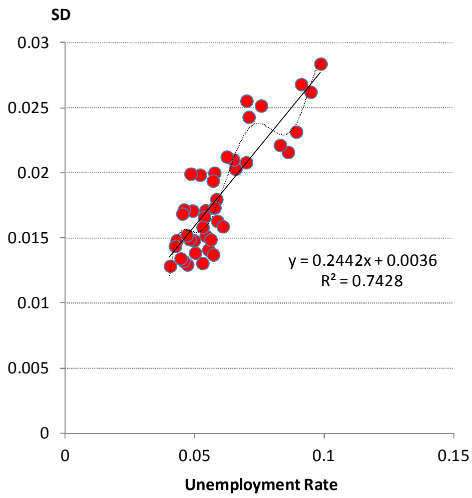


Figure 6. SD simulated by SV (left) **Figure 7. Regression model for SD (right)**





At last, we additionally show a couple of results as the supplementary information to lead the conclusion.

As stated above, 0.0311 is considered to be the possible upper bound of SD value for regional unemployment rates (see Figure 5 and Figure 6). Next, a regression analysis is performed based on the data from 1991 to 2010 (see Figure 7): We get X (the national average unemployment rate) = 0.1126 by substituting Y (SD of the unemployment rate) = 0.0311 into the equation of Y = 0.0036 + 0.2442X if the extrapolation in regression analysis is allowed. If the upper bound of the SD is 0.0311, the corresponding national average unemployment rate becomes around 11.3%. Conversely, if we assume that the upper bound of the national average unemployment rate is at this level, then the corresponding possible SD would be limited to the above level.

4. Concluding remarks

As a conclusion obtained from the series of results, the range of reasonable SD value that can be taken for evaluating the regional disparity of unemployment rates is extremely limited and the value fluctuates within such a limited range; this range can be finally estimated at around 0.010 to 0.035 for the observed period of 1991 to 2010 in the U.S.

Although the spatiotemporal structure influences the expansion or contraction direction in regional unemployment rates, the disparity movement would be thus limited in a certain range. One of the reasons is that the *relative differences* between regions tend to fluctuate in almost the same direction at the same time in each region, which necessarily limits the relative differences between regions to a certain range. On the other hand, it might appear to converge locally to what seems to be an equilibrium point for a short period, but even that equilibrium point is just a temporary process as indicated by Fujita, Krugman, et al. (1999).

From the results of a series of statistical analyses, we can draw the following conclusions: Probably the variability of the regional distribution would remain virtually limited within a certain degree unless there is a radical restructuring of the spatiotemporal structure for regional unemployment rates. Moreover, it is almost impossible to deviate from that range in the usual case. This is one piece of evidence demonstrating that the regional distribution of unemployment rates remains extremely stable. Future research is expected to obtain a further determinate conclusion by the related discussions.

References

Aragon, Y., Haughton, D., Haughton, J., Leconte, E., Malin, E., Ruiz-Gazen, A., and Thomas-Agnan, C. 2003. "Explaining the pattern of regional unemployment: The case of the Midi-Pyrenees region." Papers in Regional Science 82: 155-174.

Bayer, C. 2007. "Convergence in West German Regional Unemployment Rates." German Economic Review 8(4): 510-530.

Blackley, P. 1989. "The Measurement and Determination of State Equilibrium Unemployment Rates." Southern Economic Journal 56 (2): 440-456.

Cracolici, M., Cuffaro, M., and Nijkamp, P. 2007. "Geographical Distribution of Unemployment: An Analysis of Provincial Differences in Italy." Growth and change 38 (4): 649-670.

D'Apice, P. 2014. "Path Dependence and the Persistence of Unemployment in the Slovak Republic." European Commission 11(3): 1-9.

Elhorst, J. 2000. "The Mystery of Regional Unemployment Differentials: A Survey of Theoretical and Empirical Explanations." University of Groningen, SOM Research Institute, Research Report 2000 c06: 1-55.

Filiztekin, A. 2009. "Regional Unemployment in Turkey." Papers in Regional Science 88(4): 863-878.

Fujita, M., Krugman, P., and Venables, A. 1999. "The Spatial Economy." Massachusetts: MIT Press.

Güçlü, M. 2017. "Regional Unemployment Disparities in Turkey." Romanian Journal of Economic Forecasting 10(2): 94-108.

Hirobe, T. 2014. "Distribution about Regional Disparities of the US Labor Market: Statistical Analysis of Geographic Agglomeration by Employment Status." Regional Science Inquiry Journal 6(2): 11-21.

Kiral, E., and Mavruk, C. 2017. "Regional Unemployment Disparities in Turkey." Finans Politik & Ekonomik Yorumlar 2017 Cilt: 54 Sayı: 634: 107-134.

Kunz, M. 2009. "Disparities, Persistence, and Dynamics of Regional Unemployment Rates in Germany." Institute for Employment Research, IAB-Discussion Paper 8: 1-32.

Marston, S. 1985. "Two Views of the Geographical Distribution of Employment and Stability." Quarterly Journal of Economics 100: 57-79.

Rios, V. 2014. "What Drives Unemployment Disparities in European Regions? A Space-Time Econometric Modeling Approach." International Conference on Regional Science: Financing and the Role of the Regions and Towns in Economic Recovery: 1-54.

Rios, V. 2017. "What Drives Unemployment Disparities in European Regions? A Dynamic Spatial Panel Approach." Regional Studies 51(11): 1599-1611.

Tyrowicz, J., and Wojcik, P. 2007. "Regional Dynamics of unemployment in Poland: A Convergence Approach." The labour market impact of the EU enlargement, Physica-Verlag HD: 149-173.

Tyrowicz, J., and Wojcik, P. 2010. "Active Labour Policies and Unemployment Convergenecin Transition." Review of Economic Analysis 2: 46-72.

United States Department of Labor, Bureau of Statistics. "Local Area Unemployment Statistics." http://www.bls.gov/lau (originally accessed May 7, 2012).

Vedder, R., and Gallaway, L. 1996. "Spatial Variations in U.S. Unemployment." Journal of Labor Research 17 (3): 445-461.

PATTERNS OF MAINLY TOURISM SECTORS AT LOCAL LEVEL BY EMPLOYEE'S CHARACTERISTICS USING GIS MULTIVARIATE CLUSTERING ANALYSIS – ROMANIA CASE STUDY

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Abstract

The tourism sector, before the Corona Strikes, works as a inclusive development engine for many countries' economies and labour markets. In a global world, with increasing travel opportunities, tourism offers both labours intensive and knowledge-intensive activities, across many economic sectors. Tourism is a spatially dependent sector and also a tradable one. The Methodology for tourism statistics (Eurostat 2014), Tourism Satellite Accounts (TSA 2010) and The International Recommendations for Tourism Statistics 2008 (IRTS 2008) differentiate the "mainly tourism" industries at four digits. We identify the natural cluster by number and pattern, at 3189 local spatial units (NUTS 5) by eight attribute variable employees: gender (male, female), age (youth, adult and aged) and education detained level (low, medium and high). Sectors are detailed at two digits only (H51- Air transport, I55 - Hotels and other accommodation facilities and N79-Activities of tourist agencies and tour operators; other reservation services and tourist assistance). Romanian National Institute of Statistics provides 2011 Census data. We apply the Multivariate Clustering Analysis with K Means algorithm as a Spatial Statistical Tool in Arc Gis Pro 2.3, an unsupervised machine learning an Artificial Intelligence technique, appropriate for Big Data. Clusters resulted illustrates natural hidden patterns of local labour markets pooling in the sense of Urban& Jacobian economies, but also some insight regarding the Morettian externalities sources. These results are useful for Regions Smart Specialisation Strategies development of human resources & talents to increase innovation capabilities and inclusive job creation, but also for a prompt recovery post-Covid Pandemic.

Keywords: tourism, labour force characteristics, Multivariate Clustering Analysis, local labour markets, regional specialisation, education level, age and gender analysis

JEL classification: J210, C38, R23

1. Introduction

1.1. Importance

The economic importance of Travel & Tourism sector as a driver to employment by the latest World Travels Tourism Council's (WTTC) 2020 Economic Impact report, which shows it supported in 2019 more than 330 million jobs, or 1 in 10 jobs around the world, explaining the creation 10.3% of global GDP. WTTC (2020b) "latest annual research, in conjunction with Oxford Economics, shows the Travel & Tourism sector experienced 3.5% growth in 2019, outpacing that of the global economy (2.5%) for the ninth consecutive year. Over the past five years, one in four new jobs were created by the sector, **making Travel & Tourism the best partner for governments to generate employment**". (WTTC 2020a) The increasing importance of tourism for growth and jobs is signalled by Turner (2018) as the sector that "generates prosperity across the globalised world". Future indicates an increase in growing to 2030 at 425 million jobs, or 11.1 jobs around the world, creation 1.47% of global GDP. The growth rate is 2.4%, close to the 2.5% global average. (WTTC 2020b) For Europe Union tourism and travel sector supported in 2019 more than 22.6 million jobs, or 11.2% from total EU employment, explaining the creation of 10.3% of global GDP.(WTTC 2020b)

Bănilă (2018) cites WTTC 2018 for Romania's tourism performance in 2017 with 1.4% of the country's gross domestic product (GDP) and 208,500 jobs. Romania OECD *Tourism Trends and Policies* (2020) me ntion that „according to the Tourism Satellite Account, the direct contribution of tourism to GDP in 2017 was RON 23.9 billion, 2.8% of the total GDP, and the tourism sector directly supported 373 074 jobs". The 2018 National Tourism Development Strategy assumes among its four operational objectives to support the private innovation and increase digitisation. In the Project of The National Strategy for Ecotourism Development is planned that until 2030 creating the conditions for ecotourism development in natural protected areas. Human resources development is one key area of focus.

1.2. The new global problem is Corona Pandemic

In 2020 the first semester its effect on tourism sector at global scale is dramatic. WTTC estimate in April 2020 that the Global economic impact of COVID-19 is five times more than 2008 Global Financial Crises, that put 75 million jobs at risk, accounting decreases to GDP around 2.1 trillion $. In relative terms, the COVID-19 impact is about 23% of jobs to be destroyed from total sector jobs with direct impact in the global unemployment rate increasing with 2.1 pp. (WTTC 2020c)

Petrova (2020) cites OECD 2020 that among South Eastern European countries Romania and Serbia are seriously hit by COVID-19. This negative economic impact is the result of value chain disruptions, especially in the manufacturing and tourism sectors.

Starkov (2020) points out that Corona "though unprecedented in scale and is not the first global crisis to hit hard the hospitality industry". The reaction should be similar to Zika or hurricane season manifest before at regional ora global level.

WTTC's launched on 21th of April 2020 in London, UK, four principles to ensure swift recovery for the Travel & Tourism sector and the global economy following the end of the COVID-19 outbreak. Human capital calls in the forth principle, focused on assuring the "Financial support for workers, businesses and promotion for a prompt recovery". Hartenstein and Waugh (1994) and Schlossberg (1995) considers the loss of work a critical event for the individual exposed to a significant risk of social exclusion.

1.3. Disruptive innovations in the tourism sector announced by megatrends

Especially after the Corona Pandemic is visible, the harder time for the hotels industry of 2020 very difficult to predict. (SiteMinder 2020) Hoteliers need to imagine and adopt new technology developments to meet customer demand. SiteMinder, Revinate, IDeaS and Dr Peter O'Connor found that critical management systems (revenue, customer relationship, property and channel) will add to customer-focused systems the data-focused network. Accommodation is in an intense digital transformation process. The success of this process requests **new strategies and objectives as well as new business model adoption**. Bradley (2019) lists in the top must-have IoT five web-wired tech trends in hospitality today:

Automated Guestrooms, Engagement via Mobile, Interfaces Incorporated Naturall y, Better Online Branding and Personalized Room Setups.

The innovation changes rapidly and dynamically transform this sector. Technology developments needed to meet increasingly sophisticated customers demand. Next to actual COVID-19 shock, Bloomberg Media Group (2019) announced since 2019 some disruptive world, transformed megatrends and their implications for travel & tourism. The five Bloomberg Media Group (2019) megatrends are interlinked, and comprises: "reality enhanced; life restructured; data revolutionized; power redistributed and consumption reimagined". (Bloomberg Media Group 2019)

USA Deloitte report identified that customers overwhelmingly value shared experiences. (Reichheld et al. 2020) To rethink human experience, authors title five fundamental principles: "be obsessed with all things human, proactively identify and understand human needs before they are expressed, execute with humanity, be authentic and change the world".

1.4. Talents and human resources essential innovation capability in the tourism sector

Langford, Weissenberg, and Gasdia (2019) mark that "with all the focus on emerging technology, it's often easy to forget that people will remain one of travel and hospitality's biggest challenges throughout 2019. In an industry built on service excellence, people can be a brand's most powerful competitive asset." They also emphasized that "the travel industry can't grow without **talent:** Labor gaps are not new to travel, but the magnitude of the current workforce shortage certainly is. Rapid industry growth and an evolving workforce remain key drivers". Labour shortage marks both skilled and unskilled labour. Cameron (2017) found that the 2017 US labour shortage covers with immigrants: "even tho ugh immigrants comprise only 13 per cent of the US population—they account for 31 per cent of the workforce in the hotel and lodging industry and 22 per cent in restaurants". Vasilescu, Aparaschivei, and Roman (2012) signals for Romania, that the labour market "was experiencing large and increasing shortages of labour and skills, coupled with large migration abroad".

1.5. Adaptive capacity and adaption characteristics for the tourism sector

The tourism sector is vulnerable to many factors of variability and changes. Its adaptive capacity presents variate patterns. Parsons et al. (2018) explore the case of Samoa, a Pacific island nation highly dependent on beach tourism and already vulnerable to a variety of natural hazards. Authors found that tourism operators assure the adaptive capacity to climate change impact as a network and not an individual.

Perles-Ribes et al. (2017) re -evaluate the tourism-led growth hypothesis in the case of Spain, a leading country in the tourism industry, after the 2008 Global Financial and Economic Crisis and the 2010 Arab Spring shocks. Araújo-Vila, Fraiz-Brea, and de Araújo (2020) found that in 2020 Spain has not fully recove red after the financial crises, and worries its population continuously since then. Tourism, a key industry to the Spanish economy, next to the construction industry are still the most affected sectors. Supplementary, the "COVID-19 is an even bigger problem, which expected to have catastrophic consequences for many countries' economies, including Spain" (Araújo-Vila, Fraiz-Brea, and de Araújo 2020)

Las Vegas is the case of a successful overcoming of the 2008 Global Recession, which "benefitted from stabilized or even increasing international tourism demands". Lim and Won (2020) found that the success of thi s tourism destination & location "was possible due to its adaptive capability in Complex Adaptive System (CAS**). Highly specialized service-oriented regional economies** can enhance regional resilience by improving adaptive capacity towards within-sector related variety. **Diversification through the adaptive capability** of Las Vegas' tourism contributed to economic recovery and resilience".

Romão, Guerreiro, and Rodrigues (2017) point that tourism activities face unprecedented levels of competition in the global economy, territories as destinations are also in competition and not only product and services providers. Tourism is a space-dependent economic sector. Authors conclude that the "local resource management, promotional strategies, transport systems or accommodation provider can be more **efficiently planned** if there is some collaboration among clusters of regions with similar characteristics". The logic of this approach, according to authors, allow developing “a strategy of differentiation aiming at the provision of unique experiences based on the specific territorial resources could lead to a more sustainable form of tourism development” (Romão, Guerreiro, and Rodrigues 2017)

Frocrain and Giraud (2019) classify industries into “tradable and non-tradable categories using an index of geographic concentration since for tradable industries production tends to be geographically separated from consumption”. Tourism is also tradable, where **its foreign consumers do the moving,** at the location of tourism service providing and consuming take place. Persons mobility high restrictions as a preventive measure for Coronavirus Pandemic control locked the tourism. The foreign consumer does not access any more any destination location. In consequence all the sectors that depend on tourism (accommodation, cuisines, beverages, cultural events,…etc) are locked almost in an entire share in many countries.

2. Theoretical framework - economy of agglomerations

In general, regardless of the crises is need to increase the capability to deliver smart, sustainable and inclusive growth, to find the path to create new jobs for all and better lives.

The purpose of the work is to identify human capital natural hidden patterns at locality level in Romania (NUTS 5), of employed in tourism mainly sectors, especially with a tertiary level of education, called **talents,** by age and by gender. The secondary purpose is to check if in the most vulnerable areas, with highest concentration of poor people are talents employed in the studied sectors.

Agglomeration of creative workers Moretti (2012) creates positive externaliteis. Talents employed in tradable sectors have high multiplicator effect, in terms of job creation in nontradable sectors. Frocrain and Giraud (2019) conclude that, during 2004-2013 period, in France, for every 100 new tradable jobs, including the jobs in tourism too, that emerged in an employment area, 64 additional non-tradable jobs were created in the same area”. Frocrain and Giraud (2019) cites Le Garrec (2008) and justify that some shares from sectors like “*Food and beverage service" (56) \Accommodation" (55), \Travel agency and tour operator activities, and other reservation service and related activities" (79), \Creative, artistic and entertainment activities" (90), \Libraries, archives, museums and other cultural activities" (91), \Gambling and betting activities" (92), all could be included in the tradable group”.*

*This investigation has i*mportant implications for public policy in view to identify the externalities needed for successful and adaptive development of mainly tourism industries in regions with a high propensity of smart specialization, regardless their level of development. Clusters defined by the high share of talents in mainly tourism sectors marks **the local labour markets specialised as well the presence of labour market pooling in the analysed sectors**. Measures and actions concentrate and precisely focused in these clusters could accelerate the regional development policies implementation, new knowledge diffusion, new skills development, related variety skills development, increasing productivity, increasing the innovation capacity to acquire and development of the sector, new jobs creation in the tourism sector. On the short term, this process, accordingly adjusted could, could assure the rapid recovery after the Corona Pandemic shock.

Systems, societies and individuals are increasingly interconnected and interdependent in a global world. Also, the tourism world is transformed by competitiveness. In the profit absence tourism sector is notsustainable, practically the incomes need to be higher than the costs. Industry rivalry includes according to Porter (1979): *the customers* who want to receive more and to pay less; bargaining power of *suppliers* who want to be paid more and offer less; the creation of new sectors, respectively rivals from other industries through *the substitution* effect that offers products/services that offer the same functionality at lower costs; *new entrants* to the market by attracting customers from the old producers by reducing costs. Space is at the core of decreasing costs, directly or indirectly, mainly through: innovation and economies of agglomeration.

2.1. Innovation and talents

Innovation is the way to make a profit in the monopolistic competition model, an aspect noted by Stiglitz since 1977. Llano (2000) found that creating the new (incremental or radical) eliminates competitors, rivals, lowers costs and thus maximizes temporary profit. The zero moment is the creation of the new in location, that becomes Center. Next, its neighbours adopt it through dispersion or contagion. Finally, if the case of the whole world. The last locations that adopt this new are the periphery. Fujita, Krugman, Venables (1999) define the Center-Periphery model within the new geographical economy. This model describes three localization forces: two agglomeration / centripetal forces given by the relationship between costs and demand and a dispersion / centrifugal force determined by the local competition.

2019 European Innovation Score Board (EIS) treats the Innovation as input-output. Human resource, next to the attractiveness of research systems and innovation-friendly environment stand to the framework conditions for innovation, that are the critical innovation promoters of innovation performance, external for the enterprise. In EIS human resources cover: new doctorate graduates, population completed tertiary education and lifelong learning. In EIS Romania is ranked 28 as a modest innovator, still below the 2011 performance, but better than the last minimum form 2015. 2019 Regional Innovation Scoreboard (RIS) relative performance to EU in "2011" ranks Bucharest Ilfov as the pest performance with 54.1 2019 RIS in progress with 5.8 compared to 2017, but decreasing with -7.9 compared to 2011. All other regions present the innovation performance lower than 1/3 from the EU average in 2019, with the exception of Vest region with 34.3.

Other international systems that measure innovation and talent are the World Economic Forum (WEF)'s Global Competitiveness Index (GCI) and OECD Science, Technology and Industry Scoreboard (STIS).The GCI 2019 Report points that „countries must improve talent adaptability; that is, enable the ability of their workforces to contribute to the creative destruction process and cope with its disruptions. Talent adaptability also requires a well functioning labour market that protects workers rather than jobs." (Schwab 2019)

OECD STIS 2017 concludes that „Workers in digitally intensive industries exhibit both higher levels of cognitive skills (e.g. literacy, numeracy and problem solving), as well as non-cognitive and social skills (e.g. communication and creativity)". In this new context, tertiary education defines the best to „meet the rising demand for cognitive skills" .(OECD 2017)

Wei, Feng, and Zhang (2017) points, based on literature, that "innovation talents presence, as a most active and important resource in innovation activities; all that innovation talents make significant contributions to the improvement of innovation capability, but not vice versa".

2.2. The economies of agglomeration

The economies of agglomeration are one of the main determinants of the variation of productivity in the space. Frenken, Van Oort, and Verburg (2007, p.6) The central idea underlying the economics of agglomeration holds that clustering of economic activity occurs because firms experience some form of benefit from locating near one another. A broad definition of agglomeration economies is that it concerns economies from which a firm can benefit by being located at the same place as one or more other firms. They are related to economies of scale, which play an essential role in increasing productivity. The economies of agglomeration reduce the average costs of a long-term product, the result of an expansion of an activity (Bogart 1997). Fujita and Thisse (1996; 2013) address the "economic reasons for the existence of a large variety of agglomerations arising from the global to the local". They found that "the trade-off between various forms of increasing returns and different types of mobility costs are more fundamental" than natural features of geography. Sources of reduction of average costs are defined relative to the industrial unit frontier, as internal or external economies of scale.

Four sources of agglomeration economies (spillovers) are distinguished: one internal and three external - (Marshallian, Urbanisation and Jacobian). We add to these the fifth – the Morettian externalities or the Tertiary Human Capital Spillover (Moretti 2003). Under evolutionary trade theory and evolutionary growth theory (Saviotti & Pyka, 2004; Vernon, 1966), emphasises the distinction between the different sources of spillovers by qualitatively different types of benefits.

Internal economies of scale achives within an industry unit (a company, an industry, a city, a state, a region). The economies derive from the spatial expansion of the industry unit by lowering the costs from internal sources: technological, managerial, financial or risk mitigation. These may occur in a single firm due to production cost efficiencies realized by serving large markets (Krugman 1991), id global spread. There is nothing inherently spatial in this concept according to Frenken et al. (2007, p6), other factors than that the existence of a single large firm in space implies a large local concentration of factor employment;

External economies of scale or externalities achives within the outside of the industry unit. The spatial closeness of firms could lead to positive externalities, called agglomeration economies. These externalities could bepositive or negative (ex congestion, pollution).

Marshallian economies (technical externalities) or localization economies achieve benefits by neighbourhood with companies from the same sector/industry, respectively by specialization mechanisms. This type of external economies is available to all local firms within the same sector. Feser (2002) and Henderson (2003) points that Marshallian externalities arise from three sources: **labour market pooling,** creation of specialized suppliers, and the emergence of knowledge spillovers. This externality explains the productivity heterogeneity in space, whereby the productivity of labour in a given sector in a given city is assumed to increase with total employment in that sector. In short, Frenken, Van Oort, and Verburg (2007) prove that the expected benefit of the Marshallian externality is **productivity increase**. ***This productivity-****increasing is specific to the location where similar firms produce similar products. The spatial proximity expecte to "****spur incremental innovation and process innovation****".* Consoli & Sanchez-Barrioluengo (2019) found that "**local industrial specialisation** shaped by an agglomeration of a high□skilled workers on the **demand for no tradable service jobs".** This tertiary educated human capital agglomeration has a positive local multiplier effect on the expansion of low□skill service employment and shortage of the "routine" mid skill jobs". The agglomeration of the firms, from the same sector, in some areas give the specialized character to its region. These companies realize mutual benefits, according to Beaudry and Schiffauerova (2009) through access **to highly specialized workforce pools**. The decrease of the costs of the demand is realized by the direct access to the labour force, the search costs of the labour force are reduced. The costs of the labour supply are also reduced by the existence of various employment/employment opportunities, reduced costs of intermediate inputs, communication and innovation spread. High specialisation in a sector vulnerable to global shocks could **hinder economic growth of the region.**

Urbanisation economies are external economies available to all local firms irrespective of sector and arising from urban size and density. These economies are the result of savings from the large-scale operation of the agglomeration or city as a whole and independent from industry structure. Relatively more populous localities are also more likely to house universities, industry research laboratories, trade associations and other knowledge-generating organizations. It is the dense presence of these organizations (not solely economic, but also social, political and cultural) that supports the production and absorption of know-how, stimulating innovative behaviour, and contributes to differential rates of interregional growth. Harrison, Kelley, and Gant (1996). In this case (urbanization economies), the sectors are unrelated; therefore, according to Frenken et al. (2007, p24) the expected benefit is the unemployment decrease. Raspe and Van Oort (2006) recommend evaluating the **economic potential of cities** based on three knowledge factors: "R&D", "innovation" and "knowledge workers". The R&D is input in practice in spatial economic strategies to build regions specialization. Raspe and Van Oort (2006) found that the "the successful introduction of new products and services to the market ("innovation") and indicators of skills of employees ("knowledge workers") explains better and more profoundly the urban employment and productivity growth".

Jacobian externalities are external economies stemming from a variety of sectors. Jacobs (1961; 1969) In a region, the variety of sectors are related or unrelated (Frenken et al., 2007, p24) define the related variety is „a source of regional knowledge spillovers, called Jacobs externalities". Unrelated variety is "a portfolio protecting a region from external shocks". The expected benefits, according to Frenken et al. (2007, p24), in Jacobian externalities, is employment growth as a result of **radical innovation processed finalized with new products that are associated with new skills, new employment and new markets.** Authors point that **"related variety in cities is responsible for job creation and not urban density in itself".** Since 1998, Quigley found that "the functional specialization of firms in heterogeneous industries, near of each other, is supposed to generate spatial interdependencies and generates benefits (and costs such as congestion) for everyone in that specific location". Quigley (1998) **Thus, variety in itself may be a new source of knowledge spillovers and innovation. Frenken, Van Oort, and Verburg (2007) explains** that "the diverse industry mix in an urbanized locality also improves the opportunities to interact, copy, modify and recombine ideas, practices and technologies across industries giving rise to Jacobs externalities. Important innovations stem from the recombination of knowledge present in different industries. Geographical proximity between firms in different industries renders such recombination more likely to occur, in particular, if firms also operate under similar institutional conditions".

Beaudry and Schiffauerova (2009) calls **urbanization and Jacobian externalities in the same time.** In this case, works the **diversity mechanisms of sectors, which support the economic growth of the region**. These cases are specific to companies located in a big city, where the neighbouring companies do not belong to the same industry. The sources of benefits are:

- access to a large market, consumption can also be local, lower transport costs;
- access to a variety of specialized services available only in large cities;
- potential for the dissemination of knowledge and technology from different industries, including access to a much more diverse technological spectrum offered by research. Urban agglomeration offers benefits of lower Jacobian costs, according to the previous context. The peripheral centre structure reflects spatial models of optimizing the use of resources by **reducing the costs of transport, energy and knowledge/information - also called connectivity costs.**

The last sources of externalities are the Morettian externalities or the Tertiary Human Capital Spillover. These refer to the situation when high human capital have a spillover effect on a city economy (Moretti 2003). The magnitude of human capital spillover is tremendously significant for education policy, for new talents attraction in the region, to increase the productivity, voter participation increasing, crime and violence behaviour decreasing, etc. Moretti (2004) demonstrated that supplementary to agglomeration this effect is observable. This last externality presents interest, especially in the context of the need to accelerate the digital transformation of the tourism sector.

2.3. Tourism - concept and measurement approaches

Regulation 692/2011 concerning European statistics on tourism (and repealing Council Directive 95/57/EC) revises and updates Council Directive 95/57/EC and takes into account the internationally recommended methodology which is provided in the IRTS 2008 define 'Tourism' as "the activity of visitors taking a trip to a main destination outside the usual environment, for less than a year, for any main purpose, including business, leisure or other personal purpose, other than to be employed by a resident entity in the place visited."(Eurostat 2014)

Based on the *Methodology for tourism statistics* (Eurostat 2014), *Tourism Satellite Accounts* (TSA 2010) and The International Recommendations for Tourism Statistics 2008 (IRTS 2008) the "**mainly tourism**" industries includes the four digits detailed activities: H5110 Passenger air transport, I5510 Hotels and similar accommodation, I5520 Holiday and other short-stay accommodation, I5530 Camping grounds, recreational vehicle parks and trailer parks, N7910 Travel agency and tour operator activities. (Table 6 and 7)

We intend to explore patterns of employment in Romania's mainly tourism sectors at two digits, at the NUTS 5 level. NIS - National Institute of statistics provide this data granulation by 2011 Census data provided. (H51Air transport, I55 Hotels and other accommodation facilities and N79 Activities of tourist agencies and tour operators; other reservation services and tourist assistance)

2.3.1. Travel agency and tour operator is a tourism engine is of strategical importance to support jobs and inclusive growth in all regions

Travel agency, tour operator reservation service and related activities (N79) is a high human capital concentrator, included by Eurostat in the **Knowledge Intensive Activities (KIA).** According to Moretti (2010), the agglomerations of high human capital predict the success of locations and provide a multiplier effect. N79 create demand for Transportation and Storage (H, especially H59 – air transport)) and Accommodation and Food Service Activities (I, mostly accommodation (NACE I55), food and beverage service activities (NACE I56)). Together with knowledge, transport and accommodation shape the tourism industries, strongly linked with culture and spirituality. N79 is the highest high human capital concentrator among all tourist industries, the fact that allows it to benefit from technological innovation OECD (2007) fully. **N79 is a Less Knowledge-Intensive Market Services (LKIMS)** from the perspective of Employment classification by the intensity of technology and knowledge usage. That means this sector share the KIS sectors characteristics: generate high value-added (over 21% according to OECD 2007), have a high-intensity information use, based on ICT and digitisation adoption is increasing its efficiency and quality of services, services that provide in highly competitive markets, N79 becoming an innovation creator not only adopter (Bryson and Daniels, 2007.p 179) N79 as KIS presents a multidimensional profile: (i) knowledge – generate and exploit; (ii) innovation and (iii) spatial proximity /regional dimension. Muller and Doloreux (2007). On the background that “Europe continues to stand as the most visited region, welcoming half of the world’s international tourist arrivals” World Tourism Organization (UNWTO, 2018). N79 as tourism engine is of strategical importance to support jobs and inclusive growth in all regions. EU28 at regional level (NUTS2) presents high spatial heterogeneity, with different specialisation degrees and competitive performance levels.

2.4. Romanian tourism industries performance

2.4.1. Romanian tourism industries short profile in the context of the economy

Following the structures of (Eurostat. 2020) and using Eurostat data, Table 1 and 2 present the brief pattern of Romanian tourism industry in the context of an economy in 2017. The 690 thousand enterprises made a turnover of 345 million euros, respectively, a value added at factor cost of 88.8 million Euros and employed 5.35 million of persons. (Table 1) In relative terms, total tourism industries cover 6.2% of enterprises, 2.1% from turnover, 2.6% from value added and 4.7% from employment. Mainly tourism industries comprise 1.3% of enterprises, 0.8% from turnover, 0.9% from value-added and 1.2% from employment. Mainly the tourism sector has some gross multiplication effects over partially tourism across the key indicators ratio indicate, as follows: 3.8 for enterprise number, 1.5 for turnover, 1.9 for value-added and 2.8 for employment. These ratios are comparable with the proportions at EU27 level (Eurostat 2020), respectively of 4.9 for enterprise number, 1.4 for turnover, 1.9 for value-added and 2.8 for employment.

Before the Corona Pandemic, at one mainly tourism employee was espected to have 3 employees in partially tourism sectors.

Table 1. Romanian tourism industries short profile in the context of economy in 2017 (absolute values)

	Number of enterprises	Turnover (million EUR)	Value added at factor cost (million EUR)	Number of persons employed
Business economy other than services ([1])	485215	292990	66909	4020121
Services other than tourism industries ([2])	162306	44682	19154	1079148
Total tourism industries ([3])	42603	7395	2311.6	249744
Tourism industries (mainly tourism) ([4])	**8960**	**2912.9**	**800**	**65941**
Tourism industries (partially tourism) ([5])	33643	4482.1	1511.6	183803
Total	690124	345067	88374	5349013

Note: Due to unreliable data at country level and rounding, deviations can occur between total and subtotal
(1) B-N_S95_X_K; (2) NACE sections H, I, J, L, M, N, S95; ([3]) NACE classes H491, H4932, H4939, H501, H503, H511, I551, I552, I553, I561, I563, N771, N7721 and division N79; ([4]) NACE classes (H51+I55+N79) RIS data – Romanian Institute of Statistics 2011 Census data; ([5]) NACE classes H491, H4932, H4939, H501, H503, I561, I563, N771, N7721 and N799; (6) H49+H50+H51; Source: Eurostat (online data code: sbs_na_sca_r2, sbs_na_1a_se_r2)

Table 2. Romanian tourism industries short profile in the context of economy in 2017 (relative values)

	Number of enterprises, %	Turnover (million EUR), %	Value added at factor cost (million EUR), %	Number of persons employed (hundred), %
Business economy other than services ([1])	70.3	84.9	75.7	75.2
Services other than tourism industries ([2])	23.5	12.9	21.7	20.2
Total tourism industries ([3])	6.2	2.1	2.6	4.7
Tourism industries (mainly tourism) ([4])	**1.3**	**0.8**	**0.9**	**1.2**
Tourism industries (partially tourism) ([5])	4.9	1.3	1.7	3.4
Total	100	100	100	100

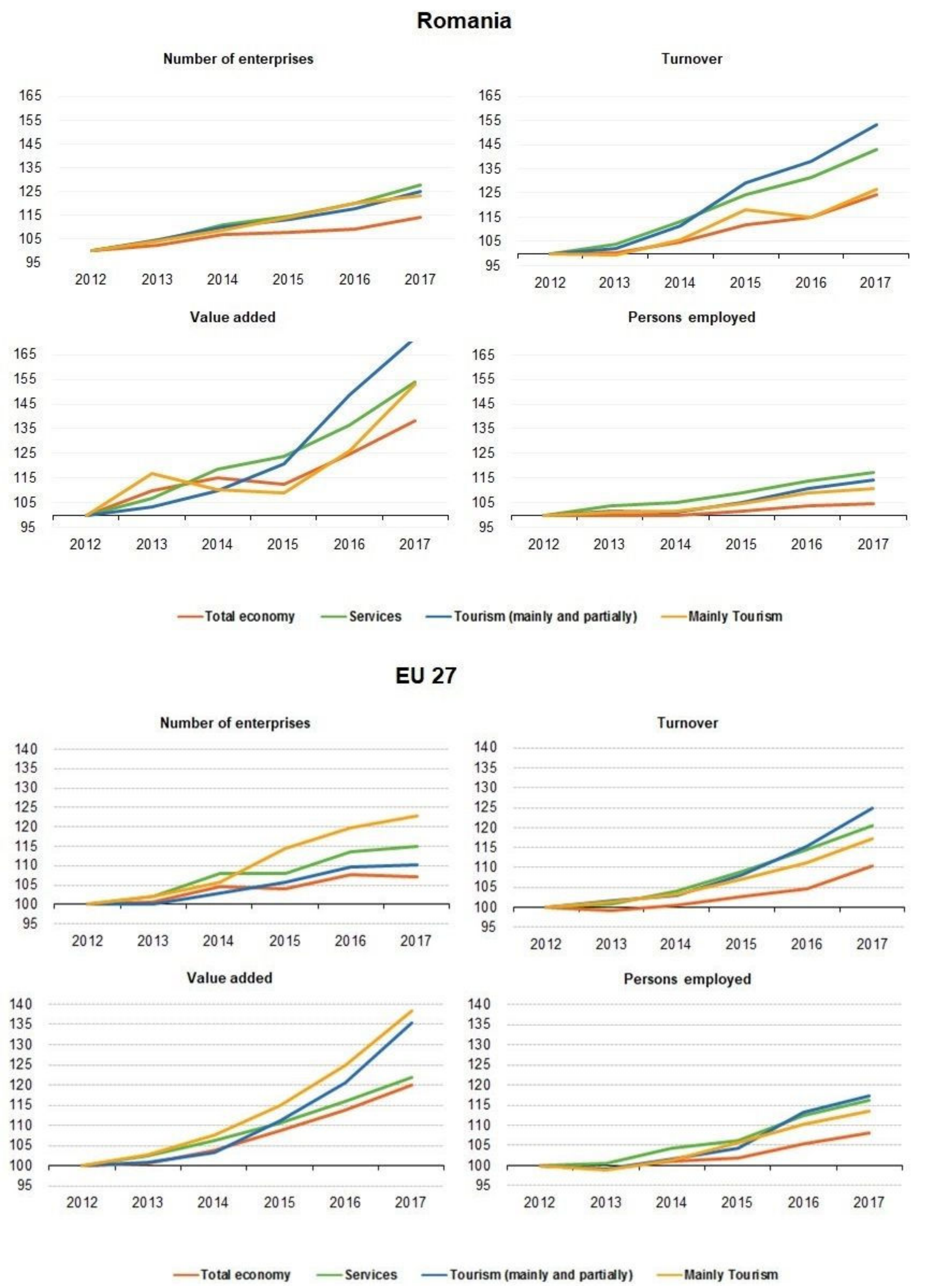
Note: Due to unreliable data at country level and rounding, deviations can occur between total and subtotal
(1) B-N_S95_X_K; (2) NACE sections H, I, J, L, M, N, S95; ([3]) NACE classes H491, H4932, H4939, H501, H503, H511, I551, I552, I553, I561, I563, N771, N7721 and division N79; ([4]) NACE classes (H51+I55+N79) RIS data – Romanian Institute of Statistics 2011 Census data; ([5]) NACE classes H491, H4932, H4939, H501, H503, I561, I563, N771, N7721 and N799; (6) H49+H50+H51; Source: Eurostat (online data code: sbs_na_sca_r2, sbs_na_1a_se_r2)

2.4.2. Tourism and economy evolution by key indicators of the economy, Romania compared with EU27, during 2012-2017

Evolution of tourism (mainly and partially) present a positive trend, overpassing the total economic performance, in all the four key indicators, in Romania as well as at EU27 level (on average). (Figure 1)

Mainly tourism is performing as the best performances, over services and tourism for enterprises number and value-added at EU27 level. This fact indicates the engine role of mainly tourism sector in the economy. In Romania, even if the industry of mainly tourism is increasing with great pace is still below the service and tourism performances. Comparing the level of 2012 fixed base key indicators for Romania with EU27 average is visible that mainly tourism increase in Romania is higher for value-added (153% for Ro and 138% for EU27) and turnover (127% for Ro and 117% for EU27), equal for enterprise number (123%) and slightly below for employment (111% for Ro and 113% for EU27).

Figure 1: Tourism and economy evolution by key indicators of the economy, Romania and UE27, 2012-2017 (index 2012=100)



Source: Eurostat (online data code: sbs_na_sca_r2, sbs_na_1a_se_r2), (Eurostat 2020)

3. Method

Aydin (2019) announced that GIS & Spatial Machine Learning: Transforming Our Planet's Pulse to Action. Artificial intelligence includes Machine Learning, and Machine Learning included Depp Learning, in a Matrioska relationship. **The new logic is to learn rules and patterns from data, while explicit regulations and knowledge do not exist; only data represented explicitly.** Aydin (2019) **The result is knowledge and rules inferred from data.** Mitchell (1997) **define machine learning as a** "computer program is said to learn from experience E concerning some class of tasks T and performance measure P, if its performance … improves with experience E". AMchine Learning in GIS uses data -driven algorithms and techniques that automate tasks as "prediction, classification and clustering". The novelty of ML in Arc GIS is the incorporation of geography in compution id. shape, density, contiguity, spatial distribution, or proximity". (Aydin 2019)

The method is **Multivariate Clustering Analysis** (MCA), the non-spatial (constrained) version, applied in Arc Gis Pro 2.3. (Box 1). Since the release of Arc GIs Pro is available a new set of Statistical Spatial Tools, including MCA K Means. (Aydin 2019) classify Multivariate Clustering among the Machine Learning Tools in Arc GIs, next to Spatially Constrained Multivariate Clustering, Density-based Clustering, Image Segmentation, Hot Spot Analysis, Cluster and Outlier Analysis, Space-Time Pattern Mining and Time Series Clustering.

Ruthartr (2018) points out that:

> "**Clustering algorithms are a type of unsupervised machine learning**, meaning you don't have to define what it means to be a cluster up front (often referred to as training the model). Instead, the algorithm does that for you by evaluating the data and **finding natural patterns that exist**".

MCA algorithm finds "natural subsets or groupings of features based on either location (spatial component only), values (attributes only) or a combination of both location and values".

K-means algorithm developed by (Steinhaus 1957) and named by (MacQueen 1967). (Ruthartr 2018)

Arc Gis Pro software uses MCA with K-means in the idea shaped by (Jain 2010):

> "Organizing data into sensible groupings is one of the most fundamental modes of understanding and learning. Cluster analysis is the formal study of methods and algorithms for grouping or clustering, objects according to measured or perceived intrinsic characteristics or similarity. Cluster analysis does not use category labels that tag objects with prior identifiers, i.e., class labels. The absence of category information distinguishes data clustering (unsupervised learning) from classification or discriminant analysis (supervised learning). The aim of clustering is to find structure in data and is therefore exploratory in nature. Clustering has a long and rich history in a variety of scientific fields. One of the most popular and simple clustering algorithms, K-means, was first published in 1955." (Jain 2010)
>
> This tool is appropriate for big data sets, Big Data. It has applied successfully to market segmentation (Wikipedia, 2020). Also, For this reason, we exploit fully the Census data, in a new manner. We apply MCA on polygon data geocodate, as the spatial component, represented by Local Administrative Units, respectively the NUTS 5 level. The employment data by the 8 characteristics, splitted in 8 density variable are the attributed data associated with the spatial location."

Our objective is to reveal natural **hidden patterns which are very difficult to see just by looking at the data points on the map.**

3.1. Multivariate Clustering Analysis

MCA tool is relatively recently used in literature. Moral et al. (2016) made a GIS-based multivariate clustering for characterization and ecoregion mapping from a viticultural perspective. Authors delineate homogeneous zones by climate and big topographical data with high variability, for Extremadura (southwestern Spain), an outstanding wine region. Romão, Guerreiro, and Rodrigues (2017) concludes that spatial analysis "is a useful contribution of in tourism studies with a clear impact on the goodness of the of the econometric model and the identification of spatial patterns in tourism activities and its determinants".“ Michaelides, Economakis, and Lagos (2006) uses Multivariate Clustering Analysis for employment and regional planning in Greece. Bena et al. (2013) apply MCA to analyse the job tenure and work injuries in relation to previous experience and difference by age. Tatarczak and Boichuk (2017; 2018) apply multivariate methods and explore the nature of youth unemployment and unemployment in Poland in more precise detail using dendrograms.

We use **MCA, K Means algorithm (K Means++), to identify seeds used to grow the cluster.** The result is to "organise, group, differentiate and catalogue" mainly tourism employment by age, education and gender characteristics by eigh characteristics. The feature is the NUTS 5 / local administrative unit, a spatial unit area. The employment data are the attribute data Pierre (2014), in our case described by eight variables. For this purpose, we use the following notations the analysed groups, defined by employee characteristics:

a) Level of education

1 – Low (ISCED 0-2, which corresponds to a level of education at best equivalent to lower secondary education);

2 – Medium (ISCED 3, which corresponds to a level equivalent to upper secondary education);

3 – High (ISCED 5-7, which corresponds to a level equivalent to tertiary education);

where we use the notations:

PP_51_1+ PP_51_2 +PP_51_3=100% (1)

PP_55_1+ PP_55_2 +PP_55_3=100% (2)

PP_79_1+ PP_79_2 +PP_79_3=100% (3)

Economic sectors:

H51 Air transport,

I55 Hotels and other accommodation facilities and

N79 Activities of tourist agencies and tour operators; other reservation services and tourist assistance,

b) Age intervals:

T – Youth (15-24 years old);

A - Adults (25-54 years old);

V – Old (55-64 years old);

where we use the notations:

PP_51_T+ PP_51_A +PP_51_V=100% (4)

PP_55_T+ PP_55_A +PP_55_V=100% (5)

PP_79_T+ PP_79_A +PP_79_V=100% (6)

c) Gender- M (males); F - (females).

where we use the notations:

PP_51_F+ PP_51_M =100% (7)

PP_55_F+ PP_55_M =100% (8)

PP_79_F+ PP_79_M =100% (9)

Result 8 groups, iterated in the following codification by share and by main tourism sector:

Digits 1 to 2 are the share symbol;

Digits 4 to 5 are the sector code;

Digits higher than 6 are the employee's characteristics;

Limit of the method: we made a tradeoff between the best spatial granularity and conceptual concordance with the sector definition. As it is visible in table 8 and 9 from Annex result in an overestimation of employment is mainly the tourism sector with 7.9 thousand persons, respective with 13.6%. Also, data are from different sources with limits of comparability. Our data are RIS data – Romanian Institute of Statistics 2011 Census and the Tourism data matrix are from SBS Eurostat.

The objective is to **create clusters (N) / or groups, as similar as possible** of local labour market classified by the similarity of the features for the eight groups mentioned [(1-Low, 2-Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M- males, F-Females)], across NUTS 5 locations from national territory of Romania (called here features). The resulted number of clusters/groups follow the rule that the "**features within each output group are as similar as possible while groups are as different as possible"** (Pierre 2014). The total number of local administrative units is 3189, higher than the 30, the minimum number of features for MCA. Each of the eight groups is analysed by their similarities that reflect differences in each characteristic share, resulting in three spatial patterns typologies, for each sector (H51, I55 and N79).

Each group is analysed by the eight employees characteristics variable.

> "The values of the Analysis Fields are standardized by the tool because variables with large variances (where data values are very spread out around the mean) tend to have a larger influence on the clusters than variables with small variances. Standardization of the attribute values involves a z-transform, where the mean for all values is subtracted from each value and divided by the standard deviation for all values. Standardization puts all the attributes on the same scale." (ESRI ArcGis Pro, 2020)

Spatial unit is NUTS 5, respectively country level, and the software is ARC GIS Pro. Multivariate clustering analysis (MCA) tool uses the K-Means algorithm.(ESRI ArcGis Pro, 2020) The natural clusters are identified directly from the data, and MCA is an unsupervised machine learning method. Data are grouped in clusters. Here "*all the features within each cluster are as similar as possible, and all the clusters themselves are as different as possible*". (ESRI ArcGis Pro, 2020) MCA is not a spatial tool but produces a spatial pattern of transitional labour markets by gender and age.

The locality level is the lowest administrative unit codified as NUTS5 according to EUROSTAT, equivalent to LAU2 Local Administrative Unit, classified according to SIRUTA. The Information System of Administrative-Territorial Units Register - SIRUTA, is a fundamental tool in automatic data processing in the territorial both statistical system and the economic system – general Financial in Romania. It works based on the legal framework: Law no. 2/1968, Decree-Law no. 38/1990 as a legal trustee's regional organization of Romania, HG no. 575 bis / 1992, CNS President Order 817/1994.

We use 2011 Census data provided by the Romanian National Institute of Statistics.

Method (Box 1)

The R2 value reflects how **much of the variation** in the original TestScores data was retained after the clustering process, so the larger the R2 value is for a particular variable, the better that variable is at discriminating among your features. (ESRI ArcGis Pro, 2020)

$$R2 = (TSS - ESS) / TSS \tag{10}$$

TSS is the total sum of squares
ESS is the explained sum of squares

Number of cluster k

MCA clustering effeteness is measured "*using the Calinski-Harabasz pseudo F-statistic, a ratio reflecting within-group similarity and between-group difference*:

$$F = \frac{\frac{R^2}{n_c - 1}}{\frac{1 - R^2}{n - n_c}} \tag{11}$$

Where:

$$R^2 = \frac{\mathrm{SST} - \mathrm{SSE}}{\mathrm{SSE}} \tag{12}$$

SST is a refelction of between-cluster differences
SSE reflects within-cluster similarity

$$SST = \sum_{i=1}^{n_c} \sum_{j=1}^{n_i} \sum_{k=1}^{n_v} (V_{ij}^k - \overline{V^k})^2 \tag{13}$$

$$SSE = \sum_{i=1}^{n_c} \sum_{j=1}^{n_i} \sum_{k=1}^{n_v} (V_{ij}^k - \overline{V_t^k})^2 \tag{14}$$

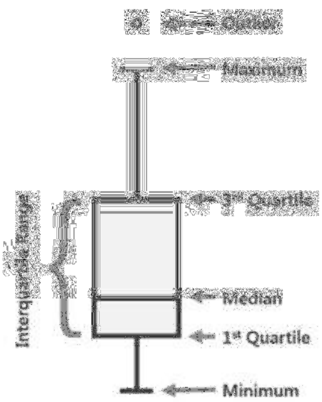
n = the number of features
n_i=the number of features in cluster i
n_c=the number of classes (cluster)
n_v=the number of variables used to cluster features
V_{ij}^k= the value of the k^{th} variable of the j^{th} feature in the i^{th} cluster
$\overline{V^k}$= the mean value of the k^{th} variable
$\overline{V_t^k}$= the value of the k^{th} variable in cluster i

Evaluating Number Clusters, a chart will be created showing the pseudo F-statistic values calculated. The highest peak on the graph is the largest F-statistic, indicating how many clusters will be most effective at distinguishing the features and variables you specified. Based on pseudo F-statistic chart we select the best k and run again the tool. Among results, nexst to the ***cluster map are the number of features per clusters***.

Clustering Method

The Multivariate Clustering tool uses the K Means algorithm by default. The goal of the K Means algorithm is to partition features so the differences among the features in a cluster, over all clusters, are minimized. Because the algorithm is NP-hard, a greedy heuristic is employed to cluster features. The greedy algorithm will always converge to a local minimum, but will not always find the global (most optimal) minimum. The K Means algorithm works by first identifying seeds used to grow each cluster. Consequently, the number of seeds will always match the Number of Clusters. The first seed is selected randomly. Selection of remaining seeds, however, while still employing a random component, applies a weighting that favours selection of subsequent seeds farthest in data space from the existing set of seed features (this part of the algorithm is called K Means ++). Because of the random component in finding seeds whenever you select Optimized seed *locations or Random seed locations for the Initialization Method, you might get variations in clustering results from one run of the tool to the next.*

Outputs



Box plots *are used to show information about both the characteristics of each cluster as well as characteristics of each variable used in the analysis. The graphic below shows you how to interpret box plots and their summary values for each Analysis Field and cluster created: minimum data value, 1st quartile, global median, 3rd quartile, maximum data value, and data outliers (values smaller or larger than 1.5 times the interquartile range). Hover over the box plot on the chart to see these values as well as the interquartile range value. Any point marks falling outside the minimum or maximum (upper or lower whisker) represent data outliers. The default parallel box plot chart summarizes both the clusters and the variables within them.Each node of the mean lines points the cluster's average value for each Analysis Field.*

Source: (ESRI ArcGis Pro, 2020)

4. <u>Findings</u>

Our main findings are the cluster patterns of Employment in Romania for each sector of the mainly tourism activities (H51, I55 and N79) at NUTS 5 level. **The clusters group features (local administrative units) with similar characteristics described by eight variables**. The statistics of variables characteristic by feature coupled with the number of clusters (N). selected N are generate statistics by the eight variable characteristics of employment associated with, the degree of goodness (R^2) that variable is discriminating among the features. **Final results are the cluster maps and the number of features per clusters** (Bennett, Vale, and d'Acosta 2015).

All three clusters profile do not have outliers. We apply the K Means algorithm .

4.1. Clusters profiles for H51 Air transport

The H51 sector employees mainly males adults with a secondary level of education. The average share of employees with tertiary level of education accounts 6% mean at NUTS 5 level.

Table 3. Statistics for employment in H51 at NUTS5 level, by shares in total for the level of education (1-Low, 2- Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M- males, F- females) and R^2

Variable	Mean	Std. Dev.	Min	Max	R^2 N=20	R^2 N=6
PP_51_A	13.9745	33.4090	0.00	100.00	0.984839	0.961982
PP_51_2	9.4201	26.6869	0.00	100.00	0.966076	0.855151
PP_51_M	11.9032	30.5678	0.00	100.00	0.962084	0.380300
PP_51_3	**6.0748**	**21.2066**	**0.00**	**100.00**	**0.957928**	**0.788985**
PP_51_T	1.7547	11.4439	0.00	100.00	0.955494	0.796854
PP_51_1	1.7833	11.5223	0.00	100.00	0.921003	0.834791
PP_51_F	5.3750	19.8586	0.00	100.00	0.910164	0.738453
PP_51_V	1.5490	9.8298	0.00	100.00	0.89477	0.818607

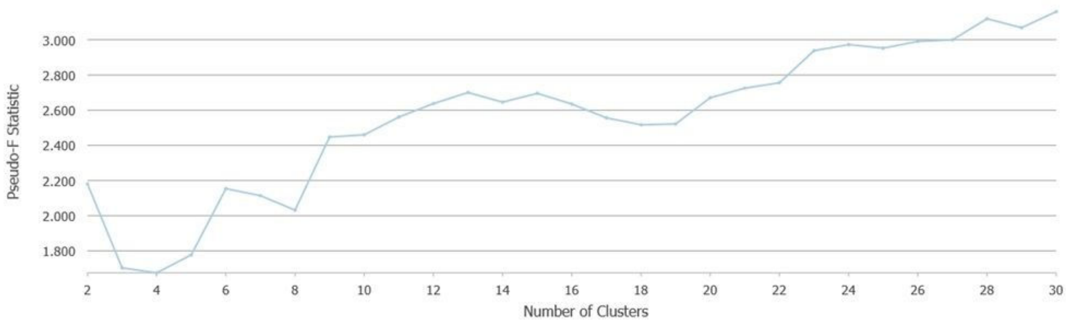
Note: N number of clusters

Source: data calculated by authors

The optimal number of cluster is 30. (Image 1) The clustering effectiveness is measured using the Calinski-Harabasz pseudo-F-statistic, which is a ratio of between-cluster variance to within-cluster variance**.** (ESRI ArcGis Pro, 2020) For the policies purpose, this number of clusters is too large. The criteria selection is given by the rule "the highest peak is the largest F-statistic, indicating how many clusters will be most effective at distinguishing the features and variables you specified."

We run the MCA a number times, selecting the results for N 20 and 6. While N=6 is the first maximum in the pseudo F statistic share, distinguishes feature similarities and differences in an acceptable level. F level indicates that this variable divides the employees into clusters most effectively. The R2 value for N=6 reflects that the Male variable does not discriminate successful among our features. While out interest variable is the proportion of employees with a tertiary level of education, we consider acceptable this cluster division.

Image 1. Optimized Pseudo-F Statistic Chart for H51, N Optimal = 30 clusters

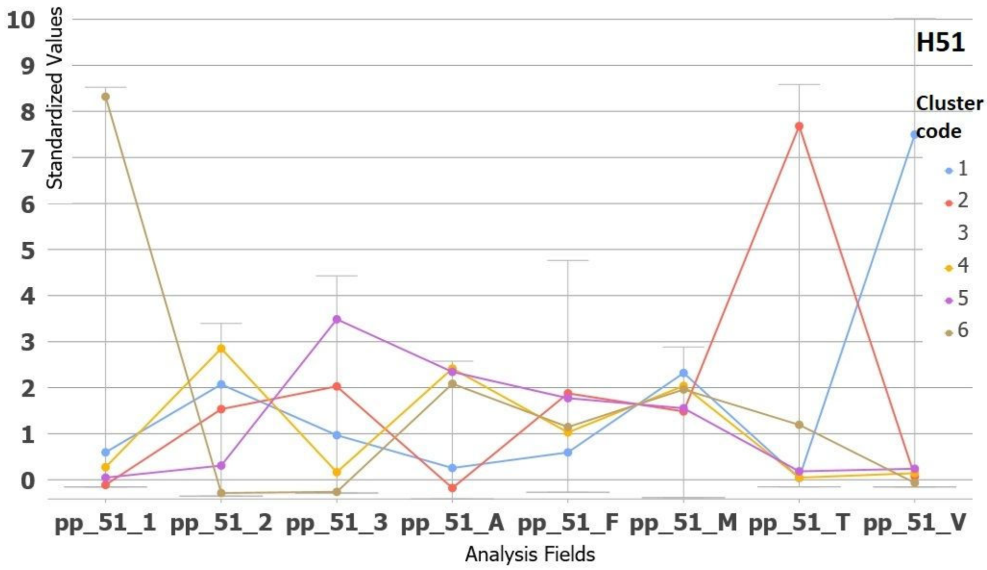


Source: graphic made by authors in Arc Gis Pro

The results of MCA are of 3 types: box plots, features per cluster chart and the MCA cluster map. All these results are linked to each other, each cluster identified is differentiated by a unique colour. In our case, MCA run on census tract to create 6 clusters.

The Box-Plots (Image 2) show information about "both the characteristics of each cluster as well as characteristics of each variable used in the analysis". Our cluster of interest is Cluster number 5 (magenta colour). (Image 2) The cluster with pp_51_3 is the cluster with the highest proportion of employees with tertiary education. In opposition, Cluster 6 reflect the tract of employees with the low level of education. Cluster number 2 includes the locations with the highest share of youth from the same sector. Cluster number 1 offer the image for tracts of the place with the highest percentage of aged employees. Cluster 3 (white) do not present activity in the sector H51, regardless of the eight characteristics, there is no employment visible.

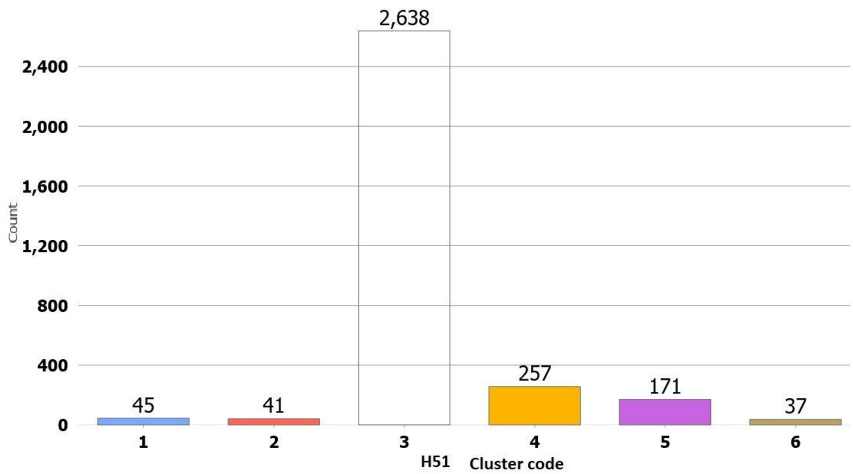
Image 2. Multivariate clustering Box-Plots, for H51, N=6



Source: graphic made by authors in Arc Gis Pro

The high concentration of H51 employees with tertiary education is in 171 features (NUTS5). (Image3)

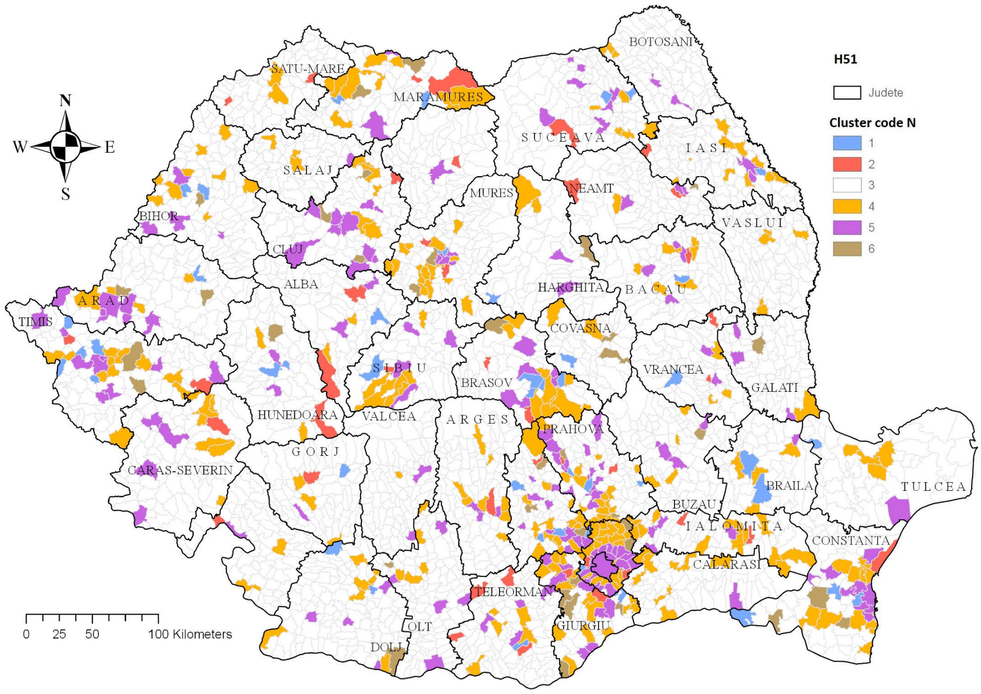
Image 3. Features per Cluster Chart, for H51, N=6



Source: graphic made by authors in Arc Gis Pro

Features with high tertiary employment in H51 are visible in Image 4 in Cluster 5 (magenta), an *indication of high-intensity cognitive activities*. It is noticeable the spatial autocorrelation and concentration around big cities. It could cover urban and periurban areas. The highest agglomeration is around Bucharest and Constanța. Mainly around Bucharest, Brașov and Constanța are locations included in Cluster 4 (mustard). This cluster is principally described by employees with the following characteristics: secondary level of education, adults and males. Their presence in the neighbourhood of Cluster 5 indicates operationalisation and execution tasks.

Image 4. Multivariate Clustering Chart outputs for H51, N=6 by shares in total for the level of education (1-Low, 2- Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M- males, F- Females)



Source: RPL 2011 NUTs 5 data, NIS source. Map made by authors in Arc GIS Pro with ESRI Romania shapefiles

4.2. Clusters profiles for I55 Hotels and other accommodation facilities

The I55 sector employees mainly females adults with a secondary level of education. The average share of employees with tertiary level of education accounts 10% means at NUTS 5 level. (Table 4)

Table 4. Statistics for employment in I55 at NUTS5 level, by shares in total for the level of education (1-Low, 2- Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M- males, F- Females) and R^2

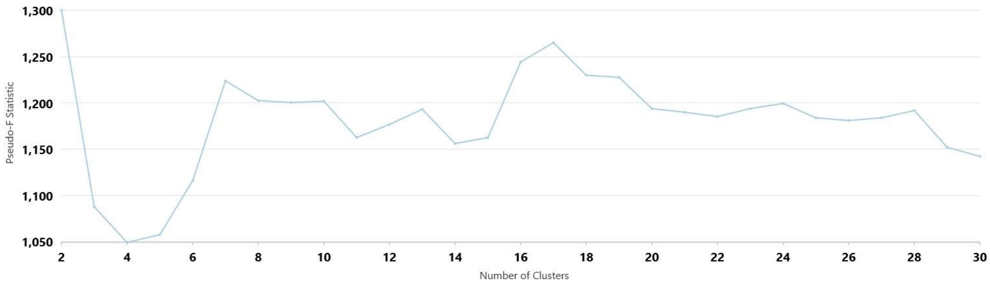
Variable	Mean	Std. Dev.	Min	Max	R^2 N=2
PP_55_A	51.868713	42.981966	0.00	100.00	0.629062
PP_55_F	47.995086	41.5676	0.00	100.00	0.575889
PP_55_2	41.665612	9.864743	0.00	100.00	0.471881
PP_55_M	21.838717	30.640288	0.00	100.00	0.219444
PP_55_1	17.651683	29.363785	0.00	100.00	0.156100
PP_55_T	15.31516	27.263364	0.00	100.00	0.136314
PP_55_3	**10.516511**	**21.576547**	**0.00**	**100.00**	**0.102621**
PP_55_V	2.649915	10.607766	0.00	100.00	0.026957

Note: N number of clusters
Source: data calculated by authors

The optimal number of cluster is 30. (Image 5) For the policies purpose, this number of clusters is too large. The criteria selection is given by the rule "the highest peak is the largest F-statistic, indicating how many clusters will be most effective at distinguishing the features and variables you specified."

We run the MCA a number times, selecting the results for N 20 and 7. While N=7 is the first maximum in the pseudo F statistic share, distinguishes feature similarities and differences in an acceptable level. F level indicates that this variable divides the employees into clusters most effectively.

Image 5. Optimized Pseudo-F Statistic Chart for I55, N Optimal = 30 clusters

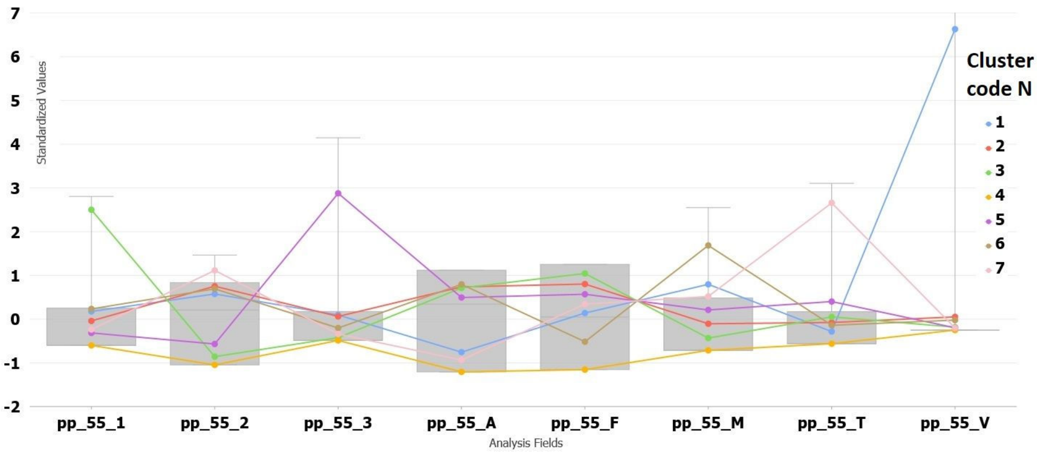


Source: graphic made by authors in Arc Gis Pro

The results of MCA are of 3 types: box plots, features per cluster chart and the MCA cluster map. All these results are linked to each other, each cluster identified is differentiated by a unique colour. In our case, MCA run on census tract to create 7 clusters.

The Box-Plots (Image 5) show information about "both the characteristics of each cluster as well as characteristics of each variable used in the analysis". Our cluster of interest is Cluster number 5 (magenta colour). (Image 7) The cluster with pp_55_3 is the cluster with the highest proportion of employees with tertiary education. In opposition, Cluster 3 reflect the tract of employees with the low level of education. Cluster number 2 includes the locations with the highest share of adult women with a medium level of education from the same sector. Cluster number 1 offer the image for tracts of the place with the highest percentage of aged employees.

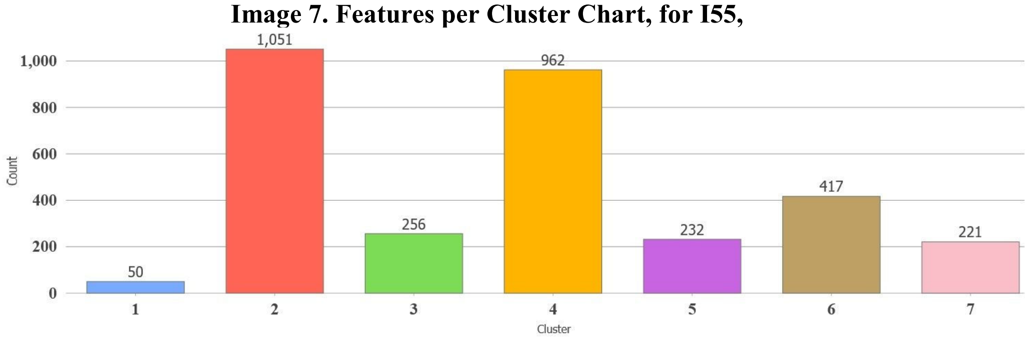
Image 6. Multivariate clustering Box-Plots, for I55, N=7



Source: graphic made by authors in Arc Gis Pro

High concentration of I55 employees with tertiary education are in 232 features (NUTS5). (Image3) and for the rural tourism Cluster 2 there are included 1051 locations.

Image 7. Features per Cluster Chart, for I55,



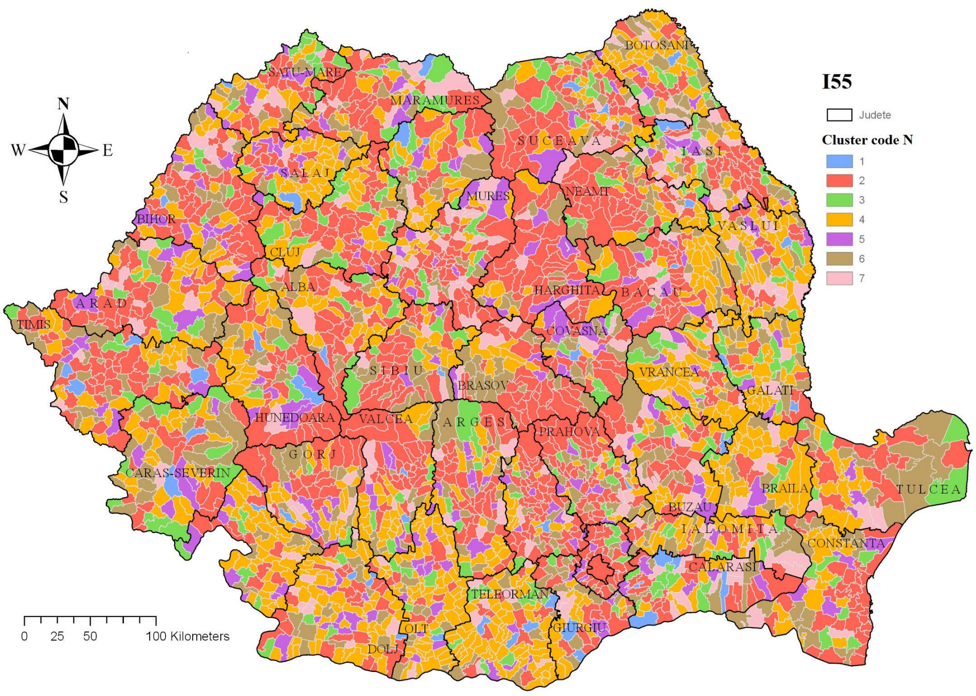
N=7

Source: graphic made by authors in Arc Gis Pro

Features with high tertiary employment in H51 are visible in Image 8 in Cluster 5 (magenta), the *indication of high-intensity cognitive activities*. It is evident the spatial autocorrelation and concentration around some touristic balnear areas: Covasna, Tușnad, Sovata, Vatra Dornei, Herculane. This person present high cognitive activities in balneary treatment – sophisticated treatments, indicating **Marshallian sources externalities**. The

Cluster 2 (red) is more spatially dispersed, especially in main touristic destinations mountain stations, seaside locations and Prahova Valley, mainly in rural areas. Bran, Valea Prahovei, etc. are agrotourism areas; employees are mostly adult women with a medium level of education. Also, cluster 2 indicates **Marshallian source externalities**. For this sector, locations from Cluster 4 do not provide activities, regardless of the eight characteristics, there is no employment visible.

Image 8. Multivariate Clustering Chart outputs for I55, N=7 by shares in total for the level of education (1-Low, 2- Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M - males, F- Females)



Source: RPL 2011 NUTs 5 data, NIS source. Map made by authors in Arc GIS Pro with ESRI Romania shapefiles,

4.3. Clusters profiles for N79 Activities of tourist agencies and tour operators; other reservation services and tourist assistance

The N79 sector employees mainly females adults with a secondary level of education. The average share of employees with tertiary level of education accounts 13% mean at NUTS 5 level. (Table 5) This sector (see 1.2.1.) is a KIA and an LKIMS sector, have a high-intensity information use, **based on ICT and digitisation adoption is increasing its efficiency and quality of services, services provided in highly competitive markets.**

Table 5. Statistics for employment in N79 at NUTS5 level, by shares in total for the level of education (1-Low, 2- Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M- males, F- Females) and R^2

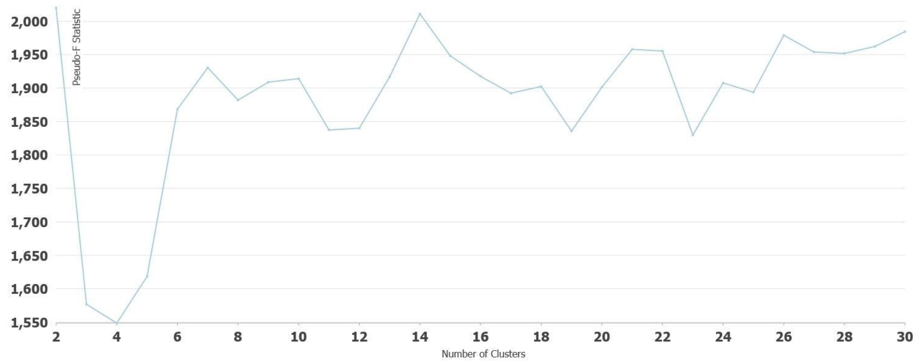
Variable	Mean	Std. Dev.	Min	Max	R^2	
					N=2	N=7
PP_79_A	26.150705	41.50857	0.00	100.00	0.796063	0.941548
PP_79_F	18.442486	34.195265	0.00	100.00	0.583396	0.746154
PP_79_2	16.747211	32.913021	0.00	100.00	0.519285	0.80747
PP_79_M	14.828132	30.465268	0.00	100.00	1.475137	0.68019
PP_79_3	**13.078031**	**29.374194**	**0.00**	**100.00**	**0.397566**	**0.797129**
PP_79_T	4.989581	18.253100	0.00	100.00	0.149869	0.773412
PP_79_1	3.445376	14.808696	0.00	100.00	0.108567	0.714129
PP_79_V	2.130332	11.129073	0.00	100.00	0.073491	0.797145

Note: N number of clusters
Source: data calculated by authors

The optimal number of cluster is 14. (Image 9) For the policies purpose, this number of clusters is too large. The criteria selection is given by the rule “the highest peak is the largest F-statistic, indicating how many clusters will be most effective at distinguishing the features and variables you specified.”

We run the MCA a number times, selecting the results for N 2 and 7. While N=7 is the first maximum in the pseudo F statistic share, distinguishes feature similarities and differences in an acceptable level. F level indicates that this variable divides the employees into clusters most effectively.

Image 9. Optimized Pseudo-F Statistic Chart for N79, N Optimal = 14 clusters

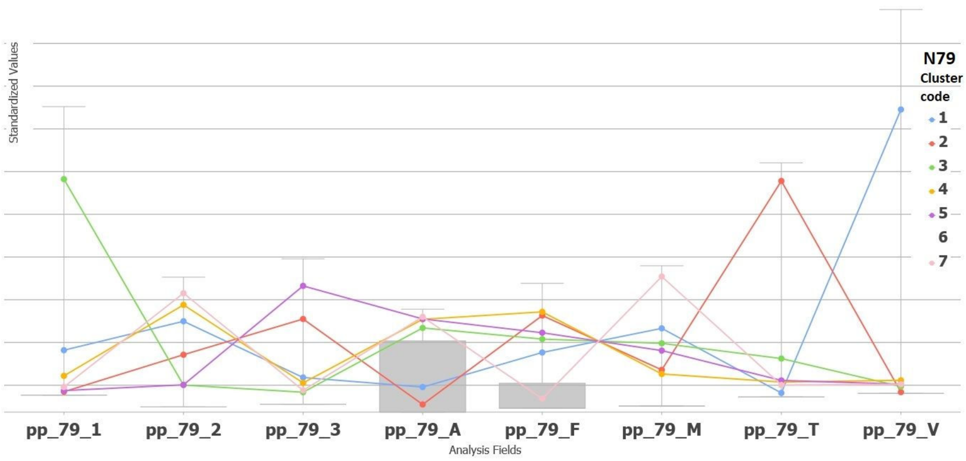


Source: graphic made by authors in Arc Gis Pro

The results of MCA are of 3 types: box plots, features per cluster chart and the MCA cluster map. All these results are linked to each other, each cluster identified is differentiated by a unique colour. In our case, MCA run on census tract to create 7 clusters.

The Box-Plots (Image 10) show information about “both the characteristics of each cluster as well as characteristics of each variable used in the analysis”. Our cluster of interest is Cluster number 5 (magenta colour). (Image 10) The cluster with pp_79_3, is the cluster with the highest proportion of employees with tertiary education. In opposition, Cluster 3 reflect the tract of employees with the low level of education, adults and youth, in equal measure males and females. Cluster number 2 includes the locations with the highest share of youth, mainly women with a high level of education from the same sector**.** Cluster number 1 offer the image for tracts of the location with the highest share of aged employees, mainly males with a secondary level of education.

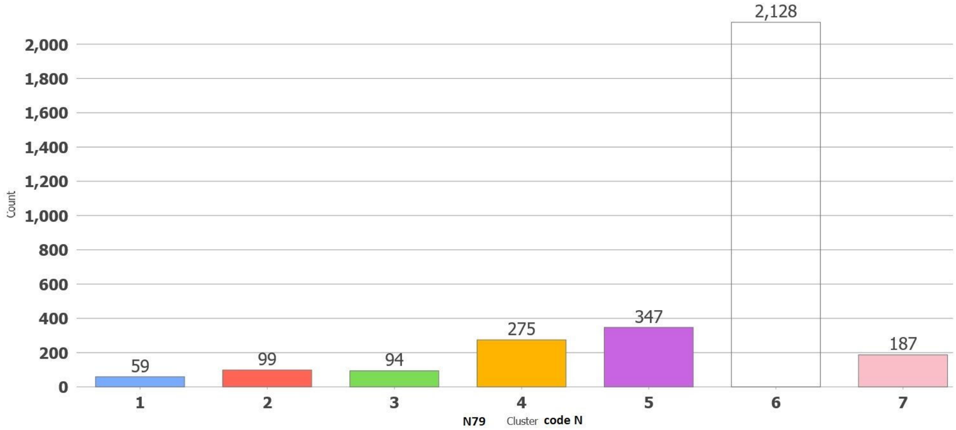
Image 10. Multivariate clustering Box-Plots, for N79, N=6



Source: graphic made by authors in Arc Gis Pro

The high concentration of N79 employees with tertiary education are in Cluster 5 (magenta) 347 features (NUTS5). (Image11) and for the youth tourism Cluster 2 (red) there are included 99 locations. Next to agglomerations of cognitive activities are the Cluster 4 (mustard), which group locations with employees with a medium level of education, mainly adult females, covering 275 features. Cluster 4 is in the neighbourhood of Cluster 5 and 2, reflecting the role of operationalising.

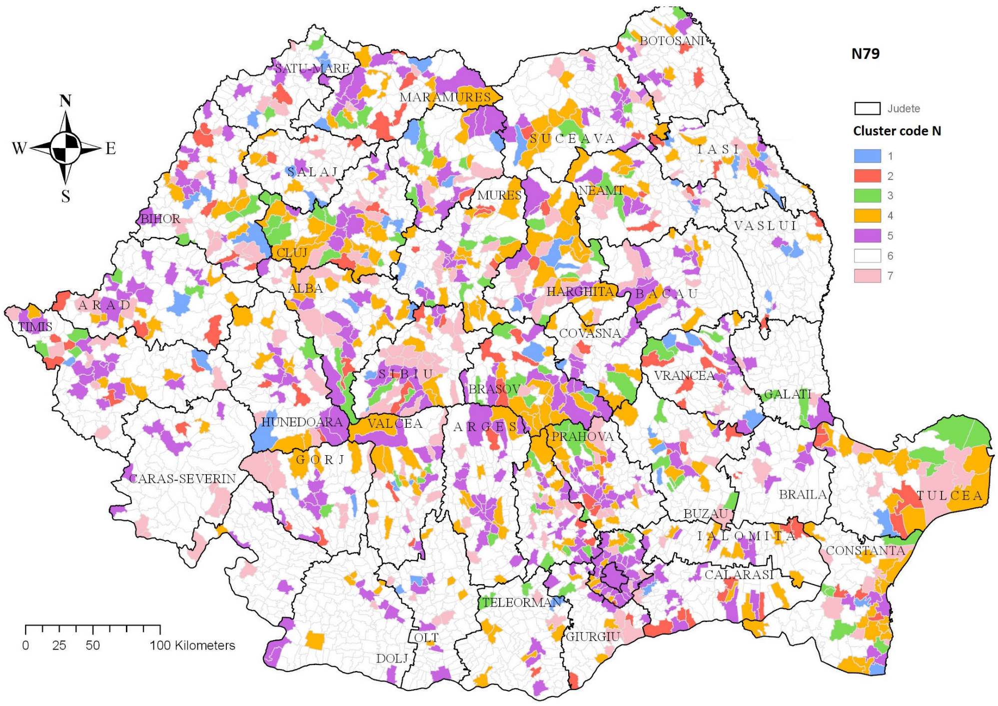
Image 11. Features per Cluster Chart, for N79, N=7



Source: graphic made by authors in Arc Gis Pro

Features with high tertiary employment in N79 are visible in Image 12 in the Cluster 5 (magenta), an *indication of high-intensity cognitive activities*.

Image 12. Multivariate Clustering Chart outputs for N79, N=7 by shares in total for the level of education (1-Low, 2- Medium and 3- high), age (T- youth, A – adults and V – aged) and gender (M- males, F- Females)



Source: RPL 2011 NUTs 5 data, NIS source. Map made by authors in Arc GIS Pro with ESRI Romania shapefiles

It is visible the spatial autocorrelation and location in the large urban agglomerations. Bucharest, Brașov are locations indicating **Urban sources externalities**. Maramures and Hunedoara locations from Cluster 5 indicating Marshallian sources externalities. Cluster 2 (red) but visible on the map, showing activities with the highest degree of digitisation. For this sector, locations from Cluster 6 do not provide activities, regardless of the eight characteristics, there is no employment visible. We emphasise the case of Cluster 3 (green), cluster with employees with a low level of education. It is clear the case of location from the North Tulcea, area of Delta Danube, a highly isolated area on the water. Here a lot o people leave from catching fishing and even rowing.

5. Discussion

Pierre (2014) cite ESRI regarding the fact that MCA is a grouping analysis tool that "perform a classification procedure that tries to **find natural clusters in your data**". This visual detailed and spatial integrated map offer a new perspective to understand the data, i.e. hidden patterns better.

Locations with talent presence could become innovation capabilities investment priorities. (Wei, Feng, and Zhang 2017) examine the impact of innovation capability on the distribution of innovation talents. Authors conclude that for China during 2001-2015: "(a) for areas with low levels of talent, the innovation environment is the most crucial factor; (b) for areas with a medium level of talent, the effects of innovation input and efficiency are moderate; and (c) for areas with a high level of talent, the positive effects of innovation input and efficiency are quite significant".

(Turner, 2018) points out that "Travel & Tourism creates jobs, drives exports, and generates prosperity across the globalised world". Regions are involved in the globalization process to a different extent depending on their structure and specialization. (Capello and Fratesi, 2011, p.2)

(Grigorescu et al. 2019) make a regional mapping of knowledge-intensive job growth from tourism industry using shapeshift analysis. (Lincaru, Ciucă, and Atanasiu 2019) presents the first draft of this article in the recent 2019 EcoSmart.

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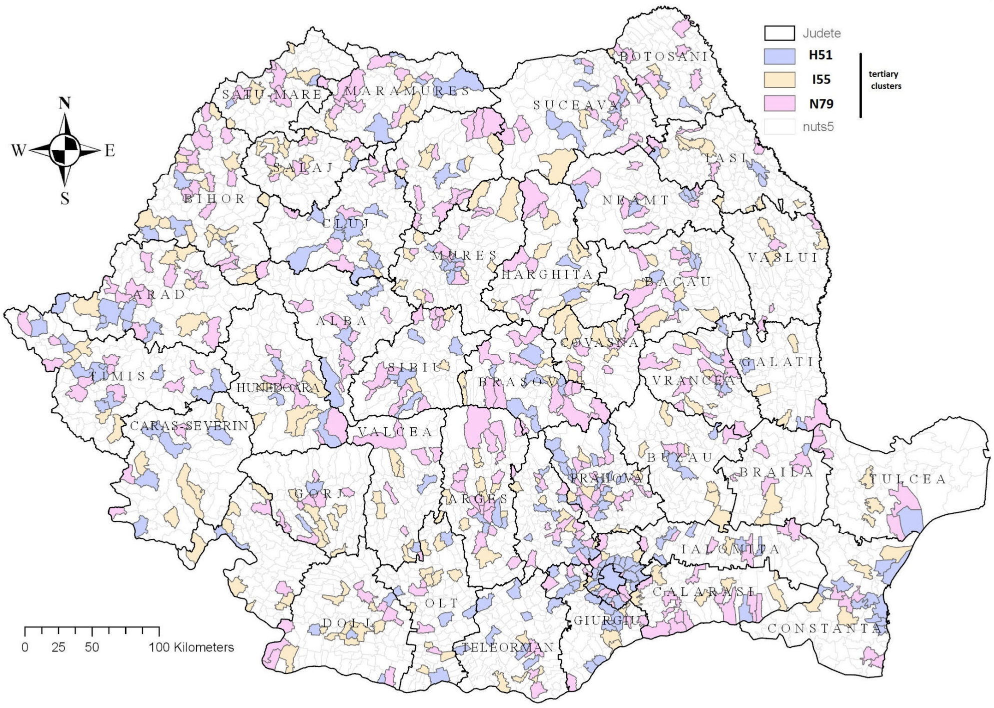
* *

It is remarkable the Bucharest, Brașov and Constanta the neighbouring presence of all analysed sector H51, I55 and N79. (Image 13) These are big cities respond to (Beaudry and Schiffauerova 2009) criterias. These places are sources of both **urbanization and Jacobian externalities. Here exists diversity based mechanisms that support the economic growth of the region.** For these locations are viable tourism ecosystem development. The highest variety allows radical innovation adoption at a rapid pace.

Another case is the Marshallian externalities case for all analysed sectors in Valea Prahovei area and Hunedoara. In Marshallian specialised location is probable the productivity-increasing coupled with incremental innovation adoption.

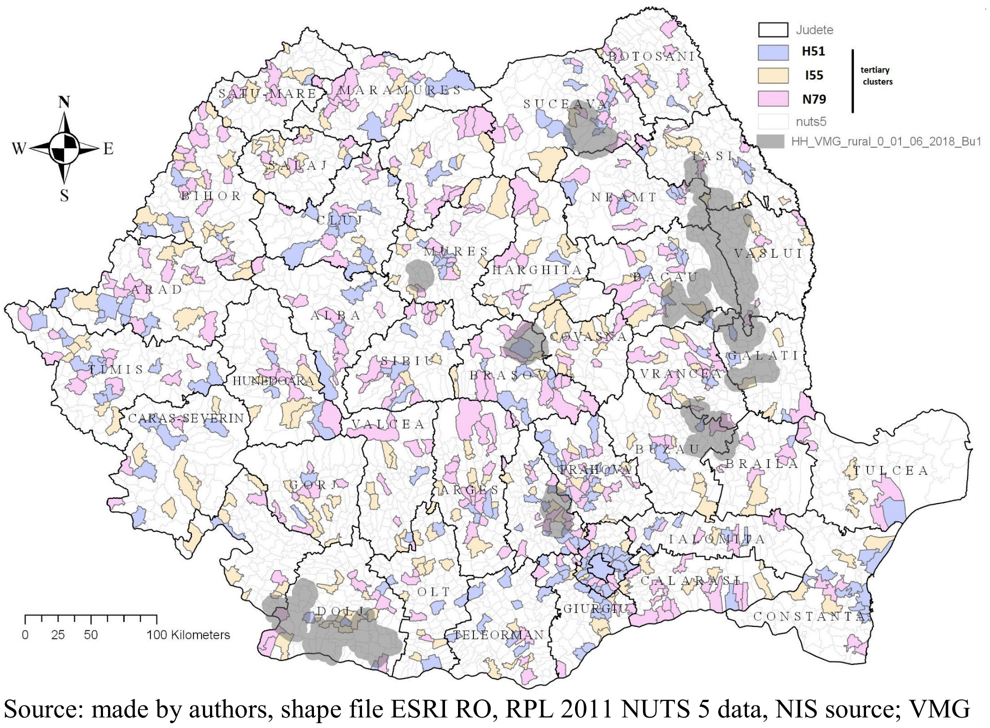
The map overlay initiated by McHarg (1971) "is a procedure for combining the attributes of intersecting features that are represented in two or more geo-registered data layers" DiBiase and Dutton (2009). In Romania, some of the most vulnerable are the Minumum Guarantee Beneficiaries (MGB). If we overlay the Image 13 on the MGB Marginalized Communities from Fl ood Risk Areas published by Lincaru et al. (2020) we obtain the Image 14. We have to emphasise that MGB persons are among the most vulnerable person in Romania, for which there are no sufficiently inclusive jobs! Perles-Ribes et al. (2017) put in discussion the question "Is the tourism-led growth hypothesis valid?", we extrapolate for the case of low educated from underdeveloped areas, as it is the extreme case fo MGB's from historical of 500 years flood risk areas. The response, issued indirectly, is NO, in Romania's poored regions tourism is not inclusive! - the message of Image 14. Result the sad conclusion that location with cumulative disasters as the impact of repetitive crises are not able to attract talents. If tourism, as the most inclusive sector for low educated fails to create inclusive jobs, then, remains still the question: what economic sector could employ persons from historically disadvantaged and vulnerable locations?

Image 13. Human Resources Capabilities inputs for Regions Smart Specialisation Strategies mainly tourism HR with high level of education (3- High) , age(T- youth, A- adults) and gender (mainly F – Females)



Source: made by authors, shape file ESRI RO, RPL 2011 NUTS 5 data, NIS source

Image 14. Human Resources Capabilities inputs for Regions Smart Specialisation Strategies mainly tourism HR with high level of education (3- High), age(T- youth, A- adults) and gender (mainly F – Females) and the VMG agglomeration beneficiaries (June, 2018. ANPIS)



Source: made by authors, shape file ESRI RO, RPL 2011 NUTS 5 data, NIS source; VMG agglomeration beneficiaries (June, 2018. ANPIS)

These results provide insights for spatial based policy decision (employment, education, innovation, investments, infrastructure, etc.) further development. Employment in tourism industries, therefore, should fulfil their potential to "create jobs for economically less advantaged socio-demographic groups or regions" (Eurostat, 2016) as an inclusive growth engine, working for all in a global knowledge economy. Another trend that increases the tourism inclusiveness dimension is the cultural heritage sites, a requisite for a sustainable tourism in a cultural context. (Huete-Alcocer, López-Ruiz, and Grigorescu 2019) Not at least, tourism is a possible link between public and private affairs. (Grigorescu 2006).

6. Conclusions

The first contribution of this work is the creation of spatial patterns of clusters for employment in the main tourism sectors, individually and superposed, at local level granularity – the lowest level of granularity. These maps exploit the recent geo-referenced information related to tourism and other areas. The hidden patters for tourism jobs are sad. Only wealthy locations can develop further sustainable tourism industry, while poor areas, i.e. the poorest ones (MGB Marginalized Communities from Flood Risk Areas) have no chance! The main conclusion of this article is that only the developed regions near highly urban agglomerations have innovation capacity to adopt radical innovation, including to exploit the digital transformation according to global megatrends. Even if the landscape is an attraction, locations (i.e. the MGM location case) these communities fail to develop tourism activities and to create inclusive jobs. This result is in line with the conclusion of (Romão, Guerreiro, and Rodrigues 2017). The results represent a useful input for building a Smart Strategy of the gradual recovery of the sectors following corona Pandemic Impact. To accelerate the digital transformation of the industry according to the demands identified by the tourism Megatrends iterated by (Bloomberg Media Group 2019) is a top priority. This Smart Strategy has to exploit sustainably all the specific territorial resources, especially its talents and human capital, regardless its level of education. In contrast "innovation talents make significant contributions to the improvement of innovation capability, but not vice versa" (Wei, Feng, and Zhang 2017). Authors insist that "attracting and nourishing talents it is the first priority for any region which want to develop smart and sustainable. An inclusive and cohesive territorial development, if exploits the digital transformation opportunities should create the Morettian externalities of high human capital, and finally should close the "diverging gap between ürban and rural"(Lopez-Ruiz et al. 2014).

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References

Araújo-Vila, Noelia, Jose Antonio Fraiz-Brea, and Arthur Filipe de Araújo. 2020. 'Spanish Economic-Financial Crisis: Social and Academic Interest'. Journal of Business Cycle Research, April. https://doi.org/10.1007/s41549-020-00045-z.

Aydin, Orhun. 2019. 'GIS & Spatial Machine Learning: Transforming Our Planet's Pulse to Action'. ESRI, 73. https://www.lib.uidaho.edu/media/gisday/Aydin_GISDay_Keynote2019.pdf.

Bănilă, Nicoleta. 2018. 'Tourism's Direct Contribution to Romania's GDP to Rise 4.6% in 2018 - WTTC'. See News - Business Intelligence for Southeast Europe. 2018. http://seenews.com/news/tourisms-direct-contribution-to-romanias-gdp-to-rise-46-in-2018-wttc-607733.

Beaudry, Catherine, and Andrea Schiffauerova. 2009. 'Who's Right, Marshall or Jacobs? The Localization versus Urbanization Debate'. Research Policy 38 (2): 318–37. https://doi.org/10.1016/j.respol.2008.11.010.

Bena, Antonella, Massimiliano Giraudo, Roberto Leombruni, and Giuseppe Costa. 2013. 'Job Tenure and Work Injuries: A Multivariate Analysis of the Relation with Previous Experience and Differences by Age'. BMC Public Health 13 (1): 869. https://doi.org/10.1186/1471-2458-13-869.

Bennett, Lauren, Flora Vale, and Jenora d'Acosta. 2015. 'Spatial Statistics: Simple Ways to Do More with Your Data'. Esri User Conference 2015 - Technical Workshop. https://www.esri.com/training/catalog/5765fb3551de57f10993106e/spatial-statistics%3A-simple-ways-to-do-more-with-your-data/.

Bloomberg Media Group. 2019. 'WORLD, TRANSFORMED MEGATRENDS AND THEIR IMPLICATIONS FOR TRAVEL & TOURISM'. World Travel Tourism Council. file:///C:/Users/Cristina/Downloads/Megatrends%202019%20-%20World%20Transformed.pd.

Bogart, William Thomas. 1997. Economics of Cities and Suburbs, The - William Thomas Bogart - 9780135699713 - Economics - Urban and Regional Economics (119). 1st ed. Prentice Hall. Pearson. https://www.pearson.ch/HigherEducation/Pearson/EAN/9780135699713/Economics-of-Cities-and-Suburbs-The.

Bradley, Kacey. 2019. 'Top 5 Trends of IoT in Hospitality : 4Hoteliers'. 4Hoteliers.Com. 2019. https://www.4hoteliers.com/features/article/13069.

Bryson, John, and Peter Daniels. 2007. 'The Handbook of Service Industries'. 2007. https://www.e-elgar.com/shop/the-handbook-of-service-industries.

Cameron, Sperance. 2017. 'Trump Immigration Crackdown Could Take Much-Needed Labor From Booming Hotels'. Bisnow. 2017. https://www.bisnow.com/national/news/hotel/trump-fiscal-plans-give-hotels-business-his-immigration-policies-take-their-workers-82979.

DiBiase, David, and John A Dutton. 2009. '5. Map Overlay Concept | The Nature of Geographic Information'. PennState College of Earth and Mineral Sciences, Department of Geography. 2009. https://www.e-education.psu.edu/natureofgeoinfo/c9_p6.html.

Eurostat. 2014. 'Methodological Manual for Tourism Statistics v3 1 20141219', 250. https://ec.europa.eu/eurostat/documents/3859598/6454997/KS-GQ-14-013-EN-N.pdf/166605aa-c990-40c4-b9f7-59c297154277.

———. 2020. 'Tourism Industries -Economic Analysis. Statistics Explained', April. https://ec.europa.eu/eurostat/statistics-explained/pdfscache/39768.pdf.

Feser, Edward J. 2002. 'Tracing the Sources of Local External Economies'. Urban Studies 39 (13): 2485–2506. https://doi.org/10.1080/0042098022000027077.

Frenken, Koen, Frank Van Oort, and Thijs Verburg. 2007. 'Related Variety, Unrelated Variety and Regional Economic Growth'. Regional Studies 41 (5): 685–97. https://doi.org/10.1080/00343400601120296.

Frocrain, Philippe, and Pierre-Noël Giraud. 2019. 'The Evolution of Tradable and Non Tradable Employment: Evidence from France'. Economie et Statistique / Economics and Statistics, no. 503d (January): 87–107. https://doi.org/10.24187/ecostat.2018.503d.1959.

Fujita, Masahisa, Paul R. Krugman, and Anthony Venables. 1999. The Spatial Economy: Cities, Regions and International Trade. Cambridge, Mass: MIT Press.

Fujita, Masahisa, and Jacques-François Thisse. 1996. 'Economics of Agglomeration'. Journal of the Japanese and International Economies 10 (4): 339–78. https://doi.org/10.1006/jjie.1996.0021.

———. 2013. Economics Agglomeration Cities Industrial Location and Globalization. 2nd ed. Cambridge University Press. https://www.cambridge.org/ro/academic/subjects/economics/microeconomics/economics-agglomeration-cities-industrial-location-and-globalization-2nd-edition, https://www.cambridge.org/ro/academic/subjects/economics/microeconomics.

Grigorescu, Adriana. 2006. 'Marketing of Public and Private Affairs - a Link'. In , KYBERNETES Volume:1179–89. Maribor, Slovenia.

Harrison, Bennett, Maryellen R. Kelley, and Jon Gant. 1996. 'Innovative Firm Behavior and Local Milieu: Exploring the Intersection of Agglomeration, Firm Effects, and Technological Change'. Economic Geography 72 (3): 233. https://doi.org/10.2307/144400.

Henderson, J.Vernon. 2003. 'Marshall's Scale Economies'. Journal of Urban Economics 53 (1): 1–28. https://doi.org/10.1016/S0094-1190(02)00505-3.

Huete-Alcocer, Nuria, Víctor Raúl López-Ruiz, and Adriana Grigorescu. 2019. 'Measurement of Satisfaction in Sustainable Tourism: A Cultural Heritage Site in Spain'. Sustainability 11 (23): 6774. https://doi.org/10.3390/su11236774.

IRTS. 2008. 'IRTS 2008 (International Recommendations, IRTS, Tourism Satellite Account, Tourism Statistics, UNWTO)'. 2008. https://unstats.un.org/unsd/tradekb/Knowledgebase/50551/IRTS-2008.

Jacobs, Jane. 1961. The Death and Life of Great American Cities. New York: Vintage Books A Division of Random House.

———. 1969. 'The City. The Economy of the Cities.' National Civic Review 58 (9): 447–48. https://doi.org/10.1002/ncr.4100580916.
Jain, Anil K. 2010. 'Data Clustering: 50 Years beyond K-Means'. Pattern Recognition Letters 31 (8): 651–66. https://doi.org/10.1016/j.patrec.2009.09.011.
Krugman, Paul. 1991. 'Increasing Returns and Economic Geography'. Journal of Political Economy 99 (3): 483–99. https://doi.org/10.1086/261763.
Langford, Guy, Adam Weissenberg, and Marcello Gasdia. 2019. '2019 US Travel and Hospitality Outlook'. Deloitte. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/consumer-business/us-consumer-2019-us-travel-and-hospitality-outlook.pdf.
Lim, Jaewon, and DooHwan Won. 2020. 'How Las Vegas' Tourism Could Survive an Economic Crisis?' Cities 100 (May): 102643. https://doi.org/10.1016/j.cities.2020.102643.
Lincaru, Cristina, Speranța Pîrciog, Adriana Grigorescu, and Cristina Stroe. 2020. 'Chapter 4. The Flood Risk Information Used in Spatial Policy-Based Design for Socio-Economic Integration of the Most Vulnerable Persons from Rural Agglomerations. Study Case Romania'. In Public Administration: Perspectives, Management and Challenges, Frederik S. Møller (Editor). Political Science and History POL028000. Niva Science Publisher. https://novapublishers.com/shop/public-administration-perspectives-management-and-challenges/.
Llano, Carlos. 2000. 'ECONOMIC GEOGRAPHY: THE CORE-PERIPHERY MODEL'. References for the slides: Fujita, Krugman y Venables: presented at the Lecture 6. https://slideplayer.com/slide/4346625/.
Lopez-Ruiz, Victor Raoul, Domingo Nevado Pena, Jose Luis Alfaro Navarro, and Adriana Grigorescu. 2014. 'Human Development European City Index: Methodology and Results | Request PDF'. Romanian Journal of Economic Forecasting XVII (3). http://www.ipe.ro/rjef/rjef3_14/rjef3_2014p72-87.pdf.
MacQueen, J.B. 1967. 'Some Methods for Classification and Analysis of Multivariate Observations.' Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, University of California Press, , Berkeley, Calif., 1, Styatistics: 281–97.
McHarg, I.L. 1971. Design with Nature. https://books.google.ro/books?id=CovnoQEACAAJ.
Michaelides, Panayotis, George Economakis, and Dimitrios Lagos. 2006. 'Clustering Analysis Methodology for Employment and Regional Planning in Greece', 9. https://pdfs.semanticscholar.org/c596/db07c25ea4d66eee9a5b77194892d8ea3e98.pdf.
Mitchell, Tom M. 1997. Machine Learning. McGraw-Hill Science/Engineering/Math. http://profsite.um.ac.ir/~monsefi/machine-learning/pdf/Machine-Learning-Tom-Mitchell.pdf.
Moretti, Enrico. 2003. 'Human Capital Externalities in Cities'. w9641. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w9641.
———. 2004. 'Workers' Education, Spillovers, and Productivity: Evidence from Plant-Level Production Functions'. American Economic Review 94 (3): 656–90. https://doi.org/10.1257/0002828041464623.
———. 2012. The New Geography of Jobs. Houghton Mifflin Harcourt.
Muller, Emmanuel, and David Doloreux. 2007. 'The Key Dimensions of Knowledge-Intensive Business Services (KIBS) Analysis: A Decade of Evolution'. U1/2007. Working Papers 'Firms and Region'. Fraunhofer Institute for Systems and Innovation Research (ISI). https://ideas.repec.org/p/zbw/fisifr/u12007.html.
OECD. 2007. 'OECD Science, Technology and Industry Scoreboard 2007 - OECD'. 2007. http://www.oecd.org/science/inno/oecdsciencetechnologyandindustryscoreboard2007.htm.
———. 2017. OECD Science, Technology and Industry Scoreboard 2017: The Digital Transformation. OECD Science, Technology and Industry Scoreboard. OECD. https://doi.org/10.1787/9789264268821-en.
Parsons, Meg, Cilla Brown, Johanna Nalau, and Karen Fisher. 2018. 'Assessing Adaptive Capacity and Adaptation: Insights from Samoan Tourism Operators'. Climate and Development 10 (7): 644–63. https://doi.org/10.1080/17565529.2017.1410082.
Perles-Ribes, José Francisco, Ana Belén Ramón-Rodríguez, Antonio Rubia, and Luis Moreno-Izquierdo. 2017. 'Is the Tourism-Led Growth Hypothesis Valid after the Global Economic and Financial Crisis? The Case of Spain 1957–2014'. Tourism Management 61 (August): 96–109. https://doi.org/10.1016/j.tourman.2017.01.003.
Petrova, Aleksia. 2020. 'Romania, Serbia to Bear Brunt of COVID-19 Induced Value Chain Disruptions - OECD'. See News - Business Intelligence for Southeast Europe. 4 April 2020. http://seenews.com/news/romania-serbia-to-bear-brunt-of-covid-19-induced-value-chain-disruptions-oecd-696326.
Pierre, Daniel. 2014. 'Developing a Tutorial for Grouping Analysis in ArcGIS'. Centre of Geographic Science. https://www.slideshare.net/COGSPresentations/developing-a-tutorial-for-grouping-analysis-in-arcgis.

Porter, Michael E. 1979. 'How Competitive Forces Shape Strategy'. Harvard Business Review, 1 March 1979. https://hbr.org/1979/03/how-competitive-forces-shape-strategy.

Quigley, John M. 1998. 'Urban Diversity and Economic Growth'. Journal of Economic Perspectives 12 (2): 127–38.

Raspe, Otto, and Frank Van Oort. 2006. 'The Knowledge Economy and Urban Economic Growth'. European Planning Studies 14 (9): 1209–34. https://doi.org/10.1080/09654310600933322.

Reichheld, Ashley, Mark Allen, Emiliy Ballbach, and Morgan Seyle. 2020. 'Human Experience: At the Heart of Learning, Living, Connecting, and Business Loyalty The Transportation, Hospitality & Services Perspective'. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-human-experience.pdf.

Romania. OECD Tourism Trends and Policies 2020. 2020. OECD Tourism Trends and Policies. OECD. https://doi.org/10.1787/721999bd-en.

Romão, João, João Guerreiro, and Paulo M. M. Rodrigues. 2017. 'Territory and Sustainable Tourism Development: A Space-Time Analysis on European Regions'. REGION 4 (3): 1. https://doi.org/10.18335/region.v4i3.142.

Ruthartr. 2018. 'New Clustering Tools in ArcGIS Pro 2.1: More Machine Learning at Your Fingertips'. ArcGIS Blog (blog). 22 January 2018. https://www.esri.com/arcgis-blog/products/analytics/analytics/new-clustering-tools-in-arcgis-pro-2-1-more-machine-learning-at-your-fingertips/.

Schwab, Klaus. 2019. 'The Global Competitiveness Report 2019' World Economic Forum: 666. http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

SiteMinder. 2020. 'The Hotel Industry of 2020: Predicting the Future of Hotel Tech Is Difficult : 4Hoteliers'. 4Hoteliers.Com. 2020. https://www.4hoteliers.com/features/article/13096.

Starkov, Max. 2020. 'Do You Have a Coronavirus Strategy? : 4Hoteliers'. 4Hoteliers.Com. 2020. https://www.4hoteliers.com/features/article/13234.

Steinhaus, Hugo. 1957. 'Sur La Division Des Corps Materiels En Parties.' Bull Acad Polon Sci 4 4 (12): 801–4. https://mathscinet.ams.org/mathscinet-getitem?mr=0090073.

Tatarczak, Anna, and Oleksandra Boichuk. 2017. 'The Use of Multivariate Techniques for Youth Unemployment Analysis in Poland'. Working Papers, May. https://ideas.repec.org/p/pes/wpaper/2017no130.html.

———. 2018. 'The Multivariate Techniques in Evaluation of Unemployment Analysis of Polish Regions'. Oeconomia Copernicana 9 (3): 361–80. https://doi.org/10.24136/oc.2018.018.

TSA, ed. 2010. Tourism Satellite Account: Recommended Methodological Framework 2008. Rev. 1. Studies in Methods Series F 80, Rev.1. Luxembourg: Commission of the European Communities, Eurostat [u.a.]. https://unstats.un.org/unsd/publication/Seriesf/SeriesF_80rev1e.pdf.

UNWTO. 2018. European Union Tourism Trends. World Tourism Organization (UNWTO). https://doi.org/10.18111/9789284419470.

Vasilescu, Maria Denisa, Larisa Aparaschivei, and Mihai Roman. 2012. 'EMPLOYMENT IN ROMANIA: EVIDENCE FROM A PANEL DATA ANALYSIS', 15. https://mpra.ub.uni-muenchen.de/38388/1/MPRA_paper_38388.pdf.

Wei, Fenfen, Nanping Feng, and Kevin Zhang. 2017. 'Innovation Capability and Innovation Talents: Evidence from China Based on a Quantile Regression Approach'. Sustainability 9 (7): 1218. https://doi.org/10.3390/su9071218.

Wikipedia. 2020. 'K-Means Clustering'. 2020. https://en.wikipedia.org/wiki/K-means_clustering.

World Tourism Organization (UNWTO). 2018. European Union Tourism Trends. World Tourism Organization (UNWTO). https://doi.org/10.18111/9789284419470.

WTTC. 2020a. '2020 Economic Impact Report on the Economic and Employment Impact of Travel & Tourism'. https://wttc.org/en-us/Research/Economic-Impact.

———. 2020b. 'The Importance of Travel & Tourism in 2019'. World Travel & Tourism Council. https://wttc.org/en-us/Research/Economic-Impact.

———. 2020c. 'TRAVEL & TOURISM ECONOMIC IMPACT FROM COVID-19'. https://wttc.org/en-us/Research/Economic-Impact.

Appendices

Table 6. Romanian tourism industries detailed profile in the context of economy (absolute values)

		Enterprises - number	Turnover or gross premiums written - million euro	Value added at factor cost - million euro	Persons employed - number
INDIC_SB	*var*	*V11110*	*V12110*	*V12150*	*V16110*
TIME/NACE_R2	*Code*	*2017*	*2017*	*2017*	*2017*
Total business economy; repair of computers, personal and household goods; except financial and insurance activities	**(1)**	**485,215**	**292,990.2**	**66,908.8**	**4,020,121**
Total services (2)	**(2)**	**204909**	**52077**	**21465.653**	**1328892**
Total tourism industries (3)	**(3)**	**40,654**	**7,140**	**2,227**	**241,812**
Tourism industries (mainly tourism) (4)	**(4)**	**7,011**	**2,658**	**716**	**58,009**
Tourism industries (mainly tourism) (H51+I55+N79) RIS data		**8,960**	**2,913**	**800**	**65,941**
Tourism industries (partially tourism) (5)	(5)	33,643	4,482	1,512	183,803
Transport related (total)	**(6)**	**43,698**	**12,993**	**3,621**	**273,947**
Land transport and transport via pipelines	H49	43,409	12,044.4	3,620.9	267,183
Passenger rail transport, interurban	*H491*	*22*	*207.6*		*13,782*
Taxi operation	*H4932*	*9,490*	*227.7*	*110.4*	*20,704*
Other passenger land transport n.e.c.	*H4939*	*3,430*	*612.9*	*227.4*	*22,420*
Water transport	H50	211	187.5		2,397
Sea and coastal passenger water transport	*H501*	*25*	*0.9*		*50*
Inland passenger water transport	*H503*	*72*	*8.3*	*6.1*	*369*
Air transport	H51	78	761.4		4,367
Passenger air transport	*H511*	*48*	*719.2*		*4,079*
Accommodation	**I55**	**6,074**	**1,303.7**	**631.6**	**50,610**
Hotels and similar accommodation	*I551*	*2,403*	*1,079.2*	*541.4*	*39,136*
Holiday and other short-stay accommodation	*I552*	*1,995*	*95.8*	*36.3*	*5,338*
Camping grounds, recreational vehicle parks and trailer parks	*I553*	*81*	*6.2*	*2.3*	*331*
Food and beverage service activities	**I56**	**20,339**	**3,082.5**	**944.4**	**131,745**
Restaurants and mobile food service activities	*I561*	*9,903*	*2,208.3*	*652.4*	*92,271*
Beverage serving activities	*I563*	*9,158*	*585.7*	*176.7*	*28,474*
Rental and leasing activities	**N77**	**2,465**	**865.7**	**473.3**	**8,500**
Renting and leasing of motor vehicles	*N771*	*990*	*530.7*	*299.8*	*3,476*
Renting and leasing of recreational and sports goods	*N7721*	*229*	*9.4*	*5.9*	*418*
Travel agency, tour operator and other reservation service and related activities	**N79**	**2,808**	**847.8**	**168.4**	**10,964**
Travel agency and tour operator activities	*N791*	*2,484*	*757.2*	*135.5*	*9,125*
Other reservation service and related activities	*N799*	*324*	*90.6*	*32.9*	*1,839*

Note: Due to unreliable data at country level and rounding, deviations can occur between total and subtotal
(1) B-N_S95_X_K; (2) NACE sections H, I, J, L, M, N, S95; (3) NACE classes H491, H4932, H4939, H501, H503, H511, I551, I552, I553, I561, I563, N771, N7721 and division N79; (4) NACE classes H511, I551, I552, I553 and N791; (5) NACE classes H491, H4932, H4939, H501, H503, I561, I563, N771, N7721 and N799; (6) H49+H50+H51; Source: Eurostat (online data code: sbs_na_sca_r2, sbs_na_1a_se_r2)

Table 7. Romanian tourism industries detailed profile in the context of economy (relative values)

		Enterprises - number	**Turnover or gross premiums written - million euro**	**Value added at factor cost - million euro**	**Persons employed - number**
INDIC_SB	Code/	***V11110***	***V12110***	***V12150***	***V16110***
TIME / NACE_R2	*Year*	***2017***	***2017***	***2017***	***2017***
Total tourism industries as share of total non-financial business economy(¹)	**(2)**	**8.4%**	**2.4%**	**3.3%**	**6.0%**
Total tourism industries as share of total Services(²)	**(3)**	**19.8%**	**13.7%**	**10.4%**	**18.2%**
Total tourism industries(³), of which:		*100%*	*100%*	*100%*	*100%*
Tourism industries (mainly tourism) (⁴)	**(4)**	17%	37%	32%	24%
Tourism industries (partially tourism) (⁵)	(5)	83%	63%	68%	76%
Total tourism industries, of which:		100%	100%	100%	100%
Transport related (total)	**(6)**	107.5%	182.0%	162.6%	113.3%
Land transport and transport via pipelines	**H49**	**106.8%**	**168.7%**	**162.6%**	**110.5%**
Passenger rail transport, interurban	*H491*	0.1%	2.9%	0.0%	5.7%
Taxi operation	*H4932*	23.3%	3.2%	5.0%	8.6%
Other passenger land transport n.e.c.	*H4939*	8.4%	8.6%	10.2%	9.3%
Water transport	**H50**	**0.5%**	**2.6%**	**0.0%**	**1.0%**
Sea and coastal passenger water transport	*H501*	0.1%	0.0%	0.0%	0.0%
Inland passenger water transport	*H503*	0.2%	0.1%	0.3%	0.2%
Air transport	**H51**	**0.2%**	**10.7%**	**0.0%**	**1.8%**
Passenger air transport	*H511*	0.1%	10.1%	0.0%	1.7%
Accommodation	**I55**	**14.9%**	**18.3%**	**28.4%**	**20.9%**
Hotels and similar accommodation	*I551*	5.9%	15.1%	24.3%	16.2%
Holiday and other short-stay accommodation	*I552*	4.9%	1.3%	1.6%	2.2%
Camping grounds, recreational vehicle parks and trailer parks	*I553*	0.2%	0.1%	0.1%	0.1%
Food and beverage service activities	**I56**	**50.0%**	**43.2%**	**42.4%**	**54.5%**
Restaurants and mobile food service activities	*I561*	24.4%	30.9%	29.3%	38.2%
Beverage serving activities	*I563*	22.5%	8.2%	7.9%	11.8%
Rental and leasing activities	**N77**	**6.1%**	**12.1%**	**21.3%**	**3.5%**
Renting and leasing of motor vehicles	*N771*	2.4%	7.4%	13.5%	1.4%
Renting and leasing of recreational and sports goods	*N7721*	0.6%	0.1%	0.3%	0.2%
Travel agency, tour operator and other reservation service and related activities	**N79**	**6.9%**	**11.9%**	**7.6%**	**4.5%**
Travel agency and tour operator activities	*N791*	6.1%	10.6%	6.1%	3.8%
Other reservation service and related activities	*N799*	0.8%	1.3%	1.5%	0.8%

Note: Due to unreliable data at country level and rounding, deviations can occur between total and subtotal
(1) B-N_S95_X_K; (2) NACE sections H, I, J, L, M, N, S95; (³) NACE classes H491, H4932, H4939, H501, H503, H511, I551, I552, I553, I561, I563, N771, N7721 and division N79; (⁴) NACE classes H511, I551, I552, I553 and N791; (⁵) NACE classes H491, H4932, H4939, H501, H503, I561, I563, N771, N7721 and N799; (6) H49+H50+H51; Source: Eurostat (online data code: sbs_na_sca_r2, sbs_na_1a_se_r2)

Announcements, Conferences, News

American Economic Association Annual Meeting
In conjunction with the Allied Social Science Associations (ASSA)
3rd – 5th January 2020, San Diego, California

(L to R) George Akerlof, Chad Jones, Nobel Laureate Paul Romer, Janet Yellen, Ben Bernanke, Nobel Laureate William Nordhaus, Barbara Nordhaus, Lint Barrage at the AEA Nobel Laureate Luncheov

Conference Overview[1]

The American Economic Association in conjunction with the Allied Social Science Associations (ASSA) held this year's annual meeting from 3rd to 5th January 2020 in San Diego, California. The meeting brought together more than 13,000 professionals and academics from the economic industry worldwide, who had the opportunity to network and discuss the latest developments and academic findings in economic research.

More specifically, this meeting covered a variety of topics on economics that were presented in depth by speakers and discussed in panels. Moreover, it offered a lot of special events, such as the Presidential Address, award presentations and lectures. This meeting was also an era of networking and conducting job interviews, connecting this way young professionals with top companies of the financial industry.

In more detail, the sessions of the event analyzed a lot of crucial economic topics in relation to all socioeconomic aspects: from entrepreneurship, labor markets, social economics, women's careers and LBGT economics, political economy, immigration, economic or gender inequalities, to economic topics associated with regulations, healthcare systems, psychology, education, the environment, the technology, innovation, machine learning and artificial intelligence.

More details on this annual meeting as well as the full schedule, the topics and the papers presented may be found here *[https://www.aeaweb.org/conference/2020]*.

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1 Conference overview by Vilelmini G. Psarrianou

51st Annual Conference of the Regional Science Association, India
"Planning Sustainable Regions: The Social-Economic-Ecological Triad"
13th – 15th February 2020, Kolkata, India

Conference Overview[2]

The 51st annual conference of RSA, India was hosted by the Amity Institute of Environmental Sciences and the Amity Institute of Social Sciences of Amity University, in Kolkata, India between the 13th and 15th February 2020. Bringing scientists from different disciplines, Regional Science plays a crucial role in researching and developing options for more sustainable regions. Taking this into account, the conference's epicenter was the topic of sustainability and it urged the necessity of adopting a more holistic approach in our way to achieve it.

More specifically, the following categories were discussed and analyzed:

a. Regional economies: urban, per-urban, and rural

b. Climate change and vulnerability

c. Environmental issues and challenges – with the subcategories of: biodiversity & ecology, agriculture & food security, travel & tourism and planning for mountain, coastal, riverine & wetland ecosystems

d. Sustainable infrastructure planning – with the subcategories of: housing, transport, communication & accessibility, trade and flow of good & services and market dynamics: financial, labour, capital goods and services

e. Social planning and sustainability – with the subcategories of: health & wellbeing, education & capacity building, heritage & culture and electronic media & regional complexities

f. Issues in the political economy – with the subcategories of: global to local challenges and governance, institutions & innovation

g. Geoinformatics and regional analysis

h. Big data in regional analysis

More information on the conference may be found on the website of Regional Science Association International

[https://www.regionalscience.org/index.php/news/upcoming-events/item/2547-51st-rsaindia-conference-13-15-february,-2020,-kolkata,-india.html].

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2 Conference overview by Vilelmini G. Psarrianou

Academic Profiles

Napoleon Maravegias is a Professor of Macroeconomic Analysis and European Economic Integration in the University of Athens, Department of Political Science and Public Administration, where he also served as Deputy President between 2006 and 2008. Moreover, between 2015 and 2019 he was a Deputy Dean of University of Athens and in the past, he also served as Assistant Professor and Professor in the Agricultural University of Athens.

He has also been invited to teach in graduate and postgraduate programs of numerous European Universities, such as the University of Grenoble (where he also obtained his DEA and Doctorat d' Etat), the Oxford University, the University of Paris, Montpellier, Valencia and Budapest.

His scientific research focuses on the following topics:

a) European Integration, b) European Governance, c) European Policies, d) Financial Relationship of Greece with the European Union and adjacent European countries, and e) the European and international financial crisis.

Furthermore, his academic work includes monographs, researches, reports of research programs and he has numerous publications in Greek and foreign academic journals.

His most recent publications include, but are not limited *to, the following:*

- *“European Union: Creation, Development and Prospects", Critique Publications, 2016*
- *"The Promise of Development, 100 texts of reflection", Papazisis Publications, 2015*
- *“From the Crisis to Development. In Search of New Development Models for Greece and the South”, Papazisis Publications, 2014*
- *"The Exit from the Crisis - Applicable Alternative Proposals", Papazisis Publications, 2014*
- *"Sustainable Models of Integrated Mountain Area Development: The Case of Epirus and Pindos", Papazisis Publications, 2014*

Academic Profile by:
Vilelmini G. PSARRIANOU, RSI J

Paolo Malanima is a Professor of Economic History & Development Economics in the Magna Graecia University in Catanzaro, Italy. Between 1977 and 1994, he also served as Professor of Economic History and Economics in the University of Pisa.

With studies in Humanities, Professor Malanima has offered a significant academic work in the area of economic history; in more detail, he has been conducting extended research on the economy of Italy under the scope of classical antiquity and global history, as well as on the “energy” and the “environment” in relation to economics. In addition to these, his most recent academic focus concerns the historical investigation on the world energy consumption and the energy technology.

Moreover, in 2002 he won the Italian National Research Counsil competition, he is president of the European School for Training in Economic and Social Historical Research and he has been a member of the Editorial Board of numerous academic journals, such as the following: Economic History Review, Investigations de Historia Economica, Società e Storia and Rivista di Storia Economica.

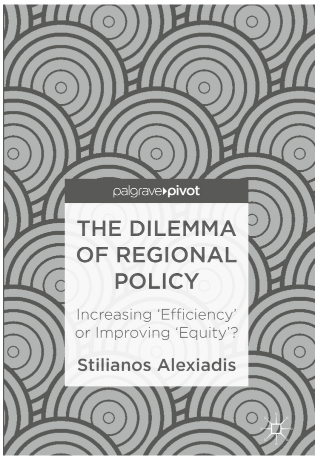
His most recent publications include:

- The limiting factor: energy, growth, and divergence, 1820 - 1913, January 2020, The Economic History Review
- Wages: Ancient, Medieval, Modern
- Trends in Mediterranean inequalities 1950-2015, December 2017, Panoeconomicus
- Italy in the Renaissance: a leading economy in the European context, 1350-1550: ITALY IN THE RENAISSANCE, November 2017, The Economic History Review
- Geography, market potential and industrialisation in Italy 1871-2001, November 2016, Papers in Regional Science

Further information on his academic work may be found here.
[https://www.researchgate.net/profile/Paolo_Malanima/publications]

Academic Profile by:
Vilelmini G. Psarrianou

Book Reviews



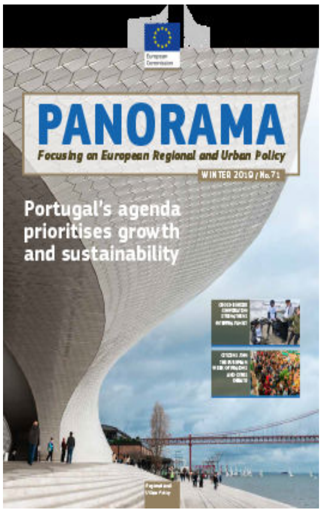
THE DILEMMA OF REGIONAL POLICY

Stilianos Alexiadis

Publisher Palgrave Pivot
Hardcover ISBN 978-3-319-68899-2
eBook ISBN DOI 10.1007/978-3-319-68900-5

This book raises the dilemma of "increasing efficiency" versus "improving equity" and aims to provide a new perspective, by introducing an allocation instrument, offering an approach for solving economic policy dilemmas. The author demonstrates his analytical skills by introducing and elaborating advanced programming tools for compromise policies, based on optimal control models. This study is addressed mainly to lectures (as an additional material) and students in Regional Economics, Development Economics, and especially Mathematical Economics. The analysis and conclusions of this study would be particularly useful to postgraduate students in Regional Economics given that there are very few (if any) textbooks devoted exclusively on policy models and guidelines/principles for the optimal allocation of regional investment. Students will be able to revise the relevant techniques while policy-makers can build strategies and arguments for regional development policies. This book can be used by planners, policy-makers and regional development institutions in the EU. It develops and describes methods of Decision-Making in Regional Planning. The models/methods examined in this book are designed in such a way as they can be easily applied (or extended) and conduct policy experiments.

Book Review by Vilelmini G. PSARRIANOU, RSI J



Panorama 71: Portugal's agenda prioritises growth and sustainability

This issue of Panorama has Portugal at the center of reference. By getting in touch with multiple representative, this issue aims to illustrate the way Portugal creates growth, leading simultaneously to a greener economy and protecting climate change.

Furthermore, the main findings of the recent Strategic Report are presented; this report includes detailed and the most recent information on the implementation of the 2014 – 2020 ESIF programs until the end of 2018. Moreover, the issue takes a detailed look at the projects funded through the European Neighborhood Instrument (ENI) cross-border cooperation programs, and at the recent fi-compass Showcase 2019 for projects supported by ESIF financial instruments.

Its photo pages refer back at the 2019 European Week of Regions and Cities, in many ways the most popular and successful edition to date, and two maps describing European road accessibility are presented.

Finally, The In Your Own Words section features a contribution from Lisbon and the Tagus Valley, and META group speaks about the opportunities represented by equity-based financial instruments. It is also worth to mention that the issue focuses on the voice and opinions of younger people too, via their experiences in the Youth4Regions media program. The project's section visits Czechia, Spain, Hungary, France and Belgium.

(Source: https://ec.europa.eu/regional_policy/en/information/publications/panorama-magazine/2020/panorama-71-portugal-s-agenda-prioritises-growth-and-sustainability)

Book Review by Vilelmini G. PSARRIANOU, RSI J

GUIDELINES

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 articles submitted to be reviewed & published in the journal

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 contact e-mail address 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 a single paragraph, no longer than 250 words. 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, separated by commas

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 separate them by commas. You can find information on the JEL system here: https://www.aeaweb.org/jel/guide/jel.php

1. Introduction

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

2.1. 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”).

2.2. 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”).

2.3. Appendices

The section “Appendices” follows the section “References”.

3. Page formatting

3.1. 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.

3.2. Margins

Top margin: 2,54cm
Bottom margin: 1,5cm
Left and right margins: 3,17cm
Gutter margin: 0cm

3.3. 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.

3.4. 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.

3.5. 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.

3.6. 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.

3.7. 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.

3.8. 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.

3.8.1. 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. <u>Paragraphs</u>

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.

4.1. 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. <u>Figures, images, and tables</u>

5.1. 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.

<u>Figures put together “as they are”, using Office tools, are absolutely inadmissible.</u> 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.**

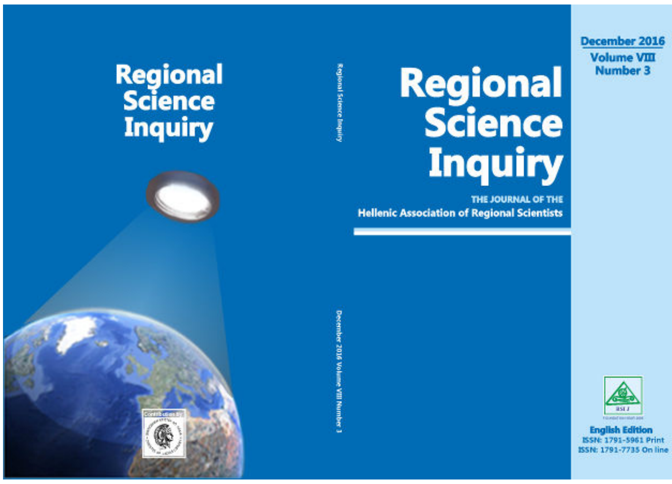
5.1.1. Reference inside the text

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.

5.1.2. 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.

5.2. 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:

$$y = ax^2 + bx + c \tag{1}$$

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 TeX form 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

7.1. 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

7.2. 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.

7.3. 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).

Leiss, Amelia. 1999. “Arms Transfers to Developing Countries, 1945–1968.” Inter-University Consortium for Political and Social Research, Ann Arbor, MI. ICPSR05404-v1. doi:10.3886/ICPSR05404 (accessed February 8, 2011).

Romer, Christina D., and David H. Romer. 2010. “The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks: Dataset.” American Economic Review. http://www.aeaweb.org/articles.php?doi=10.1257/aer.100.3.763 (accessed August 22, 2012).

Ausubel, Lawrence M. 1997. “An Efficient Ascending-Bid Auction for Multiple Objects.” University of Maryland Faculty Working Paper 97–06.

Heidhues, Paul, and Botond Kőszegi. 2005. “The Impact of Consumer Loss Aversion on Pricing.” Centre for Economic Policy Research Discussion Paper 4849.

Zitzewitz, Eric. 2006. “How Widespread Was Late Trading in Mutual Funds?” http://facultygsb.stanford.edu/zitzewitz.