Regional Science Inquiry

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Regional Science Inquiry, Vol. VIII, (1), 2016– Editorial

Labor market, migration and spatial planning are always central points of Regional Science. Especially today, these issues receive a new academic and socio-political value in the light of any regional or global « migration crisis » and the « economic crisis ».

Nur FERIYANTO and Jaka SRIYANA (Universitas Islam Indonesia) dealt with the impact of minimum wage on the labor absorption in Indonesia. Provincial panel data were used. The authors concluded that minimum wage policy across provinces has created unemployment and not a more stable society welfare. Moreover, economic growth has not contributed to the increasing of employment rate in the local economy. The provincial labor absorption was also affected by geographical factors, indicating unbalanced development in the country.

Despina P. DIMELLI (Technical University of Crete) focused on spatial policy issues in Greek islands. How planning of all spatial levels faces the settlements, which assemble an important percentage of population and also face problems as abandonment, accessibility difficulties, and many others, are main questions of the paper. The current paper attempts an integrated consideration of the spatial, demographic and productive characteristics. The author lays emphasis on the need for the creation of a "Settlements observatory" that will record all natural and anthropogenic characteristics which can lead to the formulation of specialized policies, adjusted on the settlements dynamics and the trends of their future development.

Losina PURNASTUTI, Bambang SUPRAYITNO and SUGIHARSONO (Yogyakarta

State University) try to critically examine the role of humn capital investment in the growth, using evidence from Indonesia during the fiscal decentralization era. They investigate the impact of regional government expenditure, workers' education level, and government expenditure for health and education sector on economic growth. They support that the education contributes significantly to the improvement of labor productivity, the population has positive impacts on human development and labor productivity while the total area owned by the local goverment has no effect on both of the two aspects afore-mentioned.

Svetlana RASTVORTSEVA and Inna MANAEVA (Belgorod State National Research University) argue that concentration processes about resources, population, enterprises in some regions and in the cities is very significant for economy and policy-making. the worldwide urbanization trend and local trend of economic activity agglomeration that increase the regional development differentiation within a country. Testing of the Zipf's law for the Russian cities in general shows that it's valid for the small (8,600 – 15,300 peoples) and large cities (66,700 – 331,000 peoples). The result of the study is the confirmation of the hypothesis that the Zipf coefficient depends on the size of the Federal District.

Dimitris KALLIORAS, Maria TSIAPA and Spyridon ZAPANTIS (University of Thessaly) scrutinize the spatial variations of employment change in Greece, employing a trade-adjusted shift-share analysis. The results highlight the negative national effect component as an outcome of the shocks and the upsets that the Greek economy has suffered. The industry mix component and the competitive shift component are positive only for specific regions and sectors. Particularly, for the industry mix component it comes that all Greek regions specialize in sectors that, at the national level, are export-declining and import-declining and experience labor productivity losses.

Amitrajeet BATABYAL (Rochester Institute of Technology) and Hamid BELADI (University of Texas at San Antonio) study the the rescue of destitute migrants seeking to reach Europe on boats across the Mediterranean Sea. They constructed a discrete-time Markov chain model of a stylized rescue process. They specifies the one-step transition probabilities. They delineated a recursive algorithm that can be used to compute the limiting or steady-state probabilities. Then, they used these limiting probabilities to compute the average throughput. This metric tells the long run expected number of migrants that are rescued by the stylized rescue process.

Emily VGENOPOULOU, George ECONOMOU and Pródromos PRODROMÍDIS (Athens University of Economics and Business) explored the evolution of the sectoral

concentration of regional workforces across the EU's 272 NUTS level II territories and 42 territories of associated countries in the wake of the international financial and economic crisis (2009) up to 2013 through the use of location quotients (27.5 thousand computations).

Nunzia CARBONARA and Ilaria GIANNOCCARO (Politecnico di Bari) explored the competitive success of the Industrial Districts, due to their capacity to adapt and evolve to the environment. They considered them as complex adaptive systems (CASs) and identified the ID features on the basis of the main CAS properties that foster adaptation, i.e. interconnectivity, heterogeneity and control. To formulate the theory linking the values of the ID structural features with the ID competitive success, a multiple case study is carried out. They aimed at comparing IDs with different competitive performances in terms of their CAS properties using network theories and measures.

On behalf of the Editorial Board,

Maria Goula
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Articles

LABOR ABSORPTION UNDER MINIMUM WAGE POLICY IN INDONESIA

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Abstract

This study analyzes the impact minimum wage policy and some economic factors on labor absorption in Indonesia. For this purpose, this research used provincial panel data for the period of 2006 to 2013. The study reveals that minimum wage policy across provinces has created unemployment trap in this period. It can be inferred that minimum wage policy failed to support the local economy to better and more stable society welfare. This research also found an unexpected result regarding to the role of economic growth to labor absorption. Economic growth across provinces has not contributed yet to the increasing employment rate in the local economy. Moreover, this finding reveals that provincial labor absorption was also affected by geographical factors. The provinces which are located at the west Indonesia tend to have high empolyment rate. This phenomenon indicates the existence of unbalanced development in the country.

Keywords: wage, employment, policy, investment, economic growth
JEL classification: C21, J23, J30, J31, J38

1. Introduction

The issue of employment is an important problem in developing countries such as Indonesia. Especially in a global market which is growing fast as today, a flexible labor market is needed by some countries to encourage the economy (Rajeev, 2009). Employment serves as a vehicle to put humans in a central position of national economic development. Through its work, the worker derives remuneration in the form of wages and some kind of salaries. In Indonesia, the wage provisions across provinces were referred to the Provincial Minimum Wage (UMP). Wages in all provinces are determined by the government through a minimum wage policy which is expected to be a proper remuneration received by workers. At a higher minimum wage, workers are expected to pay for a better economic and social life. The success of the local government to encourage economic growth is also a good indicator for employment prospects in the province. A high local economic growth will ensure local government in encouraging the entire business sector to increase its ability to absorb labor in each region of the country.

During the past ten years, Indonesia has faced some challenges regarding to the labor force issues. The main issue was a high unemployment rate which spread across all provinces in the country. The domestic labor market has been characterized by turbulence and structural change. These issues were caused by shifts in the industrial and services sectors as well as occupational composition of employment. Labor market conditions in the nation have improved which was followed by some problems regarding to quality of human resources and manpower (Harmadi, Setyonaluri, & Iswandono, 2008).

In the last decade, Indonesia has also experienced a rapid economic growth as well as social change that might affect the dynamic of labor force. However, this fast economic growing was interrupted by a moderate economic and financial crisis in 2008. After experiencing recession and stagnation that caused the slowdown of economy, it is expected that economic growth will rise again to around 5.5 percent in 2010s. In such situation, employment rate in all economic sectors are not enough to accommodate the increasing of

labor supply. Furthermore, labor absorption in formal as well as informal sector tends to decrease.

The structural change of the labor force in the country reflected the character of the structural in the both national and local economies. Labor force growth as well as employment rate is the result of significant changes of economic sectors especially the industrialization process (Harmadi et al., 2008; Squires & Tabor, 2007). In development process, a larger percentage of labor force was dominated by agricultural activities. Meanwhile, most of developed countries are usually characterized by rapid economic growth in which the labor force tends to move from primary sector into the secondary and tertiary sectors. Consequently, the labor force participation will automatically change consistently following these sectors' contribution to the total economy. As a result, these trends make the industrial and services sectors will become the primary economic sector in term of labor absorption.

In fact, the local governments intensively concerned to the labor absorption from a large labor force which always increase yearly in the labor market. As a big issue, unemployment potentially becomes a burden of the development process in the country. This is the main reason of this research to provide an empirical model of labor absorption using provincial data. Therefore, this study considered several factors that may affect the labor absorption in Indonesia.

2. Literature Review

The minimum wage policy is one important government instrument which is basically used for achieving justice and equality rights of workers in order to meet their needs (Mrnjavac & Blazevic, 2014). The effect of minimum wage on employment in a region can be categorized into two types. First, increasing in the minimum wage would reduce employment as businesses become reluctant to use new workers. The research about impact of minimum wage policy on cost was conducted by (Wang & Gunderson, 2012) as well as (König & Möller, 2009). They found a positive relationship between minimum wage and unemployment rate. In addition, some papers observed more significant negative relationship between minimum wage and employment (Kalenkoski & Lacombe, 2008; Partridge & Partridge, 1999). This means that higher minimum wage will reduce labor absorption.

Secondly, the higher in the minimum wage will lead to increase employment. Some papers noted that the effect of minimum wages on employment is positive (Bhorat, Kanbur, & Mayet, 2013; Cuesta, Heras, & Carcedo, 2011; Persky & Baiman, 2010). These studies generally explained that minimum wage might stimulate the economy as a whole. Since wage rate is an important factor for worker, a positive impact of minimum wage on output demand also positive. This mechanism is likely reasonable to business expansion in which the labor demand increases. Finally, employment will improve as the consequence of business expansion.

Related to investments, some studies found that foreign direct investment (FDI) has positive effect on employment. For example, a research conducted in Italy found such phenomenon (Imbriani, Pittiglio, & Reganati, 2011). The preliminary result of this research supports the statement although it still depends on the kind of each sector. Another paper also pointed out that more foreign investment in Belgium caused higher employment in industrial sector (Cuyvers & Soeng, 2011). Not only in developed countries, an employment rate rises as a response of the increase in FDI also emerged in developing countries (Lipsey, Sjöholm, & Sun, 2013).

As well as foreign investment, domestic investment as an investment instrument which comes from domestic source also play an important role to employment although it is still limited number. Most of the papers describe indirect relationship between domestic investment and employment rate (Mohamed, Singh, Singh, & Liew, 2013; Psaltopoulos, Skuras, & Thomson, 2011). Mohamed, Singh, Singh, & Liew, (2013) found the presence of two-way causal relationship between domestic investment and economic growth which potentially lead to increase employment rate. Moreover, for the same reason, positive relationship between FDI and economic growth are examined by Srinivasan, Kalaivani, & Ibrahim, (2011). Consequently, a higher economic growth will bring into more labor

absorption. In addition, Psaltopoulos et al., (2011)found that private investment in southern Europe countries has a positive effect on employment.

Furthermore, the study of linkage between economic growth and employment rate has a various results. (Kareem, 2015) measured the positive impact of economic growth on employment. Increasing in economic growth then indeed create jobs, as well as an increase in employment can accelerate economic growth (Nayyar, 2014). It was also noted by Seyfried, (2014) which states that during the crisis in Spain, the decline in economic growth is characterized by a decline in GDP had an impact on the employment decline.

However, several previous papers studied the determinants of labor absorption in the scope of countries. This study attempts to observe the dynamic of labor absorption regarding to provincial perspective. For this purpose, this research analyzes various factors may affect labor absorption using panel data for all provincial governments in Indonesia. Furthermore, this research develops labor absorption model as a function of several economic and geographical factors as independent variables refers to the previous related literatures. The simple model is proposed as follows:

$$LABOR_{it} = f\,(MW_{it}, FI_{it}, DI_{it}, EG_{it}, D_i) \qquad (1)$$

The dependent variable is poverty rate (LABOR) in each province. Meanwhile, four main independent variables are minimum wage (WE), foreign investment (FI), domestic investment (DI) and economic growth (EG) in the provincial level. These variables are assumed as main important variables that might influence the labor absorption rate. For addition, this paper also observes the effect of location of the provinces which are expressed by two dummy variables. First dummy variable (D1) indicate the impact of different location between west (Java and Sumatera) and east provinces (others), meanwhile the second dummy variable (D2) represents the different impact of provinces which are located at Java and non Java to labor absorption.

3. Research Method

3.1. Data and Variables Measurement

This study analyzes a model of labor absorption and its determinants using data of 33 provinces for the period of 2006-2013 in Indonesia. Labor absorption is defined as a number of labor forces which is absorbed in labor market in each province annually as reported by provincial Statistical Board Office. Four independent variables in the model, namely minimum wage (MW), domestic investment (DI), foreign investment (FI) and economic growth (EG) are explained as follows. The data of these variables are also collected from various edition of the report of Central Statistical Bureau Office.

3.2. Method of Analysis

This research models labor absorption with some economic variables for the annual provincial data. For the analysis process, the model involves a dependent variable (Y) and some observable explanatory variables ($X_1 ... X_n$) for panel data. The panel data regression consists of 33 units and 9 years, and therefore the model has N times T observations. A panel regression model is given by

$$Y_{it} = \beta_{0it} + \beta_1 X_{1it} + ... + \beta_n X_{nit} + \mu_{it} \qquad for\ i = 1, 2, ..., N\ and\ t = 1, 2, ..., T \qquad (1)$$

Y_{it} is the value of Y for the province i and for the time period t; X_{1it} is the value of X_1 for the province i and for the time period t, X_{nit} is the value of X_n for the unit i and for the time period t, and μ_{it} is the error for the unit i and for the time period t. Error term in the panel regression model is decomposed into two components (Baltagi, 2001). First, a component of unobserved factors that varies across units and over time as constant effects which lead to formulate a fixed effects model. Second, the component of all unobserved factors that varies across units and time as random effects through residual which lead to form a random effects

model. The panel regression model assumes that unobservable factors for the unit i and period at t will affect constant at the empirical model.

As widely known, there are three approaches of panel data analysis, namely common, fixed effects and random effects model. A common model is a simplest model which assumes that a set of panel data has no effects based on both different units and time periods. This model states that there is no different intercepts due to individual and timer period effects. In other words, the model is considered applicable for all individuals at every time as well as in the classical linier regression. Furthermore, this model assumes that individual characteristics across unit and time variant do not affect the coefficients estimate.

A second model which is known as fixed effects model assumes that unobservable factors across units and time period of observation can be captured by differences in the constant term. In fixed effects, the estimated model has different intercepts as a result of different units and time periods. Generally, this model is widely preferable because it results different constants for each unit and time period. In other words, the model provides various effects across unit and time period.

The third model is random effects which has different assumptions with two previous models. An important assumption in random effects model is that the unobserved random effects are uncorrelated with the explanatory variables. This factor affects the intercepts through residual as random process. A random effects model covers characteristics of the data based on cross unit and time period through random effects of its error. In this model, the estimation results do not lose degrees of freedom, as is the case in and common and fixed effects.

Since this study attempts to provide an empirical model, it is important to select which the best empirical model is. To find the best empirical model using panel data, several steps of testing procedure should be conducted. Model selection among these three approaches will be conducted using F test and Hausman test. F test is used to choose which a better model between common and fixed effects is. Meanwhile, random effects against fixed effects approach will be selected based on Hausman criterion. A Hausman test is a widely accepted method to select the fixed and random effects for testing to this assumption.

The labor absorption empirical model is estimated using panel data regression using 264 unit data, consists of 33 provinces for the period of 2006-2013. A simple panel regression model is expressed as follows:

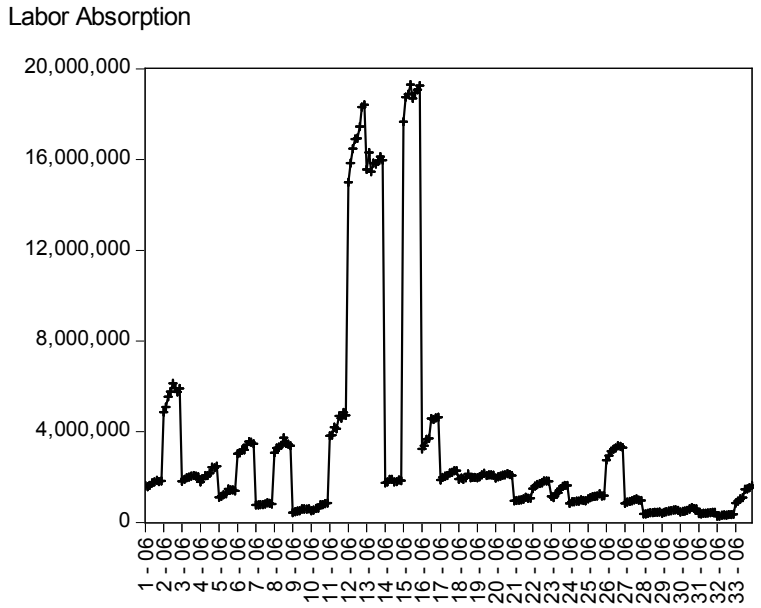
$$LABOR_{it} = \beta_0 + \beta_1 MW_{it} + \beta_2 FI_{it} + \beta_3 DI_{it} + \beta_4 EG_{it} + \beta_5 D_1 + \beta_6 D_2 + \varepsilon_{it} \quad (2)$$

As stated before, LABOR is labor absorption as dependent variable, meanwhile the independent variables are minimum wage (MW), foreign investment (FI) , domestic investment (DI), economic growth (EG) and dummy variables (D1 and D2) which indicates the location of the provinces.

4. Result and Discussion

Indonesia experiences a serious problem with high unemployment rate across provincial for more than a decade. The central and local governments focus on how to improve labor absorption rate in their development programs. Generally, all provinces have been remarkable success in increasing employment rate in the several last years. Figure 1 depicts the labor absorption rate across provinces in the period of 2006-2013. Due to the increasing of labor absorption in all provinces, this period could be considered as the successful episodes of provincial government in reducing unemployment rate. However, it seems a labor absorption disparity between several provinces, especially provinces in Java Island, and others provinces. All provinces in Java Island unless Banten, have a higher labor absorption than others. Average labor absorption in the provinces which is located at the western Island is also higher than that at eastern Island. These are the reasons this study elaborated the location of the provinces in the labor absorption empirical model.

Figure 1. Labor Absorption in all Provinces



Note: 1=Daerah Istimewa Aceh, 2=Sumatera Utara, 3=Sumatera Barat, 4=Riau, 5=Jambi, 6=Sumatera Selatan, 7=Bengkulu, 8=Lampung, 9=Kepulauan Bangka Belitung, 10=Kepulauan Riau, 11=DKI Jakarta, 12=Jawa Barat, 13=Jawa Tengah, 14=DI Yogyakarta, 15=Jawa Timur, 16=Banten, 17=Bali, 18=Nusa Tenggara Barat, 19=Nusa Tenggara Timur, 20=Kalimantan Barat, 21=Kalimantan Tengah, 22=Kalimantan Selatan, 23=Kalimantan Timur, 24=Sulawesi Utara, 25=Sulawesi Tengah, 26=Sulawesi Selatan, 27=Sulawesi Tenggara, 28=Gorontalo, 29=Sulawesi Barat, 30=Maluku, 31=Maluku Utara, 32=Papua Barat, 33=Papua.

Since this paper focus on the labor absorption as an impact of minimum wage policy, it is important to discuss the minimum wage level across provinces. The behaviour of minimum wage rate based on the provincial data fluctuates across provinces (Figure 2). The annual data of minimum wage rate in all provinces tends to increase yearly. DKI Jakarta is province with the highest minimum wage comparing to other provinces, meanwhile Yogyakarta has a lowest wage rate. If these data are matched with labor absorption level presented in Figure 1, it seems that there is not causality relationship between wage rate with and labor absorption. Overall, all provinces experienced with increasing labor absorption and wage rate in this period.

Figure 2. Minimum Wage in all Provinces

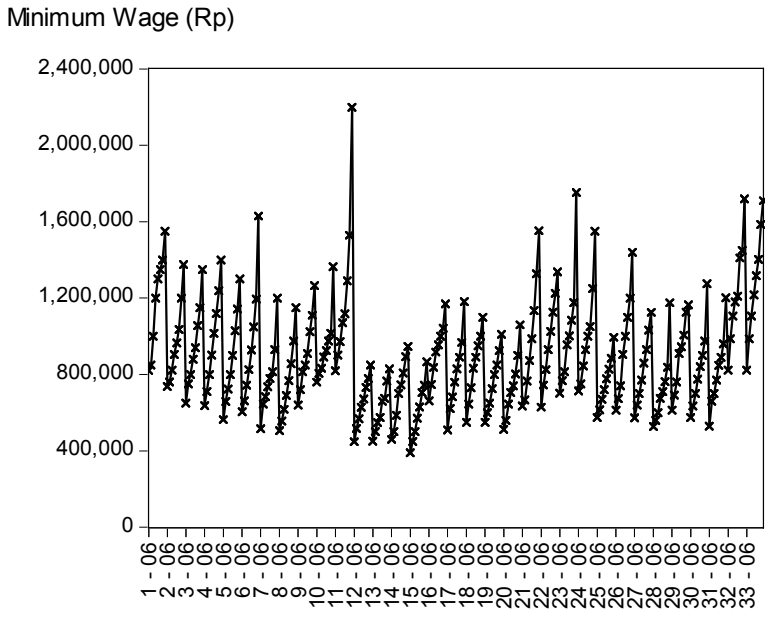


Table 1. Statistical Indicators of Data

Statistic Indicators	Labor (Person)	Minimum Wage (Rp.000)	Domestic Investment (Rp.000)	Foreign Investment (Rp.000)	Economic Growth (%)
Mean	3,190,534	896.409	1,783.3	495.8	6.06
Median	1,774,697	842.500	381.0	71.0	6.05
Maximum	19,305,056	2,200.00	34,849.00	9.928.000	28.47
Minimum	268,117,0	390.00	0	0	-17.14
Std. Dev.	4,630,403	279.976,8	3,598.4	1178.185	3.56
Jarque-Bera	583.2456	74.117	11471.37	6684.001	3720.32
Probability	0.00	0.00	0.00	0.00	0.00
Observations	264	264	264	264	264

This research analyzes a set of panel data consisting 33 provinces for the period of 2006 to 2013. The descriptions of the data using several descriptive statistic indicators are presented at Table 1. An analysis using panel data begins with testing process of model selection among three models of common, fixed effects, and random effects. Table 2 provides a result of statistical testing between common and fixed effects, meanwhile Table 3 presents the selection testing of fixed effects against random effects model. Based on F and Chi-square statistic, it can be inferred that fixed effects model is preferable than common model. Since the fixed effect is more reasonable, the next step is to select whether the model follows fixed effects or random effects model. The result of Hausman test based on chi-square statistic shows that the corresponding effect is statistically significant (Table 3). It means that null hypothesis which states that random effects is true should be rejected. The conclusion of the test is that fixed effects model is appropriate model for this analysis. Finally, further analysis of labor absorption should be conducted based on fixed effects model.

Table 2. Result of Redundant Fixed Effects Tests

Redundant Fixed Effects Tests			
Test cross-section and period fixed effects			
Effects Test	**Statistic**	**d.f.**	**Prob.***
Cross-section F	1781.441	(32,220)	0.0000
Cross-section Chi-square	1468.140	32	0.0000
Period F	3.739	(7,220)	0.0008
Period Chi-square	29.679	7	0.0001
Cross-Section/Period F	1563.095	(39,220)	0.0000
Cross-Section/Period Chi-square	1485.781	39	0.0000

Note: Ho: Common model is true; Ha: Fixed effect is true. * = Ho is rejected at 0.01 significance level, fixed effect is better than common model.

Table 3. Result of Hausman Test: Fixed and Random Effects

Correlated Random Effects - Hausman Test			
Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob. *
Period random	17.404807	4	0.0016

Note: Ho: Random effects is true; Ha: Fixed effects is true. * = Ho is rejected at 0.10 significance level, fixed effects is better than random effects.

Table 4. Estimates Result of Fixed Effects Models

Independent Variables	Without Dummy Variable		With a Dummy Variable		With 2 Dummy Variables	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	10460930	8.954 [a]	8712429.	7.579 [a]	3763499.	5.205 [a]
Minimum Wage	-9.442866	-8.222 [a]	-8.892364	-8.150 [a]	-3.211226	-4.792 [a]
Foreign Investment	767.2921	3.683 [a]	576.1727	2.879 [a]	-306.6501	-1.567
Domestic Investment	604.7333	8.5261 [a]	556.8000	8.230 [a]	492.2190	8.355 [a]
Economic Growth	-44111.10	-0.657	10523.23	0.163	10271.10	0.184
D1	-	-	2284371	5.530 [a]	857859.4	2.155 [b]
D2	-	-	-	-	6062782.	9.342 [a]
Adjusted R^2	0.506287		0.559918		0.647013	
F statistic	23.492 [a]		26.612 [a]		78.512 [a]	

Note: [a], [b] = significant at 0.10 and 0.05 significance level respectively.

The empirical results of fixed effects are presented in Table 4. This study estimates three empirical models to observe the role of the location of the provinces to the labor absorption. The estimation confirms that all independent variables are individually significant for three empirical models except economic growth. The models also give high F statistic and coefficient of determination which indicate that the estimation method is valid. For addition, this analysis also involves two dummy variables which indicate the location of the provinces as explained in the previous section. As theoretically expected, minimum wage is negatively significant. Meanwhile foreign investment and domestic investment have strong positive correlation with labor absorption. The economic growth variable in all three models model are not significant indicating that economic growth has not created employment yet across provinces in Indonesia.

4.1. Minimum wage and unemployment trap

This section discusses to main issue of this research that is the role of minimum wage policy to the labor absorption. Regarding with interpretation of the empirical analysis of labor absorption rate is based on the fixed effects model. The model has positive intercept which indicates the average of labor absorption in all provinces. It means that high rate of labor absorption across provinces have positive correlation with increasing of investment but it has negative relation with minimum wage. A higher wage rate then leads to cause lower labor absorption.

As mentioned in previous papers, minimum wage policy may cause positive or negative effect to labor absorption. In other words, the relationship between these variables is debatable (Cuesta et al., 2011). Basically, wage rate is one of several important variables in determining the demand of labor. The minimum wage policy reflects the government mission to protect the worker in the labor market. It is expected that minimum wage will improve the welfare of the workers and encourage the local economy (Mrnjavac & Blazevic, 2014). However, this evidence does not support this preposition. In contrast the minimum wage has negative impact to the labor absorption which indicates increasing wage rate causes higher unemployment (Bashir & Kadiri, 2012).

Since this study results negative correlation between minimum wage and labor absorption, it seems consistent with some previous researches (Kalenkoski & Lacombe, 2008; König & Möller, 2009; Wang & Gunderson, 2012). The papers mentioned that minimum wage contributes to employment decrease in several countries. In fact, our study finds a coefficient of minimum wage to labor absorption is -3.211226. It implies an increase of a hundred thousand rupiah of minimum wage leads to decrease in labor absorption amount to 321,123 persons. This finding is reasonable where the higher wage will probably increase production cost. The phenomenon indicates a serious problem regarding with unemployment issue in

Indonesia. Moreover, negative effect of minimum wage policy to labor absorption might cause an unemployment trap in the country.

4.2. Misguided economic growth and employment decreasing

A contradictive result regarding to the low effect of economic growth on labor absorption is found in this analysis. Economic growth as an important economic indicator in local economy did not affect labor absorption. Based on this result, it can be inferred that such relationship may runs in two ways. First, it indicates increasing economic growth was dominated by consumption, meanwhile other factors including labor absorption is stable. Second, it could also be inferred that economic growth across provinces might affect business activities which does not encourage employment rate. This second reason is more rational and acceptable since employment mainly is provided in the private sectors.

In this study, gross domestic regional product as a measurement of economic growth fails to stimulate local economy as well as employment rate. This finding implies that economic growth in local level has not reduced number of poor people yet. In other word, local economic growth potentially misguides the local economy to the unemployment trap as well as minimum wage policy does. It means that local economic growth has not played important role yet to improve social welfare across provinces in the country. This result is not in line with Kareem, (2015) who found a strong positive correlation between economic growth and employment.

Further discussion, this study also demonstrates a positive relationship between both domestic and foreign investment to unemployment reduction as well as noted by Imbriani et al., (2011). Since the local investment was limited, the rising of investment that might come from central government and other countries lead to bring the local economy expand to higher scale (Lipsey et al., 2013; Squires & Tabor, 2007). In addition, due to the low fiscal capacity in the local government, investment growth in Indonesia was generally dominated by private sector. In this case, private investors have participated to boost developing local economy to a better quality of life of society. This result suggests the government policy imposes some policies relating to the investment growth. Local governments should improve their public investment for providing public infrastructure as well as encouraging the private investment. This result points out that private sectors have contributed well to reduce unemployment rate in Indonesia.

4.3. Unbalanced spatial development

The second model which is added with a dummy variable as attribute of western and eastern provinces indicates that west provinces absorb more labor than east provinces. This result confirms the hypothesis of unbalance development in Indonesia. The last model which has two dummy variables informs that these variables are significant. From this result, we can conclude that unbalance development is not only between west and east provinces, but also between Java and outside of Java provinces. This analysis notes that location has important role to the employment rate which could be inferred as a result of development process in the local level (Kalenkoski & Lacombe, 2008). Some possible factors may be addressed why west provinces record more labor absorption than that in east provinces. These are investment growth, public facilities, number of human resources, financial assessment and other social and economic factors.

As a final point, regarding with labor absorption analysis, minimum wage policy and spatial factor play important role to the employment rate. The empirical models are able to explain the determinants of labor absorption across provinces in Indonesia. For addition, the empirical estimation using fixed effects model also provides variation effects of its intercept due to cross section and time period. Figure 3 presents empirical estimates which contain heterogeneity effects due to cross section unit. All provinces which are located at Java Island have higher effects than others. Meanwhile Jawa Timur has highest effects which mean this province recorded highest autonomous labor absorption. Figure 4 depicts the volatility of the heterogeneity effects of labor absorption caused by time variant. Overall, more than 80% provinces in Indonesia have negative cross effects. It means these provinces recorded lower employment rate than its average in all provinces. This figure describes the difference of labor

absorption level between the year of 2006 and 2013. As noted that 2009 is the cutting point of the time variant effect of unobservable factor into intercept. Furthermore, the average of labor absorption across provinces tends to achieve at a higher rate after this year.

Figure 3. Cross Effects of Labor Absorption across Provinces

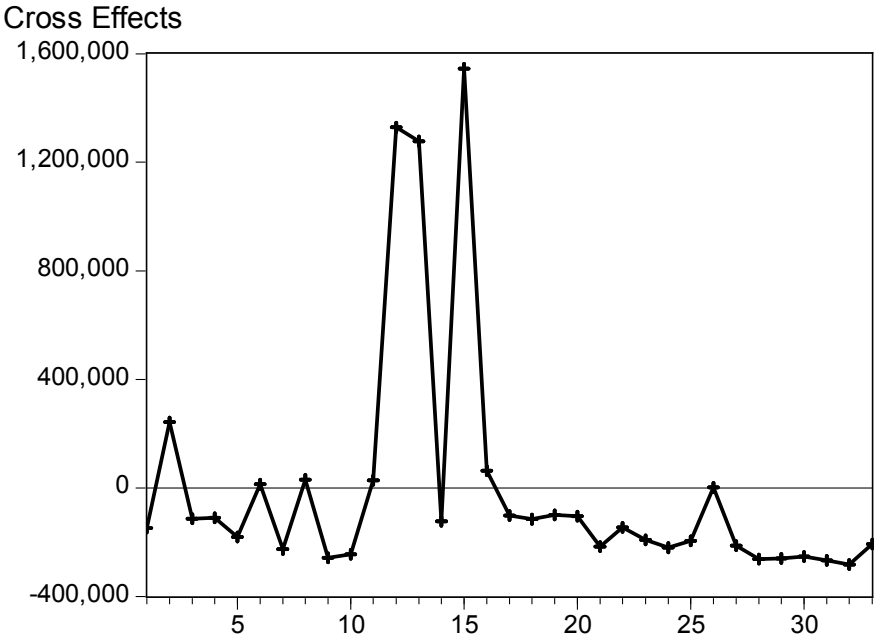
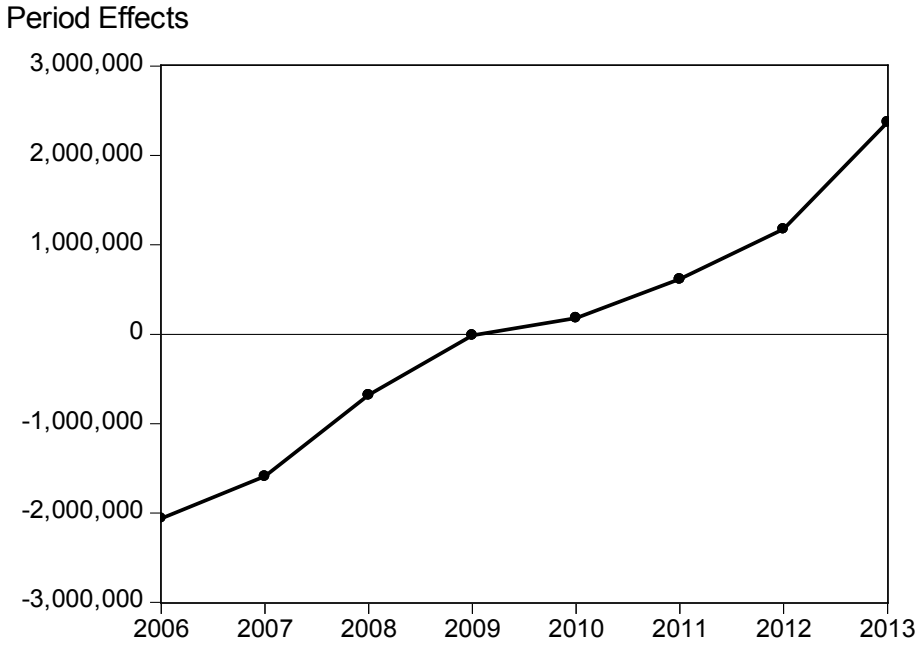


Figure 4. Period Effects in 2006-2013 of Labor Absorption



5. Conclusion

This study highlights the relationship between minimum wage and labor absorption across provinces in Indonesia. The empirical model using panel data analysis provides important result regarding with the role of wage minimum policy to labor absorption. This research found that minimum wage has negative effect to labor absorption across provinces. Other economic variables, these are domestic and foreign investment contribute positive role to employment rate. Unexpected result was recorded due to the insignificant impact of economic growth to the labor absorption. In addition, spatial factor which is characterized by location of provinces also has significant effect to the employment rate across provinces. It

concludes an unbalance development between west and east provinces as well as between Java and outside of Java provinces.

Some specific findings in this research reveal the weaknesses of economic policies in the country. Basically, minimum wage policy in Indonesia aims to protect the worker from the poverty challenge. However, this policy has brought the local economy on serious unemployment trap at the last decade. In addition, local economic growth could not reduce unemployment rate. Moreover, this study also reveals the existing spatial unbalanced development caused by geographical factors. Labor absorption at west Indonesia was higher than that at the eastern provinces. Some provinces at the Java Island also recorded more employment rate than other provinces did.

This research attempts to recommend central government to improve labor absorption in the local economy through some policies. In other hand, provincial governments need to emphasize some programmes on reducing unemployment. Some key elements might be mentioned in policy planning related to increase employment rate: (a) Increasing domestic and foreign investment relating to more productive economic projects; (b) Encouraging local government investment through increasing the local fiscal capacity; (c) Empowering human resources through some training and skill development programmes; (d) Improving the quality of local economic growth considering to absorb more labor force at the local economy.

References

Baltagi, B. . (2001). Econometric analysis of panel data (2nd ed.). England: John Wiley & Son.

Bashir, M. A., & Kadiri, I. B. (2012). Micro Economic Effects of Minimum Wage Regimes and Employment in Nigeria : the Case of the Manufacturing Industry. Arabian Journal of Business and Management Review, 1(12), 16–25.

Bhorat, H., Kanbur, R., & Mayet, N. (2013). The impact of sectoral minimum wage laws on employment, wages, and hours of work in South Africa. IZA Journal of Labor & Development, 2(1), 1. doi:10.1186/2193-9020-2-1

Cuesta, M. B., Heras, R. L., & Carcedo, J. M. (2011). Minimum Wage and Youth Employment Rates, 2000-2008. Revista de Economía Aplicada, XIX, 35–57.

Cuyvers, L., & Soeng, R. (2011). The effects of Belgian outward direct investment in European high-wage and low-wage countries on employment in Belgium. International Journal of Manpower, 32(3), 300–312. doi:10.1108/01437721111136778

Harmadi, S. H. B., Setyonaluri, D., & Iswandono, I. (2008). Labor Mobility and Length of Working Life in Indonesia. In International Conference on Applied Economics-ICOAE (pp. 343–354). Katoria, Greece: Department of International Trade, Technological Education Institute of Western Macedonia, Greece.

Imbriani, C., Pittiglio, R., & Reganati, F. (2011). Outward Foreign Direct Investment and Domestic Performance: The Italian Manufacturing and Services Sectors. Atlantic Economic Journal, 39, 369–381. doi:10.1007/s11293-011-9285-z

Kalenkoski, C. M., & Lacombe, D. J. (2008). Effects of minimum wages on youth employment: The importance of accounting for spatial correlation. Journal of Labor Research, 29, 303–317. doi:10.1007/s12122-007-9038-6

Kareem, R. O. (2015). Employment Level and Economic Growth of Nigeria. Journal of Sustainable Development Studies, 8(1), 53–70.

König, M., & Möller, J. (2009). Impacts of minimum wages: a microdata analysis for the German construction sector. International Journal of Manpower, 30(7), 716–741. doi:10.1108/01437720910997362

Lipsey, R. E., Sjöholm, F., & Sun, J. (2013). Foreign Ownership and Employment Growth in a Developing Country. Journal of Development Studies, 49(8), 1133–1147. doi:10.1080/00220388.2013.794264

Mohamed, M. R., Singh, K., Singh, J., & Liew, C. (2013). Impact of Foreign Direct Investment & Domestic Investment on Economic Growth of Malaysia. Malaysia Journal of Economic Studies, 50(1), 21–36.

Mrnjavac, Z., & Blazevic, S. (2014). Is minimum wage a good policy for poor workers in Croatia? Management, 19(1), 17–44.

Nayyar, D. (2014). Why employment matters: Reviving growth and reducing inequality. International Labour Review, 153(3), 351–364. doi:10.1111/j.1564-913X.2014.00208.x

Partridge, M. D., & Partridge, J. S. (1999). Do minimum wage hikes reduce employment? State-level evidence from the low-wage retail sector. Journal of Labor Research, 20(3), 393–413. doi:10.1007/s12122-999-1007-9

Persky, J., & Baiman, R. (2010). Do State Minimum Wage Laws Reduce Employment ? Mixed Messages from Fast Food Outlets in Illinois and Indiana, 40(2), 132–142.

Psaltopoulos, D., Skuras, D., & Thomson, K. (2011). Employment effects of private investment initiatives in rural areas of southern Europe: a regional SAM approach. Agricultural Economics Review, 12(2), 50–61.

Rajeev, M. (2009). Globalisation and labour market flexibility: a study of contractual employment in India. International Journal of Development Issues, 8(2), 168–183. doi:10.1108/14468950910997701

Seyfried, W. (2014). Examining The Employment Intensity Of Economic Growth Of The PIIGS. International Business & Economics Research Journal, 13(3), 593–599.

Squires, D., & Tabor, S. (2007). the Absorption of Labor in Indonesian Agriculture. The Developing Economies, 32(2), 167–187. doi:10.1111/j.1746-1049.1994.tb00047.x

Srinivasan, P., Kalaivani, M., & Ibrahim, P. (2011). An empirical investigation of foreign direct investment and economic growth in SAARC nations. Journal of Asia Business Studies, 5(2), 232–248. doi:10.1108/15587891111152366

Wang, J., & Gunderson, M. (2012). Minimum wage effects on employment and wages: dif-in-dif estimates from eastern China. International Journal of Manpower, 33(8), 860–876. doi:10.1108/01437721211280353

PLANNING SETTLEMENTS IN THE GREEK ISLANDS

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Abstract

The reason for the current paper was the concern about the way spatial planning confronts the settlements in Greece. As spatial policies mainly focus in the urban centers and the problems that these present, the question that was placed was how planning of all spatial levels faces the settlements, which assemble an important percentage of population and also face problems as abandonment, accessibility difficulties, and many others. The current paper attempts initially a recording of the spatial, demographic and productive characteristics of the Islander Greek settlements. In the second phase it examines the tools for the Greek islander settlements Regional and Urban Planning with the use of case studies, in order to evaluate planning's ability to solve the problems these areas face. Through the research it is concluded the need for the creation of a "Settlements observatory" that will record all natural and anthropogenic characteristics which can lead to the formulation of specialized policies, adjusted on the settlements dynamics and the trends of their future development. The paper concludes that a specialized approach based on the use of specialized indicators is necessary; in order to plan areal units that require specified policies.

Keywords: islander settlements, spatial planning, Greek settlements
JEL classification:

1. Introduction

Most of the world's population lives in a variety of settlements that are rapidly changing. These constant population changes in the Greek urban centers and the abandonment of small settlements have led to the unbalanced development of the Greek territory. The mutation of the country's economic base is the basic factor for this phenomenon. The collapse of the primary and the secondary sector and the simultaneous gigantism of the tertiary sector, especially tourism, changed the map of the Greek population's distribution.

More specifically the development of tourism infrastructures in the coastal areas has exploited the coastal small settlements while the settlements of the hinterlands are abandoned as the traditional economic activities of primary sector decline. These changes in the productive sectors have led to the islander areas uneven development as coastal areas are expanding shaping zones of coastal built areas, occupying agricultural, forest and preserved e.tc. areas while in the hinterlands "ghost" settlements are remaining unpopulated, reminding that once they were the base of the Greek economy.

For the development of the settlements the spatial planning is a determinant factor. The regional and urban plans that have been applied during the past decades have not managed to propose policies for the settlements that will designate their characteristics and use them as a tool for their development.

The current paper is structured by two sections. In the first section it presents and analyses the demographic characteristics of the small Greek settlements. In the second section with the use of case studies it focuses on the tools for settlements spatial planning and it points out the need for the formulation of specified policies that can be applied for these areas development.

2. Methodology and data

The research will use the following methodology. Initially it will examine the definitions of the settlements, the causes for their population changes in Greece. Then it will focus on the islander settlements their corresponding characteristics and additionally it will examine the land uses changes in their wider regions. In the next section it will examine the existing

legislative framework for their spatial planning, in Urban and Regional level and it will evaluate the weaknesses that make their planning ineffective.

3. Settlements definitions and categories

The criteria used to specify what settlements are, vary widely from country to country so it is not possible to give a single definition. However the main principles for the definition of an area are population's size, urban characteristics as types of areas, predominant economic activities as manufacturing and services or an administrative function. However, most censuses combine these four aspects. So, the most common classification is the distinction in rural, urban and semi-urban settlements

For the current paper initially it is necessary to define what settlements are, according to the Greek classification of urban areas. The criterion of the Hellenic Statistical Authority is mainly the recorded population, so it defines as settlements the urban areas that are inhabited by less than 2.000 residents.

According to the 181/D/1985[1] decree the settlements are divided in the following categories according to each recent census:

1. Small sized settlements: had less than 200 residents or less than 100 buildings.
2. Middle sized settlements: had population that varied between 201 and 1.000 residents or more than 100 and less than 500 buildings.

- Big sized settlements: had population between 1.001and 2.000 residents.

According to the 81/645 EU Directive[2] the settlements according to the geomorphologic characteristics of the areas where they are allocated are classified in:

- Lowland settlements (Fig. 1). These settlements are in areas where altitude is lower than 800 meters.
- Semi-mountainous settlements. These settlements are either in the mountains foothills, or their area is shared by about the half in the valley, and the other half in the mountain, but in both cases the settlements biggest part is below 800 meters altitude.
- Mountainous settlements (Fig. 2). These settlements are in areas that are sloping and uneven, divided by ravines and covered by steep mountains. As mountainous are also defined the settlements that are allocated in a higher than 800 meters altitude.

Fig.1 Moutsouna settlement, Naxos

Fig. 2 Faraklata settlement Cephalonia

Source Google Earth

[1] This Decree about settlements defines the ways for the definition of their borders and their building restrictions.

[2] It concerns the Community list of less-favored farming areas within the meaning of Directive 75/268/EEC (Greece)

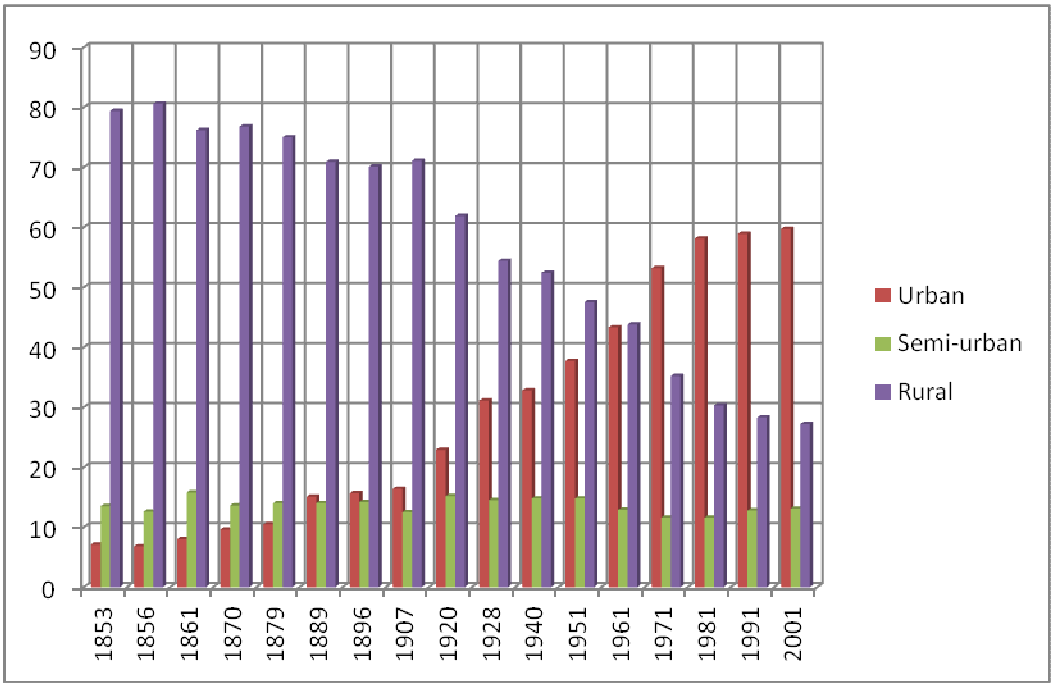
4. The changes in the Greek territory.

The rapid change of rural areas during the 20th century is defined by the decline of the traditional rural economic activities. Since the establishment of the Greek state, social, political and economic changes shaped the country's spatial status. The rural areas that are characterized by low population densities, primary industries and small settlements (Garrett, 2007) were the base for the development of the new country since its proclamation in 1833. The initial rural character of the Greek population gradually mutated into urban. This phenomenon was caused by population movements from settlements towards the cities with different rates, which depended on the prevailing conditions. The desire for a new life in the city that was combined with the dream for better living conditions, through the employment in tertiary sectors that were rapidly developing in the urban centers, led to the settlements abandonment and the urban centers gigantism.

It is characteristic that during the 1920-40 period the urbanization trends were significantly burdened (urban population is the 33% of the total), while during the Second World War and the Civilian War, urbanization increased. So, in 1951, 38% of the total recorded population lived in the cities (Kotzamanis, 2009). The next thirty years were characterized by the huge tend for internal and external immigration/urbanization.

So, in 1863 the 79,4% of the total recorded population was rural, while in 2001 the rural population of Greece was 28,6% of the total recorded population (Fig. 3).

Fig. 3: The population of Greece according to the degree of urbanity (%) (V. Kotzamanis)



5. The characteristics of settlements population.

The geomorphology of Greece that is characterized by the combination of mountainous and islander areas has led to population's dispersion in many different regions. The population's distribution in different sized urban areas is shown in Figure 4. The majority of residents are recorded in the 12.292 Greek settlements where 28,6% of the total recorded population is concentrated (Fig.4 & Table 1).

Fig. 4: The population's distribution in different sized urban areas. (Hellenic Statistical Authority, 2001 census)

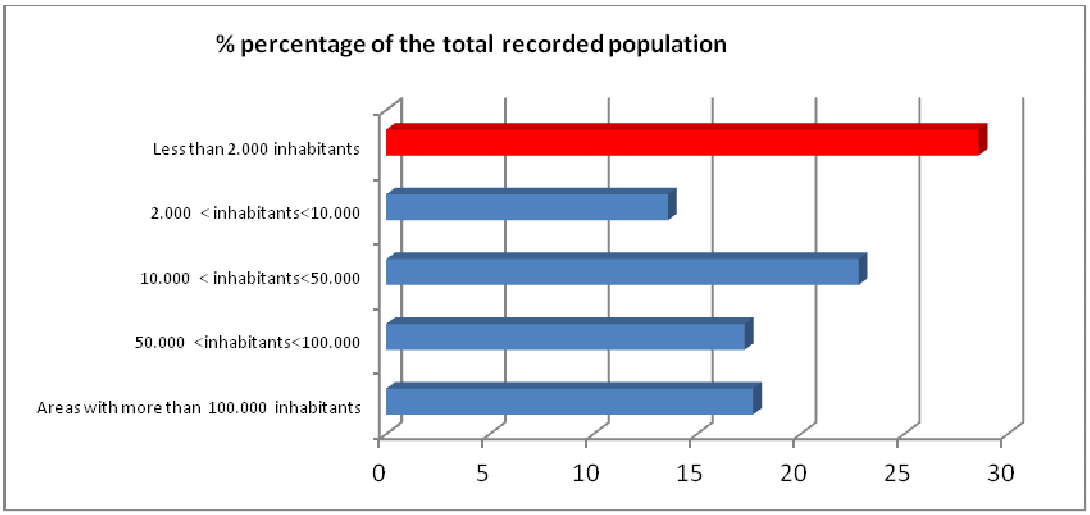


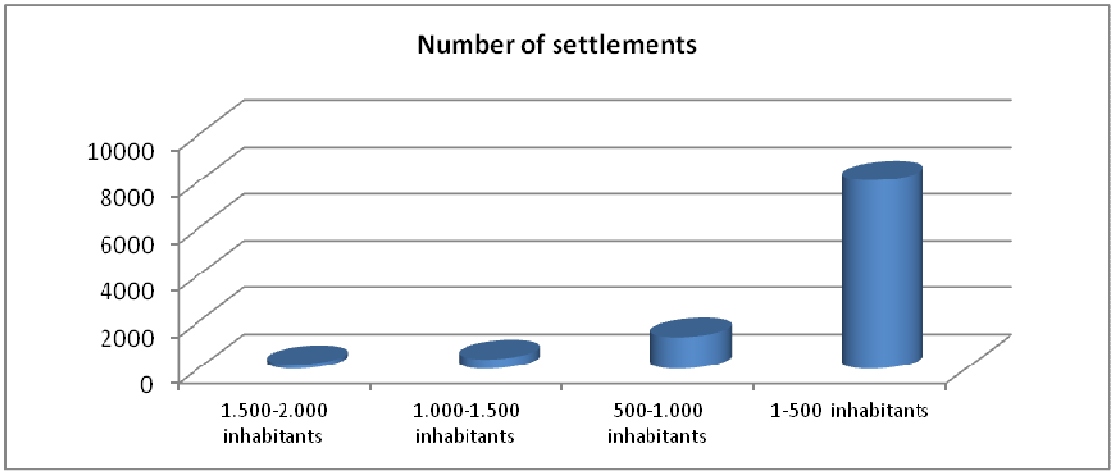
Table 1: Classification and distribution of population in Greek urban areas.

Inhabitants	Number of settlements	% percentage of the total recorded population
Areas with more than 100.000 inhabitants	8	17,7
50.000 <**inhabitants**<100.000	28	17,3
10.000 < **inhabitants**<50.000	108	22,8
2.000 < **inhabitants**<10.000	383	13,6
Less than 2.000 inhabitants	12.292	28,6

Source: Hellenic Statistical Authority, 2001 census.

A more detailed investigation shows that 81% of the recorded settlements are inhabited by less than 500 residents while their average population size in 174 people (Figure 5 & Table 2).

Fig.5: The inhabitants' distribution in different sized settlements.



Source: Hellenic Statistical Authority, 2001 census.

Table 2: Classification of settlements according to their recorded population

Inhabitants	Number of settlements	Average population	Population's total
1.500-2.000 inhabitants	173	1.730	154.255
1.000-1.500 inhabitants	411	1.208	376.674
500-1.000 inhabitants	1355	690	835.089
1-500 inhabitants	8072	174	1.404.575

Source: Hellenic Statistical Authority, 2001 census.

As for the areal distribution of the settlements, their majority is allocated in the continental regions, while in the islander regions 35% of the recorded settlements are allocated (fig. 6).

Fig. 6: The areal distribution of settlements in the Greek territory Source: (Dimelli ,2001)

For the investigation of the population's composition the research will use the following demographic indicators (Gousios, 1999): Ageing ratio (A.r.)[3], Child ratio (C.r.)[4] and Age dependency ratio (A.d.r)[5]:

From the records of the 1991 census, results that 2.790.198 inhabitants were living in the Greek settlements. The ageing ratio indicator was 19,3%, the child ratio indicator was 17,5% and the age dependency ratio indicator was 36,8%. A more detailed research shows that in 1991 the mountainous settlements were inhabited by 558.930 people, while the lowland and the semi-mountainous settlements were inhabited by 2.231.268 people. The indicators examination reveals that in the mountainous settlements people aged over 65 were more than the corresponding of the lowland and the semi-mountainous settlements.

In 2001, the settlements population reduced in 2.779.593 inhabitants (0,4% decrease). This decrease was not uniformly distributed, as in the mountainous settlements the recorded reduction amounted to 3% (from 558.793 inhabitants in 1991 to 541.172 in 2001). A more detailed investigation shows that in the mountainous settlements population's reduction is more intense as almost 45,6% had less inhabitants in 2001 compared with 1991. The ageing ratio indicator amounts to 22, 2% (the corresponding of 1991 was 19,3) the child ratio indicator was 17,5% (the corresponding of 1991 was 17,5) and the age dependency ratio 34, 1% (the corresponding of 1991 was 36,8,3). It is characteristic that in most cases the population's decrease varied from 10 to 250 inhabitants. Since most of the settlements were

[3] $$A.r. = \frac{\text{Number of people aged 65 and over}}{\text{Total population}} \times 100$$

[4] $$C.r. = \frac{\text{Number of people aged 0-14}}{\text{Total population}} \times 100$$

[5] $$A.d.r. = \frac{\text{Number of people aged 65 and over}}{\text{Number of people aged 15-64}} \times 100$$

inhabited by less than 500 residents this reduction is recorded as intense (Table 3). It is also interesting that 30% of the recorded settlements have increased their inhabitants, leading to a balance between the recorded population changes.

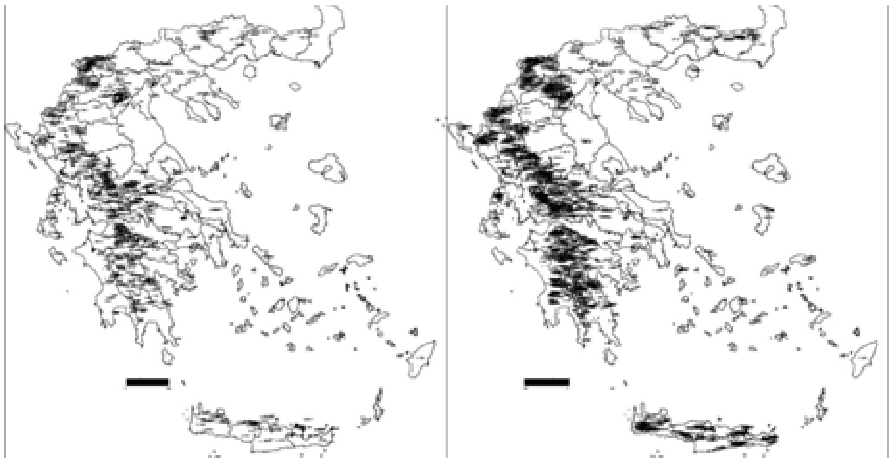
Table 3. The settlements population changes according to their altitude

Population change	Number of settlements	Lowland and semi-mountainous settlements	Mountainous settlements
Reduction			
-3.215 -1.000	4	1	3
-999 έως -500	18	12	6
-499 έως -250	70	52	18
-249 έως -10	4.448	3.306	1.142
-9 έως -1	1.940	1.419	521
No change	216	157	59
Increase			
1 έως 9	1.749	1.447	302
10 έως 249	3.695	3.254	441
250 έως 499	186	179	7
500 έως 999	35	31	4
1.000 έως 1.506	5	4	1

Source: Dimelli (2011)

The investigation of the population changes phenomenon according to the settlements spatial characteristics shows that there is not a certain area where intense changes were recorded, as changes were uniformly dispersed in the Greek territory (Fig.7). It is remarkable that in most of the cases a settlement that "loses" population is close to another that "gathers" more residents.

Fig. 7. The population changes of the Greek small settlements, (Dimelli, 2011)



Settlements with population increase Settlements with population decrease

6. The islander settlements

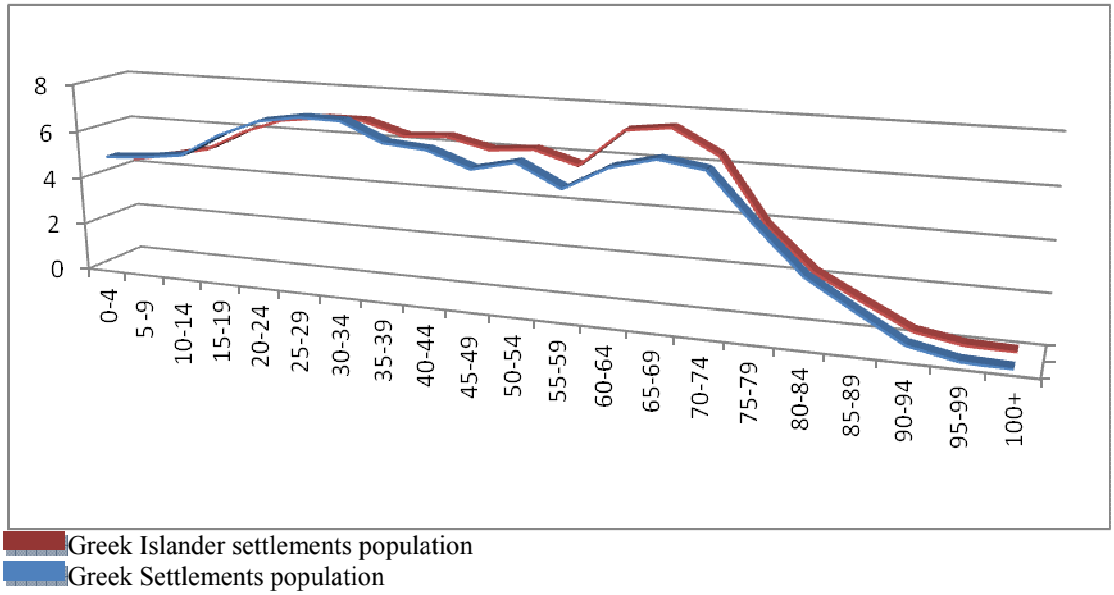
The Greek islands (Figure 8) present geomorphologic variety. The difficulties in their accessibility that is intensified during the winter period and the touristic exploitation during the rest seasons have in many cases depleted their resources capacity.

Fig. 8-The Greek islands

Dimelli, 2011

In the 227 inhabited Greek islands, 3.188 settlements are recorded (26% of the settlements total). These islander settlements according to the 2011 census were inhabited by 653.009 residents. The age composition of the islander settlements population is presented in Figure 9 and Table 4. The ageing ratio indicator was 23,4%, the child ratio indicator was 18,6% and the age dependency ratio indicator was 39,5%.

Fig.9. The population's age composition in all Greek and in the islander Greek settlements



AGES	Number of Islander Settlements Inhabitants	Percentage of Islander Settlements Inhabitants	Number of all Settlements Inhabitants	Percentage of all Settlements Inhabitants
0-4	31.787	4.87	137.530	4.39
5 -9	32.587	4.99	147.818	4.71
10-14	34.052	5.21	159.765	5.10
15-19	40.429	6.19	187.478	5.98
20-24	44.989	6.89	206.868	6.60
25-29	46.852	7.17	213.462	6.81
30-34	46.690	7.15	213.930	6.82

AGES	Number of Islander Settlements Inhabitants	Percentage of Islander Settlements Inhabitants	Number of all Settlements Inhabitants	Percentage of all Settlements Inhabitants
35-39	41.716	6.39	197.719	6.31
40-44	40.820	6.25	201.386	6.42
45-49	36.706	5.62	188.514	6.01
50-54	39.405	6.03	193.338	6.17
55-59	33.573	5.14	177.323	5.66
60-64	39.971	6.12	225.354	7.19
65-69	42.961	6.58	232.474	7.41
70-74	41.202	6.31	202.609	6.46
75-79	28.562	4.37	122.942	3.92
80-84	17.132	2.62	71.216	2.27
85-89	9.979	1.53	41.102	1.31
90-94	3.016	0.46	11.954	0.38
95-99	524	0.08	2210	0.07
100+	138	0.02	686	0.02

Source: Hellenic Statistical Authority, 2001 census.

So the islander settlements have less young citizens, while the fact that their population aged above 65 years is more than the average recorded in the settlements total, shows that policies should focus on populations' restraint, the detailed planning of infrastructures for certain needs and the creation of opportunities that will appeal inhabitants of certain ages which can offer in certain sectors and contribute to the revival of traditional sectors.

7. Land uses changes in the settlements wider areas.

The islander areas face pressures as the Greek Regional and Urban legislation are characterized by many uncertainties. The coastal areas are a conductive field for tourism exploitation while the abandoned hinterlands are threatened by the arbitrary activities of primary sector as overgraze. Recent maps show that the forest areas of the islands are less, compared with the corresponding areas of the rest of the country. This fact is caused by intense urban sprawl that results by arbitrary constructions and the few existing restrictions regarding building in non-urban areas. The basic problems of the islander settlements wider regions are the following:

7.1. Urban sprawl

Mediterranean urban areas, are characterized by dispersed and horizontal forms rather at the expense of farming and forested areas (Plan Bleu and Centre d'Activit´es Regionales, 2001b). The societies are highly depending on the use of private automobile, which combined with the lack of planning and controlling mechanisms explain the status of today's urban landscapes (Cagmani and Gibelli, 2002).The arbitrary and non-planned constructions are common phenomena in Greece since the 19th century. This fact combined with the absence of controlling mechanisms and the constant urban areas expansion, legalize and encourage the intense urban sprawl. So every peri-urban area can easily mutate to urban with very few restrictions.

This way for the past decades the Greek urban tissue is expanding beyond its limits, against protected areas, forests and coastal zones. A main way of development is the ribbon sprawl at the coastal sides of main roads that connect the islander centers with the settlements (Fig. 10).

Fig. 10: Urban sprawl lengthwise main axes at the limit of the Chania city (Google Earth)

The urban sprawl phenomenon, that is synonymous with the dispersed non-planned construction is characterized by the mixture of low-density areas in the cities purviews, is common in the Greek islands with a frequency that varies in relation to tourism demand, the existence of large infrastructure and other parameters. From the examination of the urban sprawl intensity in Greece (Fig. 11) it results that in the islands intense and very intense urban sprawl are recorded while in the only islander areas where low sprawl is recorded this happens because they are already congested from the construction activities that took place during the past decades so today they are considered as saturated.

Another issue is that urban sprawl deteriorates the traditional settlements that are in most cases characterized by high density constructions and labyrinthine road networks, as the new sprawled buildings don't follow the traditional urban forms (Fig. 12)

Fig. 11: Urban sprawl in the Greek counties in 2010. (Minetos 2010)

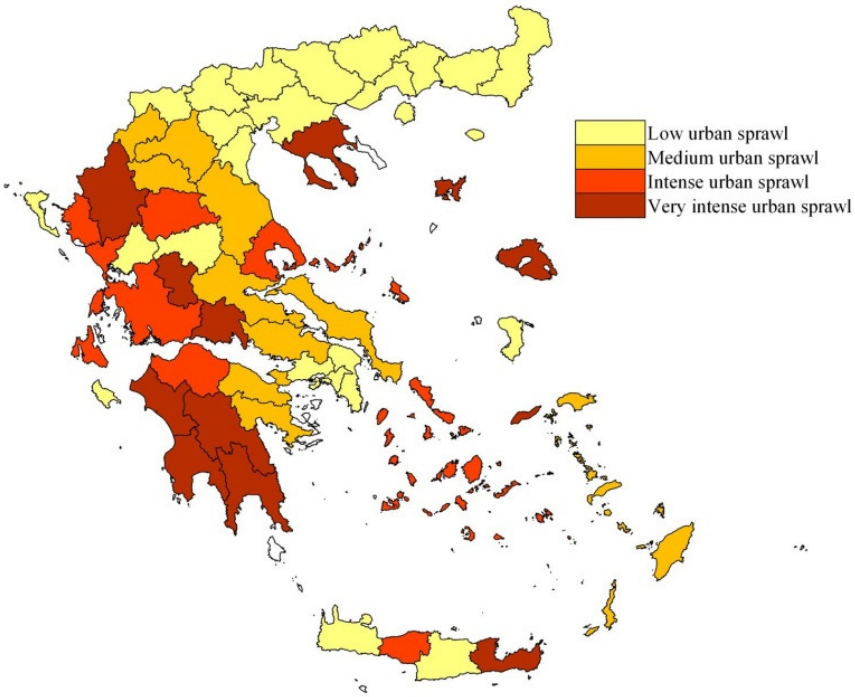
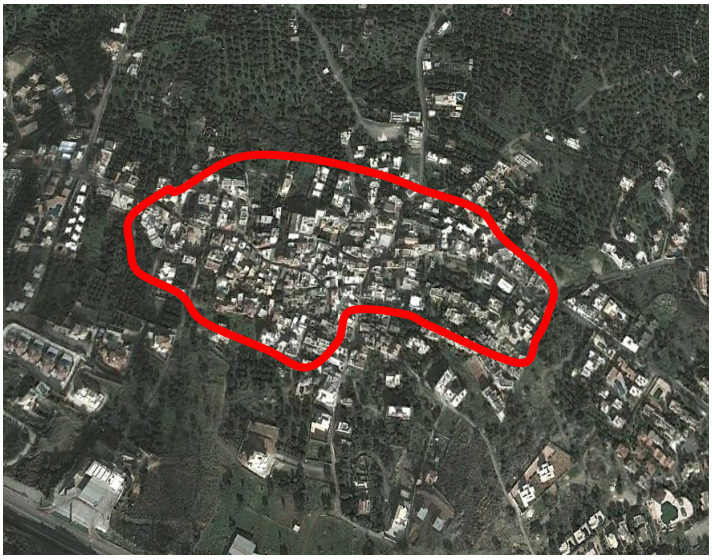


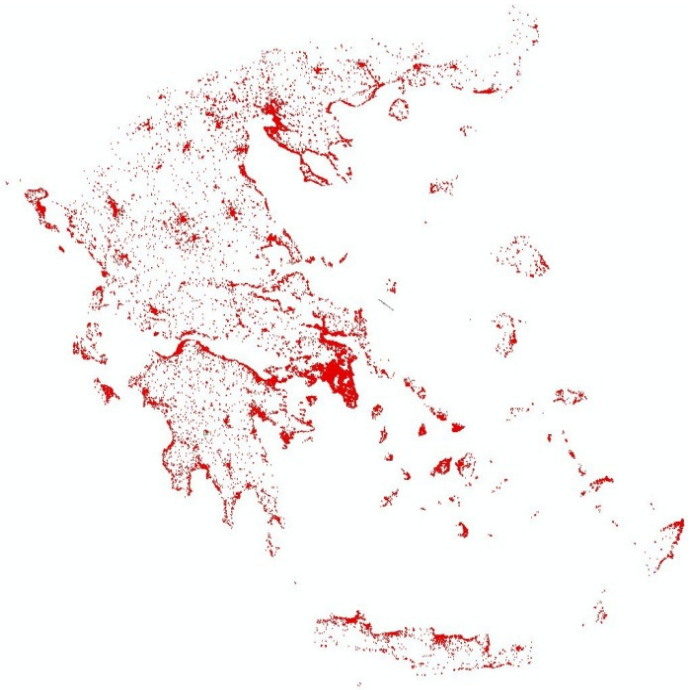
Fig. 12: Koutouloufari traditional settlement –The dense traditional core and the new sprawled areas(Google Earth)



7.2. Arbitrary construction.

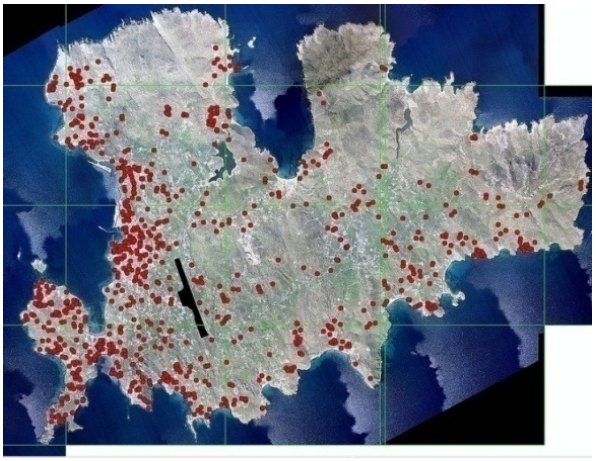
Arbitrary construction is not exclusively a Greek phenomenon. Initially it was a way for the coverage of the refugees and the low income class housing demands as it was a cheap way of building. Today, most of the Greek arbitrary constructions are luxury buildings that result from the maximization of profit from land's exploitation. More specifically in the islander coastal areas most of the arbitrary constructions are touristic infrastructures that either are exceeding the allowed building restrictions or are constructed in prohibited areas (Fig. 13).

Fig. 13: Arbitrary constructions Greece in 2012. ***(Ministry of Environment and Climate Change)***



One characteristic case of the intensity of arbitrary constructions is Mykonos Island where the intensity between arbitrary constructions in the coastal zones and in hinterlands is obvious (Fig. 14).

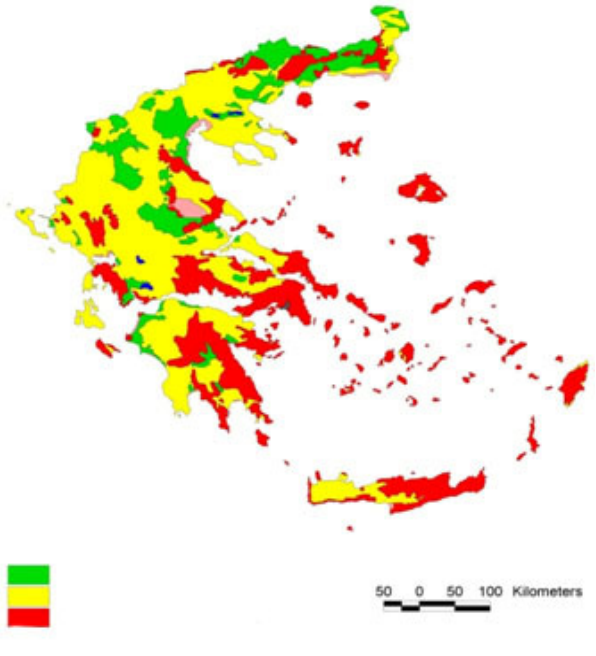
Fig. 14: Arbitrary constructions in Mykonos Island. (Ministry of Environment and Climate Change)



7.3. Deforestation

The housing and touristic demands have led to intense deforestation of many Greek areas. The deforestation rates during the 1991-2001 decade showed that the majority of the Greek islands have intense deforestation. The consequences of deforestation are not limited in the environmental degradation but are also worsening these areas inhabitants living conditions via the caused microclimate changes. A research of the Agricultural University of Athens reveals that most of the islander areas are threatened by high risk due to erosion (Fig. 15).

Fig.15. The potential risk of desertification due to deforestation in Greece(Agricultural University of Athens)

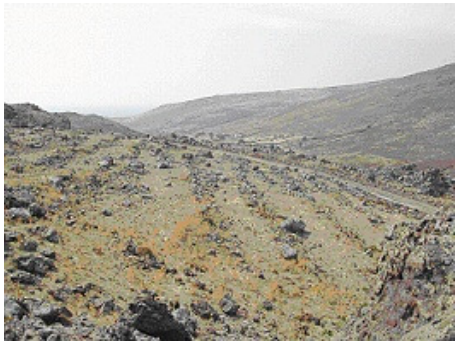


Risk due to erosion: green=Low, yellow=Medium, red=High.

7.4. Agricultural land reduction

The reduction of agricultural land is a result of two causes. The main cause is the constant cities unplanned expansion that is motivated by the cheap land prices of the peri-urban areas. The other cause is the abandonment of agricultural activity due to the change of the economic base or to the population's reduction.

Fig 16: Deforested areas in Lesvos Island, degraded due to the absence of land management



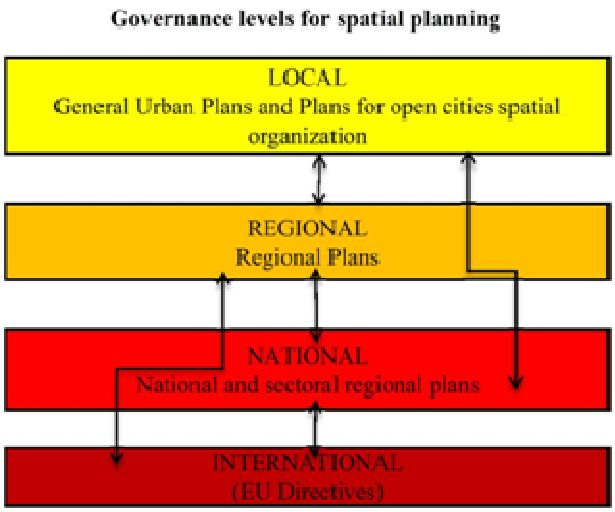
http://www.unibas.it/desertnet/dis4me/images/photos/ deforestation/lesvos_1.jpg

So whether the settlements are expanding or abandoned they are facing many issues that spatial planning must solve. The principles of sustainable development impose that social, economic and environmental parameters should be planned in order to achieve better living conditions for all the concerned population. So, spatial planning should focus on policies that will provide better environments while more specifically regional planning should provide directions for all economic sectors that will lead to the regions development. One of the main problems of the Greek spatial planning system is that spatial planning is "isolated" as it is not connected with the development planning. This fact leads to the formulation of policies that suggest ways of development without counting in the economic tools for their achievement. Nevertheless the research will investigate the levels of spatial planning and the formalities they present for the settlements development in order to evaluate if they can solve the problems they face. The second section of the research investigates the spatial tools for settlements planning. It is divided in two parts the investigation of regional and the investigation of urban spatial tools of the Greek Planning system.

8. The Greek spatial planning system

The Greek spatial territory is defined by many levels of planning that concern Regional and Urban policies, since the legislation of the 2508 Law in 1997. Regional planning includes the National and the Sectoral Regional Plans which provide the principles for the country's sustainable development. The Sectoral Plans concern main productive sectors as tourism, industries, renewable energy sources e.tc. Regional plans are directed by the European Union's spatial policies and give development directions to the Regional Plans that are legislated for each of the 13 Greek regions. The Regional Plans provide the principles for every regions development and define the policies that should be followed by a lower planning level the General Urban Plans and the Plans for open cities spatial organization which define the development for each of the country's municipality (Fig. 17).

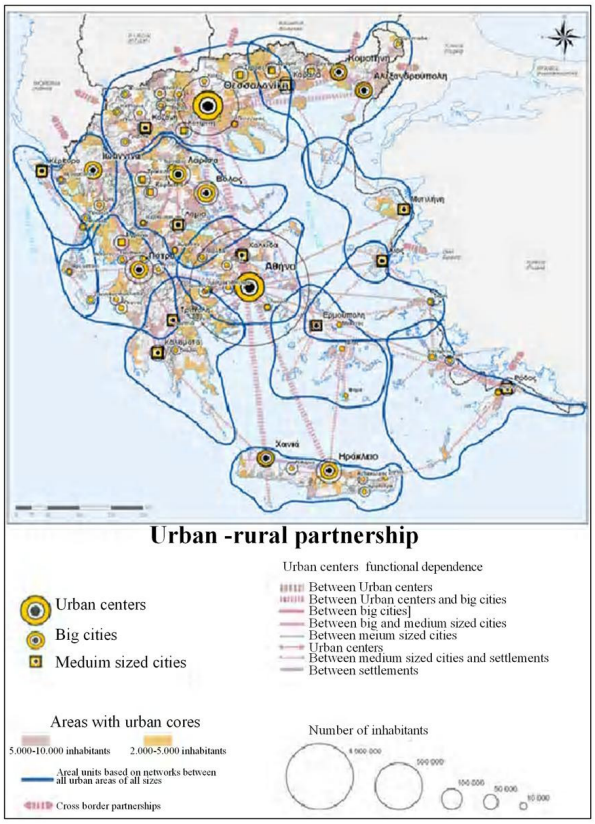
Fig 17: The relation between different planning levels of Greece



9. The Greek regional planning policies for settlements

According to the 9th article of the National Regional plan, which was legislated in 2008, the Regional policies should focus on the improvement of the dynamic settlements infrastructures, and the further development of the mountainous and coastal regions. The Plan also defines that urban centers, small and medium sized cities and settlements should organize networks in order to establish of partnership between urban and rural areas, responding to key demands for the population's retention (Fig. 18). Finally, it defines that mountainous settlements and regions should be faced particularly with a more specific sectoral-regional plan that until today has not yet been legislated. The basic tool for tourism developments the Tourism Regional Plan that was legislated in 2013 defines that the abandoned settlements can regenerate with the restoration of the existing buildings and the creation of new infrastructures. It also defines that these settlements expansion should be controlled in order to avoid environmental degradation.

Fig. 18: Urban rural partnership as it is defined by the National Regional Plan



(Ministry of Environment and climate change)

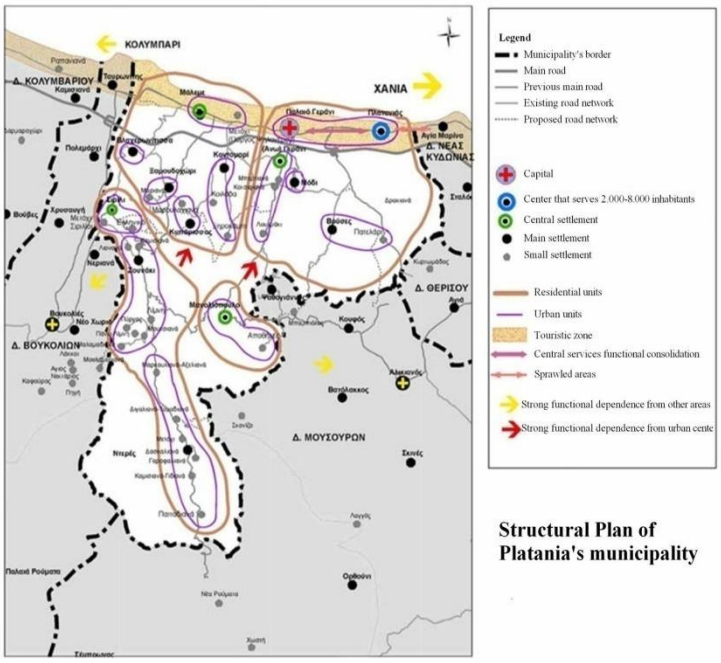
A detailed research of the settlements population's records showed that they don't all constitute disadvantaged areas. In many settlements, as it resulted from the 1991-2001 records, the population increased while there was a simultaneous increase of employment in the secondary and the tertiary sector. Further research showed these settlements were close to the main road network, the urban centers and the big scale infrastructures (Dimelli, 2011). It appears that settlements can be grouped in categories according to their population, employment, economic, e.tc characteristics and trends and each category should be planned with different aim. So, it is necessary to focus on more parameters of the settlements development and formulate different for each category principles for the designation of their characteristics.

The questioning from these directives is if such general formulations can solve the settlements problems and lead towards their development or it is necessary to proceed to more detailed planning, based on indicators that reveal the settlements specifications. This way planning would be more effective and would contribute in the settlements optimum development.

10. The Greek urban planning policies for settlements

The attempt for spatial planning not only of urban centers but for settlements as well began with the legislation of the 2508 Law in 1997. Until then, only specific settlements were planned if they presented certain characteristics like traditional architectural elements. So, after 1997, the Greek state started to plan the settlements and their wider regions in the frame of sustainable development. Since then, the until today applied plans define the limits of zones and the permitted building restrictions and assess the required infrastructures after calculating the future population as it results from the recorded changes. A characteristic example is the urban plan for Platania's municipality in the island of Crete (Fig. 19) which defines the settlements functional networks as they result from the required infrastructures, the land use zones, the permitted building restrictions and the protected areas. Particularities as the productive basis structure, the restoration of the existing built nutshell, the traffic problems solution, the arbitrary construction, the reduction of agricultural land, the orientation of sprawled areas e.tc. are not taken into consideration, fact that makes planning fragmentary.

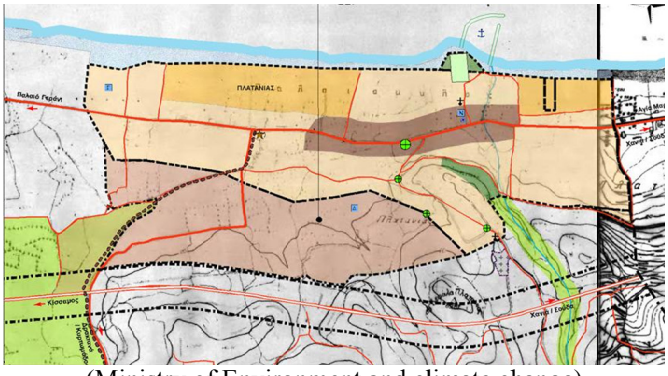
Fig 19: The structural plan of Platania municipality that shows the defined settlements networks



(Ministry of Environment and climate change)

As for the settlements interior, planning is contented in the definition of land use zones, the orientation of their limits and the definition of sizes as plot ratio, allowed building heights e.tc (Fig. 20). It does not proceed to a detailed plan about the road and pedestrian networks, the required green areas, the connection of the residential areas with the coastal zone and the rest elements that urban planning should take into consideration in order to make an urban area friendlier for its inhabitants.

Fig 20: Urban Plan of Platania settlement that shows the land use zones.



(Ministry of Environment and climate change)

11. Conclusions

The Island settlements present a wide geographical spread that through the years and the applied spatial policies still lack of infrastructure and utilities. The coastal areas are in many cases facing intense environmental problems due to tourism exploitation while the hinterlands are abandoned. The issue of island settlements is faced fragmentarily from Greek spatial policies as they are not planned with the principles of a sustainable management strategic plan that would incorporate the economic and social mainstream.

Regional and Urban planning attempts to face settlements as networks, but the criterion for their classification is mainly their population. In Regional planning, settlements are not faced with the detail that results from their complexity which is affected by a plethora of parameters. In urban planning, the proposals focus on the required infrastructures for their functions as these results from the future population's estimates. These planning practices, lead to areas where road networks, wider regions and other parameters that will create better urban environments, are ignored.

The new conditions that are dictated by rapid economic and social changes, lead to an intense transformation process of the islander areas and directly affect the sustainability of regional socioeconomic modules. So, specialized approaches, which will record, update and compare data with the use of a system of indicators, are necessary for the formulation of specific policies for development. One tool towards this direction can be the creation of a Settlements Observatory that will collect and process islander settlements data regarding their social, economic, natural and human environment and the institutional framework that determines their growth. The exported specific conclusions of such research based on existing dynamics and prediction of the expected trends can prioritize, prevent, encourage or discourage the parameters that contribute to the settlements development, through coordinated policies that will result from all levels planning. This will ensure a more integrated approach, in which all relevant policies can flexibly adapt to the specific characteristics of each area.

References

Cagmani and Gibelli, 2002 Camagni, R., Gibelli, M.C., Rigamonti, P., (2002). Urban mobility and urban form: the social and environmental costs of different patterns of urban expansion. Ecol. Econ. 40 (2), 199–216.

Dimelli D., (2012), Settlements networks in Islander Greece: proceedings of the 10th National Conference of the Greek European Regional Science Association, Economic crisis and policies for cohesion and development, https://plandevel.web.auth.gr/ ERSA_GR_CONF_2012/papers/Dimelli_paper.pdf Accessed 25 June 20013. (in Greek).

Dimelli D., (2011), The Greek settlements network: proceedings of the 9th National Conference of the Greek European Regional Science Association, Regional development and Greece, http://www.prd.uth.gr/sites/ GS_RSAI/ CONFERENCE_MAY2011_ SITE/PAPERS_MAY2011_PDF_CD/DIMELLI_D_12.pdf Accessed 25 June 2013. (in Greek).

Garrett N., (2007), Changing settlements, Thomas Nelson & sons publ. , London.

Gousios D., (1999), The spatial dimension in Planning and the application of policies for the mountainous regions: from the mountainous communities in the mountainous geographic zones, in Mountainous areas and the Balkans, Euromontana and Mountainous economy institute, Athens (in Greek).

Klabatsea E. Panagiotatou E., (2007), Observing the Aegean ..., National Technical University of Athens Publications, Athens. (in Greek).

Kotzamanis B., Androulaki E., (2009), Demographic trends in modern Greece (1830-2007). Laboratory of Demographic and Social Analyses. (in Greek).

Minetos D. (2010), Spatial Planning and Land Use in the Insular Areas, proceedings of the Union of Prefectural Authorities of Greece conference, on Emergence problems facing the

Ionian Islands and suggested solutions posted on www.enae.gr/docs/eisigisi_minetos.doc(Accessed 27 October 2013. (in Greek).

Plan Bleu and Centre d'Activit´es R´egionales, 2001b. Urban sprawl in the Mediterranean region, PNEU, PAMand Plan Bleu, Sophia Antipolis. Available from http://www.planbleu.org/publications/urbsprawl.pdf (accessed June 2006).

DOES HUMAN CAPITAL INVESTMENT MATTER FOR GROWTH? EVIDENCE FROM INDONESIA DURING THE FISCAL DECENTRALIZATION ERA

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Abstract

The purpose of this study is to investigate the role of regional government expenditure, workers' education level, and government expenditure for health and education sector in economic growth by using secondary data published by National Bureau of Statistics Indonesia. Panel data estimation approach was adopted to analyze the data. The result of the study shows that education contributes significantly to the improvement of labor productivity. Other findings indicate that the population has positive impacts on various aspects of human development and labor productivity while the total area owned by the local goverment has no effect on both of the two aspects aforementioned. It implies that human resource is an essential component for economic growth and for human development itself.

Keywords: Human Capital Investment, Government Expenditure, Fiscal Decentralization.
JEL classification: H51, H52, H72, H75

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1. Introduction

Along with the decentralization, there are numbers of money flowing massively, from the central government to the regional goverment. As a result, the subject and the object of development become closer to the local goverment who has a discretionary authority to manage the budget, and therefore, the development movement can be maximally optimalized for the benefit of many people.

Desentralization has many dimensions and are generally divided into three categories, namely administration desentralization, political desentralization, and fiscal desentralization. Among the three categories, the readiness aspect of fiscal desentralization is one which is often ignored. The influence of fiscal desentralization to the society prosperity in regions depends on the readiness of local goverment's capacity in managing the finance. If the local goverment is ready to manage the fiscal, the APBN finance which is administered to the region can improve the welfare of its people optimally. And it means that the management of

fiscal becomes more efficient and the corruption can be effectively abolished. On the other hand, when the desentralization is done so suddenly, there will be unreadiness from the local goverment in managing the fiscal which greatly increases, and therefore, the amount of money which is administered to the regions will merely lead to waste.

Kyriacou dan Sagalés (2008) state that desentralization can improve our goverment quality in various ways. The quality of government can be improved in various ways such as the following:

1. Decentralized government will be better informed about local conditions and so can better satisfy citizen preferences.
2. Citizens themselves may be better informed about local government activity and, assuming that local politicians are locally elected rather than centrally appointed, good or bad performance in such a setting can be directly rewarded or punished.
3. In a fiscally decentralized setting with inter-jurisdictional mobility and thus competition, it is expected that locally elected governments offer public goods more efficiently (responsive to local demands and at lower cost) and also to be less corrupt since economic agents would flee more corrupt regions

Decentralizarion brings about the principle of mechanism accountability which consists of an external competition with another government and also the pressure of the government itself related to the local democracy (Bardhan and Mookherjee, 2005). Undoubtedly, however, some weaknesses in the government accountability commonly occur in developing and transition countries due to the malfunction of local democracy which is related to the asymmetry of knowledge, wealth, social status, and political participation patterns.

Decentralization should not be merely interpreted as a way for increasing the amount of money managed by the local government, but in fact, it requires creativity and innovation from the local government in its spending aspect. When the local government emphasizes its financial management on the revenue aspect, many charges or taxes, which aim at increasing the revenue will inevitably occur. Then, if this is done haphazardly without considering the overall impact on the economy, it will exactly decrease the revenue in the future because we know that the taxes or levies collection and so forth would be disincentive (in other words, having a negative economic multiplier). In contrast, when the government considers the expenditures very well, the targeted priority or specific sectors are expected to create an optimal economic multiplier.

Investment expenditures must be given the highest priority due to the fact that they can create greater multipliers compared to consumption expenditures. Through investments, the expenditures will not merely flow and simply vanish at the end, but it will be a key factor for increasing the output level in the future.

Stansel (2009) argues that government expenditures in a general meaning are not really necessary in relation to the economic growth. However, much better results can be achieved if these expenditures are distributed and allocated into a more specific component, that is investment expenditure (the greater the investment done by the government, the higher the growth will be achieved). Besides, the government investment is also effective in lowering the unemployment rate in particular areas.

In the development, human capital investment is an important expenditure because it aims at improving the quality of human resource itself. Considering the fact that human capital is the main production factor in generating output at the micro level, this investment is worth doing, though, the benefits can not be obtained in the short-term period. It is also necessary to emphasize the quality of human resource at the macro level from a certain area in its economic development.

In his research, Denaux (2007) found that local government spending in the higher education sector was significantly higher affecting the economic growth in that region. However, the expenditure at the lower levels (i.e. the school level) does not have any influence on the economic growth. Another research study conducted at a more macro level by Oluwatobi and Ogunrinola (2011) in Nigeria also shows that government expenditures on education and health sectors can foster economic growth. In addition, Dao (2012) also asserts that the government expenditure on human capital investment is crucially important. His study shows that the economic growth of a country depends on the level of its government spending on education, health, and other investments.

Against the importance of government expenditures on human capital investment as previously mentioned, this research is worth conducting. The government expenditures, though, may be abused for wasteful expenses, which do not significantly bring many benefits for improving people's welfare. Since the role of provincial government and district government is very important in the fiscal decentralization era to achieve the development goals, it is necessary to conduct this research at the local government level (the provincial government). This is intended to determine how far the effect of government expenditures, particularly in relation to the function of human capital investment in education and health sectors.

2. Method

A model used by Yeoh and Stansel (2013) was applied in this research with some modification and augmentation to meet the purpose of the study. The model is modified as follows:

$$[LnPDRBkap]_{\downarrow}(i,t) = A + \beta_{\downarrow}1\ [Gedu]_{\downarrow}(i,t) + \beta_{\downarrow}2\ [Health]_{\downarrow}(i,t) + \beta_{\downarrow}3\ [GFac]_{\downarrow}(i,t) + \beta_{\downarrow}4\ Ln(K/L) + [\beta_{\downarrow}(5)\ [SMK]_{\downarrow}(i,t) + \beta_{\downarrow}(6)\ [Dip]_{\downarrow}(i,t) +]_{\downarrow}\beta_{\downarrow}7\ [Univ]_{\downarrow}(i,t) + \beta_{\downarrow}8\ [LnPop]_{\downarrow}(i,t) + \beta_{\downarrow}9\ [LnLand]_{\downarrow}(i,t$$

Where:
Y/L=PDRBkap: Regional GDP per capita which can be obtained from Regional GDP of each province
Gedu: government spending for education
Ghealth: government spending on health
GenFac: government spending for public facilities
K/L: capital stock per capita, using gross capital changes in regional or provincial GDP for the proxy
SMK: The ratio of workers with vocational education background (at secondary education level)
Dip: The ratio of workers with vocational education background (at higher education level)
Univ: The ratio of workers with higher education background (non-vocational)
Pop: population in the province
Land: the width of an area in the province

To find out how the effect of human capital investment to the economic development, the independent variable is replaced with the human development index. This estimation model can be used with consideration that the growth is expected to significantly contribute to the human resource development. Therefore, it can be obtained equality as follows:

$$HDI_{i,t} = A + \beta_1 Gedu_{i,t} + \beta_2 Ghealth_{i,t} + \beta_3 GenFac_{i,t} + \beta_4 Ln\left(\frac{K}{L}\right)$$

$$+ \beta_5 SMK_{i,t} + \beta_6 Dip_{i,t} + \beta_7 Univ_{i,t} + \beta_6 LnPop_{i,t} + \beta_7 LnLand_{i,t} + \varepsilon$$

Where, HDI is the human development index, either as an aggregate or an individual constituent components, such as the literacy level, the life expectancy, the average length of education and the real consumption per capita.

3. 3. Results and Discussion

This study employs the data from the summaries of all provincial governments' regional budgets in Indonesia provided by the Directorate General of Regional Finance, Ministry of Finance, Republic of Indonesia and the National Bureau of Statistics. The data used were panel data from 2006 to 2012 by analysis on the provincial level all across Indonesia.

Table 1 Variable Definition

Symbol	Variables
LnPDRBkap	Regional Gross Domestic Product per capita (Log)
HDI	Human Development Index
GTOT	Government total expenditure
GEDUC	Government expenditure on education
GHEALTH	Government expenditure on health

Symbol	Variables
GFAC	Government expenditure on public facilities
K/L	Investment expenditure
SMK	The ratio of workers with vocational education background (at secondary education level)
DIP	The ratio of workers with vocational education background (at higher education level)
UNIV	Ratio of labors with higher education background-non vocational degree
POP	Population in each province (log)
LAND	Width of area in each province (log)

The dependent variable in the first model is Regional GDP per capita in the log form. Other than being a proxy for economic growth, the variable can be used to measure the level of labor productivity in each province. The second dependent variable is the Human Development Index. The HDI value is the composite of several human development dimensions such as life expectancy, literacy rate, average length of education, real consumption per capita.

The explanatory variables are divided into three groups of variables for measuring the effectiveness of government expenditure on the economic growth and human development index. These five groups are (1) government expenditure group, (2) education types and population, and (3) area. The first group--the government expenditure group--is categorized into total expenditure, expenditure for education sector, government expenditure for health sector, and government expenditure on public facilities (infrastructure), and investment expenditure variables. The second group represents the stock of human resource in both quality and quantity. The proxy for human resource stock quality is represented by the ratio of labors with vocational high school, diploma, and higher education backgrounds, whereas the quantities are represented by the population variable, which is transformed into the forms of logs. The last independent variable is the variable for the width of the area, which is transformed into log form.

In general, the data description in HDI including the government expenditure on education, government expenditure on health, and the total government expenditure is illustrated in the four following figures. Figure 1 indicates the HDI level in each province and national HDI in 2012. Based on the ratio, the percentage of provinces with HDI level higher than the average of national HDI)is less than 50%. Only 14 out of 33 provinces have higher HDI level than the national HDI average. Jakarta, the capital of Indonesia, reaches the highest HDI level of 78,33 whereas the region with the lowest HDI level at 65.86 is Papua.

Figure 1 Provincial HDI and National HDI in 2012

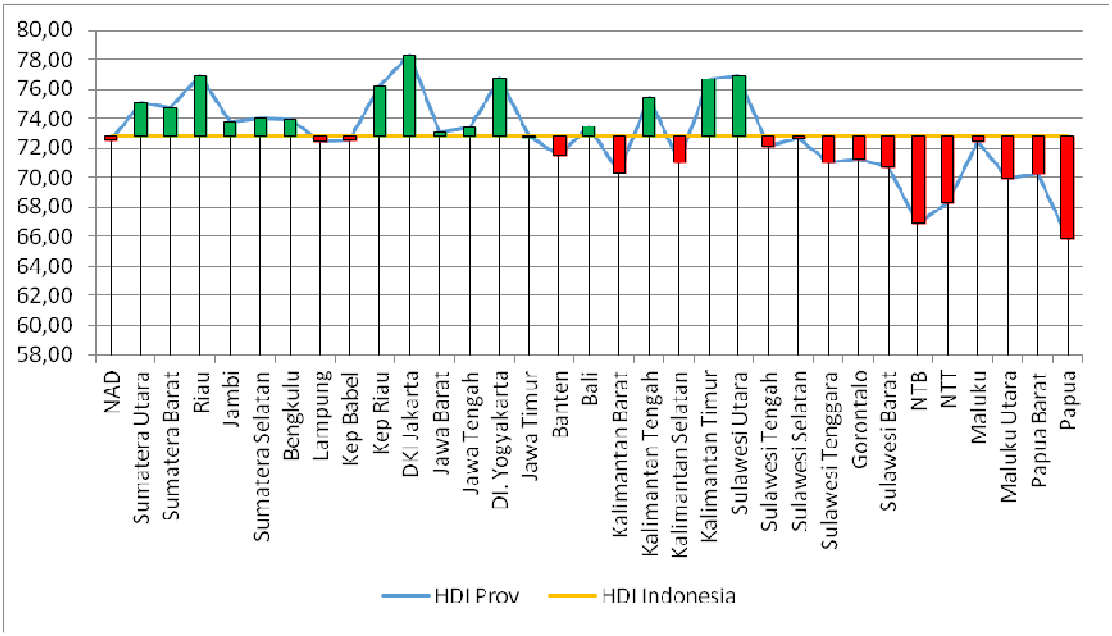


Figure 2 Government expenditure per capita on education sector based on the province and the average of national expenditure

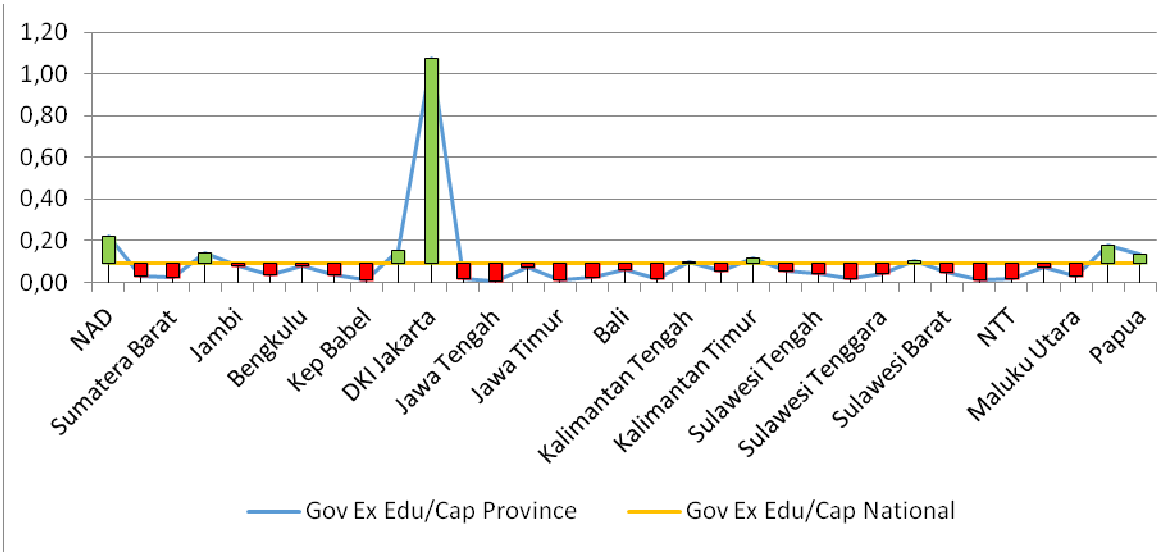
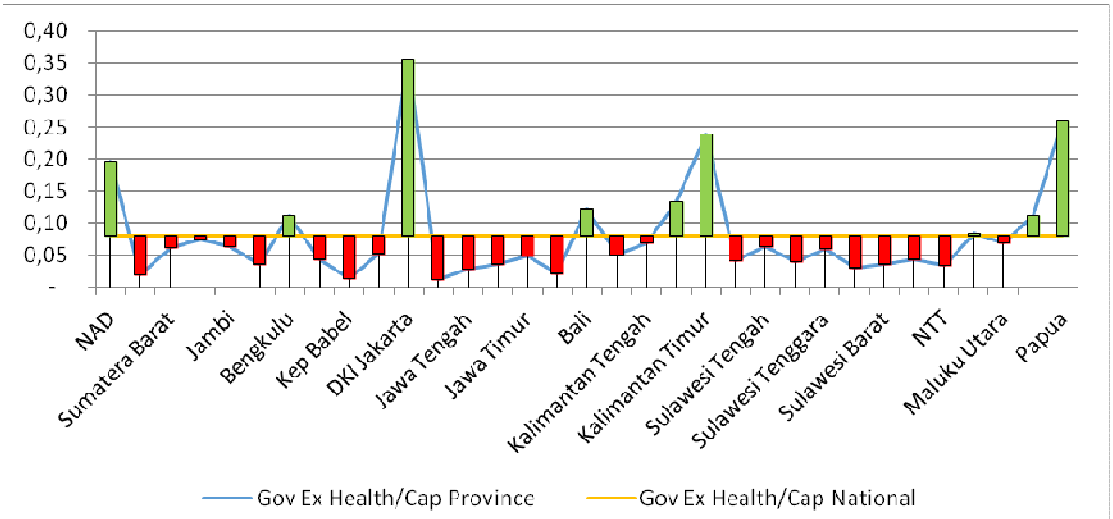
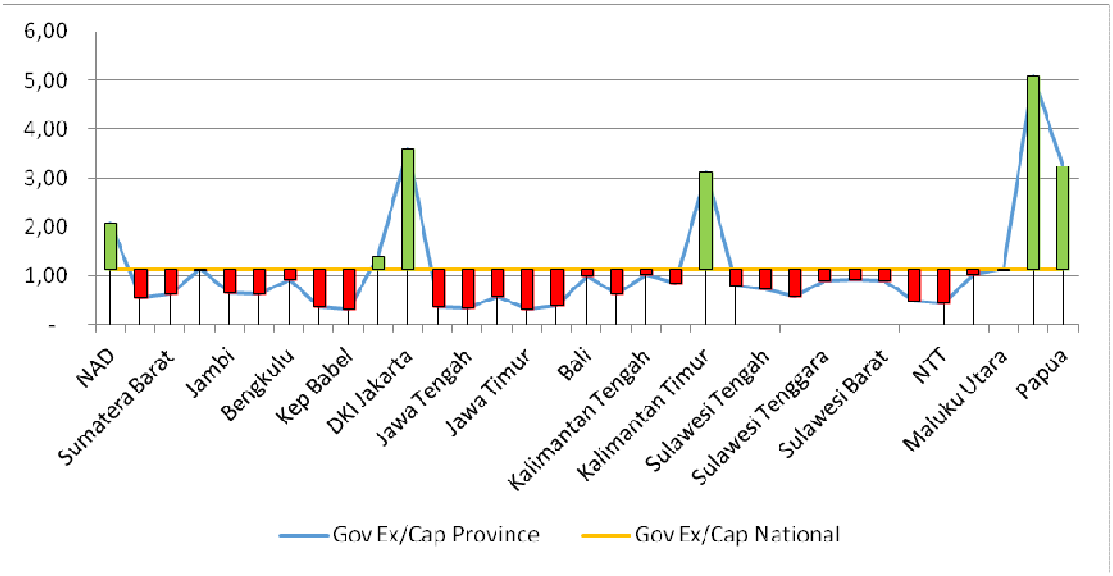


Figure 3 Government expenditure on public health per capita based on the province and the average of national expenditure in 2012



Figures 2, 3, and 4 describe the government expenditure per capita on each sector (education and health) and the total expenditure. The distribution of the government expenditure per capita in each province compared to the national average is not satisfactory. Only 27% of 33 are provinces with expenditures per capita are above the national average. As shown in Figure 2, there are only 9 provinces with expenditure on education per capita above the national average. For the distribution of the government expenditure on health per capita, only 8 provinces are above the national average. If we look at the government total expenditure for all provinces compared to the government expenditure per capita, only 6 provinces or 18% of 33 provinces spend higher than the national average.

Figure 4.: Government expenditure per capita based on the province and the average of national expenditure in 2012



The result of the model estimation of economic growth using Pool and Fixed Effect approaches is presented in Table 2. In general, the model estimation of economic growth or labor productivity using Pool approach shows that most of the variables have significant effects on the statistics, except for two variables including government expenditure and population. It is worth noting in this Pool approach estimation mode that the ratio of labors with vocational senior high school background have positive and significant effect on the statistics of economic growth. Each increase by 1 point in the ratio of labors with vocational high school background to the total labors will increase the regional domestic product per capita as much as 0.14 % (column a), 0.13 % (column c), 0.14% (column e) and 0.13% (column g). The ratio of labors whose educational backgrounds are diplomas to the total labors also indicates the similar result on the economic growth. This suggests the significance of labors with diplomas on the economic growth. The result is in accordance with the ratio of labors with higher education background. Each increase by 1 point in the ratio of labors with higher education background to the total labors will increase the labor regional domestic product per capita from 0.07% to 0.12% (see column a, c, e and g).

The estimation using Fixed Effect Approach indicates a slightly different result. None of the variable representing the government total expenditure or government expenditure based on the function is significant to the economic growth. As to variables representing the labor quality, positive and significant effect on the statistics of economic growth is only provided by the ratio of labors with higher education background to the total labors. The variable for the ratio of labors with higher education background (non vocational education) consistently shows positive and significant effect in all models of estimation both Pool and Fixed Effect Approaches. However, the value for model estimation using pool approach is bigger than the value for fixed effect approach. This indicates the significance of the role of higher education in determining the labor productivity, which finally fosters the economic growth.

The population variable in both approaches gives different results in the estimation. In fixed effect approach in all models (column b, d, f, and h,), the population variable consistently gives positive and significant effects on economic growth. It indicates a positive correlation between population growth and economic growth. However, in the pool approach, the population variable does not consistently give any positive and significant effect on the economic growth (column a, c, e and g).

Table 3 describes the result of model estimation for Human Development Index using pool and fixed effect approaches. In the model estimation using Pool approach, the variables representing the expenditures does not statistically affect the value of Human Development Index, except for the government total expenditure variable. However, this variable negatively

affects the level of Human Development Index. It raises a question on the effectiveness of government expenditure on the human development index in each province.

In the pool approach used, four estimation models were employed. Only one model involving the government total expenditure (see column a and c) shows a positive correlation between investment per capita and Human Development Index, despite the small magnitude, that is an increase of annual investment per capita of 1 million rupiahs will be followed by an increase of HDI level as much as 0.01%.

The labor quality represented by the variables for the ratio of labors with certain kinds of education backgrounds (Vocational High School, Diplomas, Higher Education Degrees) have positive and significant effect on the Human Development Index, namely ratio of labors with vocational high school background and ratio of labors with higher education background. In all estimation models, the ratio of labors with higher education background made greater contribution to the Human Development Index than those with vocational high school background.

The number of population made positive contribution to the Human Development Index in all estimation models in Pool approach except on the estimation model g (see column g). Each increase in the population as many as 1000 individuals will increase the Human Development Index up to 3.8%.

The fixed effect approach gives different estimation results on several variables. The government total expenditure variable only has a significant effect on the Human Development Index when the variable accommodates the ratio of labors with diplomas background. Based on the functions of expenditures, the government expenditure in education seems to have a negative effect on the Human Development Index, whereas the government expenditure on health has a positive effect on the formation of Human Development Index. An increase of 1 million rupiahs on the expenditure will increase the Human Development Index by 0.66% and 0.62%.

The comparison of the effectiveness of the government total expenditure and the government expenditure in each sector on the economic growth (labor productivity) using the fixed effect approach is presented in Table 4. In general, both the government total expenditure and human capital investment in education and health (or expenditures based on the functions) does not affect the labor productivity, and in other words, it is not productive to increase the labor productivity.

The investment expenditure by private sectors is more productive in increasing the labor productivity. This finding is similar to the previous studies, which are used as references. Besides, the finding based on the types of education is relevant to the theories and indicates a positive effect, which grows greater as the education level gets higher. However, statistically, only labors with higher education background are able to increase the labor productivity. It means that the greater the ratio of labors with university degree to the total labors correlates to greater labor productivity. Other findings suggest that the population increases labor productivity whereas the width of the area (land) does not affect the labor productivity.

Table 2 Economic Growth Estimation Model

Variable	Pool (a)	FE (b)	Pool (c)	FE (d)	Pool (e)	FE (f)	Pool (g)	FE (h)
C	-2.021266***	-13.94149	-2.264660***	-13.00442	-1.888083***	-13.91003	-2.098825***	-12.92469
GTOT	8.29E-10	5.72E-09	-1.38E-09	5.07E-09				
GEDU					-3.24E-08	-3.58E-08	-4.73E-08	-3.71E-08
GHEALTH					-1.34E-07	8.34E-08	-1.20E-07	7.82E-08
GFAC					5.64E-08***	-4.76E-09	3.97E-08**	-4.78E-09
(K/L)	4.71E-09***	2.11E-09**	5.23E-09***	2.20E-09***	5.49E-09***	2.67E-09***	6.16E-09***	2.79E-09***
SMK	0.136684***	0.008467	0.127603***	0.010898	0.141367***	0.008710	0.131268***	0.011207

Variable	Pool (a)	FE (b)	Pool (c)	FE (d)	Pool (e)	FE (f)	Pool (g)	FE (h)
DIP			0.114869***	0.025130			0.108307***	0.026345
UNIV	0.118777***	0.110692***	0.074455***	0.105754***	0.112249***	0.109478***	0.073043***	0.104166***
POP	-0.022785	1.870299***	-0.017046	1.793098***	-0.033311	1.858658***	-0.029551	1.776605***
LAND	0.399566***	-1.118636	0.405827***	-1.102854	0.401050	-1.104851	0.407440***	-1.086963
R-squared	0.721828	0.924719	0.737185	0.924965	0.730384	0.925294	0.743172	0.925561

Note: * significant at 10%, ** significant at 5%, *** significant at 1%

Table 3.: Human Development Estimation Model

Variable	Pool	FE	Pool	FE	Pool	FE	Pool	FE
C	55.13554***	-31.37445	55.16638***	-24.20894	55.98753***	-31.74560	57.68626***	-24.31264
GTOT	-1.43E-07**	5.35E-08**	-1.43E-07**	4.86E-08				
GEDU					-7.84E-08	-2.23E-07***	-1.86E-07	-2.33E-07***
GHEALTH					-4.42E-07	6.61E-07***	-1.70E-07	6.22E-07***
GFAC					6.21E-08	-5.02E-08	7.81E-08	-5.04E-08
(K/L)	1.20E-08**	5.54E-09*	1.20E-08*	6.20E-09	5.68E-09	9.39E-09***	8.04E-09	1.03E-08***
SMK	0.460688***	0.026530	0.461839***	0.045120	0.462814***	0.024567	0.425068***	0.043406
DIP			-0.014557	0.192165			0.084400	0.198732**
UNIV	0.574306***	0.562313***	0.579923***	0.524552	0.537607***	0.559118***	0.564158***	0.519045***
POP	0.385614**	9.300680***	0.384887**	8.710348	0.365696**	9.266069***	0.266572	8.647101***
LAND	0.368480***	-4.053635	0.367687***	-3.932952	0.318708**	-3.966468	0.252801*	-3.831528
R-squared	0.510784	0.952957	0.510798	0.953720	0.506375	0.954250	0.488781	0.955057

Note: * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 4.: The comparison of the effectiveness of the government total expenditure and government expenditure per sector on the economic growth (Fixed Effect)

Variable	Expenditure based on Function (a)		Total Expenditure (b)	
C	-13.91003	-12.92469	-13.94149	-13.00442
GEDU	-3.58E-08	-3.71E-08		
GHEALTH	8.34E-08	7.82E-08		
GFAC	-4.76E-09	-4.78E-09		
GTOT			5.72E-09	5.07E-09
K/L	2.67E-09***	2.79E-09***	2.11E-09**	2.20E-09***
SMK	0.008710	0.011207	0.008467	0.010898
DIP		0.026345		0.025130
UNIV	0.109478***	0.104166***	0.110692***	0.105754***
POP	1.858658***	1.776605***	1.870299***	1.793098***
LAND	-1.104851	-1.086963	-1.118636	-1.102854
R-squared	0.925294	0.925561	0.924719	0.924965

Note : * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5 describes the comparison of the effectiveness of the government total expenditure and government expenditure based on the sectors on the HDI using Fixed Effect approach. In general, both the government total expenditure and the expenditure based on functions namely expenditure on human capital investment in education and health affects the human development index (HDI) in the province. In details, however, the human capital expenditure on education has a negative effect on the HDI whereas the expenditure on health gives a positive effect to the HDI.

The provincial government total expenditure in the regional budget has a significant effect on the HDI. In comparison, the provincial government total expenditure and government expenditure based on the functions in the form of human capital investment (totally in health and education) are more effective than the provincial government total expenditure in the regional budget expenditure. It indicates that more detailed expenditures based on the functions are more effective to increase the human development in the region.

The investment expenditure by private sectors is more productive in increasing the labor productivity. This finding is similar to the previous studies used as references in this study. The findings based on the types of education are positively relevant to the theories and education levels made greater contribution to the human development. Statistically, the greater ratio of labors with university degree and diploma indicates the increasing human development. Another finding also suggests that the population contributes to human development.

Table 5.: The comparison of the effectiveness of the government total expenditure and government expenditure based on the sectors on the HDI (Fixed Effect)

Variable	Expenditure based on functions (a)		Total Expenditure (b)	
C	-31.74560	-24.31264	-31.37445	-24.20894
GEDU	-2.23E-07***	-2.33E-07***		
GHEALTH	6.61E-07***	6.22E-07***		
GFAC	-5.02E-08	-5.04E-08		
GTOT			5.35E-08**	4.86E-08
K/L	9.39E-09***	1.03E-08***	5.54E-09*	6.20E-09
SMK	0.024567	0.043406	0.026530	0.045120
DIP		0.198732**		0.192165
UNIV	0.559118***	0.519045***	0.562313***	0.524552
POP	9.266069***	8.647101***	9.300680***	8.710348
LAND	-3.966468	-3.831528	-4.053635	-3.932952
R-squared	0.954250	0.955057	0.952957	0.953720

Note: * significant at 10%, ** significant at 5%, *** significant at 1%.

4. Conclusion

The following conclusions can be drawn from the research findings. The government total expenditure generally does not increase the economic growth or labor productivity. The labor productivity will increase along with higher levels of education, as shown by the ratio of labors with varied education background. Non-vocational education above vocational high school education is proved to be productive to increase the province's labor productivity in the region. The government expenditure on human capital investment in education and health does not improve the labor productivity. In other words, the human capital investment is not productive for the regional economy. Both the government total expenditure and expenditures

on education and health sectors are not productive to increase the labor productivity. Meanwhile, the investment by the regional private sectors is productive to improve the labor productivity. Although economically not productive, the human capital investment in health sector is able to improve the human development. The effect of the investment can be seen on the HDI and specifically on the components of HDI. This effect does not occur on the provincial government total expenditure (if it is viewed from the total expenditure in the regional budget), which is not effective to increase the human development in each province.

Other findings suggest that the number of population contributes to various components of human development and labor productivity, whereas the width of the area does not affect both human development and labor productivity. This indicates that quantitatively, human is a crucial component to economic growth and human development. As to provinces, the width of area does not contribute to the economic growth and human development.

References

_____ (2012), Nota Keuangan Dan Rancangan Anggaran Pendapatan Dan Belanja Negara Tahun Anggaran 2013 Resektor privat Indonesia, Kemenkeu RI.

_____(2012), Ringkasan APBD Pemda seluruh Indonesia, Kemenkeu, Dirjen Perimbangan Keuangan Daerah.

Agrawal, Arun, dan Jesse Ribot, (2002),"Analyzing Decentralization: A Frame Work with South Asian and East African Environmental Cases", Working Paper Series, Institutions and Governance Program World Resources Institute, Washington, D.C.

Bardhan, Pranab and Dilip Mookherjee (2005),"Decentralization, Corruption and Government Accountability: An Overview", For `Handbook of Economic Corruption' edited by Susan Rose-Ackerman, Edward Elgar, revised: June 20, 2005.

Barro, R. J. (1997) Determinants of economic growth: a cross-country empirical study. Cambridge, MA: MIT Press

Ciccone, Antonio and Elias Papaioannou (2006),"Human Capital, The Structure of Production, and Growth", Working Paper Series, No 623/May 2006, European Central Bank.

Dao, Minh Quang (2012), "Government Expenditure and Growth in Developing Countries", Progress in Development Studies 12 (1), pp. 77–82.

Denaux, Z.S. (2007), "Endogenous Growth, Taxes and Government Spending: Theory and Evidence" Review of Development Economics, Volume 11 (1), pp. 124-138.

Fjeldstad, Odd-Helge, (2004),"Decentralization and Corruption: A review of the literature", WP 2004: 10, CMI Working Papers.

Griliches, Z. (1997) Education, human capital and growth: a personal perspective. Journal of Labor Economics, 15 (1), Part 2, pp. S330-S344.

Gupta, Sanjeev, Michael Keen, Benedict Clements, Kevin Fletcher, Luiz de Mello, Muthukumara Mani (2002), "Fiscal dimensions of sustainable development"

IMF. (2002). Prepared for World Summit on Sustainable Development Johannesburg, August 26–September 4, 2002Washington, D.C.: International Monetary Fund, Fiscal Affairs Dept.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi, (2006),"Governance Matters V: Aggregate and Individual Governance Indicators for 1996-2005", The World

Bank.

Khilji, Bashir Ahmad., Kakar, Zaheer Khan., dan Subhan Sahabat (2012), "Impact of Vocational Training and Skill Development on Economic Growth in Pakistan, World Applied Sciences Journal 17 (10), pp. 1298-1302

Kolstad, Ivar dan Odd-Helge Fjeldstad, (2006),"Fiscal decentralization and corruption: A brief overview of the issues", U4 ISSUE 3.

Kyriacou, Andreas P. dan Oriol Roca-Sagalés, (2008),"Fiscal Decentralization and The Quality of Government: Evidence from Panel Data", Universitat Autònoma de Barcelona: Instituto de Estudios Fiskales.

La Porta, Rafael; Florencio Lopes-de-Silanez; Andrei Shleifer; dan Robert Vishny, (1998), "The Quality of Government", NBER Working Paper No.6727, September 1998.

Lyakurwa, William M. (2007), "Human Capital and Technology for Development: for Africa", AfDB Annual Meetings Symposium, Shanghai, China14-17 May 2007.

Oluwatobi, Stephen. O and Ogunrinola, I. Oluranti (2011), "Government Expenditur on Human Capital Development: Implications for Economic Growth in Nigeria", Journal of Sustainable Development, 4, (3)

Putthasri, Weerasak, Walaiporn Patcharanarumol, Viroj Tangcharoensathien, (2011), "Role and function of local government units in financing and providing health services in two selected provinces in Thailand", Journal of Public Health and Development, 9 (2).

Stansel, Dean (2009), "Local Government Investment and Long-Run Economic Growth", The Journal of Social, Political, and Economic Studies; Summer 2009; 34, (2); ProQuest pp. 244.

Solow, R. (1957) Technical change and the aggregate production function. Review of Economics and Statistics, Vol.39, pp. 312-320.

Treisman, (2002), "Decentralization and the Quality of Government", Department of

Political Science, University of California, Los Angeles.

UNDP (2010), Peningkatan Kinerja Pembangunan Daerah: Alat-alat Praktis dari Indonesia, BAPPENAS dan UNDP.

Yeoh, Melissa and Dean Stansel (2013),"Is Public Expenditure Productive? Evidence from the Manufacturing Sector in U.S. Cities, 1880–1920", Cato Journal, 33, (1).

ZIPF'S LAW APPEARANCE IN THE RUSSIAN CITIES[1]

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Abstract

The understanding of concentration processes about resources, population, enterprises in some regions and in the cities is very significant for economists and policy-makers. It's caused by the worldwide urbanization trend and local trend of economic activity agglomeration that increase the regional development differentiation within the country. Issues of economic activity locations and space distribution are solved by scientists over the past two centuries. Recent works show the increasing interest of economists to the Zipf's law testing in the regional system and the rank-size distribution of the cities. Research aims are to test the Zipf's law in the Russian cities and to test the hypothesis that the Russian Zipf coefficients depends on the size of the geographical territory of the Federal District.Methodology. In the paper it's used least square method for tasting the Zipf's law in Russian cities in general and separately for the federal districts. There is 1,123 Russian cities panel (cities with over 1,000 people population in 2014).Results. The Zipf's law is confirmed in the territory of Russia in general. According to the Federal Districts the Zipf coefficients range from -0.65 (Far Eastern Federal District) to -0.9 (the Urals and the North Caucasian Federal Districts). Equitability of cities hierarchy in the Ural and the North Caucasus Federal Districts dues to the fact that there are 139 cities located in the 1,789 thous. km2 in the Urals and 56 cities in the 170 thous. km2 in the Caucasus. In the Far East the city location is very disperse - 66 cities in the area of 6000 thous. km2 (Zipf coefficient - 0.65). Conclusions. Testing of the Zipf's law for the Russian cities in general shows that it's valid for the small (8,600 – 15,300 peoples) and large cities (66,700 – 331,000 peoples). For cities panel with population exceeds 100 thous. people. The Zipf's law is not valid for cities of more than 1 million people. (exception – the city of St. Petersburg). The result of the study is the confirmation of the hypothesis that the Zipf coefficient depends on the size of the Federal District.

Keywords: location theories, the Zipf's law, the city, the rank-size distribution, the cities of Russia

JEL classification: R12

1. Introduction

Understanding of concentration processes for resources, population, enterprises at specific territories and more often in cities is of significant importance at implementation of social and economic policy. It is associated and world-wide tendency to urbanization and agglomerative factors arisen in staging area of economical activity and reinforcing differentiation of regional development within the country. Economic activity is considered as not only location of industrial production, service sector and other types of activity, but also population, labour resources, investments and even prosperity (expressed for e.g. in salary level). It shall be noted that traditionally in allocation theory households and agricultural sector are studied within land use and do not belong to economic activity (Beckmann, 1999, p. 61).

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When business solution on production location in one or other region (city) is taken the factors which should provide high profitability in the future move to the forefront. We can put perspectives of further extension of activity, availability of labour resources of the required level and at a low price, acceptable level of taxes and possibility of subsidies acquisition, level of infrastructure development, in particular transport one, availability of social objects to such factors. Regional governments, for its part shall predict dynamics and qualitative parameters of the above factors for organization of corresponding events on promotion of the territory attraction.

Issues on the economic activity allocation in territorial area (city, region, country) are being solved by scientists within two hundred years. Very seldom economics contain synthetic relationships which can be considered as laws. Zipf's law for cities is one of the most evident dependences in economics and public-social sciences in total (Brakman et al., 1999). Modern studies demonstrate interest of economists to Zipf's law and the cities rank-size distribution.

The purpose of the survey, which results are indicated in the present article, is check of Zipf's law implementation in the Russian cities, proof or disproof of hypothesis that in Russia Zipf coefficient depends on size of geographical territory of the federal district.

2. Theoretical background

To obtain the stated objective, let's study available empirical studies on the given problems in foreign economic literature. F. Auerbach has proposed hypothesis of empiric dependence between size of the city (its population) and its rank in hierarchy of region or country cities (Auerbach, 1913). Zipf's law ensures that within the territory distribution per the city size complies with Pareto distribution with index equal to one. Other determination of the Zipf's law lies in the fact that if the large cities to be ranged per decreasing of their population so ratio of two cities population will be inverse to ratio of their ranks (Andreev et al., 2015). T. Rozen and M. Reznik were the first persons who have performed complex surveys basing on the 44 countries. Approbation of Zipf's law has shown that the highest index of Pareto is for Australia (1.9), the least one – for Marocco (0.8). Surveyors have stated that in Australia the index is excessive one and they put such a case to the exceptions. If Australia is removed from sampling, the leader per Pareto index is Nigeria − 1.5.

T. Cameron proposes one-stage structural model for determination of city size, approbation which has taken part in 121 cities of the USA with population exceeding 100 thous. people. Surveyor states that city size depends on a lot of factors one of which is the distance to the capitals (Cameron, 1990).

Regularities of the cities hierarchy were stated by P. Krugman (Krugman, 1996). As a result of analysis of Zipf's law action for empirical regularity and inadequacy of available cities he has entered the term "secret of the cities hierarchy". K. Gabaix states that Zipf's law for cities is a sample of agglomerating law which determines the most accurate regularity in economy. It covers almost all countries and time periods. Scientist states that Zipf's law shall be prerequisite for the law of cities growth at local level. Surveyor determines two groups of such a law explanation. Economical prerequisites and random processes. Economic explanation is based on balancing of transport expenses, positive and negative external influence, and difference in effectiveness. Main problem of such a division is that it is difficult to determine that different economical structures (the USA in 1991 and India in 1911) perform one and the same power balance. Within the given theory there are no prerequisites for the implementation of Zipf's law.

Y. Mansury suggests a model, which determines a role of spatial distribution in creation of Zipf's law (approbation in the USA). In model the distribution per cities sizes obtains permissible balance. The author extends functions of model due to the inclusion of external effects (Mansury, 2007).

Z. Xu and R. Harriss state that Zipf's law is observed in the most part of countries. Concept of cities size distribution requires accounting of inter-city relations on the process of economic growth (Xu et al., 2010).

N. Moura and M. Ribeiro call Zipf's law as demonstration of complex systems dynamics: "demographic distribution of individuals over the earth surface having sharp peaks of population concentration in cities alternating with relatively large spreads, where population

density is much low, observes power law of typical dynamics of complex systems" (Moura et al., 2006).

L. Benguigui and E. Blumenfeld-Lieberthal have developed a dynamic model for measurement of city size using Zipf's law (Benguigui et al., 2007). The given model is based on two factors: Random multiplicative growth and increasing of cities number. Authors have detected such particularities of model as adaptation to various conditions and time effect on city system.

B. Jiang and T. Jia study geo-spatial perspective of justice of Zipf's law in the cities of the USA (Jiang et al., 2011). Results of their searches are verified by the Zipf's law observance within the territory of entire country. Scientists state that cities correspond to power distribution, Zipf coefficient is varied at one.

V. Andreev and V. Lukianova has checked Zipf's law in cities of the Chuvash Republic, which stated implementation of Zipf's law for a set of city districts (Andreev, 2015). If sample will contain Cheboksary city district the Zipf's law is violated.

3. Methodology

Zipf's law relating to the distribution of cities size generally is presented by dependence between city rank (r) and its size (s), sometimes this rule is named as "rank-size". It can be represented by the following formula:

$$s = r^{-1} \quad (1)$$

Corresponding city size *s* will be equal to 1.1/2, 1/3 and etc. If city rank *r* is equal to 1.2.3. The largest city is twice larger the next per rank and tree times larger than the third one and etc. The given equation has a common nature for economic parameters in distribution of profits and sizes of companies (Alperovich, 1984).

Power-based equation of Zipf's law is presented as follows:

$$y = kx^{-\alpha} \quad (2)$$

where *x*- quantity, *k*- constanta, and α- exponent of power law. The given law is known as Pareto distribution. Italian scientist V. Pareto has stated distribution of prosperity among the regions and has determined that it is quite uneven: 20% of population owns 80% of prosperity (wealth), and 80% of population − only 20% of prosperity – rule "rich grows richer".

B. Jiang and T. Jia for determination of power function allows constructing logarithmic graph in the form of straight line (Jiang et al., 2011):

$$\ln(y) = -\alpha \ln(x) + \ln(k) \quad (3)$$

Zipf's law or Pareto distribution are equation of power law. Value of exponent α for power function is determined by method of least square, method of systematic drift is also known. Due to the fact that function of power distribution is not always compared with other types of distribution such as logarithmically normal distribution and exponential distribution, any hypothesis concerning the given law is very hard to adduce.

Probable methods were proposed by M. Goldstein (Goldstein et al., 2004), M. Newman (Newman, 2005) basing on the Kolmogorov-Smirnov test for determination of distribution per power law. These methods are used not only for correspondence to data (or their part) per power law but also for determination insofar as these data comply with other types of distribution. Indicator is specified by the following formula (Jiang et al., 2011):

$$\alpha = 1 + n\left[\sum \ln \frac{x_i}{x_{\min}}\right]^{-1} \quad (4)$$

α means exponent to be valued, x_{min}- minimum value, which distribution per power function obtains. In Zipf's law exponent is equal to one.

Kolmogorov-Smirnov test, modified by A. Clauset (Clauset et al., 2009), allows obtaining maximum correspondence: Cities sizes were in accordance with law on power distribution. Main idea – maximum distance (δ) between data per cumulative function of density and model created:

$$\delta = \max\left|f(x) - g(x)\right|, x > x_{mim} \qquad (5)$$

where *f(x)* - cumulative function of synthetic data with value not less x_{min} , and *g(x)* - cumulative function of power law of distribution which in the best way corresponds to condition $x > x_{min.}$

4. The data

To check Zipf's law in the Russian cities, we have used data of Federal service of government statistics of 2014. Survey object is the Russian cities within federal districts and country as a whole. Sampling has included settlements with city status in 2014. In total the sampling was formed which has included 1,123 cities with population from 1 thous. people to 12108.3 thous. people. The next stage of survey fulfillment of Zipf's law was checked in the Russian cities with population exceeding 100 thous. people. Due to the fact that within the territory of federal district number of cities with population exceeding 100 thous. people. Is insignificant, for economic analysis check of Zipf's law action was performed for the Russia totally.

5. Results

Classification of Russian cities per the population is as follows: small towns – population up to 20 thous. citizens, medium cities – from 20 to 100 thous. citizens, large cities from 100 to 250 thous. citizens, big cities – from 250 thous. to 1 mls. Taking into consideration such a classification, let's review the Russian cities in 2014 (Table 1).

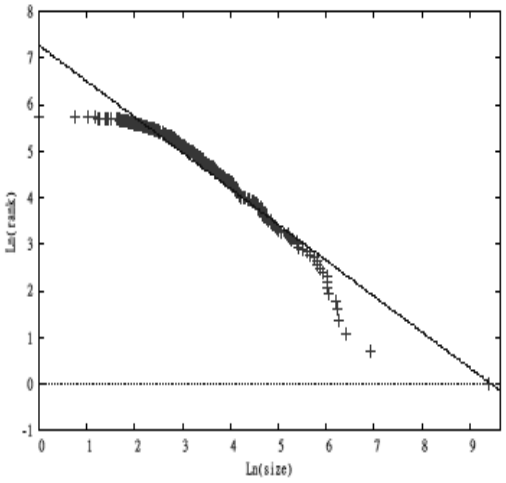
Table 1. Classification of the Russian cities per population in 2014

Federal district	Small towns, up to 20 thous. people		Medium cities, 20 – 100 thous. people		Large cities, 100 – 250 thous. people		Big cities, 250 -1000 thous.people	
	qty of units	Ratio, %	qty of units	Ratio, %	qty of units	Ratio, %	qty of units	Ratio, %
Central	139	45	124	40	27	9	17	6
North-western	84	56	53	36	4	3	7	5
Southern	19	24	43	53	9	12	8	11
North- Caucasian	7	13	35	62	9	16	5	9
Privolzhsky	71	36	95	47	15	8	17	9
Ural	32	23	86	62	11	8	10	7
Siberian	44	34	65	50	11	8	10	8
Far Eastern	30	46	26	39	6	9	4	6
Total per Russia	**426**	**38**	**527**	**47**	**92**	**8**	**78**	**7**

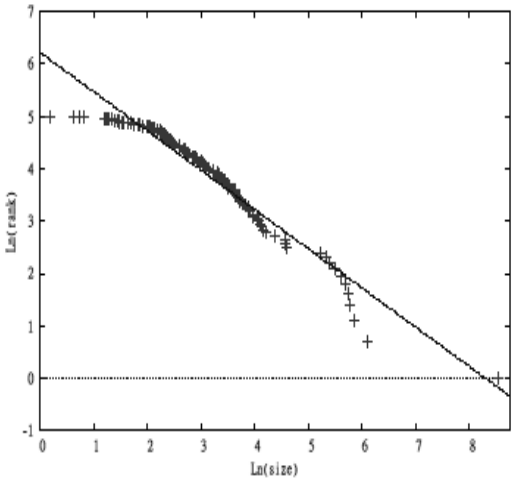
At the Russian territory the most part of cities of the medium size. In some districts small towns are prevailing: In Central federal district − 45% of total number, North-Western federal district − 56 %. As analysis results show average number of small and medium cities exceeds number of large and big ones in five times. For calculation in research method of least squares is used for distribution exponent determination.

Graphs which show regularity rank-size (Zipf's law) in cities at regional and national level in the Russia are indicated in Fig. 1.

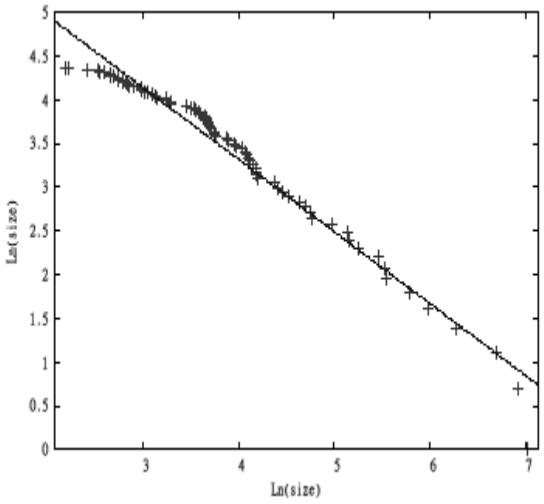
Figure 1 Dependence "rank-size", calculated for the Russian cities in total and per federal districts



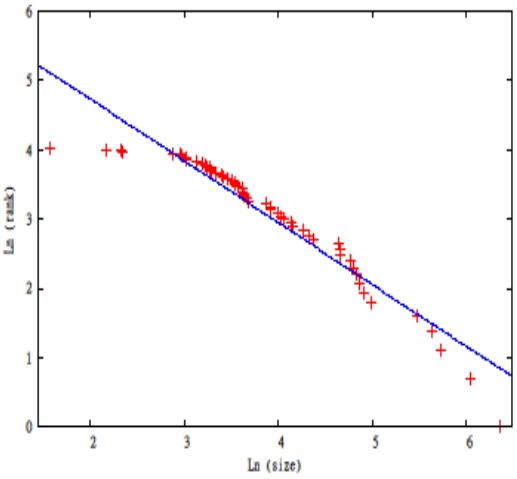
a) Central federal district



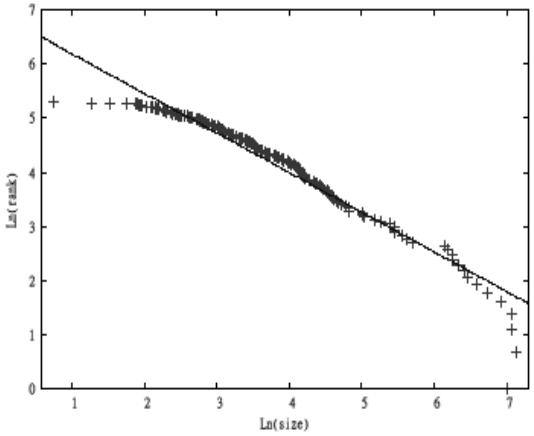
b) North-western federal district



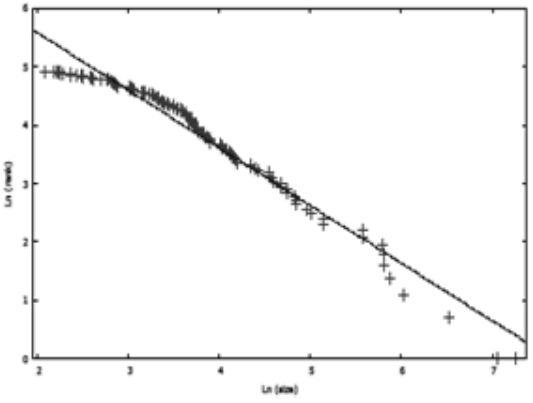
c) Southern federal district



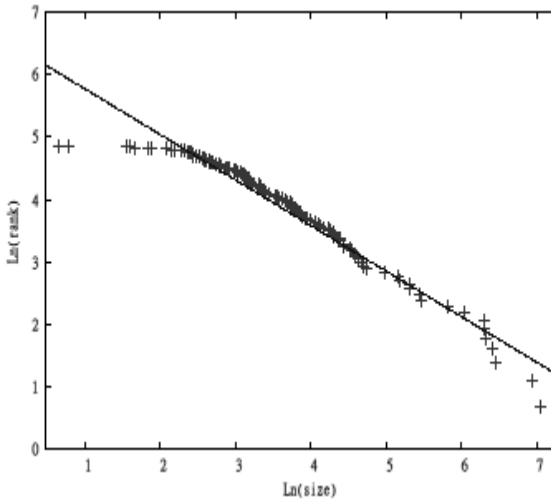
d) North-Caucasian federal district



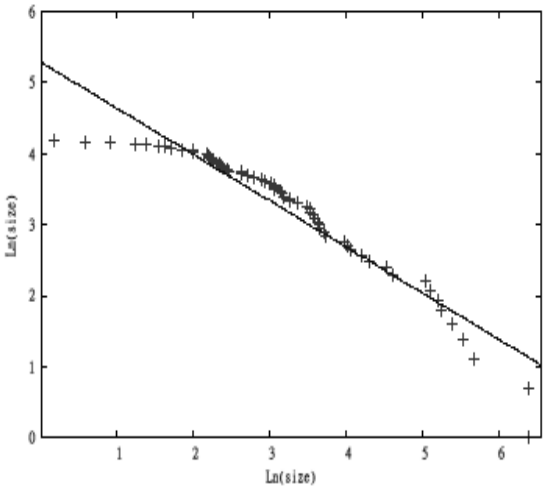
e) Privolzhsky federal district



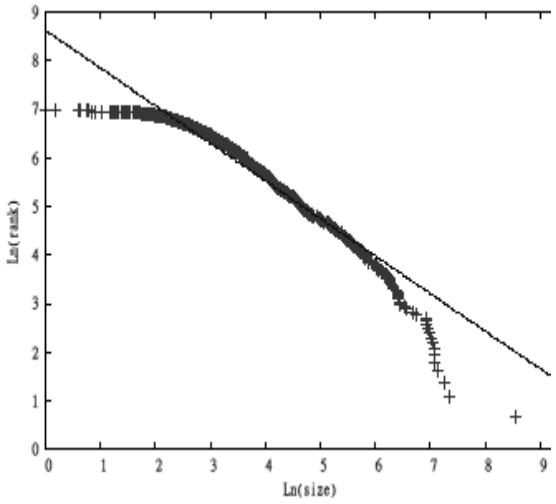
f) Ural federal district



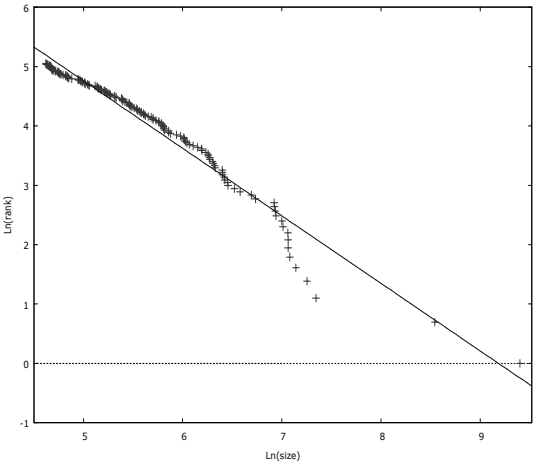
g) Siberian federal district



h) Far Eastern federal district



i) Russian cities, total



g) Russian cities with population exceeding 100 thous. people

Conventional symbols: + - observed; − - linear.

In Central federal district distribution of population corresponds to Zipf's law except for very small towns (1,000-6,000 people) and nine largest cities (408,500-1,014,600 people). It is noticeable that Moscow falls within the scope of Zipf's law. For such cities as Voronezh, Yaroslavl, Ryazan, Lipetsk, Tula, Kursk, Tver, Ivanovo, Bryansk, it is necessary to increase population.

In Northern-Western federal district small towns with population from 1,200 to 5,800 people, large cities – from 187,300 to 448,500 people fall within the scope of Zipf's law. Saint-Petersburg falls within the scope of Zipf's law at that its population can be even less.

In Southern federal district there is a following situation: small towns (9,000-18,000 people) do not correspond to the distribution of Zipf's law. Large cities − Rostov-on-Don (1,109,800 people) and Volgograd (1,018,000 people) − it is reasonable to increase population.

Due to the North-Caucasian federal district it shall be noted that such large cities as Makhachkala (578,300 people), Stavropol (419,800 people), Vladikavkaz (307,300 people), big cities - Pyatigorsk (146,000 people) and Khasavyurt (135,300 people) shall increase their population. Small towns with population from 4,800 people to 10,400 people in North-Caucasian district do not fall within the Zipf's law.

Within the territory of Privolzhsky federal district exception from Zipf's law is small towns with population from 2,100 to 5,800 people, large cities – from 1,096,700 to 1,263,900 people (Nizhny Novgorod, Kazan, Samara, Ufa).

In Ural federal district bright discrepancy to Zipf's law is detected in Ekaterinburg (1,412,300 people) and Chelyabinsk (1,169,400 people). Increasing of population is required for such cities as Tyumen (679,900 people), Magnitogorsk (414,900 people), Nizhny Tagil (357,300 people), Surgut (332,300 people). Population of small towns which do not correspond to rank-size law is varied from 8,000 to 16,100 people.

IN Siberian federal district Zipf's law covers small towns (1,900-8,600 people) and large Novosibirsk (1,547,900 people), Omsk (1,166,100 people), Krasnoyarsk (1,035,500 people), Barnaul (632,800 people), Irkutsk (613,000 people).

At the territory of Far Eastern federal district Zipf's law covers small towns with population from 9,400 to 11,800 people, in medium from 58,800 to 94,300 people, and in large one − Artem (102,400 people). For all the rest cities of the federal district Zipf's law is not implemented.

At check of Zipf's law in total for the Russian cities the following statements were detected. The law covers small towns with population from 8,600 to 15,300 people, large – from 66,700 to 331,000 people.

Basing on the analysis results of cities with population exceeding 100 thous. people. The following conclusion can be made: Zipf's law does not cover cities with population exceeding mln. people (except for Saint-Petersburg).

Results of Zipf's law analysis within the Russian cities are indicated in Table 2.

Table 2. Results of Zipf's law analysis in the Russian cities per federal districts in 2014

Federal district	Qty of cities in federal district, units	Territory area, thous. km^2	Minimum population of cities included in federal district, thous.people	Maximum population of cities included in federal district, thous.people	Coefficient of Zipf for district city, coeff.
Central	307	650	1	12108.3	- 0.76
North-western	148	1677.9	1.2	5132	- 0.7
Southern	79	421.3	9	1109.8	- 0.82
North- Caucasian	56	170	4.8	578	- 0.9
Privolzhsky	198	1037	2.1	1096.7	- 0.73
Ural	139	1789	8	1169.4	- 0.9
Siberian	130	5114.8	1.9	1547.9	- 0.7
Far Eastern	66	6000	1.2	603.2	- 0.65
Total per Russia	1123	16860	1	12108.3	- 0.77

We have studied exposure of Zipf's law separately in each Russian federal district in 2014. This allows determining the following particularities. In total Zipf's law covers the entire territory of Russia. Per districts, Zipf coefficient is varied within the range from –0.65 (Far Eastern federal district) to –0.9 (Ural and North-Caucasian federal districts). We suppose that evenness of hierarchy of cities included in Ural and North-Caucasian federal districts is determined to the fact that in Ural federal district 139 cities are located at the territory of 1789 thous. km^2, in Caucasian - 56 cities − at 170 thous. km^2. In Far East cities are located rare - 66 cities at the territory 6000 thous. km^2 (Zipf coefficient − -0.65).

As a result of the analysis on Russian cities sampling with population exceeding 100 thous. people, we have obtained Zipf coefficient -1.13, that indicates even distribution of cities to be studied at the Russian territory in total. High values of R^2 (app. 0.9) indicate presence of strong binding: "rank-size".

6. Conclusion

In the present article we have checked implementation of Zipf's law at regional and national level in Russia in 2014. Survey has included settlements with "city" status with population in 2014 from 1000 people to 12108.3 thous. people. Individually analysis on sampling of cities with population exceeding 100 thous. people was performed.

We have detected that Zipf's law is implemented within the Russian territory in various degree. Analyzing federal districts separately we have determined that the present law does not cover small towns with population from 1,000 people to 18 thous. people and large from 135.3 thous. people to 5,132 thous. people. It shall be noted that Moscow in Central federal district corresponds to Zipf's law. At check of Zipf's law totally for the Russian cities we have detected that the law covers small (8,600 people -15,300 people) and large (66,700 people – 331,000 people) cities. The most interesting is sampling of cities with population exceeding 100,000 people. In this group Zipf's law does not cover cities with population exceeding 1 mln. people (except for Saint-Petersburg).

Within Russia, Zipf coefficient is varied within the range from -0.64 (Far Eastern federal district) to 0.9 (Ural and North-Caucasian federal districts). At analysis of sampling of cities with population exceeding 100 thous. people Zipf coefficient was - 1.13, which indicates evenness of cities hierarchy in this sampling. Result of the surveys performed was verification of hypothesis upon the presence of dependence of Zipf coefficient on sizes of geographical territory of federal district.

References

1. Alperovich, G. (1984), "The size distribution of cities: On the empirical validity of the rank-size rule". Journal of Urban Economics, 16, 232-239
2. Andreev, V., Lukiyanova, V. (2015), "Proverka zakona Gibrata dlya naselennykh punktov Chuvashskoi respubliki" [Check Gibrat law for the settlements of the Chuvash Republic]. Vestnik Chuvashskogo universiteta = Bulletin of Chuvash University, 1, 154–161.
3. Auerbach, F. (1913), "Das gesetz der bevolkerungskoncentration". Petermanns Geographische Mitteilungen, 59, 74-76.
4. Beckmann, M. (1999), Lectures on location theory. Berlin: Springer
5. Benguigui, L., Blumenfeld-Lieberthal, E. (2007), "A dynamic model for city size distribution beyond Zipf's law". Physica A: Statistical Mechanics and Its Applications,384, 613-627.
6. Brakman, S., Garretsen, H., Marrewijk, C., & Berg, M. (1999), "The Return of Zipf: Towards a Further Understanding of the Rank-Size Distribution". Journal of Regional Science, 31(9), 182-213.
7. Cameron, T. A. (1990), "One-stage structural models to explain city size". Journal of Urban Economics, 27(3), 294-307.
8. Clauset, A., Shalizi, C., Newman, M. (2009), "Power-Law Distributions in Empirical Data". SIAM Rev. SIAM Review, 51, 661-703.
9. Goldstein, M., Morris, S., Yen, G. (2004), "Problems with fitting to the power-law distribution". The European Physical Journal B Eur. Phys. J. B, 41, 255-258.
10. Goula M., Ladias C., Gioti-Papadaki O., Hasanagas N. (2015), "The spatial dimension of environment-related attitudes: does urban or rural origin matter?" Regional Science Inquiry, Vol. VII, (2), pp. 115-129
11. Jiang, B., Jia, T. (2011), "Zipf's law for all the natural cities in the United States: A geospatial perspective". International Journal of Geographical Information Science,25(8), 1269-1281
12. Krugman, P. (1996), "Confronting the Mystery of Urban Hierarchy". Journal of the Japanese and International Economies, 10(4), 399-418

13. Mansury, Y., Gulyás, L. (2007), "The emergence of Zipf's Law in a system of cities: An agent-based simulation approach". Journal of Economic Dynamics and Control, 31, 2438-2460.

14. Moura, N., Ribeiro, M. (2006), "Zipf's law for Brazilian cities". Physica A: Statistical Mechanics and Its Applications, 367, 441-448

15. Newman, M. (2005), "Power laws, Pareto distributions and Zipf's law". Contemporary Physics, 46(5), 323-351.

16. Rastvortseva S.N., Chentsova A.S. (2015), "Regional specialization and geographical concentration of industry in Russia". Regional Science Inquiry, Vol. VII, (2), pp. 97-106

17. Xu, Z., Harriss, R. (2010), "A Spatial and Temporal Autocorrelated Growth Model for City Rank--Size Distribution". Urban Studies, 47(2), 321-335

SPATIAL VARIATIONS OF EMPLOYMENT CHANGE IN GREECE OVER THE EARLY-CRISIS PERIOD (2008-2011)

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Abstract

Towards conceptualizing and understanding the spatial impact of the contemporary economic crisis, the paper scrutinizes the spatial variations of employment change in Greece. To this end, the paper employs a trade-adjusted shift-share analysis; a shift-share formulation accounting for employment changes resulting from changes in exports, imports and domestic demand. Trade-adjusted shift-share analysis is employed against the backdrop of the world economy, on the basis of employment data that refer to NACE Rev. 2 aggregation sectoral levels and to NUTS II spatial level, and covers the early-crisis period (2008-2011). The results obtained highlight the negative national effect component as an outcome of the shocks and the upsets that the Greek economy has suffered. The industry mix component and the competitive shift component are positive only for specific regions and sectors. Particularly, for the industry mix component it comes that all Greek regions specialize in sectors that, at the national level, are export-declining and import-declining and experience labor productivity losses.

Keywords: economic crisis, employment change, Greek regions, trade-adjusted shift-share analysis

JEL classification: C10, F10, L16, R11, R12

1. Introduction

Towards conceptualizing and understanding the spatial impact of the contemporary economic crisis, the paper scrutinizes the spatial variations of employment change in Greece, a country being within a stressful context of economic recession, fiscal consolidation and structural adjustment (Greek Ministry of Finance 2010, 2011 and 2012); an outcome of both exogenous and endogenous factors (Oltheten et al. 2003, Kotios and Pavlidis 2012, Petrakos et al. 2012, inter alia). To this end, the paper employs the trade-adjusted shift-share analysis; a shift-share formulation accounting for employment changes resulting from changes in exports, imports and domestic demand. Trade-adjusted shift-share analysis is employed against the backdrop of the world economy and covers the early-crisis period (2008-2011). Though small in duration, the period of analysis is extremely importance as it captures the shocks and the upsets that the Greek economy has suffered, just after the eruption of the economic crisis.

The analysis is employed on the basis of employment data, derived from the Hellenic Statistical Authority (ELSTAT 2015), that refer to NACE Rev. 2 aggregation sectoral levels and the NUTS II spatial level. Employment has been preferred over GDP as measure of analysis under the rationale that employment data is the most available, at a timely manner, input for evidence-based policy-making at the regional level. Apparently, this allows for a systematic account as regards the spatial impact of economic crisis. National-sectoral-level

data for GDP are derived from ELSTAT (2015) while trade activity (i.e. value of exports and imports flows), necessary for the application of the trade-adjusted shift-share analysis, are derived from UN (2015a, 2015b). Both variables are expressed in real (i.e. inflation-adjusted) terms (i.e. constant, year 2000, prices), with the utilization of deflators obtained from the World Bank. Due to the fact that trade data refer to SITC sectoral level, the necessary sectoral arrangements have been made for the sake of compatibility with the corresponding employment and GDP data.

The paper is organized as follows: The next section describes the trade-adjusted shift-share analysis. The third section sketches the profile of the Greek regions. The fourth section discusses the results derived from the application of the trade-adjusted shift-share analysis. The last section offers the conclusions.

2. The trade-adjusted shift-share analysis

Shift-share analysis is a method of decomposing regional employment growth patterns into expected (share) and differential (shift) components. On the basis of the propositions made by Dunn (1959), Rosenfeld (1959) and Esteban-Marquillas (1972), the standard shift-share analysis treats regional employment changes (i.e. gains or losses) between two points in time as the sum of three components: (a) the national effect, (b) the industry mix, and (c) the competitive shift. The national effect component represents the share of regional job growth attributable to growth of the national economy (i.e. how much regional growth can be attributed to the national growth?). The industry mix component represents the share of regional job growth attributable to differences in industry and total national growth rates (i.e. how much regional growth can be attributed to the region's mix of industries?). The competitive shift component represents the share of regional job growth attributable to differences in regional and national industrial growth rates (i.e. how much regional growth can be attributed to the region's competitiveness?).

Let E be standing for employment, i for sectors, r for regions, for base (initial) year, and t for terminal (final) year. The change in regional employment is given by: $\Delta E^r = \sum_i E^r_{i0} e^r_i$, where $e^r_i = \frac{E^r_{it} - E^r_{i0}}{E^r_{i0}}$. The regional employment change can be, further, decomposed as the sum of the national effect, the industry mix and the competitive shift:

$$\Delta E^r \equiv \underbrace{\sum_i E^r_{i0} e}_{national\_effect} + \underbrace{\sum_i E^r_{i0}\left(e_i - e\right)}_{industry\_mix} + \underbrace{\sum_i E^r_{i0}\left(e^r_i - e_i\right)}_{competitive\_shift},$$

where $e_i = \frac{\sum_r E^r_{it} - E^r_{i0}}{\sum_r E^r_{ir}}$ and $e = \frac{\sum_i \sum_r E^r_{it} - E^r_{i0}}{\sum_i \sum_r E^r_{i0}}$.

Shift-share analysis was first applied by Dunn (1960), for the calculation of employment changes in the USA over the period 1939-1954, even though its origins date back in the 1940s (Jones 1940, Creamer 1943). Later on, it was popularized, mainly, by the contributions made by Fuchs (1962) and Ashby (1964), who measured the corresponding employment changes over the periods 1929-1954 and 1940-1960, respectively. Despite the lack of theoretical substance and the criticism surfaced (see, *inter alia*, Houston 1967, MacKay 1968, Cunningham 1969, Richardson 1978, Theil and Gosh 1980, Bartels et al. 1982), shift-share analysis became, pretty soon, an extremely useful, and easy-to-use, tool for regional economists trying to sketch the economic profiles of regional economies.

Yet, one serious criticism against the (standard) shift-share analysis has to do with the use of the national economy as the norm against the measurement of changes in the regional (i.e. sub-national) economies as international trade - the first type of linkage between economic entities (Cornett 1996), and one of the most expedient (economic) factors in pushing economies into integration (Paas and Tafenau 2008) - becomes increasingly important to both national and, consequently, regional economies. Indeed, the process of (economic) integration eliminates border obstacles in factor movements and further intensifies itself via the reduction of transactions costs (Kallioras et al. 2009). The abolition of border obstacles allows for the

emergence of several spatial forces related to exports and imports competition, thus increasing regional competition (Brülhart et al. 2004). In an attempt to deal with this criticism, Markusen et al. (1991) modified shift-share analysis proposing a trade-adjusted shift-share counterpart – the trade-adjusted shift-share analysis – where the conventional national effect and industry mix components are, further, disaggregated to account for regional employment growth resulting from changes in exports, imports and domestic demand. In addition, since output has been used as the base against which the relative importance of both imports and exports has been measured, the national effect and industry mix components have been, further, extended to account for possible effects on employment due to productivity gains. That is, it represents hypothetical losses in employment in cases where output growth leads to disproportionately smaller employment growth.[1]

Trade-adjusted shift-share analysis is based on the relationship: $Q = D + X - M$, where Q is the value of production (i.e. GDP), D is domestic demand (i.e. apparent consumption), X stands for exports and M stands for imports.

The national effect component of the trade-adjusted shift-share analysis is given by: $\sum_i E_{i0}^r e = \sum_i E_{i0}^r (e + q - q) = \sum_i E_{i0}^r q + \sum_i E_{i0}^r (e - q)$. In this relationship, $q = \frac{Q_t - Q_0}{Q_0}$ is the national-level growth of output. The term $\sum_i E_{i0}^r q$ can be, further, decomposed as: $\sum_i E_{i0}^r q = \sum_i E_{i0}^r \left(d \frac{D_0}{Q_0} + x \frac{X_0}{Q_0} - m \frac{M_0}{Q_0} \right)$, where $d = \frac{D_t - D_0}{D_0}$ represents growth in domestic demand, $x = \frac{X_t - X_0}{X_0}$ growth in exports, and $m = \frac{M_t - M_0}{M_0}$ growth in imports. The national effect component of the trade-adjusted shift-share analysis is fully decomposed as:

$$\sum_i E_{i0}^r e = \underbrace{E_0^r \left(d \frac{D_0}{Q_0} \right)}_{\text{domestic\_demand\_national\_effect}} + \underbrace{E_0^r \left(x \frac{X_0}{Q_0} \right)}_{\text{exports\_national\_effect}} - \underbrace{E_0^r \left(m \frac{M_0}{Q_0} \right)}_{\text{imports\_national\_effect}} + \underbrace{E_0^r (e - q)}_{\text{labor\_productivity\_national effect}}.$$

It can be confirmed that: $q = d \frac{D_0}{Q_0} + x \frac{X_0}{Q_0} - m \frac{M_0}{Q_0}$.

The industry mix component of the trade-adjusted shift-share analysis is obtained by the relationship: $\sum_i E_{i0}^r (e_i - e) = \sum_i E_{i0}^r (q_i - q) + \sum_i E_{i0}^r ((e_i - e) - (q_i - q))$. The term $\sum_i E_{i0}^r (q_i - q)$ can be, further, decomposed, yielding:

$$\sum_i E_{i0}^r (q_i - q) = \sum_i E_{i0}^r \left[\left(d_i \frac{D_{i0}}{Q_{i0}} + x_i \frac{X_{i0}}{Q_{i0}} - \frac{M_{i0}}{Q_{i0}} \right) - \left(d \frac{D_0}{Q_0} + x \frac{X_0}{Q_0} - \frac{M_0}{Q_0} \right) \right].$$ The latter becomes:

$$\sum_i E_{i0}^r (q_i - q) = \underbrace{\sum_i E_{i0}^r \left(d_i \frac{D_{i0}}{Q_{i0}} - d \frac{D_0}{Q_0} \right)}_{\text{domestic\_demand\_industry\_mix}} + \underbrace{\sum_i E_{i0}^r \left(x_i \frac{X_{i0}}{Q_{i0}} - x \frac{X_0}{Q_0} \right)}_{\text{exports\_industry\_mix}} - \underbrace{\sum_i E_{i0}^r \left(m_i \frac{M_{i0}}{Q_{i0}} - m \frac{M_0}{Q_0} \right)}_{\text{imports\_industry\_mix}}.$$

Thus, the industry mix component of the trade-adjusted shift-share analysis can be, fully, decomposed as:

[1] At this point, it should be noted that in Markusen et al. (1991) there have been some typographical errors that prevent the reader to fully comprehend the proposed methodology. These errors have offered the opportunity for a fertile discussion of this methodological proposition in the literature (Dinc and Haynes 1998a and1998b). Noponen et al. (1998) account for these errors and respond to the comments raised. Thenceforth, there have been many empirical studies in the literature deploying the trade-adjusted shift-share analysis (Fotopoulos et al. 2010, Kowaleski 2011, Chiang 2012, *inter alia*).

$$\sum_i E_{i0}^r (e_i - e) = \underbrace{\sum_i E_{i0}^r \left(d_i \frac{D_{i0}}{Q_{i0}} - d \frac{D_0}{Q_0} \right)}_{\text{domestic\_demand\_industry\_mix}} + \underbrace{\sum_i E_{i0}^r \left(x_i \frac{X_{i0}}{Q_{i0}} - x \frac{X_0}{Q_0} \right)}_{\text{exports\_industry\_mix}} - \underbrace{\sum_i E_{i0}^r \left(m_i \frac{M_{i0}}{Q_{i0}} - m \frac{M_0}{Q_0} \right)}_{\text{imports\_industry\_mix}} + \underbrace{\sum_i E_{i0}^r \left((e_i - e) - (q_i - q) \right)}_{\text{labor\_productivity\_industry\_mix}}$$

The competitive shift component of the trade-adjusted shift-share analysis remains the same as in the standard version of the method.

As far as the interpretation of the components of the trade-adjusted shift-share analysis is concerned, it should be noted that the national effect component has four sub-components: (a) the domestic demand national effect, (b) the exports national effect, (c) the imports national effect, and (d) the labor productivity national effect. These sub-components would represent, respectively, the effect on employment through a residual effect of national demand shifts, the hypothetical effect if employment were to expand proportionately to national exports, the effect on employment through national imports substituting for domestic production, and a correction factor as productivity gains (losses) may lead to employment losses (gains) if output growth leads to disproportionately smaller (greater) job growth. The industry mix component of the trade-adjusted shift-share analysis, also, has four sub-components: (a) the domestic demand industry mix, (b) the exports industry mix, (c) the imports industry mix, and (d) the labor productivity industry mix. These sub-components would represent, respectively, the residual effect of domestic demand on local industries, the hypothetical employment effect as if a region's industries expanded proportionally to national export sales in those industries, the hypothetical employment effect through import substitution for region's industries, and a correction factor as productivity gains (losses) may lead to employment losses (gains) if the national-level productivity growth of the region's industrial structure has outperformed (lagged-behind) the corresponding productivity growth of the nation's industrial structure. Evidently, the employment effects attributed to domestic demand, exports and imports shifts are all hypothetical. The basic assumption is that output-based measures are translated into jobs as if employment-to-output ratios had remained constant. The labor productivity components come into play to account (as correction factors) for possible shifts of employment-output ratios.

Within the framework of internationalization / economic integration, (especially) the decomposition of the industry mix component of the trade-adjusted shift-share analysis, and the consequent interpretation of the results, is of great importance. This is so as international trade has a direct impact on the level and the nature of regional sectoral specialization, changing, significantly, the mix of opportunities and threats of the external environment (comparing to the corresponding mix of a closed economy) and accentuating the importance of the indigenous strengths and weaknesses.

The domestic demand industry mix sub-component is positive when: $\frac{D_{it} - D_{io}}{Q_{i0}} - \frac{D_t - D_0}{Q_0} > 0$. This means that: (a) a sector faces domestic demand expansion, at the national level, whereas total economy faces domestic demand decline, or (b) a sector faces domestic demand expansion, at the national level, at a higher rate than total economy, or (c) a sector faces domestic demand decline, at the national level but at a lower rate than total economy. In contrast, the domestic demand industry mix sub-component is negative when: $\frac{D_{it} - D_{io}}{Q_{i0}} - \frac{D_t - D_0}{Q_0} < 0$. This means that: (a) a sector faces domestic demand decline, at the national level, whereas total economy faces domestic demand expansion, or (b) a sector faces domestic demand expansion, at the national level, but at a lower rate than total economy, or (c) a sector faces domestic demand decline, at the national level, at a higher rate than total economy.

The exports industry mix sub-component is positive when: $\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$. This means that: (a) a sector is export-expanding, at the national level, whereas total economy is export-declining, or (b) a sector is export-expanding, at the national level, at a higher rate than total economy, or (c) a sector is export-declining, at the national level, but at a lower rate than total economy. In contrast, the exports industry mix sub-component is negative when: $\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}<0$. This means that: (a) a sector is export-declining, at the national level, whereas total economy is export-expanding, or (b) a sector is export-expanding, at the national level, but at a lower rate than total economy, or (c) a sector is export-declining, at the national level, at a higher rate than total economy.

The imports industry mix sub-component is positive when: $\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$. This means that: (a) a sector is import-expanding, at the national level, whereas total economy is import-declining, or (b) a sector is import-expanding, at the national level, at a higher rate than total economy, or (c) a sector is import-declining, at the national level, but at a lower rate than total economy. In contrast, the imports industry mix sub-component is negative when: $\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}<0$. This means that: (a) a sector is import-declining, at the national level, whereas total economy is import-expanding, or (b) a sector is import-expanding, at the national level, but at a lower rate than total economy, or (c) a sector is import-declining, at the national level, at a higher rate than total economy.

The labor productivity industry mix sub-component is positive when: $(q_i-e_i)-(q-e)\succ 0$. This means that: (a) a sector experiences productivity increase, at the national level, whereas total economy experiences productivity decrease, or (b) a sector experiences productivity increase, at the national level, at a higher rate than total economy, or (c) a sector experiences productivity decline, at the national level, but at a lower rate than total economy. In contrast, the labor productivity industry mix sub-component is negative when: $(q_i-e_i)-(q-e)\prec 0$. This means that: (a) a sector experiences productivity decrease, at the national level, whereas total economy experiences productivity increase, or (b) a sector experiences productivity increase, at the national level, but at a lower rate than total economy, or (c) a sector experiences productivity decline, at the national level, at a higher rate than total economy.

3. The profile of the Greek regions

Greece is divided into 13 NUTS II regions, namely: Anatoliki Makedonia & Thraki, Kentriki Makedonia, Dytiki Makedonia, Thessalia, Ipeiros, Ionia Nisia, Dytiki Ellada, Sterea Ellada, Peloponnisos, Attiki, Voreio Aigaio, Notio Aigaio, and Kriti. Attiki is the capital region of Greece, where the capital city of Athens is situated. Kentriki Makedonia hosts the city of Thessaloniki, the second Greek metropolitan area. Ionia Nisia, Voreio Aigaio, Notio Aigaio, and Kriti are entirely insular regions. The rest of the Greek regions are mainly continental. Dytiki Makedonia is the only Greek region which has no access to the sea. Figure 1 depicts the nomenclature of Greek regions and Table 1 presents some stylized facts. Notable is the fact that jointly the regions of Attiki and Kentriki Makedonia concentrate more than the 50% of Greece's population and produce more than the 50% of Greece's GDP.

Figure 1: The nomenclature of the Greek regions

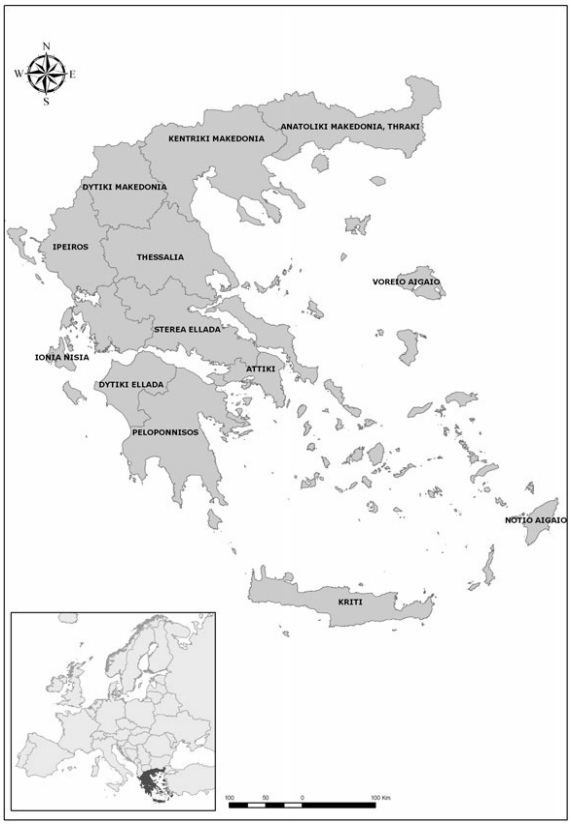

Table 1: Stylized facts for the Greek regions, year 2011

REGION NAME	AREA		POPULATION		GDP	
	(km^2)	(% country)	(inhabitants)	(% country)	(€)	(% country)
Anatoliki Makedonia & Thraki	14,157	10.7	608,182	5.6	307,879	5.0
Kentriki Makedonia	19,146	14.5	1,881,869	17.4	1,011,962	16.3
Dytiki Makedonia	9,451	7.2	283,689	2.6	145,668	2.4
Thessalia	14,036	10.6	732,762	6.8	395,931	6.4
Ipeiros	9,203	7.0	336,856	3.1	188,030	3.0
Ionia Nisia	2,306	1.7	207,855	1.9	128,659	2.1
Dytiki Ellada	11,350	8.6	679,796	6.3	395,858	6.4
Sterea Ellada	15,549	11.8	547,390	5.1	297,289	4.8
Peloponnisos	15,489	11.7	577,903	5.3	339,639	5.5
Attiki	3,808	2.9	3,827,624	35.4	2,355,002	38.0
Voreio Aigaio	3,835	2.9	199,231	1.8	101,125	1.6
Notio Aigaio	5,285	4.0	308,975	2.9	170,099	2.7
Kriti	8,335	6.3	623,065	5.8	354,678	5.7
GREECE	**131,950**	**100.0**	**10,815,197**	**100.0**	**6,191,819**	**100.0**

Source: ELSTAT (2015) / Authors' Elaboration

Tables 2 and 3 present the sectoral employment allocation of Greek regions. 9 NACE-2 sectors considered, namely: agricultural products, manufacturing products, construction,

transport & travel, informatics & information services, financial & insurance services, cultural & recreational services, government services, and other business services.

The overwhelming majority of sectors is highly concentrated in the capital region of Attiki with shares ranging (year 2011) from 33% (construction) to 68% (informatics & information services). The only exception to that is the sector of agricultural products that is mainly concentrated in the other metropolitan region of Kentriki Makedonia. This fact verifies the prevailing role of the metropolitan region of Attiki that generates imbalances in the production pattern of Greece not only by producing over the half of GDP but also by presenting high concentration levels in nearly all the production sectors. Slight trends of partial de-concentration seem to have taken place during the early-crisis period as the concentration shares in most of the sectors in Attiki have decreased (exceptions are found to the sectors of agricultural products, construction and government services).

Under a different perspective, noteworthy is the fact that nearly all Greek regions specialize primarily in the sector of transport & travel (except Peloponnisos that specialize in agricultural products) and secondarily in government services. Greece's production base historically - due to poor industrial performance and deindustrialization trends - was restructured, mainly, towards local-scale services (i.e. government services) as well as in tourism activities (Panteladis and Tsiapa 2012). Noteworthy is, also, the fact that no Greek region specialize in the sectors of construction, informatics & information services, financial & insurance services, cultural & recreational services, and other business services underlying their low-tech services specialization ability.

Table 2: Sectoral employment allocation (% country) in the Greek regions, years 2008 and 2011

REGION NAME	agri/al products		manuf/ng products		const/on		trans/rt & travel		info/ics & info/ion services		fin/al & ins/nce services		cult/al & recr/al services		gov/ment services		other buss/ss services	
	(% country)		(% country)		(% country)		(% country)		(% country)		(% country)		(% country)		(% country)		(% country)	
	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011
Anatoliki Makedonia & Thraki	11.0	10.9	5.0	4.5	4.7	3.4	4.0	4.1	1.7	2.1	3.0	3.0	3.0	2.7	5.6	5.6	3.7	3.2
Kentriki Makedonia	17.6	16.7	20.0	19.2	16.2	12.6	16.5	16.8	13.0	14.4	11.5	13.4	15.6	15.1	15.8	16.0	17.1	16.0
Dytiki Makedonia	3.6	3.2	3.6	4.4	3.0	2.4	1.8	2.0	0.3	0.5	1.2	1.2	1.6	1.6	2.4	2.3	0.8	1.3
Thessalia	11.7	13.1	6.4	5.9	6.6	5.6	5.5	5.7	0.6	0.9	3.8	3.9	4.9	4.7	7.2	6.3	4.0	4.4
Ipeiros	4.9	4.7	2.3	2.8	3.9	4.3	2.5	2.8	0.9	0.6	1.7	1.6	2.2	1.8	3.5	3.3	1.8	2.2
Ionia Nisia	3.0	3.1	0.8	0.9	2.4	2.8	2.9	2.6	0.1	0.2	0.9	1.4	1.8	1.9	1.4	1.5	1.7	1.7
Dytiki Ellada	10.9	11.1	4.2	4.7	7.2	7.9	5.8	6.0	3.0	3.3	3.7	3.9	4.1	5.8	6.4	6.3	4.5	4.6
Sterea Ellada	8.1	7.6	6.7	7.7	5.7	6.3	4.3	4.1	2.5	2.2	2.9	2.4	3.2	3.4	3.9	3.9	2.7	3.2
Peloponnisos	14.9	13.4	3.9	4.4	5.6	7.3	4.6	4.5	3.0	2.6	2.7	3.1	4.0	5.4	5.0	4.1	2.9	3.2
Attiki	3.0	3.2	40.4	38.8	33.4	33.6	39.9	39.8	69.8	67.9	61.9	60.6	53.2	50.6	39.4	41.3	52.6	51.9
Voreio Aigaio	1.8	1.8	1.0	1.1	1.5	1.8	1.6	1.7	1.1	1.2	1.1	1.0	0.8	0.9	2.2	2.3	0.9	1.0
Notio Aigaio	1.5	1.8	1.7	2.0	3.3	5.3	4.1	3.6	1.2	1.3	1.4	1.2	1.9	1.8	2.3	2.3	2.0	2.5
Kriti	8.0	9.5	3.9	3.6	6.6	6.7	6.4	6.3	2.7	2.7	4.1	3.2	3.7	4.4	4.9	4.9	5.4	4.8
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: ELSTAT (2015) / Authors' Elaboration

Table 3: Sectoral employment allocation (% region) in the Greek regions, years 2008 and 2011

REGION NAME	agri/al products		manuf/ng products		const/on		trans/rt & travel		info/ics & info/ion services		fin/al & ins/nce services		cult/al & recr/al services		gov/ment services		other buss/ss services		**total**	
	(% region)		(% region)		(% region)		(% region)		(% region)		(% region)		(% region)		(% region)		(% region)		(% region)	
	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011	2008	2011
Anatoliki Makedonia & Thraki	23.6	25.6	11.8	10.0	7.3	3.8	24.7	26.2	0.6	0.8	1.5	1.6	3.7	3.7	21.8	23.8	5.0	4.6	**100.0**	**100.0**
Kentriki Makedonia	11.5	11.9	14.4	12.9	7.7	4.3	31.2	33.0	1.4	1.6	1.7	2.1	6.0	6.3	19.0	20.8	7.1	7.1	**100.0**	**100.0**
Dytiki Makedonia	17.1	15.8	18.9	20.5	10.3	5.7	24.4	26.9	0.3	0.4	1.2	1.3	4.4	4.6	21.2	20.8	2.4	4.0	**100.0**	**100.0**
Thessalia	19.7	23.8	11.9	10.1	8.1	4.9	27.1	28.4	0.2	0.2	1.4	1.6	4.9	5.1	22.3	20.9	4.4	5.0	**100.0**	**100.0**
Ipeiros	18.0	17.9	9.5	10.1	10.5	8.0	26.9	30.0	0.5	0.4	1.4	1.4	4.9	4.0	23.9	23.1	4.3	5.1	**100.0**	**100.0**
Ionia Nisia	15.6	17.2	4.9	4.8	9.3	7.5	44.6	40.7	0.1	0.2	1.0	1.7	5.6	6.3	13.3	15.7	5.6	5.9	**100.0**	**100.0**
Dytiki Ellada	19.4	20.2	8.2	8.1	9.4	6.9	30.1	29.9	0.9	0.9	1.5	1.6	4.4	6.3	21.1	20.9	5.1	5.2	**100.0**	**100.0**
Sterea Ellada	18.4	18.5	16.8	17.7	9.5	7.3	28.4	27.5	0.9	0.8	1.5	1.3	4.2	4.9	16.2	17.2	4.0	4.7	**100.0**	**100.0**
Peloponnisos	29.2	28.5	8.4	8.7	8.0	7.5	25.9	26.1	1.0	0.9	1.2	1.4	4.6	6.8	18.1	15.8	3.6	4.2	**100.0**	**100.0**
Attiki	0.9	1.0	12.7	11.2	6.9	5.0	33.0	33.5	3.3	3.2	4.0	4.1	9.0	9.2	20.7	23.1	9.6	9.8	**100.0**	**100.0**
Voreio Aigaio	13.0	12.5	7.7	7.4	7.7	6.1	33.1	32.8	1.3	1.3	1.8	1.6	3.4	3.6	27.9	30.4	4.1	4.2	**100.0**	**100.0**
Notio Aigaio	6.1	7.6	7.7	8.1	9.7	10.8	47.6	42.1	0.8	0.9	1.2	1.2	4.5	4.6	17.3	18.2	5.1	6.5	**100.0**	**100.0**
Kriti	15.4	19.4	8.3	6.9	9.3	6.6	36.1	35.4	0.9	0.8	1.8	1.4	4.2	5.2	17.3	18.2	6.7	6.0	**100.0**	**100.0**

Source: ELSTAT (2015) / Authors' Elaboration

4. Application of the trade-adjusted shift-share analysis for the Greek regions

During the early-crisis period (2008-2011), Greek employment declined at about 13.52%, Greek GDP declined at about 14.29%, Greek exports declined at about 14.13%, and Greek imports declined at about 36.23%. Needless to say, all Greek regions exhibited a decline in terms of employment. Yet, there are some notable exceptions (i.e. slight increases) at the sectoral level, namely: agricultural products (Thessalia, Notio Aigaio, and Kriti), informatics & information services (Anatoliki Makedonia & Thraki, Dytiki Makedonia, Thessalia, and Ionia Nisia), financial & insurance services (Kentriki Makedonia, Ionia Nisia, and Peloponnissos), cultural & recreational services (Dytiki Ellada, Peloponnissos, and Kriti), government services (Ionia Nisia), and other business services (Dytiki Makedonia, Ipiros, Sterea Ellada, and Notio Aigaio).

Table 4 presents the economy-wide results of the trade-adjusted shift-share analysis[2] for the Greek regions with respect to the world. The national effect component is negative for all Greek regions, an outcome of the major shocks and upsets that the Greek economy has experienced (in such a short period). The same holds at the sectoral level, also. The industry mix component is positive for the regions of Anatoliki Makedonia & Thraki, Thessalia, Ionia Nisia, Dytiki Ellada, Peloponnisos, and Voreio Aigaio. The aforementioned regions specialize in sectors that favor employment growth. Noteworthy is that, at the sectoral level, the industry mix component is positive for all Greek regions in the sectors of agricultural products, transport & travel, financial & insurance services, cultural & recreational services, government services, and other business services. In contrast, the industry mix component is negative for all Greek regions in the other sectors considered. The competitive shift

[2] Due to lack of space the trade-adjusted shift-share analysis' results for each particular sector are not provided. Yet, they are available upon request.

component is positive for the regions of Dytiki Makedonia, Ipeiros, Ionia Nisia, Dytiki Ellada, Sterea Ellada, Voreio Aigaio, Notio Aigaio, and Kriti. The aforementioned regions exhibit conditions that favor employment growth. At the sectoral level, the competitive shift component is positive for the regions of Thessalia, Ionia Nisia, Dytiki Ellada, Attiki, Notio Aigaio, and Kriti in the sector of agricultural products; for the regions of Dytiki Makedonia, Ipeiros, Ionia Nisia, Dytiki Ellada, Sterea Ellada, Peloponnisos, Voreio Aigaio, and Notio Aigaio in the sector of manufacturing products; for the regions of Ipeiros, Ionia Nisia, Dytiki Ellada, Sterea Ellada, Peloponnisos, Attiki, Voreio Aigaio, Notio Aigaio, and Kriti in the sector of construction; for the regions of Anatoliki Makedonia & Thraki, Kentriki Makedonia, Dytiki Makedonia, Thessalia, Ipeiros, Dytiki Ellada, and Voreio Aigaio in the sector of transport & travel; for the regions of Anatoliki Makedonia & Thraki, Kentriki Makedonia, Dytiki Makedonia, Thessalia, Ionia Nisia, Dytiki Ellada, Voreio Aigaio, and Notio Aigaio in the sector of informatics & information services; for the regions of Kentriki Makedonia, Dytiki Makedonia, Thessalia, Ionia Nisia, Dytiki Ellada, and Peloponnisos in the sector of financial & insurance services; for the regions of Dytiki Makedonia, Ionia Nisia, Dytiki Ellada, Sterea Ellada, Peloponnisos, Voreio Aigaio, and Kriti in the sector of cultural & recreational services; for the regions of Kentriki Makedonia, Ionia Nisia, Attiki, Voreio Aigaio, Notio Aigaio, and Kriti in the sector of government services; and for the regions of Dytiki Makedonia, Thessalia, Ipeiros, Ionia Nisia, Dytiki Ellada, Sterea Ellada, Peloponnisos, Voreio Aigaio, and Notio Aigaio in the sector of other business services.

Table 4: Results of the trade-adjusted shift-share analysis for the Greek regions with respect to the world, economy-wide, period 2008-2011

REGION NAME	**JOB CHANGE**	NATIONAL EFFECT				**NATIONAL EFFECT**	INDUSTRY MIX				**INDUSTRY MIX**	**COMPETITIVE SHIFT**
		DOMESTIC DEMAND	EXPORTS	(-) IMPORTS	(-) LABOR PROD/TY		DOMESTIC DEMAND	EXPORTS	(-) IMPORTS	(-) LABOR PROD/TY		
Anatoliki Makedonia & Thraki	**-57,145**	-132,623	-27,991	108,440	2,825	**-49,349**	-31,688	-234	27,902	6,619	**2,599**	**-10,395**
Kentriki Makedonia	**-182,750**	-434,072	-91,612	354,921	9,247	**-161,516**	-106,952	-19,890	100,105	24,553	**-2,184**	**-19,050**
Dytiki Makedonia	**-17,946**	-59,445	-12,546	48,606	1,266	**-22,119**	-36,132	3,603	28,687	2,160	**-1,681**	**5,855**
Thessalia	**-64,596**	-167,322	-35,314	136,811	3,565	**-62,260**	-33,518	-3,135	29,205	9,224	**1,776**	**-4,112**
Ipeiros	**-22,417**	-76,461	-16,137	62,519	1,629	**-28,451**	-7,290	-1,698	2,540	6,260	**-189**	**6,223**
Ionia Nisia	**-19,112**	-53,690	-11,331	43,899	1,144	**-19,978**	14,245	-12,749	-8,454	7,185	**226**	**639**
Dytiki Ellada	**-41,623**	-158,949	-33,547	129,965	3,386	**-59,144**	-1,818	-10,902	-388	14,233	**1,124**	**16,397**
Sterea Ellada	**-45,605**	-124,583	-26,294	101,866	2,654	**-46,357**	-61,104	71	51,848	6,505	**-2,681**	**3,433**
Peloponnisos	**-59,080**	-144,865	-30,574	118,450	3,086	**-53,904**	-15,570	-5,082	15,504	8,855	**3,707**	**-8,883**
Attiki	**-375,111**	-991,926	-209,349	811,052	21,132	**-369,091**	-15,822	-67,652	33,450	47,911	**-2,112**	**-3,907**
Voreio Aigaio	**-9,304**	-40,122	-8,468	32,806	855	**-14,929**	5,251	-3,944	-3,900	3,324	**732**	**4,893**
Notio Aigaio	**-24,669**	-70,765	-14,935	57,861	1,508	**-26,331**	14,927	-17,064	-8,540	9,585	**-1,093**	**2,755**
Kriti	**-48,591**	-146,519	-30,923	119,802	3,121	**-54,519**	5,547	-19,127	-2,771	16,127	**-225**	**6,153**

Source: ELSTAT (2015) / UN (2015a, 2015b) / World Bank (2015) / Authors' Elaboration

Table 5 presents the decomposition of the exports industry mix sub-component of the economy-wide trade-adjusted shift-share analysis. The exports industry mix sub-component is positive only in the regions of Dytiki Makedonia and Sterea Ellada. Both regions specialize in sectors that are export-declining, at the national level, but at a lower rate than the total economy. The exports industry mix sub-component is negative in the rest of the Greek regions. These regions specialize in sectors that are export-declining, at the national level, at a higher rate than the total economy. In any case, all sectors are export-declining, at the national level. Therefore, it is wrong to infer that for the regions of Dytiki Makedonia and Sterea Ellada the positive exports industry-mix sub-component suggests specialization in export-expanding sectors.

Table 5: Decomposition of the exports industry mix sub-components of the trade-adjusted shift-share analysis for the Greek regions with respect to the world, economy-wide, period 2008-2011

REGION NAME	(1) $\sum_i E_{i0}^r(\frac{X_{it}-X_{i0}}{Q_{i0}})$	(2) $\sum_i E_{i0}^r(\frac{X_t-X_0}{Q_0})$	(1)-(2)
Anatoliki Makedonia & Thraki	-28,225	-27,991	-234
Kentriki Makedonia	-111,503	-91,612	-19,890
Dytiki Makedonia	-8,943	-12,546	3,603
Thessalia	-38,449	-35,314	-3,135
Ipeiros	-17,835	-16,137	-1,698
Ionia Nisia	-24,081	-11,331	-12,749
Dytiki Ellada	-44,449	-33,547	-10,902
Sterea Ellada	-26,223	-26,294	71
Peloponnisos	-35,656	-30,574	-5,082
Attiki	-277,001	-209,349	-67,652
Voreio Aigaio	-12,411	-8,468	-3,944
Notio Aigaio	-32,000	-14,935	-17,064
Kriti	-50,051	-30,923	-19,127

Source: ELSTAT (2015) / UN (2015a, 2015b) / World Bank (2015) / Authors' Elaboration

Table 6 presents the decomposition of the imports industry mix sub-component of the economy-wide trade-adjusted shift-share analysis. The imports industry mix sub-component (opposite values) is negative only in the regions of Ionia Nisia, Dytiki Ellada, Voreio Aigaio, Notio Aigaio, and Kriti. These regions specialize in sectors that are import-declining, at the national level, but at a lower rate than the total economy. The imports industry mix sub-component (opposite values) is positive in the rest of the Greek regions. These regions specialize in sectors that are import-declining, at the national-level, at a higher rate than the total economy. In any case, all sectors are import-declining, at the national level. Therefore, it is wrong to infer that for the regions of Ionia Nisia, Dytiki Ellada, Voreio Aigaio, Notio Aigaio, and Kriti the negative imports industry mix sub-component (opposite values) suggests specialization in import-expanding sectors.

Table 6: Decomposition of the imports industry mix sub-components of the trade-adjusted shift-share analysis for the Greek regions with respect to the world, economy-wide, period 2008-2011

REGION NAME	(1) $\sum_i E_{i0}^r(\frac{M_{it}-M_{i0}}{Q_{i0}})$	(2) $\sum_i E_{i0}^r(\frac{M_i-M_0}{Q_0})$	-[(1)-(2)]
Anatoliki Makedonia & Thraki	-136,342	-108,440	27,902
Kentriki Makedonia	-455,026	-354,921	100,105
Dytiki Makedonia	-77,293	-48,606	28,687
Thessalia	-166,016	-136,811	29,205
Ipeiros	-65,058	-62,519	2,540
Ionia Nisia	-35,445	-43,899	-8,454
Dytiki Ellada	-129,577	-129,965	-388
Sterea Ellada	-153,714	-101,866	51,848
Peloponnisos	-133,954	-118,450	15,504
Attiki	-844,502	-811,052	33,450
Voreio Aigaio	-28,906	-32,806	-3,900
Notio Aigaio	-49,321	-57,861	-8,540
Kriti	-117,031	-119,802	-2,771

Source: ELSTAT (2015) / UN (2015a, 2015b) / World Bank (2015) / Authors' Elaboration

Table 7 presents the decomposition of the labor productivity industry mix sub-component of the economy-wide trade-adjusted shift-share analysis. Assuming constant employment-to-output ratios over the period considered, shifts in exports, imports and domestic demand translate to employment changes. The labor productivity industry mix sub-component (opposite values) is positive in all Greek regions. This means that all Greek regions specialize in sectors that experience labor productivity losses, at the national level, at rates higher than the total economy. It is thus wrong to infer that all Greek regions specialize in sectors that experience labor productivity gains, at the national level, at rates lower than the total economy.

Table 7: Decomposition of the labor productivity industry mix sub-components of the trade-adjusted shift-share analysis for the Greek regions with respect to the world, economy-wide, period 2008-2011

REGION NAME	-(1) $\sum_i E^r_{i0}(e_i - q_i)$	-(2) $\sum_i E^r_{i0}(e - q)$	-(1)-[-(2)]
Anatoliki Makedonia & Thraki	9,444	2,825	6,619
Kentriki Makedonia	33,801	9,247	24,553
Dytiki Makedonia	3,427	1,266	2,160
Thessalia	12,789	3,565	9,224
Ipeiros	7,888	1,629	6,260
Ionia Nisia	8,328	1,144	7,185
Dytiki Ellada	17,619	3,386	14,233
Sterea Ellada	9,159	2,654	6,505
Peloponnisos	11,941	3,086	8,855
Attiki	69,043	21,132	47,911
Voreio Aigaio	4,179	855	3,324
Notio Aigaio	11,093	1,508	9,585
Kriti	19,248	3,121	16,127

Source: ELSTAT (2015) / UN (2015a, 2015b) / World Bank (2015) / Authors' Elaboration

Overall, it comes that all Greek regions specialize in sectors that, at the national level, are export-declining and import-declining and experience labor productivity losses. The vast majority of the Greek regions specialize in sectors that, at the national level, are export-declining at a higher rate than the total economy, import-declining at a higher rate than the total economy, and experience labor productivity losses at rates higher than the total economy. Apparently, in the regions of Anatoliki Makedonia & Thraki, Thessalia, Ionia Nisia, Dytiki Ellada, Peloponnisos, and Voreio Aigaio the positive impact of imports decline and labor productivity losses manages to counterbalance, in relative terms, the negative impact of exports decline (as the positive values of the industry mix component of the trade-adjusted shift-share analysis indicates).

Towards the categorization of the Greek regions, on the basis of the trade-adjusted shift-share analysis' results, the paper follows the regional classification proposed from Kallioras (2014). Table 8 suggests a sixteen-fold classification that can provide some useful guidelines related to regional-differentiating policies designed to enhance regional development. Regions are attributed to types on the basis of actual values of the exports and imports industry mix sub-components, and the decomposition of the exports and imports industry mix sub-components. On the basis of the trade-adjusted shift-share analysis' classification, regional policies proposed may be expansionary, structural, stabilization or preventive. Expansionary policies encourage the preservation and / or the expansion of competitive advantages, structural policies face development deprivation and contribute to sustainability and the viability of growth, stabilization policies are targeted policies that neutralize or offset certain negative trends in the growth environment, and preventive policies are selective policies that prevent and mitigate negative effects on growth. Each type of policy may be

combined with policies designed at the regional level (i.e. place-based policies) , tailored to regional characteristics and specificities (as reflected in the competitive shift-component).

Table 8: Trade-adjusted shift-share analysis' regional classification, regional characteristics and policies proposed.

REGIONAL TYPE	CRITERIA	REGIONAL CHARACTERISTICS	POLICIES PROPOSED
1	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$; $\frac{X_{it}-X_{io}}{Q_{i0}}>0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	EXPANSIONARY POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$; $\frac{M_{it}-M_{io}}{Q_{i0}}>0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	PREVENTIVE POLICIES
2	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$; $\frac{X_{it}-X_{io}}{Q_{i0}}<0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	STABILIZING POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$; $\frac{M_{it}-M_{io}}{Q_{i0}}<0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	STRUCTURAL POLICIES
3	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$; $\frac{X_{it}-X_{io}}{Q_{i0}}>0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	EXPANSIONARY POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$; $\frac{M_{it}-M_{io}}{Q_{i0}}<0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	STRUCTURAL POLICIES
4	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$; $\frac{X_{it}-X_{io}}{Q_{i0}}<0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	STABILIZING POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$; $\frac{M_{it}-M_{io}}{Q_{i0}}>0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	PREVENTIVE POLICIES
5	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}<0$; $\frac{X_{it}-X_{io}}{Q_{i0}}>0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	STRUCTURAL POLICIES

REGIONAL TYPE	CRITERIA	REGIONAL CHARACTERISTICS	POLICIES PROPOSED
	$\frac{M_{it}-M_{io}}{Q_{i0}} - \frac{M_t-M_0}{Q_0} < 0$; $\frac{M_{it}-M_{io}}{Q_{i0}} > 0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	STABILIZING POLICIES
6	$\frac{X_{it}-X_{io}}{Q_{i0}} - \frac{X_t-X_0}{Q_0} < 0$; $\frac{X_{it}-X_{io}}{Q_{i0}} < 0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	PREVENTIVE POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}} - \frac{M_t-M_0}{Q_0} < 0$; $\frac{M_{it}-M_{io}}{Q_{i0}} < 0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	EXPANSIONARY POLICIES
7	$\frac{X_{it}-X_{io}}{Q_{i0}} - \frac{X_t-X_0}{Q_0} < 0$; $\frac{X_{it}-X_{io}}{Q_{i0}} > 0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	STRUCTURAL POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}} - \frac{M_t-M_0}{Q_0} < 0$; $\frac{M_{it}-M_{io}}{Q_{i0}} < 0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	EXPANSIONARY POLICIES
8	$\frac{X_{it}-X_{io}}{Q_{i0}} - \frac{X_t-X_0}{Q_0} < 0$; $\frac{X_{it}-X_{io}}{Q_{i0}} < 0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	PREVENTIVE POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}} - \frac{M_t-M_0}{Q_0} < 0$; $\frac{M_{it}-M_{io}}{Q_{i0}} > 0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	STABILIZING POLICIES
9	$\frac{X_{it}-X_{io}}{Q_{i0}} - \frac{X_t-X_0}{Q_0} > 0$; $\frac{X_{it}-X_{io}}{Q_{i0}} > 0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	EXPANSIONARY POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}} - \frac{M_t-M_0}{Q_0} < 0$; $\frac{M_{it}-M_{io}}{Q_{i0}} > 0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	STABILIZING POLICIES
10	$\frac{X_{it}-X_{io}}{Q_{i0}} - \frac{X_t-X_0}{Q_0} > 0$;	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING	STABILIZING POLICIES

REGIONAL TYPE	CRITERIA	REGIONAL CHARACTERISTICS	POLICIES PROPOSED
	$\frac{X_{it}-X_{io}}{Q_{i0}}<0$	SECTOR	
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}<0$; $\frac{M_{it}-M_{io}}{Q_{i0}}<0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	EXPANSIONARY POLICIES
11	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$; $\frac{X_{it}-X_{io}}{Q_{i0}}>0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	EXPANSIONARY POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}<0$; $\frac{M_{it}-M_{io}}{Q_{i0}}<0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	EXPANSIONARY POLICIES
12	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}>0$; $\frac{X_{it}-X_{io}}{Q_{i0}}<0$	POSITIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	STABILIZING POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}<0$; $\frac{M_{it}-M_{io}}{Q_{i0}}>0$	NEGATIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	STABILIZING POLICIES
13	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}<0$; $\frac{X_{it}-X_{io}}{Q_{i0}}>0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	STRUCTURAL POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$; $\frac{M_{it}-M_{io}}{Q_{i0}}>0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	PREVENTIVE POLICIES
14	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}<0$; $\frac{X_{it}-X_{io}}{Q_{i0}}<0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	PREVENTIVE POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0$; $\frac{M_{it}-M_{io}}{Q_{i0}}<0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	STRUCTURAL POLICIES
15	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}<0$;	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-EXPANDING SECTOR	STRUCTURAL POLICIES

REGIONAL TYPE	CRITERIA	REGIONAL CHARACTERISTICS	POLICIES PROPOSED
	$\frac{X_{it}-X_{io}}{Q_{i0}}>0$		
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0;\ \frac{M_{it}-M_{io}}{Q_{i0}}<0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-DECLINING SECTOR	STRUCTURAL POLICIES
16	$\frac{X_{it}-X_{io}}{Q_{i0}}-\frac{X_t-X_0}{Q_0}<0;\ \frac{X_{it}-X_{io}}{Q_{i0}}<0$	NEGATIVE EXPORTS INDUSTRY MIX, EXPORT-DECLINING SECTOR	PREVENTIVE POLICIES
	$\frac{M_{it}-M_{io}}{Q_{i0}}-\frac{M_t-M_0}{Q_0}>0;\ \frac{M_{it}-M_{io}}{Q_{i0}}>0$	POSITIVE IMPORTS INDUSTRY MIX, IMPORT-EXPANDING SECTOR	PREVENTIVE POLICIES

Source: Kallioras (2014)

Table 9 presents the classification of the Greek regions, on the basis of the trade-adjusted shift-share analysis' results, and according the trade-adjusted shift-share analysis' classification followed. It turns out that the regions of Anatoliki Makedonia & Thraki, Kentriki Makedonia, Thessalia, Ipeiros, Peloponnisos, and Attiki belong to regional type 6, having negative exports and imports industry-mix sub-components and specialization in export-declining and import-declining sectors; the regions of Dytiki Makedonia and Sterea Ellada belong to regional type 10, having positive exports and negative imports industry-mix sub-components and specialization in export-declining and import-declining sectors; and the regions of Ionia Nisia, Dytiki Ellada, Voreio Aigaio, Notio Aigaio, and Kriti belong to regional type 14, having negative exports and positive imports industry-mix sub-components and specialization in export-declining and import-declining sectors. Therefore, stabilizing policies are suggested for the regions of Dytiki Makedonia and Sterea Ellada and preventive policies are suggested for the rest of the Greek regions with respect to exports, and structural policies are suggested for the regions of Ionia Nisia, Dytiki Ellada, Voreio Aigaio, Notio Aigaio, and Kriti and expansionary policies are suggested for the rest of the Greek regions with respect to imports.

Table 9: Classification of the Greek regions according to the economy-wide trade-adjusted shift-share analysis results with respect to the world, period 2008-2011

REGION NAME	BELONGS TO REGIONAL TYPE …	SUGGESTED POLICIES FOR EXPORTING SECTORS	SUGGESTED POLICIES FOR IMPORTING SECTORS
Anatoliki Makedonia & Thraki	6	PREVENTIVE	EXPANSIONARY
Kentriki Makedonia	6	PREVENTIVE	EXPANSIONARY
Dytiki Makedonia	10	STABILIZING	EXPANSIONARY
Thessalia	6	PREVENTIVE	EXPANSIONARY
Ipeiros	6	PREVENTIVE	EXPANSIONARY
Ionia Nisia	14	PREVENTIVE	STRUCTURAL
Dytiki Ellada	14	PREVENTIVE	STRUCTURAL
Sterea Ellada	10	STABILIZING	EXPANSIONARY
Peloponnisos	6	PREVENTIVE	EXPANSIONARY

REGION NAME	BELONGS TO REGIONAL TYPE …	SUGGESTED POLICIES FOR EXPORTING SECTORS	SUGGESTED POLICIES FOR IMPORTING SECTORS
Attiki	6	PREVENTIVE	EXPANSIONARY
Voreio Aigaio	14	PREVENTIVE	STRUCTURAL
Notio Aigaio	14	PREVENTIVE	STRUCTURAL
Kriti	14	PREVENTIVE	STRUCTURAL

Sources: Kallioras (2014) / ELSTAT (2015) / UN (2015a, 2015b) / World Bank (2015) / Authors' Elaboration

5. Conclusions

The paper scrutinizes the spatial variations of employment change in Greece towards conceptualizing and understanding the spatial impact of the contemporary economic crisis over the early-crisis period (2008-2011). To this end, the paper employs the trade-adjusted shift-share analysis; a shift-share formulation accounting for employment changes resulting from changes in exports, imports and domestic demand. The results of the trade-adjusted shift-share analysis obtained, against the backdrop of the world economy, demonstrate the negative national effect component as an outcome of the shocks and the upsets that the Greek economy has suffered. This negative effect is partially counterbalanced, in some specific regions and sectors, by the positive industry mix component and competitive shift component. Particularly, noteworthy is that the industry mix component is positive for all Greek regions in the sectors of agricultural products, transport & travel, financial & insurance services, cultural & recreational services, government services, and other business services. In contrast, the industry mix component is negative for all Greek regions in the other sectors considered. In any case, it comes that all Greek regions specialize in sectors that, at the national level, are export-declining and import-declining and experience labor productivity losses. According to the classification of the Greek regions, on the basis of the trade-adjusted shift-share analysis' results, stabilizing policies are suggested for the regions of Dytiki Makedonia and Sterea Ellada and preventive policies are suggested for the rest of the Greek regions with respect to exports, and structural policies are suggested for the regions of Ionia Nisia, Dytiki Ellada, Voreio Aigaio, Notio Aigaio, and Kriti and expansionary policies are suggested for the rest of the Greek regions with respect to imports. Each type of policy may be combined with place-based policies, tailored to regional characteristics and specificities.

References

Ashby L. D. (1964), The Geographical Redistribution of Employment: An Examination of the Elements of Change, Survey of Current Business, 44(10): 13-20.

Barca F., McCann P. and Rodriguez-Pose A. (2012), The Case for Regional Development Intervention: Place-Based versus Place-Neutral Approaches, Journal of Regional Science, 52(1): 134-152.

Bartels C. P., Nicol W. R. and van Duijn J. J. (1982), Estimating the Impact of Regional Policy: A Review of Applied Research Methods, Regional Science and Urban Economics, 12(1): 3-41.

Brülhart M., Crozet M. and Koenig P. (2004), Enlargement and the EU Periphery: The Impact of Changing Market Potential, HWWA Discussion Paper, 270.

Chiang S.-H. (2012), The Sources of Metropolitan Unemployment Fluctuations in the Greater Taipei Metropolitan Area, Papers in Regional Science, 91(4): 775-793.

Cornett A. P. (1996), The Internationalization of Economies: From Regional to Global Orientation, Copenhagen: DJØF-Publishers (in Danish).

Creamer D. (1943), Shifts of Manufacturing Industries, in USA National Resources Planning Board, Industrial Location and National Resources, Washington D.C.: US Government Printing Office.

Cunningham N. J. (1969), A Note on the Proper Distribution of Industry, Oxford Economic Papers, 21(1): 122-127.

Dinc M. and Haynes K. E. (1998a), International Trade and Shift-Share Analysis: A Specification Note, Economic Development Quarterly, 12: 337-343.

Dinc M. and Haynes K. E. (1998b), International Trade and Shift-Share Analysis: A Specification Note, Rejoinder, Economic Development Quarterly, 12: 351-354.

Dunn E. S. Jr. (1959), A Statistical and Analytical Technique for Regional Analysis: Description and Projection, Economie Appliquee, 4: 521–530 (in French).

Dunn E. S. Jr. (1960), A Statistical and Analytical Technique for Regional Analysis, Papers and Proceedings of the Regional Science Association, 6: 98-112.

ELSTAT (2015), Statistical Themes, http://www.statistics.gr/portal/page/portal/ESYE.

Esteban-Marquillas J. M. (1972), A Reinterpretation of Shift-Share Analysis, Regional and Urban Economics, 2(3): 249–261.

Fotopoulos G., Kallioras D. and Petrakos G. (2010), Spatial Variations in Greek Manufacturing Employment Growth: The Effects of Specialization and International Trade, Papers in Regional Science, 89(1): 109-133.

Fuchs V. R. (1962), Statistical Explanations of the Relative Shift of Manufacturing among Regions of the United States, Papers of the Regional Science Association, 8, 1-5.

Greek Ministry of Finance (2010), Memorandum of Economic and Financial Policies, available at: http://www.minfin.gr/content-api/f/binaryChannel/minfin/datastore/d1/d9/7c/d1d97cb60bad8706a2cabbf83e5ae9fb7f3ab369/application/pdf/MOU+_+MEFP+13+march+2012%5B1%5D.pdf.

Greek Ministry of Finance (2011), Medium-Term Fiscal Strategy, 2012-2015, available at: http://www.minfin.gr/content-api/f/binaryChannel/minfin/datastore/8d/78/0e/8d780e3337a1e1cb20d1a1707686d7399be4913a/application/pdf/MTFS.pdf.

Greek Ministry of Finance (2012), Medium-Term Fiscal Strategy, 2013-2016, available at: http://www.minfin.gr/content-api/f/binaryChannel/minfin/datastore/a7/91/b0/a791b0bf4bc73a9679bac65792933157d4cf7b27/application/pdf/%CE%9C%CE%95%CE%A3%CE%9F%CE%A0%CE%A1%CE%9F%CE%98%CE%95%CE%A3%CE%9C%CE%9F_2013.pdf.

Houston D. B. (1967), The Shift and Share Analysis of Regional Growth: A Critique, Southern Economic Journal, 33(4): 577-581.

Jones J. H. (1940), The Report of the Royal Commission on the Distribution of the Industrial Population, Journal of the Royal Statistical Society, 103(3): 323-343.

Kallioras D. (2014), Proposing a Classification of Regions on the Basis of the Trade-Adjusted Shift-Share Analysis' Results, Empirical Economics Letters, 13(12): 1285-1294.

Kallioras D., Topaloglou L. and Venieris S. (2009), Tracing the Determinants of Economic Cross-Border Interaction in the European Union, Spatium International Review, 21: 1-10.

Kotios A. and Pavlidis G. (2012) (eds.), International Economic Crises: Systemic or Political Crisis? Athens: Rosili (in Greek).

Kowaleski J. (2011), Specialization and Employment Development in Germany: An Analysis at the Regional Level, Papers in Regional Science, 90(4): 789-811.

MacKay D. I. (1968), Industrial Structure and Regional Growth: A Methodological Problem, Scottish Political Journal, 15: 129-142.

Markusen A. R., Noponen H. and Driessen K. (1991), International Trade, Productivity, and US Regional Job Growth: A Shift-Share Interpretation, International Regional Science Review, 14: 15-39.

Noponen H., Markusen A. R. and Driessen K. (1998), International Trade and Shift-Share Analysis: A Response to Dinc and Haynes, Economic Development Quarterly, 12: 344-350.

Oltheten E., Pinteris G. and Sougiannis T. (2003), Greece in the European Union: Policy Lessons from Two Decades of Membership, Quarterly Review of Economics and Finance, 43: 774-806.

Paas T. and Tafenau E. (2008), Regional Integration and International Trade Clusters of the enlarged European Union, in Jones B. R. (ed.): Europe at the Crossroads, New York: Nova Publishers, 67-89.

Panteladis I. and Tsiapa M. (2012), Asymmetries and Inequalities in the Greek Space, The Greek Review of Social Research, 137-138: 51-84 (in Greek).

Petrakos G., Fotopoulos G., Kallioras D. (2012), Peripherality and Integration: Industrial Growth and Decline in the Greek Regions, Environment and Planning C: Government and Policy, 30(2): 347-361.

Richardson H. H. (1978), The State of Regional Economics: A Survey Article, International Regional Science Review, 3(1): 1-48.

Rosenfeld F. (1959), A Comment to expose E. S. Dunn on "Statistical and Analytical Technique for Regional Analysis": Presentation of Mathematical Method, Economie Appliquee, 4: 531-534 (in French).

Theil H. and Gosh R. (1980), A Comparison of Shift-Share and the RAS Adjustment, Regional Science and Urban Economics, 10: 175-180.

UN (2015a), COMTRADE, Available: http://comtrade.un.org.

UN (2015b), UN Service Trade, Available: http://unstats.un.org/unsd/servicetrade.

World Bank (2015), World Development Indicators, Available: http://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG.

A STOCHASTIC MODEL OF MIGRANT RESCUE IN THE MEDITERRANEAN SEA[1]

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Abstract
We theoretically study the rescue of destitute migrants seeking to reach Europe on boats across the Mediterranean Sea. To this end, we first construct a discrete-time Markov chain (DTMC) model of a stylized rescue process. Second, we specify the one-step transition probabilities of the DTMC. Third, we delineate a recursive algorithm that can be used to compute the limiting or steady-state probabilities of our DTMC model. Finally, we use these limiting probabilities to compute the average throughput. This metric is an efficiency measure and it tells us the long run expected number of migrants that are rescued by the stylized rescue process under study.

Keywords: Markov Chain, Mediterranean Sea, Migrant, Rescue, Uncertainty
JEL classification: J61, D81

1. Introduction

Grinding poverty and economic mismanagement in many parts of sub-Saharan Africa combined with political turmoil in nations such as Libya have led many Africans to seek a better life in Europe. In addition, the ongoing war in Syria, political and sectarian tensions across the Middle East, and the rise of the so called Islamic State have similarly left many people desirous of a better life in Europe and in other parts of the rich world.

As noted by *The Economist* (Anonymous (2014, 2015)), the above two broad forces have now resulted in large numbers of migrants making the perilous journey to southern European nations across the Mediterranean Sea in flimsy boats from points in North Africa such as Libya and Turkey. As noted by D'Emilio and Corder (2015) and by Phillip (2015), this journey across the Mediterranean Sea on unstable vessels can be very dangerous. Therefore, it is not surprising that nearly 2,000 migrants have perished attempting to cross the Mediterranean Sea from Africa in a desperate bid for asylum or work in Europe.[2]

The European Union (EU) has been slow to respond to the migration crisis that has led to thousands of deaths at sea. However, as pointed out by Kanter (2015), there is now agreement among EU leaders that there needs to be a significantly more comprehensive response to deal not only with the migrant smugglers but also with the migrants themselves. A key part of this comprehensive response seeks to stop smugglers with human cargo before they leave the shores of North African nations such as Libya. This notwithstanding, authorities in front-line nations such as Italy have increasingly begun to rescue the hapless migrants, following which, they are brought to appropriate processing points on Italian islands such as Lampedusa and Sicily.

This migrant crisis has become a major public policy problem not only in the front-line nations of Europe such as Greece and Italy but also in more northern nations such as Germany and Great Britain. Despite the salience and the contemporary relevance of this migrant crisis,

[1] Batabyal acknowledges financial support from the Gosnell endowment at RIT. The usual absolution applies.

[2] See Pianigiani (2015) and Yardley and Povoledo (2015) for additional details on these points.

to the best of our knowledge, there are *no* theoretical analyses of any aspect of this problem in the extant literature. As best as we can tell, the only paper that has addressed the related problem of external border enforcement is by Haake *et al.* (2013). These researchers use a numerical example to show that when the EU Commission takes an active role, under certain circumstances, it can put in place the optimal level of border control by member states.

Given the absence of theoretical research on the above described migrant problem, our objective in this note is to commence the theoretical study of the migrant problem by concentrating on a particular aspect of this problem. Specifically, we focus on the *rescue* of impoverished migrants—attempting to cross the Mediterranean Sea from a point in North Africa or Turkey—by the naval authorities of a front-line nation such as Italy. The rest of this note is organized as follows. Section 2 constructs a discrete-time Markov chain (DTMC) model of a stylized rescue process. Section 3 specifies the one-step transition probabilities of the DTMC. Section 4 delineates a recursive algorithm that can be used to compute the limiting or the steady-state probabilities of our model. Section 5 uses these limiting probabilities to compute the average throughput. This last metric is an efficiency measure and it tells us the long run expected number of migrants that are rescued by the stylized rescue process we analyze. Section 6 concludes and then discusses two ways in which the research in this note might be extended.

2. The Theoretical Framework

Consider a flimsy vessel such as a rubber dinghy in the Mediterranean Sea that is loaded with a large number of migrants who are seeking to reach the shores of a southern European nation such as Italy. In the course of its journey across the Mediterranean Sea, this dinghy is first spotted and then approached by a navy ship from a front-line nation such as Italy. The goal of this navy ship is to *rescue* the migrants from their presently precarious rubber dinghy. To this end, the ship lays a bridge to the vessel loaded with the migrants.

Migrants are rescued one at a time and we suppose that the transfer of a migrant from the rubber dinghy to the navy ship occurs at the beginning of a time slot. These time slots are of unit length and the time it takes to transfer a migrant from the rubber dinghy to the navy ship is one time slot. What adds uncertainty to the rescue process is that the systematic transfer of migrants from the rubber dinghy to the navy ship may fail because of a variety of reasons. For instance, a migrant being transferred may be too weak to travel over the bridge and hence may fall into the sea. Alternately, instead of moving to the navy ship in an orderly manner (one migrant per time slot), migrants, fearful of the rubber dinghy sinking, may rush the bridge and attempt to board the rescuing navy ship all at once. Finally, some migrants—potentially children—may not understand that they are to move to the navy ship one at a time and therefore they may attempt to board the navy ship along with their parents and/or relatives.

We model the above aspects of the rescue process by supposing that each migrant transfer from the rubber dinghy to the navy ship may fail with some probability $\in > 0$ .A failed migrant transfer is attempted again at the beginning of the next time slot. The numbers of migrants arriving on the navy ship during the various time slots are independent random variables with a common discrete distribution function given by $\{b_j, j = 0,1,2,...\}$ .Newly arriving migrants are all housed in the rescuing navy ship. To keep the subsequent mathematical analysis tractable, we suppose that the mean arrival rate of the migrants is smaller than the mean number of attempts needed to transfer a migrant successfully from the rubber dinghy to the navy ship.

Mathematically, this means that the inequality $\sum_{\forall j} jb_j < 1/\in$ holds.

Let Z_n denote the number of migrants in the rubber dinghy/navy ship system at the beginning of the *nth* time slot. Then, it follows that the stochastic process $\{Z_n\}$ is a discrete-

time Markov chain with state space given by the set $I = \{0,1,2,...\}$.[3] With this theoretical framework in place, our next task is to specify the one-step transition probabilities of the DTMC model that we have just described.

3. One-Step Transition Probabilities

It helps to combine the one-step transition probabilities of our DTMC model into two groups. For the first group, we focus on the states $j = 0,1,2,...$ For the second group, we concentrate on the states for which $i \geq 1$ and $j = i-1, i, i+1, ...$ Putting these two groups of states together, the relevant one-step transition probabilities are

$$p_{0j} = b_j, for\ j = 0,1,2,... \tag{1}$$

and

$$p_{ij} = \ \in b_{j-i} + (1-\in) b_{j-i+1}, for\ i \geq 1, j = i-1, i, i+1, ..., \tag{2}$$

with the understanding that $b_{-1} = 0$. Having specified the one-step transition probabilities, we now proceed to describe a recursive algorithm that can be used to compute the limiting or steady-state probabilities of our model.

4. A Recursive Algorithm

The captain of our navy ship or, more generally, an appropriate EU asylum and/or immigration authority may wish to compute the limiting probabilities for the DTMC migrant rescue model that we are studying. To see how this computation exercise might actually be undertaken, let us first use definition 3.3.2 in Tijms (2003, p. 98) and theorem 4.1 in Ross (2014, p. 206) to point out that for our DTMC model $\{Z_n\}$ with state space $I = \{0,1,2,...\}$, the probability distribution $\{\pi_j, j \in I\}$ is the limiting or steady-state distribution if

$$\pi_j = \sum_{k \in I} \pi_k p_{kj}, j \in I. \tag{3}$$

Now, note that for the DTMC model under study here, the one-step transition probabilities $p_{ij} = 0$ as long as $j \leq i-2$. In addition, for any state $i \neq 0$, the mean number of transitions per unit time out of the set $B = \{i, i+1, i+2, ...\}$ ought to equal the mean number of transitions per unit time into the same set *B*. Putting the above two pieces of information together, we obtain an equation that provides us with the recursive algorithm that we seek. Specifically, we get

$$(1-\in) b_0\ \pi_i = \sum_{k=0}^{k=i-1} \pi_k [\ \in \sum_{l=i-k}^{l=\infty} b_l + (1-\in) \sum_{l=i-k+1}^{l=\infty} b_l\ ],\ for\ i = 1,2,3,... \tag{4}$$

We now proceed to our final task in this note. This involves using the limiting probabilities that we have just described to calculate the average throughput. Note that we are interested in this metric because it is an efficiency measure and it gives us a closed-form expression for the long run expected number of migrants that are rescued by the stylized rescue process under study.

5. The Average Throughput

There are two ways to calculate the average throughput associated with the migrant rescue process that we are studying. First, by direct computation, the average throughput is $\sum_{j=1}^{\infty} \pi_j \times (1-\in)$. This expression can be further simplified and this simplification gives us

[3] See standard textbooks such as Tijms (2003, pp. 83-84) or Ross (2014, pp. 183-184) for a more detailed corroboration of this claim

$$Average\,Throughput = \sum_{j=1}^{j=\infty} \pi_j \times (1-\in) = (1-\pi_0)(1-\in) \ . \qquad (5)$$

Second, the average throughput can also be calculated by recognizing that this metric is, in fact, equal to the mean input into our DTMC model of migrant rescue[4]. Now, if we denote the mean input by δ then it follows that $\delta = \sum_{\forall k} kb_k$. Therefore, we have $(1-\pi_0) = \delta / (1-\in)$ or, rearranging, the average throughput is, once again, equal to $(1-\pi_0)(1-\in)$.

Inspecting the right-hand-side (RHS) of equation (5), we see that the long run expected number of migrants that are rescued by the stylized rescue process under study (the average throughput) is given by the product of two terms. The first term $(1-\pi_0)$ can be interpreted as the long run fraction of migrants who are waiting to be rescued by the navy ship. The second term $(1-\in)$ is the probability that an individual migrant is transferred from the rubber dinghy to the navy ship without incident. Since the average throughput is a measure of the efficiency of our migrant rescue process, equation (5) tells us that this efficiency can be increased by making π_0 and/or $\in$ small. From a practical perspective, the limiting probability π_0 is unlikely to be controllable by, say, the captain of the navy ship. However, the failure probability $\in$ certainly ought to be a control variable for the navy ship captain. Therefore, the smaller is $\in$, the greater is the efficiency of our migrant rescue process. In particular, in the limit as $\in \to 0$, the efficiency of the migrant rescue process is as high as it can possibly be.

6. Conclusions

In this note, we theoretically studied the rescue of destitute migrants seeking to reach Europe on boats across the Mediterranean Sea. To this end, we first constructed a discrete-time Markov chain (DTMC) model of a stylized rescue process. Second, we specified the one-step transition probabilities of the DTMC. Third, we delineated a recursive algorithm that could be used to compute the limiting or steady-state probabilities of our model. Finally, we used these limiting probabilities to compute the average throughput which is an efficiency measure. This metric gave us the long run expected number of migrants that were rescued by the stylized rescue process under study.

The analysis in this note can be extended in a number of different directions. In what follows, we suggest two possible extensions. First, it would be useful to model an alternate scenario in which an access control rule is used to manage the migrants. Specifically, there would now exist an inland "gate" and this gate would be closed to newly arriving migrants when the number of migrants awaiting processing has reached some threshold. Once the number of migrants to be processed declines to some level below the threshold, this gate would be opened again. Second, it would also be instructive to analyze a setting in which with some positive probability, a migrant is denied asylum or a safe haven in an EU nation because (s)he is deemed to be, for instance, a security risk. Studies that analyze these aspects of the underlying problem will provide additional insights into the nexuses between alternate ways of apprehending and processing migrants and the working of migrant rescue schemes.

References

Anonymous. 2014. A surge from the sea: Illegal migration is causing strains across the continent, The Economist, August 16.

Anonymous. 2015. Europe's boat people: For those in peril, The Economist, April 25.

D'Emilio, F., and Corder, M. 2015. Italy: At least 40 migrants dead at sea, 320 others rescued, Washington Post, August 15.

[4] This statement is related to a well known result in queuing theory known as Little's formula. For textbook discussions of this formula, see Tijms (2003, pp. 50-53) or Ross (2014, pp. 482-483).

Haake, C.J., Krieger, T., and Minter, S. 2013. On the institutional design of burden sharing when financing external border enforcement in the EU, International Economics and Economic Policy, 10, 583-612.

Kanter, J. 2015. E.U. agrees to naval intervention on migrant smugglers, New York Times, May 18.

Phillip, A. 2015. Watch the 'heart-stopping' moment rescuers pull drowning migrants out of the Mediterranean Sea, Washington Post, August 6.

Pianigiani, G. 2015. Hundreds of migrants rescued after boat capsizes off Libya, New York Times, August 5.

Ross, S.M. 2014. Introduction to Probability Models, 11th edition. Academic Press, Amsterdam, The Netherlands.

Tijms, H.C. 2003. A First Course in Stochastic Models. Wiley, Chichester, UK.

Yardley, J., and Povoledo, E. 2015. Mediterranean shipwreck kills 40 before a rescue, New York Times, May 5.

MAPPING THE SECTORAL CONCENTRATION OF THE WORKFORCE ACROSS EU REGIONS, 2009-2013

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Abstract
The paper explores the evolution of the sectoral concentration of regional workforces across the EU's 272 NUTS level II territories and 42 territories of associated countries in the wake of the international financial and economic crisis (2009) up to 2013 through the use of location quotients (27.5 thousand computations). Bird's eye views of the findings, in the form of maps, are attached.

Keywords: Territorial sector concentration, location quotient, specialization and localization, regional workforce, EU
JEL classification: R12

1. Introduction

The paper studies the evolution of sectoral concentration across EU regions in the wake of the international financial and economic crisis, from 2009 (i.e., the time the crisis reached the EU affecting a recession (EU, 2009)), up to 2013, the last year for which data exist.

As the subnational (regional) economies of the EU's member states now operate under an ever more unified legislative, trading and development funding framework, and the connectedness of the world's economies grows very quickly, there are probably more reasons to engage in such studies compared to the past. The issue has been researched in several occasions, for instance in connection with the EU's enlargements (Mora et al., 2004). The consensus was that sectoral concentration (and relocation) in Europe seemed to be a slow and multifaceted process that did not leap out from the statistical data (e.g., Brülhart and Traeger, 2005; and the studies cited therein). Yet, taking a fresh look at the data, especially as they become more complete and exploring the patterns may yield new insights.

Indeed, the EU's statistical office, Eurostat, now supplies annual sectoral employment and other statistics at the NUTS II level [1] from not only the 28 member states (i.e., 272 regions), but also several candidate or free trade association countries as well (i.e., 42 additional regions). This allows the computation of the analytical statistic which measures a region's sectoral concentration relative to a larger geographic unit, namely, the location quotient (LQ), in the case of both 272 and 314 regions (involving 12,679 and 14,739 computations, respectively). It is like taking simultaneous snap shots from different distances: one from across the EU, another from across the EU and several associated countries.

The rest of the paper is organized as follows: Section 2 discusses the data and method, Section 3 supplies the findings, and Section 4 the conclusions.

[1] The *Nomenclature des Unités Territoriales Statistiques* (NUTS) is the three-tier hierarchical structure used in the EU to standardize territorial units. The population thresholds of NUTS I level range from 3 to 7 million, for NUTS II from 0.8 to 3 million; however the guidelines are not applied rigidly.

2. The location quotient and the localization and specialization coefficients

The LQ is a good starting point for understanding the regional economy: the uniqueness and characteristics of different regions. It quantifies how concentrated in terms of some economic feature or asset (earnings, GDP; jobs in a sector hereinafter) a particular region is compared to a larger reference unit (often the national or federal average; here the EU). It is computed as a sectoral share of a regional employment divided by the sector's share of the national (here, European) total for the same statistic (Isard, 1960):

$$LQ_{ij} = \frac{sectoral\ employment\ (i)\ in\ region\ j - total\ employement\ in\ region\ j}{sectoral\ employment\ (i)\ in\ all\ regions - total\ employement\ in\ all\ regions} \quad (1)$$

or

$$LQ_{ij} = \frac{sectoral\ employment\ (i)\ in\ region\ j - sectoral\ employment\ (i)\ in\ all\ regions}{total\ employement\ in\ region\ j - total\ employement\ in\ all\ regions} \quad (2)$$

It takes values from zero to above one. (In theory, there is no upper limit.) For example, a LQ of 1.0 in mining means that the region and the EU are equally concentrated in mining; while an LQ of 1.8 means that the region has proportionally more miners, i.e., a higher concentration in mining than the EU.

A minor rearrangement of the components entering expression (1) provides additional insights: Subtracting the ratio of the denominator from the ratio of the numerator, adding up the positive (or negative) outcomes pertaining to any one sector and dividing the outcome by 100, yields the coefficient of localization. This takes values from zero to one. The highest (lowest) the coefficient is, the more regionally concentrated (non-concentrated) the sector compared to the EU workforce. Likewise, subtracting the ratio of the denominator from the ratio of the numerator in expression (2), adding up the positive outcomes pertaining to any one region and dividing the outcome by 100, yields the coefficient of specialization, vis-a-vis the EU. This also takes values from zero to one. As in the previous case, the highest (lowest) the coefficient is, the more diversified (similar) the regional workforce in terms of economic activities compared to the overall EU workforce.

3. Findings

Table 1a lists the EU regions which display the three highest coefficients of specialization in any one year. These are the Île de France, Southeast Romania, Mardid, Outer London, Berkshire-Buckinghamshire-Oxfordshire. Table 1b provides the coefficients of localization in each sector (economic activity) in any one year. The ten activities are: (1) the primary sector (agriculture, forestry, fishing), (2) secondary sector excluding construction, (3) construction, (4) trade, transport, accommodation, food service activities, (5) information-communication, (6) financial-insurance activities, (7) real estate activities, (8) professional, scientific-technical, administrative, support service activities, (9) public administration, defense, education, human health, social work activities, (10) arts-entertainment-recreation, other service activities (including household and extra-territorial).

It turns out that public administration, as well as the primary and secondary sectors are the most concentrated (and, perhaps, rooted in certain regions); whereas information-communication, financial-insurance activities and real estate are the least concentrated (and, hence, perhaps more footloose and easier to attract).

Table 2 lists the three EU regions which display the highest LQ values in the ten basic economic activities (sectors) monitored by Eurostat in each of the five years under examination. To aid the reader, the relevant regional sectoral and total employment figures are supplied beneath the name of each region. It turns out that the highest concentrations in:

- The primary sector are found in regions of Romania and Greece.
- The secondary sector are found in regions of the Czech Republic, Romania and Hungary.
- Construction are found in regions of France, Slovakia, Portugal, Italy and Spain.

- Trade, transport, accommodation, food service activities are found in regions of Greece and Spain.
- Information-communication are found in regions of the UK, the Czech Republic and Sweden.
- Financial-insurance activities are found in Luxembourg and regions of the UK.
- Real estate are found in regions of the Czech Republic, the UK, France, and in Latvia.
- Professional, scientific-technical, administrative and support services are found in regions of the UK, Sweden and Germany.
- Public administration, defense, education, human health, and social work activities are found in regions of Spain, Belgium and Sweden.
- Arts-entertainment-recreation and other service activities are found in regions of Belgium and Italy and in Luxembourg and Cyprus.

However, if a broader perspective that includes the regions of a number of associated counties (namely, Iceland, Norway, the Former Yugoslav Republic of Macedonia, Switzerland, Turkey) is considered, then (see Table 3) a somewhat different picture emerges; and the highest concentrations in:

- The primary sector are found in regions of Turkey and Romania.
- The secondary sector are found in regions of Turkey, Romania, and the Czech Republic.
- Construction are found in regions of France, Turkey, Portugal, Slovakia, Spain and Italy.
- Trade, transport, accommodation, food service activities are found in regions of Greece and Spain.
- Information-communication are found in regions of Norway, the Czech Republic, the UK and Sweden.
- Financial-insurance activities are found in Luxembourg and regions of the UK and Switzerland.
- Real estate are found in regions of the Czech Republic, the UK, France, and in Latvia.
- Professional, scientific-technical, administrative and support services are found in regions of the UK, Sweden and Germany.
- Public administration, defense, education, human health, and social work activities are found in regions of Spain and Norway.
- Arts-entertainment-recreation and other service activities are found in regions of Turkey, Belgium, Italy, and in Cyprus.

To visually aid the reader two sets of colored maps (maps 1-5, and 6-10) at the LQ threshold of 1.6 are provided in the Appendix. (At lower thresholds the complexity of the maps increases.) Both show considerable diversity at the subnational level: shapes and contours that do not follow (match) the national borders; in some cases the patterns are stable in others they are not, thus supplying examples of sectoral stability and mobility (relocation) over time. In addition, a close comparison between two snap shots taken in any given year reveals that the notion of concentration is relative. Once the outlook is broadened and Turkey and other countries are taken into account and included in the picture, then the primary sector workforces in parts of Spain, France, Italy, Croatia, Hungary, Bulgaria, Lithuania, Poland, Finland, that were initially perceived as large, may now fade from the picture.

These results may be useful to both central and regional government policy makers, as well as entrepreneurs to keep in mind.

4. Conclusions

Overall, there is evidence of considerable specialization is certain regions compared to others; as well as evidence of and diversity in the localization of economic activities across the EU. It follows that production possibilities vary and that a number of activities may be more (less) footloose and easier (harder) to attract. In addition, the juxtaposition of simultaneous snap shots from across the (a) EU and (b) EU and several associated countries in terms of regional workforce location quotients shows that the notion of sectoral concentration is quite relative.

References

Brülhart M. and R. Traeger (2005). "An account of geographic concentration patterns in Europe." Regional Science and Urban Economics, 35 (6): 597-624.

EU (2009). Economic Crisis in Europe: Causes, Consequences and Responses. Edited by P. van den Noord, European Economy, 7. Luxembourg: EU Commission.

Isard W. (1960). Methods of Regional Analysis. Cambridge MA: MIT Press.

Mora T., E.Vayá and J.Suriñach (2004). "The enlargement and the European Union and the spatial distribution of economic activity." Eastern European Economics, 42 (5): 6-35.

APPENDIX

Table 1: The EU in terms of the coefficients of specialization and localization: 2009-2013

(a) The EU regions with the three highest coefficients of specialization

	2009	2010	2011	2012	2013
Île de France, FR	1	1	1	1	1
Sud-Est, RO	2	2	2	2	2
Madrid, ES	3	5	4	4	4
Outer London, UK	4	4	3	3	3
Berk., Buc., Oxford., UK	7	3	5	5	5

(b) The regional concentration of economic activities across the EU (coefficient of localization) in %

	2009	2010	2011	2012	2013
Primary sector	6.59	6.62	6.67	6.88	6.89
Secondary sector	7.56	7.51	7.56	7.53	7.47
Construction	2.53	2.35	2.11	1.90	1.73
Trade, transport, accommodation, food service activities	4.28	4.22	4.35	4.41	4.19
Information-communication	1.09	1.11	1.12	1.12	1.12
Financial-insurance activities	1.09	1.05	1.09	1.05	1.03
Real estate	0.32	0.34	0.34	0.39	0.40
Professional, scientific-technical, admin., support services	2.14	2.07	1.96	2.04	2.27
Public admin., defense, education, human health etc.	8.00	8.21	8.23	8.05	7.84
Arts-entertainment-recreation, other service activities	1.37	1.42	1.51	1.54	1.61

Table 2: The top three EU regions in terms of the highest location quotient in each sector, along with the respective sectoral and overall employment figures (in thousands of people): 2009-2013

Agriculture, forestry and fishing

	2009			2010			2011			2012			2013	
1	Nord-Est, RO		1	Nord-Est, RO		1	Nord-Est, RO		1	Nord-Est, RO		1	Nord-Est, RO	
	803.1	1,666.1		828.7	1,688.4		846.4	1,731.5		841.5	1,764.3		848.9	1,795.1
2	Sud-Vest Oltenia, RO		2	Sud-Vest Oltenia, RO		2	Sud-Vest Oltenia, RO		2	Sud-Vest Oltenia, RO		2	Sud-Vest Oltenia, RO	
	486.1	1,031.5		483.6	1,016.7		488.1	1,024.1		486.3	1,022.3		437.0	974.3
3	Sud – Muntenia, RO		3	Sud – Muntenia, RO		3	S.& E. Peloponnese, GR		3	S.& E. Peloponnese, GR		3	S.& E. Peloponnese, GR	
	471.0	1,445.1		485.0	1424.8		64.4	214.0		59.6	197.2		62.7	191.3

Secondary sector (except construction)

	2009			2010			2011			2012			2013	
1	Severovýchod, CZ		1	Moravskoslezsko, CZ		1	Moravskoslezsko, CZ		1	Vest, RO		1	Vest, RO	
	242.6	690.5		188.5	543.5		196.4	540.7		292.1	811.6		304.1	812.4
2	Vest, RO		2	Severovýchod, CZ		2	Severovýchod, CZ		2	Moravskoslezsko, CZ		2	Severovýchod, CZ	
	284.0	815.4		238.2	690.3		247.2	688.6		191.4	543.0		244.8	689.5
3	Közép-Dunántúl, HU		3	Vest, RO		3	Strední Morava, CZ		3	Severovýchod, CZ		3	Strední Morava, CZ	
	150.9	435.1		269.3	805.4		195.8	550.5		240.7	684.1		190.0	554.2

Construction

	2009		2010		2011		2012		2013	
1	Corse, FR		Corse, FR		Východné Slovensko, SK		Východné Slovensko, SK		Východné Slovensko, SK	
	17.6	89.6	15.3	105.9	74.2	609.9	73.9	614.8	77.3	625.4
2	Açores, PT		Açores, PT		Valle d'Aosta, IT		Valle d'Aosta, IT		Valle d'Aosta, IT	
	16.5	111.8	15.6	109.7	6.7	56.8	6.6	56.1	6.2	55.3
3	Illes Balears, ES		Východné Slovensko, SK		Stredné Slovensko, SK		Stredné Slovensko, SK		Corse, FR	
	65	484.3	82.3	608.5	65.8	561.4	65.2	566.4	6.7	61.2

Wholesale and retail trade, transport, accomodation and food service activities

	2009			2010			2011			2012			2013	
1	South Aegean, GR		1	South Aegean, GR		1	Canarias, ES		1	Canarias, ES		1	Canarias, ES	
	60.3	136.8		52.9	131.4		337.9	768.7		323.2	743.5		310.4	729.7
2	Ionian Isl., GR		2	Canarias, ES		2	South Aegean, GR		2	South Aegean, GR		2	South Aegean, GR	
	37.3	87.8		303.2	756.8		51.9	130.7		52.5	80.6		50.7	122.8
3	Canarias, ES		3	Ionian Isl., GR		3	Illes Balears, ES		3	Illes Balears, ES		3	Illes Balears, ES	
	308.2	775.0		32.1	82.2		182.9	465.1		190.1	471.8		194.6	475.8

Information and communication

	2009			2010			2011			2012			2013	
1	Inner London, UK		1	Praha, CZ		1	Inner London, UK		1	Berk., Buc., Oxford., UK		1	Berk., Buc., Oxford., UK	
	116.4	1,509.6		53.8	656.8		134.8	1,535.3		97.9	1,184.8		102.4	1,197.6
2	Praha, CZ		2	Berk., Buc., Oxford., UK		2	Praha, CZ		2	Stockholm, SE		2	Inner London, UK	
	50.5	660		85.6	1,139.1		54.8	635.2		88.3	1,106		133.7	1,608.9
3	Berk., Buc., Oxford., UK		3	Stockholm, SE		3	Berk., Buc., Oxford., UK		3	Inner London, UK		3	Stockholm, SE	
	87.6	1,146.6		79.6	1,062.5		94.6	1,162.7		123.1	1,562.3		89.3	1,133.4

Financial and insurance activities

	2009			2010			2011			2012			2013	
1	Luxembourg		1	Luxembourg		1	Luxembourg		1	Luxembourg		1	Luxembourg	
	27.6	217.2		27.3	220.8		28.3	224.8		29.5	236.1		30	238.7
2	Inner London, UK		2	Inner London, UK		2	Inner London, UK		2	Inner London, UK		2	Inner London, UK	
	149.6	1,509.6		139	1,409.8		165.5	1,535.3		178	1,562.3		142.9	1,608.9
3	Essex, UK		3	Essex, UK		3	Essex, UK		3	Essex, UK		3	Essex, UK	
	64.1	807		62.4	824.8		65.5	838.8		69.1	843.5		63.9	859.4

Real estate activities

	2009	2010	2011	2012	2013
1	Praha, CZ 13 660	Praha, CZ 14.4 656.8	Devon, UK 12.6 535.7	Latvia 23 650.2	Praha, CZ 16.8 649.4
2	Languedoc-Roussillon,FR 17.7 909.2	Latvia 17.9 850.7	Latvia 17.5 861.6	Praha, CZ 14.2 647.5	Latvia 22.7 893.9
3	Île de France, FR 92.2 5,237.9	Île de France, FR 97.5 5,163.9	Île de France, FR 104.4 5,203.2	Devon, UK 11.3 537.1	Highlands & Islands,UK 4.4 224.7

Professional, scientific and technical activities; administrative and support service activities

	2009	2010	2011	2012	2013
1	Inner London, UK 288.8 1,509.6	Inner London, UK 286.9 1,409.8	Inner London, UK 301.4 1,535.3	Inner London, UK 319.5 1,562.3	Inner London, UK 332.5 1,608.9
2	Stockholm, SE 188 1,052.4	Stockholm, SE 190.9 1,062.5	Stockholm, SE 197.3 1,091.3	Stockholm, SE 203.8 1,106	Stockholm, SE 207.7 1,133.4
3	Berlin, DE 243.3 1,546.8	Berlin, DE 251.9 1,564.2	Hamburg, DE 146.7 903.6	Hamburg, DE 149.5 913.2	Hamburg, DE 148.9 934.1

Public administration, defense, education, human health and social work activities

	2009	2010	2011	2012	2013
1	Melilla, ES 11.4 23.1	Ceuta, ES 13 26.9	Ceuta, ES 14.4 26.6	Ceuta, ES 11.5 24.3	Ceuta, ES 12.3 25.6
2	Ceuta, ES 14 28.4	Melilla, ES 10.5 24.2	Melilla, ES 13 26.3	Melilla, ES 11.8 25.6	Melilla, ES 11.8 24.6
3	Namur, BE 80 184.3	Namur, BE 75 188.2	Namur, BE 77.4 186.8	Namur, BE 79.3 191.2	Övre Norrland, SE 95.5 242.2

Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies

	2009			2010			2011			2012			2013	
1	Brussels, BE		1	Brussels, BE		1	Brussels, BE		1	Brussels, BE		1	Brussels, BE	
	50.9	403.8		54.7	410.4		52.2	413.0		54.7	420.1		57.9	412.6
2	Luxembourg		2	Cyprus		2	Lazio, IT		2	Lazio, IT		2	Lazio, IT	
	22.2	217.2		42.0	395.2		254.5	2,252.9		267.5	2,250.1		245.3	2,207.8
3	Lazio, IT		3	Lazio, IT		3	Cyprus		3	Luxembourg		3	Cyprus	
	213.4	2,241.2		238.5	2,256.6		43.8	398.2		25.9	236.1		38.8	365.1

Table 3: The top three EU and affiliated regions in terms of the highest location quotient in each sector, along with the respective sectoral and overall employment figures (in thousands of people): 2009-2013

Agriculture, forestry and fishing

	2009			2010			2011			2012			2013	
1	Agri etc, TR		1	Agri etc, TR		1	Agri etc, TR		1	Dogu Karadeniz, TR		1	Agri etc., TR	
	184.7	303.3		173.1	303.8		185.6	342.6		548.2	1,029.7		206	385.8
2	Dogu Karadeniz, TR		2	Dogu Karadeniz, TR		2	Dogu Karadeniz, TR		2	Agri etc., TR		2	Nord-Est, RO	
	573.3	1,077.7		542.1	1,034		529.8	1036		189.5	364.7		848.9	1,795.1
3	Erzurum etc., TR		3	Erzurum etc., TR		3	Nord-Est, RO		3	Nord-Est, RO		3	Dogu Karadeniz, TR	
	172.1	347.5		178.4	354.2		846.4	1731.5		841.5	1764.3		438.6	957

Secondary sector (except construction)

	2009			2010			2011			2012			2013	
1	Bursa etc., TR		1	Bursa etc., TR		1	Bursa etc, TR		1	Bursa etc, TR		1	Vest, RO	
	395.9	1,109.9		429.1	1,139.1		452.6	1,236.5		471.8	1,301.8		304.1	812.4
2	Severovýchod, CZ		2	Moravskoslezsko, CZ		2	Moravskoslezsko, CZ		2	Vest, RO		2	Severovýchod, CZ	
	242.6	690.5		188.5	543.5		196.4	540.7		292.1	811.6		244.8	689.5
3	Vest, RO		3	Severovýchod, CZ		3	Severovýchod, CZ		3	Moravskoslezsko, CZ		3	Bursa etc., TR	
	284	815.4		238.2	690.3		247.2	688.6		191.4	543		490.1	1,384.7

Construction

	2009		2010		2011		2012		2013	
1	Corse, FR		Corse, FR		Van etc, TR		Sanliurfa etc,. TR		Van etc,. TR	
	17.6	89.6	15.3	105.9	67.6	497.5	91.4	570.4	78.4	518.7
2	Açores, PT		Açores, PT		Východné Slovensko, SK		Van etc., TR		Mardin etc., TR	
	16.5	111.8	15.6	109.7	74.2	609.9	70.6	521.4	53.1	373.1
3	Illes Balears, ES		Východné Slovensko, SK		Valle d'Aosta, IT		Východné Slovensko, SK		Sanliurfa etc., TR	
	65	484.3	82.3	608.5	6.7	56.8	73.9	614.8	90.1	667.6

Wholesale and retail trade, transport, accomodation and food service activities

	2009			2010			2011			2012			2013	
1	South Aegean, GR		1	South Aegean, GR		1	Canarias, ES		1	Canarias, ES		1	Canarias, ES	
	60.3	136.8		52.9	131.4		337.9	768.7		323.2	743.5		310.4	729.7
2	Ionian Isl., GR		2	Canarias, ES		2	South Aegean, GR		2	Illes Balears, ES		2	Illes Balears, ES	
	37.3	87.8		303.2	756.8		51.9	130.7		190.1	471.8		194.6	475.8
3	Canarias, ES		3	Ionian Isl., GR		3	Illes Balears, ES		3	South Aegean, GR		3	South Aegean, GR	
	308.2	775		32.1	82.2		182.9	465.1		52.5	131		50.7	122.8

Information and communication

	2009	2010	2011	2012	2013
1	Oslo, Akershus, NO	Praha, CZ	Inner London, UK	Oslo, Akershus, NO	Berk., Buc., Oxford., UK
	47.2 609	53.8 656.8	134.8 1,535.3	53.5 641.1	102.4 1,197.6
2	Inner London, UK	Berk., Buc., Oxford., UK	Praha, CZ	Berk., Buc., Oxford., UK	Oslo, Akershus, NO
	116.4 1,509.6	85.6 1,139.1	54.8 635.2	97.9 1,184.8	55.2 645.6
3	Praha, CZ	Stockholm, SE	Berk., Buc., Oxford., UK	Stockholm, SE	Inner London, UK
	50.5 660	79.6 1,062.5	94.6 1,162.7	88.3 1,106	133.7 1,608.9

Financial and insurance activities

	2009		2010		2011		2012		2013	
1	Luxembourg		Luxembourg		Luxembourg		Luxembourg		Luxembourg	
	27.6	217.2	27.3	220.8	28.3	224.8	29.5	236.1	30	238.7
2	Inner London, UK		Inner London, UK		Inner London, UK		Inner London, UK		Zürich, CH	
	149.6	1,509.6	139	1,409.8	165.5	1,535.3	178	1,562.3	73.4	812.1
3	Zürich, CH		Zürich, CH		Zürich, CH		Zürich, CH		Inner London, UK	
	64.2	776.8	67.5	778.2	70.4	792.6	76	806.1	142.9	1,608.9

Real estate activities

	2009	2010	2011	2012	2013
1	Praha, CZ	Praha, CZ	Devon, UK	Latvia	Praha, CZ
	13 660	14.4 656.8	12.6 535.7	23 650.2	16.8 649.4
2	Languedoc-Roussillon,FR	Latvia	Latvia	Praha, CZ	Latvia
	17.7 909.2	17.9 850.7	17.5 861.6	14.2 647.5	22.7 893.9
3	Île de France, FR	Île de France, FR	Île de France, FR	Devon, UK	Highlands & Islands,UK
	92.2 5,237.9	97.5 5,163.9	104.4 5,203.2	11.3 537.1	4.4 224.7

Professional, scientific and technical activities; administrative and support service activities

	2009	2010	2011	2012	2013
1	Inner London, UK	Inner London, UK	Inner London, UK	Inner London, UK	Inner London, UK
	288.8 1,509.6	286.9 1,409.8	301.4 1,535.3	319.5 1,562.3	332.5 1,608.9
2	Stockholm, SE	Stockholm, SE	Stockholm, SE	Stockholm, SE	Stockholm, SE
	188 1,052.4	190.9 1,062.5	197.3 1,091.3	203.8 1,106	207.7 1,133.4
3	Berlin, DE	Berlin, DE	Hamburg, DE	Hamburg, DE	Hamburg, DE
	243.3 1,546.8	251.9 1,564.2	146.7 903.6	149.5 913.2	148.9 934.1

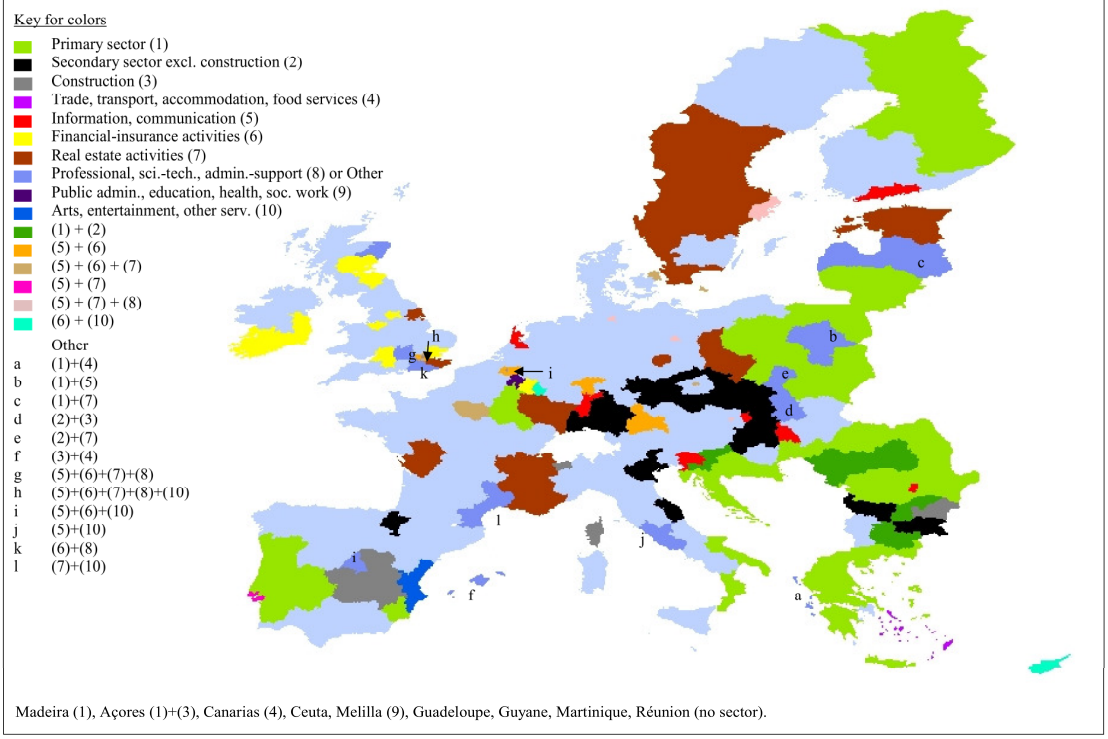
Public administration, defense, education, human health and social work activities

	2009		2010		2011		2012		2013	
1	Melilla, ES		Ceuta, ES		Ceuta, ES		Ceuta, ES		Ceuta, ES	
	11.4	23.1	13	26.9	14.4	26.6	11.5	24.3	12.3	25.6
2	Ceuta, ES		Nord, NO		Melilla, ES		Melilla, ES		Melilla, ES	
	14	28.4	100.9	228.8	13	26.3	11.8	25.6	11.8	24.6
3	Nord, NO		Melilla, ES		Nord, NO		Nord, NO		Nord, NO	
	100.7	229.1	10.5	24.2	102.3	232.8	99.5	234.5	96.3	234.6

Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies

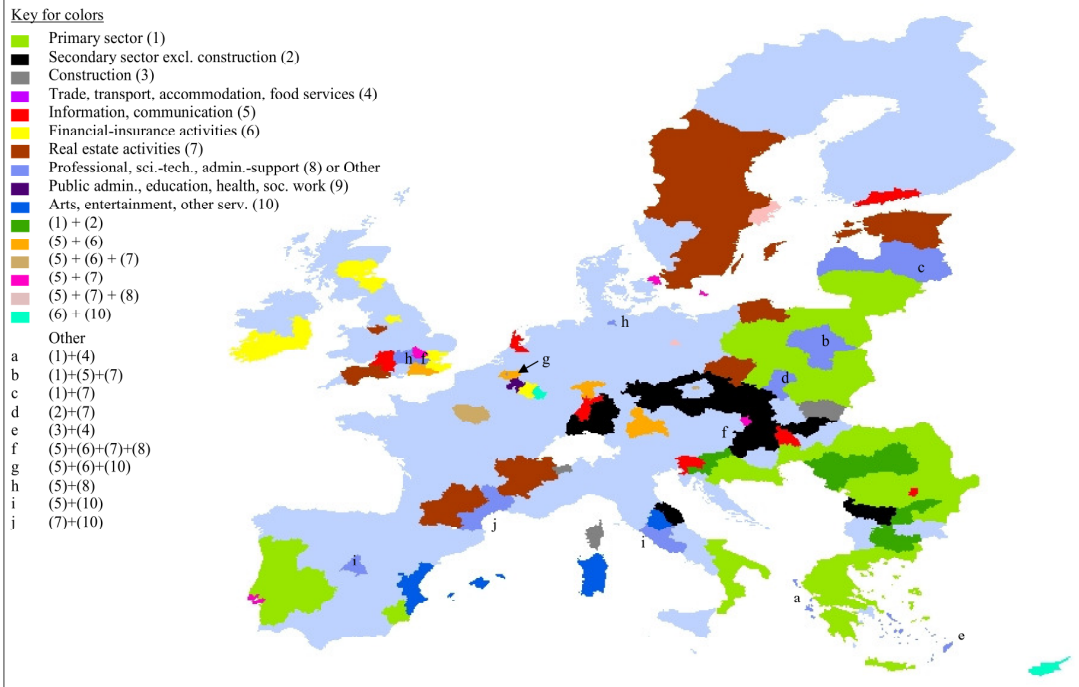
	2009			2010			2011			2012			2013	
1	Zonguldak etc., TR		1	Brussels, BE		1	Kastamonu etc., TR		1	Kastamonu etc., TR		1	Brussels, BE	
	82.6	417.4		54.7	410.4		45	324.3		49.8	305.9		57.9	412.6
2	Samsun etc., TR		2	Kastamonu etc., TR		2	Brussels, BE		2	Brussels, BE		2	Lazio, IT	
	164.5	1,005.6					52.2	413		54.7	420.1		245.3	2,207.8
3	Brussels, BE		3	Zonguldak etc., TR		3	Malatya etc., TR		3	Lazio, IT		3	Cyprus	
	50.9	403.8		45.2	378.2		61.6	519.5		267.5	2250.1		38.8	365.1

Map 1: Sectoral labor force concentration in the EU in 2009 (Location Quotient > 1.6)



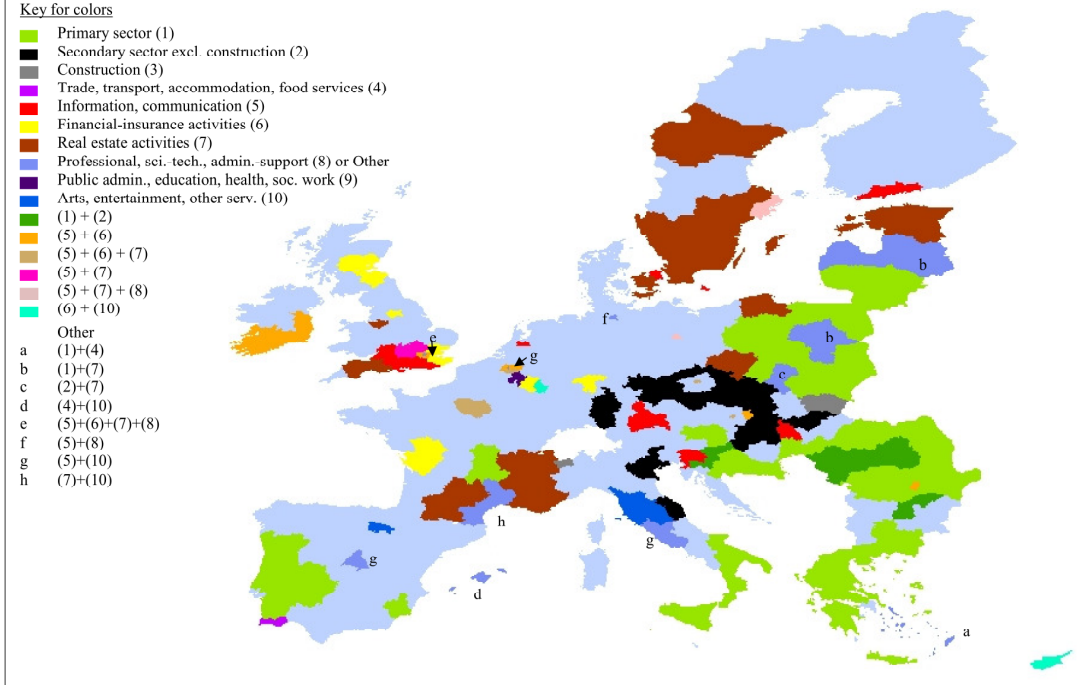
Madeira (1), Açores (1)+(3), Canarias (4), Ceuta, Melilla (9), Guadeloupe, Guyane, Martinique, Réunion (no sector).

Map 2: Sectoral labor force concentration in the EU in 2010 (Location Quotient > 1.6)



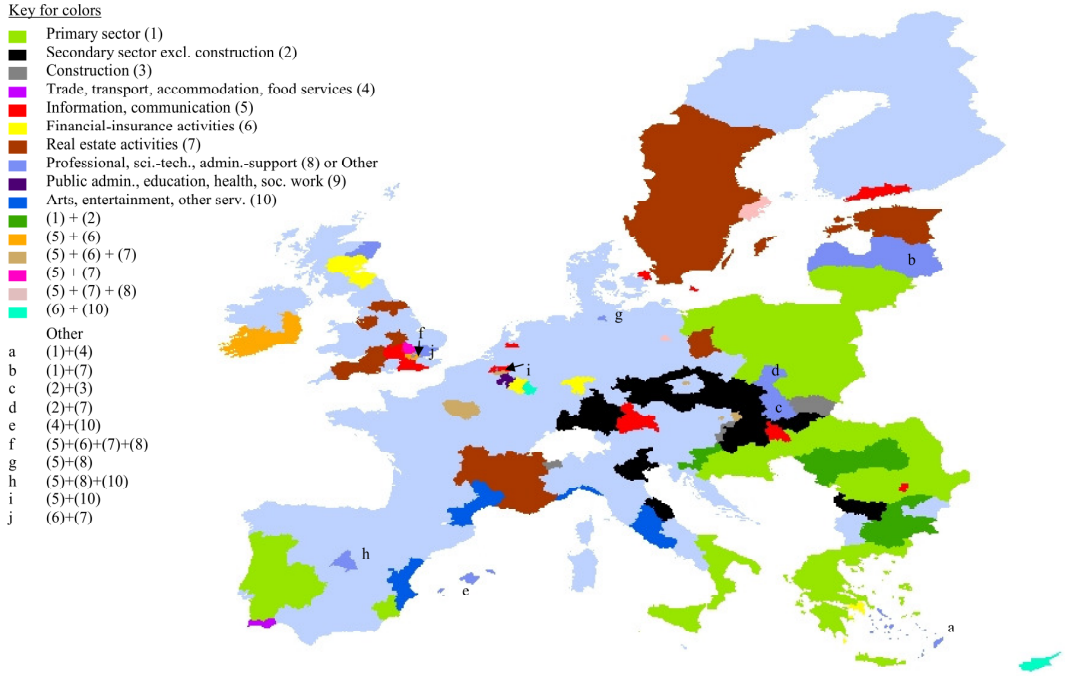
Madeira (1), Açores (1)+(3), Canarias (4), Réunion (7), Ceuta, Melilla (9), Guadeloupe, Guyane, Martinique (no sector).

Map 3: Sectoral labor force concentration in the EU in 2011 (Location Quotient > 1.6)



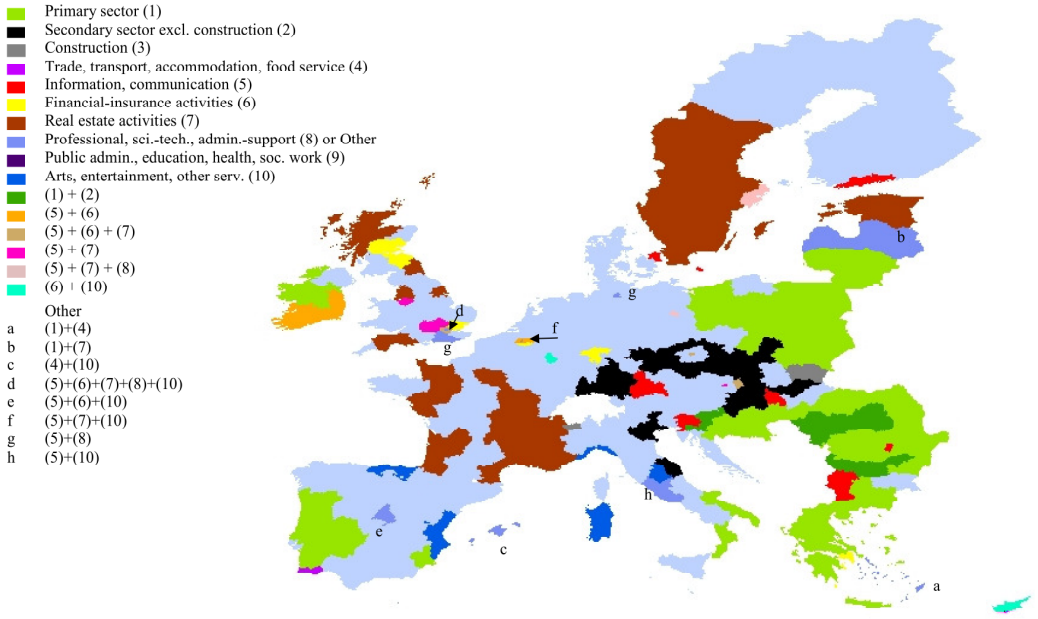
Madeira (1), Açores (1)+(10), Canarias (4), Réunion (7), Ceuta, Melilla (9), Guadeloupe, Guyane, Martinique (no sector).

Map 4: Sectoral labor force concentration in the EU in 2012 (Location Quotient > 1.6)



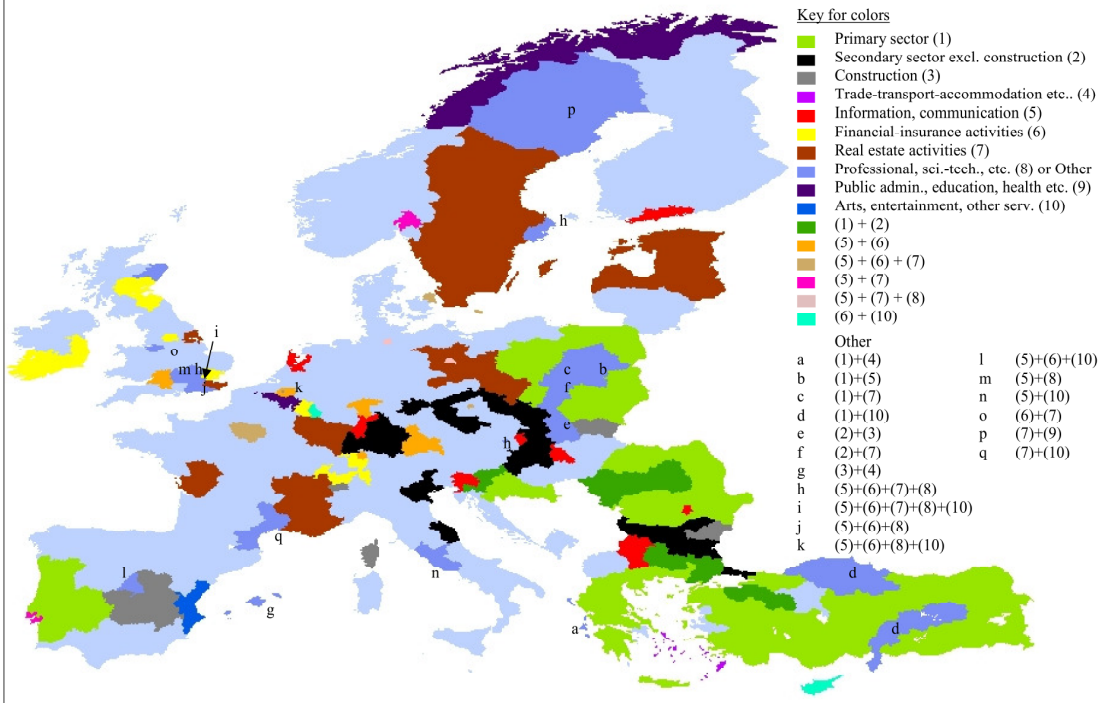
Açores, Madeira (1), Canarias (4), Martinique, Réunion (7), Ceuta (9), Melilla (9)+(10), Guadeloupe, Guyane (no sector).

Map 5: Sectoral labor force concentration in the EU in 2013 (Location Quotient > 1.6)



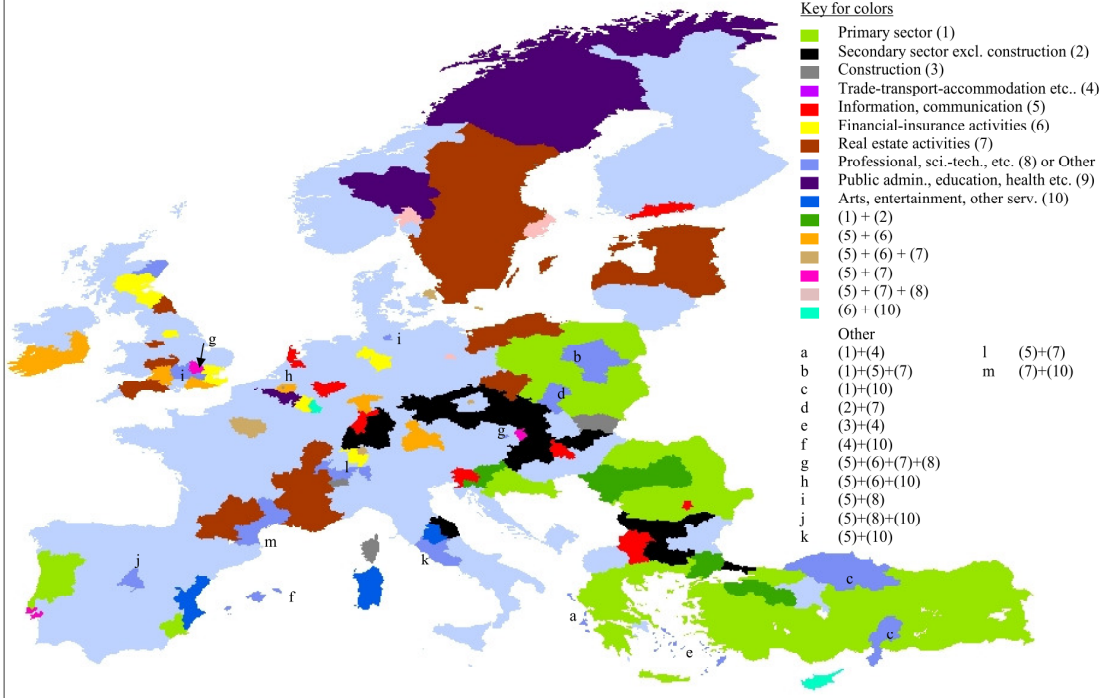
Açores, Madeira (1), Canarias (4), Réunion (7), Ceuta (9), Melilla (9)+(10), Guadeloupe, Guyane, Martinique (no sector).

Map 6: Sectoral labor force concentration in the EU and associated countries in 2009 (Location Quotient > 1.6)



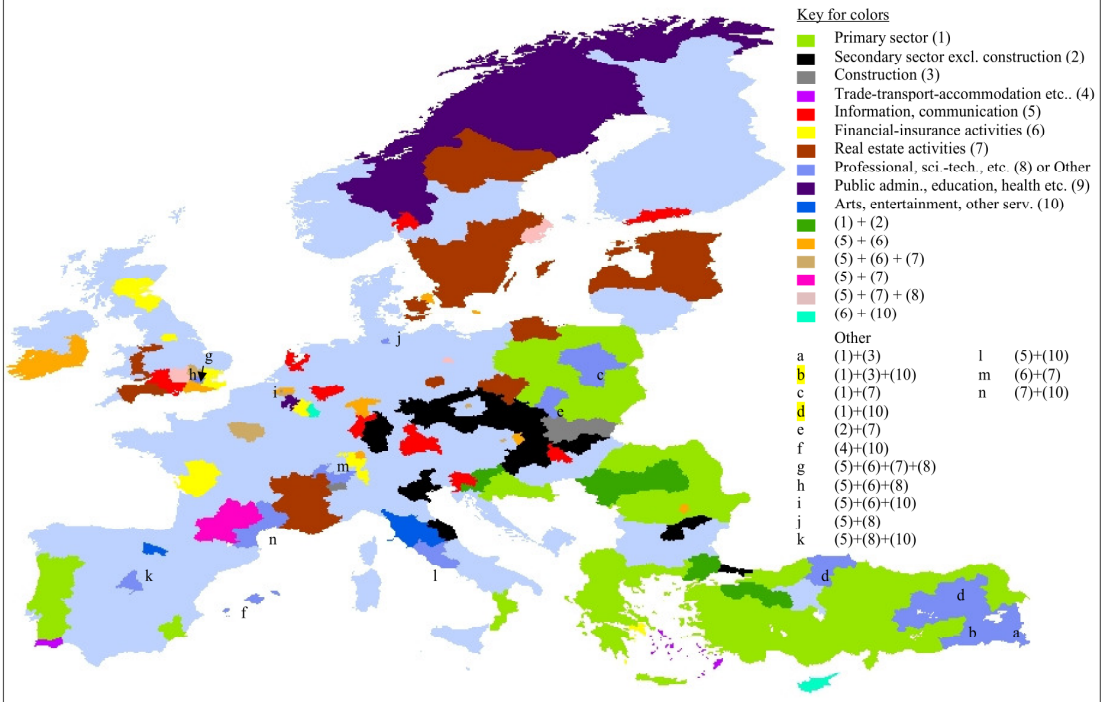
Açores, Madeira (1)+(3), Canarias (4), Iceland (6), Ceuta, Melilla (9), Guadeloupe, Guyane, Martinique, Réunion (no sector).

Map 7: Sectoral labor force concentration in the EU and associated countries in 2010 (Location Quotient > 1.6)



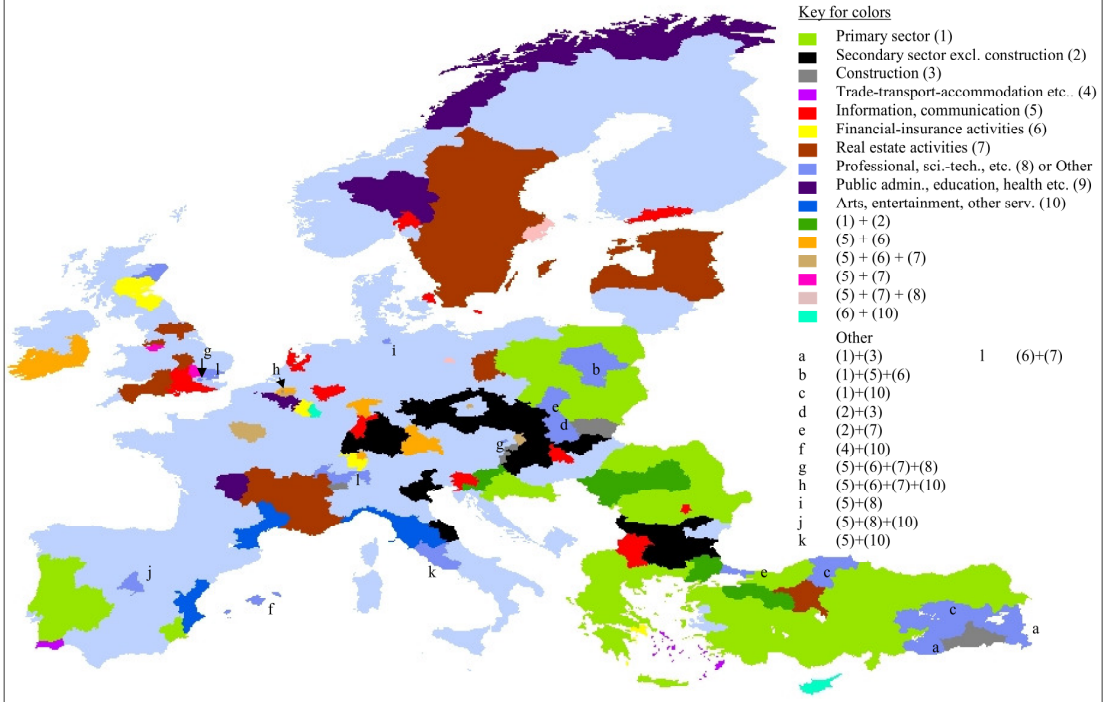
Madeira (1), Açores (1)+(3), Canarias (4), Iceland (6), Réunion (7), Ceuta, Melilla (9), Guadeloupe, Guyane, Martinique (no sector).

Map 8: Sectoral labor force concentration in the EU and associated countries in 2011 (Location Quotient > 1.6)



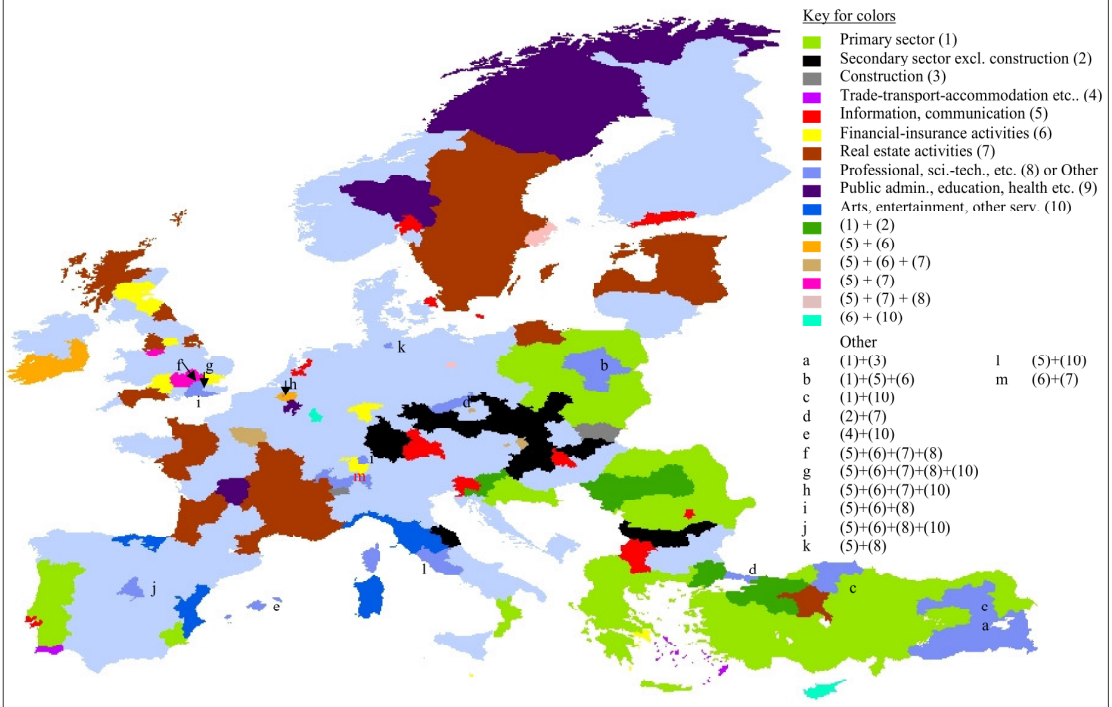
Madeira (1), Açores (1)+(10), Canarias (4), Iceland (5)+(6), Réunion (7), Ceuta, Guyane, Melilla (9), Guadeloupe, Martinique (no sector).

Map 9: Sectoral labor force concentration in the EU and associated countries in 2012 (Location Quotient > 1.6)



Açores, Madeira (1), Canarias (4), Martinique, Réunion (7), Ceuta (9), Melilla (9)+(10), Guadeloupe, Guyane, Iceland (no sector).

Map 10: Sectoral labor force concentration in the EU and associated countries in 2013 (Location Quotient > 1.6)



Açores, Madeira (1), Canarias (4), Réunion (7), Ceuta, Guyane (9), Melilla (9)+(10), Guadeloupe, Iceland (6), Martinique (no sector).

COMPETITIVE SUCCESS OF INDUSTRIAL DISTRICTS: AN EXPLORATIVE STUDY IN ITALY

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Abstract

The paper conducts an explorative research on the competitive success of the Industrial Districts IDs (GCs), due to their capacity to adapt and evolve to the environment. Our aim is to identify the ID structural features supporting adaptation by using the complexity theory. We consider the IDs as complex adaptive systems (CASs) and identify the ID features on the basis of the main CAS properties that foster adaptation, i.e. interconnectivity, heterogeneity, and control. To formulate the theory linking the values of the ID structural features with the ID competitive success, a multiple case study is carried out. In particular, it is aimed at comparing IDs with different competitive performances in terms of their CAS properties using network theories and measures. Three theoretical propositions are finally derived.

Keywords: Industrial districts, complex adaptive systems, network, complexity science, adaptive capacity

JEL classification:

1. Introduction

Industrial Districts (IDs) are geographically defined production systems, characterized by a large number of small and medium sized firms that are involved at various phases in the production of a homogeneous product family. These firms are highly specialized in a few phases of the production process, and integrated through a complex network of inter-organizational relationships (Porter, 1998).

The literature on IDs is quite rich and involves different streams of research, such as social sciences, regional economics, economic geography, political economy, and industrial organization. Referring to this literature, studies have mainly provided key notions and models to explain the reasons of ID competitive success that has largely contributed to the regional and national economic development. Examples of such models are: the flexible specialization conceptualized by Piore and Sabel (1984); the localized external economies concept anticipated by Marshall (1920) and further formalized by Krugman (1991); and the industrial atmosphere notion conceived by Marshall (1920).

The foregoing models show that the main critical factors governing the success of ID firms can be traced back to the following ID features: physical and cultural proximity of many small and medium sized firms; division of labor among firms; presence within the area of complementary competencies and skills; high degree of specialization of both firms and workforce; existence of a dense network of inter-firm relationships where firms co-operate and compete at the same time; presence of a dense network of social relationships based mainly on face-to-face contacts; and the easy and fast circulation of knowledge and information in the area.

These features appear relevant where the competitive context is characterized by both increasing and not particularly sophisticated demand, but they seem to be insufficient to guarantee the ID success in the recent competitive scenario. In fact, by looking at several dynamic and competitive IDs we have observed that they are modifying their structures and strategies, thereby losing some of their traditional features.

In such a context, the foregoing studies do not explain why some IDs fail when facing the new competitive scenario while others not. Nor do they explain why some IDs evolve by

assuming different structures to remain competitive and others not. These studies in fact, adopt a static perspective to analyze IDs by restricting their analyses to the definition of a set of conditions explaining ID competitive advantage in a particular context. In addition they focus on the system as a whole and not on the single components (firms), observe the phenomena when they are already happened at the system level, and describe them in terms of cause-effect relations by adopting a top-down approach.

Our intention is to overcome these limitations by adopting a different approach. We look at the ID competitive advantage as not the result of a set of pre-defined features characterizing IDs but as the result of their capability to adapt and evolve with the external environment. In fact, if the IDs possess the conditions that allow them to adapt and co-evolve with the environment, they will modify themselves so as to be more successful in that environment. In this way, IDs have competitive advantage not because they are characterized by a set of features but because they are able to evolve exhibiting features that are the spontaneous result of the adaptation to the environment. This result is not known a priori, but emerges from the interactions among the system components and between them with the environment.

This approach is based on the complexity theory (Gell-Mann, 1994), which studies the complex adaptive systems (CASs) and explains causes and processes underlying emergence in CASs. In particular, CASs consist of an evolving network of heterogeneous, localized and functionally-integrated interacting agents. The latter interact in a non-linear fashion and can adapt and learn, thereby evolving and developing a form of self-organization that enables them to acquire collective properties that each of them does not have individually. CASs have adaptive capability and co-evolve with the external environment, modifying it and being modified. CAS theory identifies the main features influencing adaptation, namely interconnectivity, level of control, and heterogeneity. The values of these variables that foster adaptation are also defined: a moderate level of interconnectivity, a high value of heterogeneity, and a moderate level of control (Kauffman, 1993).

Once the IDs have been recognized as CASs, the CAS theory is used to look for the ID features that allow the adaptability of IDs in “high velocity” environments. In particular, these ID features are identified by translating the three CAS properties supporting adaptation into ID structural features.

In the light of this argument, the major contribution of our paper is to derive theoretical propositions that link the competitive success of the IDs to specific ID structural features and to their value. Based on the literature we associate the level of interconnectivity with the number of links among ID firms, the heterogeneity with the distribution of the links in the IDs, and the level of control with the degree of control of the ID organizational structure. We argue that specific values of these features are able to foster adaptation of the ID to the external environment and, as a consequence, to improve the ID performance. Finally, we conduct an explorative empirical research based on a multiple case study design (Yin, 1989), with the aim of comparing the ID features captured in the analysis and articulating theoretical propositions regarding the values that foster the ID performance.

We choose four cases of Italian ID located in Southern Italy characterized by different competitive performances and we compare them in terms of their CAS properties. To compare the four IDs we use methods of social network analysis (Borgatti and Everett, 1999; Wasserman and Faust, 1994). Therefore, firstly we model each ID by means of the network of business inter-firm relations and then we compare the network structure by using network attributes. In particular, the network density, the network centrality, and the Gini coefficient of the coreness values are calculated as proxy of the three main ID features influencing adaptation, namely interconnectivity, level of control, and heterogeneity, respectively.

The paper is organized as follows. First, the main theories explaining the sources of the ID competitive advantage are briefly reviewed. Then, the complexity theory is presented and the key CAS properties fostering adaptation are defined. Finally, the case studies are discussed and the theoretical propositions presented.

2. Industrial district competitive advantage

2.1. Traditional sources of competitive advantage for Industrial Districts

Traditional studies on IDs have analyzed the main advantages of IDs that explain the reasons of their success.

In particular, the studies of economic geography have pointed out the benefits associated to the "agglomeration external economies", mainly due to the lower input costs, the development of common suppliers, specialist labour pools, spillover of technical know-how, and the development of a greater comprehension of the workings of the particular industry by individuals and firms (Becattini, 1990; Marshall, 1920).

Studies on industrial economics have highlighted the reduction of the transactional costs due to geographical proximity of firms and informal and face-to-face contacts among them as one of the most important benefits of IDs (Powell, 1987). Other studies have stressed that one of the key source of ID competitive advantage is their capacity to develop product and process innovations. In particular, many authors have pointed out that the ID innovative capacity mainly results from the presence of high specialized technical competencies, the existence of networks of formal and informal relationships, and the geographical proximity that creates an environment wherein information, codes, languages, routines, strategies, and knowledge are easy to be transferred and shared (Cooke, 1999; Cooke and Morgan, 1998; Henry and Pinch, 2002; Lundvall and Johnson, 1994).

Synthesizing the results of these studies, the key source of the ID competitive advantage is the static efficiency, namely cost advantages gained by clustered firms, due to a set of features characterizing them: the specialization of firms, the presence of a specialized workforce, the division of labour among firms, the accumulation of specific knowledge in the local area, the networking processes among both the economic and social system, the development of a widespread innovative capacity, the presence into the local area of a common system of social-cultural values.

However, in the recent years these factors determining the success of IDs in a competitive context characterized by both increasing and not particularly sophisticated demand, seem to be insufficient to guarantee competitive advantage to both the system and its firms. In this new situation, new sources of competitive advantage based not only on the paradigm of the static efficiency are needed.

2.2. Knowledge-based competitive advantage of Industrial Districts

Recently strategic management literature has pointed out that in today economy the source of sustainable competitive advantage for firms can not more be limited to cost and differentiation advantages and has recognized the importance of knowledge as a fundamental factor in creating economic value and competitive advantage for firms (Barney, 1991; Grant, 1998; Leonard-Barton, 1995). What firm knows, how it uses what it knows, and how fast it can develop new knowledge are key aspects for firm success (Hamel and Prahalad, 1994; Prusak, 1997). Therefore, knowledge is a key asset for competing firms and, consequently, learning is a key process. This in fact increases the firm cognitive capital (knowledge stock).

These new strategic management theories have forced new studies on IDs. In particular, in the last years some scholars have analyzed the role of knowledge in IDs and proposed a knowledge-based theory of IDs (Malmberg and Maskell, 2004; Maskell, 2001). These works have investigated the nature of knowledge circulated in IDs, the knowledge transfer and creation processes embedded in IDs, and the learning processes activated by firms in IDs (Albino et al., 2005; Tallman et al., 2004). This superior capacity of IDs to support processes of learning and knowledge transfer and creation has been identified as the key source of their competitive advantage.

Oppositely to the traditional studies on IDs where the source of competitive advantage is static based on the possess of given features, in these knowledge-based studies on IDs the competitive advantage results from dynamic processes activated by ID firms, namely the learning and knowledge management processes.

In line with this new perspective, we seek new dynamic sources of competitive advantage by adopting a different theoretical approach, namely complexity science.

3. The key properties of complex adaptive systems

Three basic schools have given rise to complexity science: the European, American, and Econophysics Schools. The European School consists of Prigogine (1955), Haken (1977), and Mainzer (2004), amongst many others. It is math intensive, and originates with the natural science experiments on "Bénard processes". The American School consists largely of scholars associated with the Santa Fe Institute (Anderson, et al., 1988; Arthur, et al., 1997; Cowan, et al., 1994; Pines, 1988). Drawing from the life sciences and making extensive use of computational approaches and agent-based models, the American school complexity literature mainly focuses on Complex Adaptive Systems (CASs) and on the conditions called the "edge of chaos" (Kauffman, 1993; Lewin, 1992). The Econophysics School dates back to the discovery that communities ranked by population form a Pareto-distributed rank/frequency by Auerbach (1913) and Zipf (1949). Its focus is on how order creation actually unfolds once the forces of emergent order creation by self-organizing agents are set in motion. Key elements of this third phase are fractal structures, power laws, and scale-free theory.

During the 1990s, there was an explosion of interest in complexity science as it relates to organizations and strategy. Complexity science offers a number of new insights that can be used to seek new dynamic sources of competitive advantage. In fact, application of complexity science to organization and strategy identifies key conditions that determine the success of firms in changing environments associated with their capacity to self-organize and create a new order, learn and adapt (Levy, 2000; Mckelvey and Maguire, 1999; Mitleton-Kelly, 2003).

Amongst the different streams of study of complexity science, we focus primarily on the American School and in particular on the Complex Adaptive System theory, identifying the main properties of CASs and studying their dynamics. A CAS is a set of heterogeneous and interacting agents that emerges as a new order, or new structure/process over time. The agents interact in a non-linear fashion, can adapt and learn, thereby evolving and developing a form of self-organization that enables them to acquire collective properties that each of them does not have individually. CASs adapt to changing environmental conditions without any singular entity deliberately managing or controlling them and co-evolve with the external environment, modifying it and being modified (Axelrod and Cohen, 1999; Choi et al., 2001; Gell-Mann,1994; Holland, 1995; Lane, 2002).

Based on the main contributions of CAS theory three main structural properties of CASs are identified that foster their adaptive capacity, namely interconnectivity, level of control, and heterogeneity.

3.1. Interconnectivity

CAS theory identifies the number of interconnections within the system as a critical condition for self-organization and emergence. Kauffman (1995) points out that the number of interconnections among agents of an ecosystem influences the adaptive capacities of the ecosystem. He uses the NK model to investigate the rate of adaptation and level of success of a system in a particular scenario. The adaptation of the system is modeled as a walk on a landscape. During the walk, agents move by looking for positions that improve their fitness represented by the height of that position. A successful adaptation is achieved when the highest peak of the landscape is reached. The ruggedness of the landscape influences the rate of adaptation of the system. When the landscape has a very wide global optimum, the adaptive walk will lead toward the global optimum. In a rugged landscape, given that there are many less differentiated peaks, the adaptive walk will be trapped on one of the many suboptimal local peaks.

By using the concept of tunable landscape and the NK model, Kauffman (1995) demonstrates that the number of interconnections among agents (K) influences the ruggedness of the landscape. As K increases, the ruggedness increases and the rate of adaptation decreases. Therefore, in order to assure the adaptation of the system to the landscape, the value of K should be moderate.

This result has been applied in organization studies to modeling organizational change and technological innovation (Kauffman et al., 2000; Levinthal, 1997; Rivkin and Siggelkow,

2002). In organization studies the K parameter has an appealing interpretation, namely, the extent to which components of the organization affect each other.

3.2. Heterogeneity

Different studies on complexity highlight that variety destroys variety. For example, Ashby (1956) suggests that successful adaptation requires a system to have an internal variety that at least matches environmental variety. Systems having agents with appropriate requisite variety will evolve faster than those without. The same topic is studied by Allen (2001), LeBaron (2001), and Johnson (2000). Their agent-based models show that novelty, innovation, and learning all collapse as the nature of agents collapses from heterogeneity to homogeneity. Dooley (2002) states that one of the main properties of a complex system that supports the evolution is diversity. Such a property is related to the fact that each agent is potentially unique not only in the resources that it holds, but also in terms of the behavioral rules that define how it sees the world and how it reacts. In a complex system diversity is the key towards survival. Without diversity, a complex system converges to a single mode of behavior.

3.3. Level of control

The governance of a system is another important characteristic influencing CAS self-organization and adaptive behaviors. Le Moigne (1990) observes that CASs are not controlled by a hierarchical command-and-control center but instead manifest a certain form of autonomy. The latter is necessary to allow evolution and adaptation of the system. A strong control orientation tends to produce tall hierarchies that are slow to respond (Carzo and Yanousas, 1969) and invariably reduce heterogeneity (Jones, 2000; Morgan, 1997). The presence of "nearly" autonomous subunits characterized by weak but not negligible interactions is essential for the long-term adaptation and survival of organizations (Sanchez, 1993; Simon, 1996). Furthermore, Granovetter's (1973) research finding is that novelty and innovation happen more frequently in networks consisting mostly of "weak ties" as opposed to "strong ties". The latter tend to produce "groupthink" (Janis, 1972).

4. The complex adaptive system properties and the industrial district features

The basic assumption of our study is that IDs are CASs. They exhibit different CAS properties: the existence of different and heterogeneous agents (e.g. firms and institutions), non-linear behaviors, many types of interactions and motive to connect among agents and between agents and the environment, distributed decision making, decentralized information flows, and adaptive capacity (Albino et al., 2005; Carbonara et al., 2010). Once the IDs have been recognized as CASs, by exploiting the analogy between CASs and IDs, the ID features that foster its adaptive capacity may be identified. In particular, to do this, we recognize what ID features can be associated with the three CAS properties enabling adaptation, i.e. interconnectivity, heterogeneity, and level of control.

The interconnectivity property of CASs is associated with the interconnectivity level of IDs, that results form the business and social linkages among the ID firms. Business linkages among firms of the same ID are due to the horizontal and the vertical labour division characterizing the ID production model and these links may occur for any business matters, e.g. trade of inputs, participation in the same business association, exchange of information. Social links are established thanks to the face-to-face contacts and the friendship and kinship existing among employees of different firms.

The heterogeneity property of CASs is expressed for the IDs as the diversity among ID firms (the agents) that vary in terms of resources, knowledge, competitive strategies, etc. As such, we consider that the ID heterogeneity is influenced by the specific network of relationships that firms establish with the other firms. In fact, since the network of relationships acts as a mean of diffusion of information, knowledge, competitive strategies (Giuliani, 2007; McEvily and Zaheer, 1999), it tends to increase the homogeneity across the firms.

Finally, we associate the level of control of CASs with the level of control characterizing an ID that is determined by the governance of the ID's organizational structure. Two main alternative ID's organizational structures may be identified: the so-called Marshallian ID where firms are mostly independent one from each other and the ID with the leader firms, characterized by the existence of firms taking a leader position in the district that assume a role of managerial guide and control their own network (Albino et al., 2006).

Aiming at formulating theoretical propositions on the value that the ID features should exhibit to foster adaptation to external environment, we develop an explorative empirical research based on multiple case-study.

5. Methodology

5.1. Research design

Our explorative research adopts a multiple-case study approach (Yin, 1989). This methodology is particularly appropriate when theory building is the main aim of the research and a further exploration on the constructs of the theory is required. We selected four IDs localized in Southern Italy. The selection was driven by the argument to identify polar cases of declining district and successful district in order to compare them in terms of CAS properties. Eisendhardt (1989) in fact argues that theory building from case studies can be enhanced by choosing cases that highlight extreme situations or polar types in which the phenomenon under investigation is observable.

We focused on Made-in-Italy sectors and chose the four cases on the basis of mainly secondary data and previous studies.

At the end of this activity, we identified the four following IDs: (i) Barletta knitwear district, (ii) Andria underwear district, (iii) Barletta footwear district, and (iv) Foggia agro-food district.

To measure the competitive performance of the four cases we have used two different measures: the return on investment index (ROI) and the value added (VA). In particular, the performance index of the network based on the ROI is calculated asking each firm to indicate whether its ROI is lower, equal, or higher than the average ROI of the sector. Then we have assigned the value of 1, 2, and 3 to each case, respectively. The performance index of the network is the average across the performance index of the firms. As for the VA, national statistical data are used .

Table 1. Industrial district's dimension and sample.

	The knitwear district of Barletta	**The underwear district of Andria**	**The footwear district of Barletta**	**The agro-food district of Foggia**
Population of firms	498	371	336	284
Sample	217	188	179	142
Respondents	151 (70%)	125 (66%)	117 (65%)	88 (62%)
ROI	2.1	2.4	1.7	1.2
Value Added (million €)	85.34	97.59	69.45	40.46

To model and compare the four considered IDs we used methods of social network analysis. Therefore, firstly we modelled each ID by means of the network of business inter-firm relations and then we compared the structure of the four networks by using network attributes. In particular, we used the following set of measures: network density; network heterogeneity; and network centrality.

The network density (*ND*) is defined as the proportion of possible linkages that are actually present in a graph. The network density is calculated as the ratio of the number of linkages present, *L*, divided by its theoretical maximum in the network, *n(n-1),*[1] with *n* being

[1] A directed graph without self-loops has at most n(n-1) possible edges and an undirected graph has half this value.

the number of nodes in the network (Borgatti and Everett, 1997; Wasserman and Faust, 1994):

$$ND = \frac{L}{n \cdot (n-1)}$$

The network heterogeneity is referred to the "coreness" of each actor in the network, where the coreness is the degree of closeness of each node to a core of densely connected nodes observable in the network. Using actor-level coreness data, we calculated the Gini coefficient, that is used as an index of heterogeneity (Borgatti and Everett, 1999). An high Gini coefficient means that the actors in the network are characterized by different distribution of linkages.

The network centrality is calculated by the normalized average degree centrality of the nodes and the normalized average closeness centrality.

The degree centrality of a node DC(i) is defined as the number of edges incident upon that node. Thus, degree centrality refers to the extent to which an actor is central in a network on the basis of the ties that it has directly established with other actors of the network. This is measured as the sum of direct linkages x of node i with other j nodes of the network:

$$DC(i) = \sum_{j=1}^{n} x_{ij}$$

To compare network of different size is better to use the average normalized degree centrality, calculated by averaging the normalized degree centrality of each node, where the normalized degree centrality is the degree centrality divided by the maximum possible degree expressed as a percentage (Borgatti and Everett, 1997).

The closeness centrality is most frequently used to measure relative access to network resources and information, and can also be interpreted as measuring the degree of independence from others in the network (Borgatti and Everett, 1997). It is inversely proportional to the total geodesic distance from the node to all other nodes in the network. Geodesic distance is defined as the length (number of edges) of the shortest path linking two nodes (Freeman, 1979). As for the degree centrality, to compare the closeness centrality of the different networks we use the normalized averaged closeness centrality.

Network measures were evaluated using the network analysis software toolkit UCINET 6.0 (Borgatti et al., 2002).

5.2. Sampling

A sample of firms has been selected within each IDs using a stratified sampling technique rather than a random one. In particular, we have stratified the population on the basis of the production phase that firm performs (production stages) or the manufacturing specialization of firm. In this way the risk that the network of business inter-firm relationships is influenced by a random selection of firms is reduced. In fact, the random sampling technique could select disproportionally firms belonging to the different stages.

5.3. Data

5.3.1. Data collection

The study is based on micro level network data, collected at the firm level in the four IDs. To collect data we conducted interviews on the field with managers and owners of the companies. Interviews were carried out on the basis of a structured detailed questionnaire aimed at identifying the business inter-firm relations. In particular, we asked firms to indicate the firms in the sample with which they have business exchange.

5.3.2. Data analysis

Data analysis consists into two steps: firstly, we carried out the case studies and then, we employed a cross-case analysis aimed at identifying similarities and differences among the analysed cases and generating hypotheses (Sammarra and Belussi, 2006; Choi and Hong, 2000).

5.4. Four cases from Italy

5.4.1. The Barletta knitwear district

Nowadays the district is formed by 498 firms, employing more than 2.000 workers. The district is specialized in the knitwear production and main products are: casual clothes, women dress, woollens, sweatshirts, etc. Firms are classified into the following five main stages of the production process:

- Yarn and fabric producers,
- Screen printings, which put trimmings, make molds and print fabrics,
- Laundries, which dress the clothes and iron them,
- Knitwear producers, which make the knitted clothes,
- Garment makers, which assembly the final products and sell them to the distributors.

In order to analyze the whole structure of the local district, we selected a stratified sample of 217 firms (Table 2). We received about the 70% of answers to the questionnaires and on the basis of the information collected we have first built the incidences matrix and then represented the district network by using the software UCINET.

Table 2. Key information on the Barletta knitwear district and the sampled firms.

	District	Sample	Respondents
Number of firms in 2006	498	217	151
Firms by specialization			
- Yarn and fabric producer	10	4	3
- Screen printing	10	4	3
- Knitwear producer	142	63	43
- Laundry	46	20	14
- Garment maker	290	126	88

The network is formed by 151 nodes and linked by 3070 bidirectional ties. In Table 3 the network attributes are reported.

Table 3. Barletta knitwear district network attributes.

Attributes	Value
No of nodes	151
No of ties	3070
Network density	13.6%
Gini coefficient	0.14
Average DC	20.3%
Standard deviation	5.2
Normalized Average DC	14%
Standard deviation	3.5
Normalized Average CC	52.1%
Standard deviation	2.1

5.4.2. The Andria underwear district

The district is located in the province of Bari, in the northernmost part of the Italian region of Puglia and comprises 3 municipalities, namely Andria, Bisceglie and Canosa, with the great concentration in the municipality of Andria (301 firms).

The district is specialized in the underwear production, main products are:

- Ladies underwear and lingerie (e.g. panties, petticoats, bras), men underwear (pajamas, underpants);
- Woollen underwear (undershirts, panties, petticoats, etc.).

In the district there are 371 firms operating in the underwear sector out of which we chose a stratified sample of 188 firms specialized in five different production phases: yarn and

fabric producers, screen printings, woollen underwear producers, laundries, and underwear makers (Table 4).

Table 4. Key information on the Andria underwear district and the sampled firms.

	District	Sample	Respondents
Number of firms in 2006	371	188	125
Firms by specialization			
- Yarn and fabric producers	40	21	14
- Screen printer	12	4	3
- Woollen underwear producer	126	65	43
- Underwear maker	167	84	56
- Laundry	26	14	9

In order to analyze the whole structure of the local district, on the basis of the information collected through the questionnaires, we have built the district network. In this case study we had a rate of return equal to 66%. Table 5 shows the network attributes.

Table 5. Andria underwear district network attributes.

Attributes	Value
No of nodes	125
No of ties	1862
Network density	12.1%
Gini coefficient	0.2
Average DC	14.9
Standard deviation	5.3
Normalized Average DC	12.1%
Standard deviation	4.3
Normalized Average CC	49.2%
Standard deviation	3.4

5.4.3. The Barletta footwear district

The district is located in the new-born province of Barletta-Andria-Trani, in the Puglia region. The concentration of small and medium-sized firms is focused on the production of casual shoes for lower market spheres, mostly provided with so-called injected soles. Some of the larger firms in the district are devoted to the production of the more advanced safety shoes that are developed for use in dangerous working circumstances.

The most recent Census of Industry, carried out in 2001, made clear that the industrial district of Barletta officially consists of 369 firms in the footwear sector, with final firms and specialised suppliers both accounting for about 50 percent. At the end of 2006, by using the Infocamere database we have registered 336 firms operating in the footwear sector. In particular, district firms encompass branded and non-branded end-product manufactures, several specialized suppliers (such as shoe string manufacturers, die-sinkers, heels manufacturers, etc.) and subcontractors (such as upper and sole producers).

In order to analyze the structure of the local district, we selected a stratified sample of 179 firms. We received about the 65% of answers to the questionnaires and on the basis of the information collected we have built the district network (Table 6).

Table 6. Key information on the Barletta footwear district and the sampled firms.

	District	Sample	Respondents
Number of firms in 2006	336	179	117
Firms by specialization			
- Die-sinkers	14	8	5
- Parts and accessories (shoe string, heels, etc.)	43	23	15
- Upper producers	95	50	33
- Shoe producers	184	98	64

The network is formed by 117 nodes and linked by 3024 ties. In Table 7 the network attributes are reported.

Table 7. Barletta footwear district network attributes.

Attributes	Value
No of nodes	117
No of ties	3024
Network density	22.3%
Gini coefficient	0.1
Average DC	25.8%
Standard deviation	5.5
Normalized Average DC	22.3%
Standard deviation	4.8
Normalized Average CC	56.2%
Standard deviation	1.7

5.4.4. The Foggia agro-food district

The district is located in the province of Foggia, in the Puglia region. Agriculture and the whole food and agriculture industrial system represent the mainstay of the economy of the province of Foggia, as confirmed by the total agricultural surface area of the province that exceeds 560.000 hectares, the number of farms (about 61.000), and by the number of agricultural employees (the incidence of agriculture employment is the 13,9% in the province of Foggia versus the average national value of 4,4%). The area so called "Tavoliere" is among the major Italian producers of tomatoes, olives, wine grapes, and vegetables, but shows high production ratios also for vegetable oils, the processing and preservation of fruit and vegetables, and the production of corn seed and starch products. Alongside the primary cultivation activity, a reasonably sized satellite district of SMEs specialized in the food-processing, food-packaging, and fresh fruit and vegetables conditioning has developed in the last few decades. In the district we have counted in the 2006 284 firms out of which we chose a stratified sample of 142 firms specialized in the three main agri-food productions characterizing the district, namely the olive oil, the wine and the fruit and vegetable production (Table 8).

Table 8. Key information on the Foggia agro-food district and the sampled firms.

	District	Sample	Respondents
Number of firms in 2006	284	142	88
Firms by specialization			
- Vine production	77	39	20
- Olive oil production	121	61	42
- Fruit and vegetable production	86	43	26

In order to analyze the whole structure of the local district, on the basis of the information collected through the questionnaires, we have built the district network. In this case study we had a rate of return equal to 62%. Table 9 shows the network attributes.

Table 9. Foggia agro-food district network attributes.

Attributes	Value
No of nodes	88
No of ties	378
Network density	4.9%
Gini coefficient	0.04
Average DC	3.4%
Standard deviation	5.5

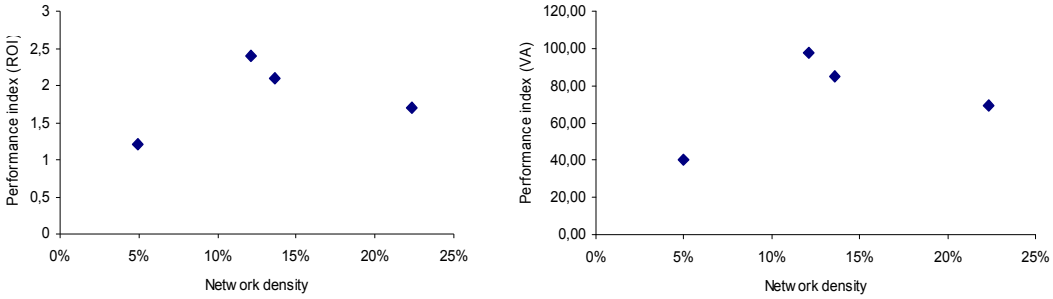
Attributes	Value
Normalized Average DC	4.9%
Standard deviation	3.9
Normalized Average CC	17.1%
Standard deviation	1.1

6. Result of the cross-case analysis

The four networks are compared in terms of network attributes and performances. Note that network density is used as a measure of the interconnectivity among firms, the Gini coefficient measures the ID heterogeneity, and the normalized average degree centrality and the normalized average closeness centrality are measures of the level of control inside the ID.

Figure 1 plots the values of the network density and the performance indexes for the four networks.

Figure 1. Comparison of the network density and the performance indexes



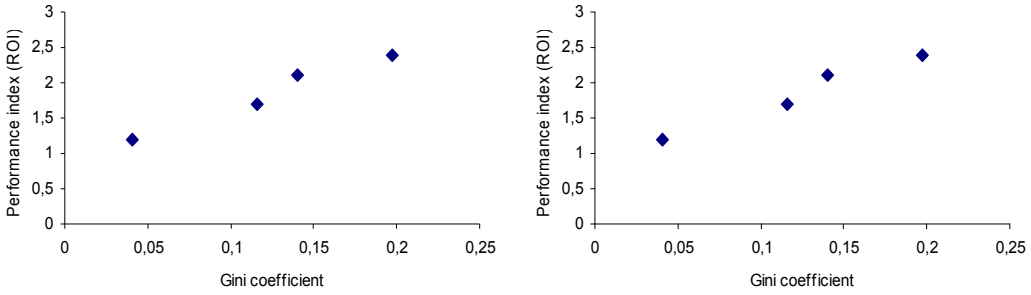
Notice that the relationship between the performance indexes and the network density follows an inverse U-shaped relationship, in fact the performance indexes increase when the network density increases, but till a certain value (threshold). When the network density overcomes the threshold the performance indexes decrease. This result is coherent with what CAS theory affirms on the relation between the level of interconnectivity of the CAS and its capacity to adapt to the environment and successfully evolve. Too many links make the system of firms more vulnerable. In fact, for example, in the Barletta footwear district firms are densely connected by buyer-supplier relationships. As a consequence, the decline of some buyer firms and the strategic decisions of some other buyers to delocalize great part of production in Albania and Romania has decreased the performance of the connected firms and determined the district crisis. Too few links make the district firms isolated and in such a condition they lose the benefits of the information and knowledge sharing.

On the basis of the discussion above, we formulate the following proposition:

Proposition 1. The ID performance first tends to increase and then to decline with the number of links among ID firms. It seems that a threshold of the number of links among ID firms exists.

Figure 2 plots the values of the Gini coefficient and the performance indexes of the four districts. As the Gini coefficient increases, the performance indexes raise. Being the Gini coefficient a proxy of the network heterogeneity, the obtained finding is consistent with the CAS theory that highlights the importance of the heterogeneity as a source of innovation and adaptiveness.

Figure 2. Comparison of the Gini coefficient and the performance indexes.



A low Gini coefficient characterizes a network where the agents are equally connected, and thus have the same network of relationships. This determines an even distribution of information, knowledge, and competitive strategies which flow through the network of relationships, and then the homogeneity of the system.

On the contrary, a high Gini coefficient means that the actors in the network are characterized by different distribution of linkages. The system is characterized by an uneven distribution of information, knowledge, and competitive strategies and then there is a greater heterogeneity in the system.

What is happened in the Foggia agro-food district and in the Barletta footwear district, both presenting a low value of the Gini coefficient, is that firms have adopted similar manufacturing and marketing strategies. In particular, a great part of the firms operating in the Foggia district is mainly involved in the first stages of the agro-food supply chains and they are scarcely distributed on the downstream stages of the supply chain. Such a condition has negatively affected the performance of the district firms, which do not have a direct control of the final market and are unable to add value to their products. As regards the Barletta footwear district, most of the firms have focused on lower market segments, for many years they have adopted conservative strategy characterized by an absence of significant efforts to innovate and to upgrade the locally embedded knowledge. This behavior in a not particularly dynamic market has guaranteed the survival of the district, but recently, when the market has become more competitive, due to a more sophisticated demand of the consumers oriented to brand names and due to the increasing competition from low-cost countries, has led to the district crisis.

The Andria underwear district has faced with the same change of the competitive context but the differentiation of firms in terms of capabilities and knowledge has favoured the formulation of different competitive strategies, e.g. some firms created a brand or acquired licensing exploiting their marketing capabilities, some others focus on niches such as the handmade embroidered products or low cost products exploiting their manufacturing capability, some others became sub-contractors of large firms external to districts exploiting their capacity to provide high logistics performances. Such a differentiation has determined less internal competition and protect the district from the crisis.

Therefore, we posit that:

Proposition 2. More uneven the distribution of the linkages across the ID firms, higher the ID performance.

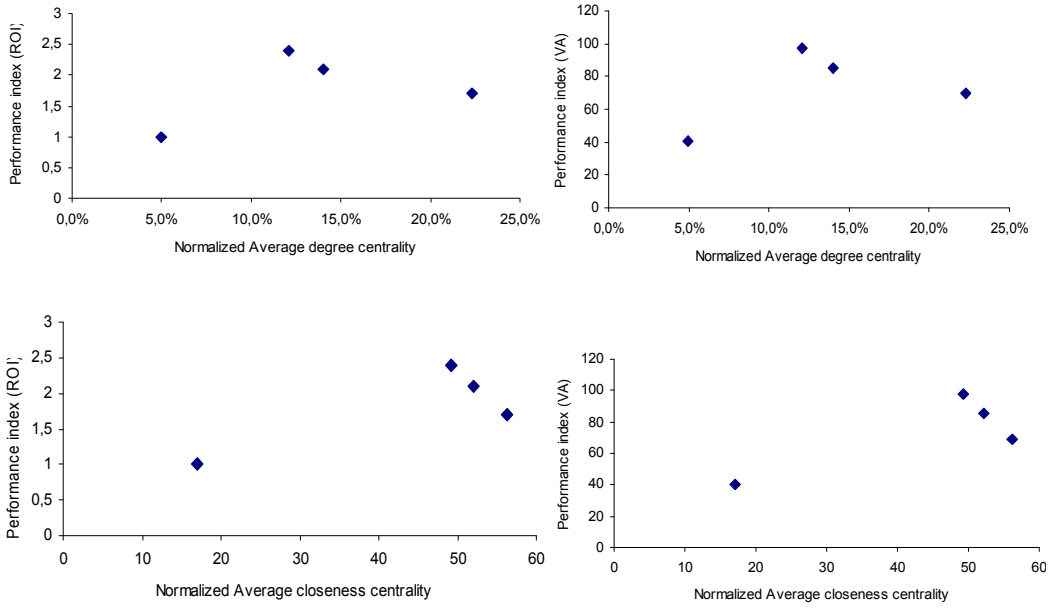
Figure 3 shows the values of the normalized average degree centrality/closeness centrality and the performance indexes of the four networks. As the average degree centrality/closeness centrality increases, the performance indexes first increase and then decline. Being the average normalized degree centrality/closeness centrality a proxy of the level of control/level of independency of the actors in the network, this trend is coherent with the CAS theory which puts in evidence the need to balance hierarchy and autonomy.

The Barletta footwear district is characterized by a high level of normalized average degree and closeness centrality. This is due to the presence in the ID of some large-sized firms that assume a focal position in the network and that create their own supply chains

managed using a centralized control. This reduces the flexibility of the supply chains operating in the district and narrows the information flows inside the supply chains without any sharing among them.

On the other extreme, the Foggia agro-food district is characterized by firms that are scarcely interconnected both by vertical and horizontal linkages. They are neither integrated along the supply chain nor cooperate in the same stage of the supply chain. This reduces the possibility to offer on the market a wider range of products, to implement a system of product traceability that ensures the quality and security of products, and to increase the contractual power of the district SMEs toward the big buyers.

Figure 3. Comparison of the centrality measures and the performance indexes.



The districts with intermediate level of normalized average degree and closeness centrality, namely the Andria underwear district and the Barletta knitwear district, present higher performances. The supply chains inside these IDs are mainly managed using a decentralized control where each firm makes independent production and inventory decisions. Thanks to this form of governance, the IDs gain the advantages of the flexible specialization model and keep high their performance.

Therefore, we hypothesize that:

Proposition 3. ID performance first increases with the level of control of the ID organizational structure and then tends to decrease. This suggests the presence of a threshold of the level of control of the ID organizational structure.

7. Conclusions

This paper used complexity science concepts to offer a new perspective on the theoretical understanding on Industrial Districts (IDs) competitive success. In fact, complexity science has been used as a conceptual framework to investigate the reasons for the competitive success of IDs. This approach is particularly valuable given that it allows the limits of traditional studies on IDs to be overcome. In particular, the ID competitive advantage is not the result of a set of pre-defined features characterizing IDs, but it is the result of dynamic processes of adaptability and evolution of the IDs with the external environment. Therefore, the ID competitive success is linked to the system adaptive capacity that is a key property of complex adaptive systems (CASs).

Using the theory of CAS, the key structural features of IDs that give them the adaptive capacity have been identified, namely: i) the number of links among ID firms, ii) the

heterogeneity in the distribution of the links across the ID firms; and iii) the level of control of the ID organizational structure.

We conducted an explorative research adopting a multiple-case study approach. It involved four in-depth case studies on Italian IDs selected as polar cases of declining district and successful district. We compared them in terms of CAS properties using the social network theory and measures.

In particular, the networks of the business inter-firm relationships have been mapped and then their attributes of network density, Gini coefficient, and degree centrality and closeness centrality calculated. These attributes are used as measures of the ID structural features fostering adaptation: the network density is used as proxy of the number of links among firms, the Gini coefficient as proxy of the heterogeneity in the distribution of the links across the ID firms, and the degree centrality and closeness centrality as proxies of the level of control of the ID organizational structure.

Comparing the four networks we generated three theoretical propositions regarding the values of the ID structural features that foster the ID performance. In particular, our findings suggest that the ID performance first increases and then declines as the number of links among firms and level of control of the ID organizational structure raise, so suggesting the existence of a threshold. Moreover, a high heterogeneity in the distribution of the links across the ID firms assures higher ID performance.

These findings have broader policy implications. For example, policies addressed to sustain ID competitive advantage should be devoted to avoid the formation of overcrowded networks of links among ID firms, to increase the heterogeneity, and to assure the balance between hierarchy and autonomy in the ID organizational structure.

We recognize certain limitations in our research. In particular, the main limitation of the study concerns that we included only four networks and we compared networks of different industries. Thus, further researches should be devoted to improve empirical investigation and test extensively the hypotheses.

References

Albino, V., Carbonara, N., and Giannoccaro, I. 2005. Industrial districts as complex adaptive systems: Agent-based models of emergent phenomena. In Industrial Clusters and Inter-Firm Networks, ed. C. Karlsson, B. Johansson and R. Stough,: 73-82. Northampton: Edward Elgar Publishing.

Albino, V., Carbonara, N., and Giannoccaro, I. 2006. Innovation within Industrial Districts: An Agent-Based Simulation Model. International Journal of Production Economics Vol., 104: 30-45.

Allen, P. M. 2001. A complex systems approach to learning, adaptive networks. International Journal of Innovation Management Vol., 5: 149-180.

Anderson, P. W., Arrow, K. J. and Pines, D. 1988. The economy as an evolving complex system. Proceedings of the Santa Fe Institute Vol. V.

Arthur, W. B. 1990. Positive feedback in the economy. Scientific American Vol.262: 92-99.

Ashby, W.R. 1956. An Introduction to Cybernetics. London: Chapman & Hall.

Auerbach, F. 1913. Das Gesetz Der Bevolkerungskoncentration. Petermanns Geographische Mitteilungen Vol. 59: 74-76.

Axelrod, R., and Cohen, M.D. 1999. Harnessing Complexity: Organizational Implications of a Scientific Frontier. New York: The Free Press.

Barney, J.B. 1991. Firm resources and sustained competitive advantage. Journal of Management Vol., 17: 99-120.

Becattini, G. 1990. The Marshallian industrial district as a socio-economic notion. In Industrial districts and Inter-firm co-operation in Italy, ed. G. Becattini, F. Pyke and W. Sengenberger: 37-52. Geneva: International Institute for Labour Studies.

Borgatti, S.P., and Everett, M.G. 1997. Network Analysis of 2-Mode Data. Social Networks Vol. 19: 243-269.

Borgatti, S.P., and Everett, M.G. 1997. Network Analysis of 2-Mode Data. Social Networks Vol., 19: 243-269.

Borgatti, S.P., and Everett, M.G. 1999. Models of core/periphery structures. Social Networks Vol., 21: 375-395.

Borgatti, S.P., Everett, M.G., and Freeman, L.C. 2002. UCINET 6 for Windows. Harvard: Analytic Technologies.

Carbonara N., Giannoccaro I., and McKelvey, B,. 2010. Making Geographical Clusters more successful: Complexity-based policies. Emergence: Complexity & Organization, forthcoming.

Carzo, R., and Yanousas, J. N. 1969. Effects of flat and tall structure. Administrative Science Quarterly Vol., 14: 178–191.

Choi, T.Y., and Hong, Y. 2002. Unveiling the structure of supply networks: case studies in Honda, Acura, and Daimler-Crysler. Journal of Operations Management Vol. 20: 469-493.

Choi, T.Y., Dooley, K.J., and Rungtusanatham, M. 2001. Supply Networks and complex adaptive systems: control versus emergence. Journal of Operations Management Vol. 19: 351-366.

Cooke, P. 1999. The co-operative advantage of regions. In The new industrial geography: Regions, regulation, and institutions, ed. T. Barnes and M. Gertler, 54-73. London: Routledge.

Cooke, P., and Morgan, K. 1998. The associational economy: Firms, regions, and innovation. Oxford: Oxford University Press.

Cowan, G. A., Pines, D. and Meltzer, D. 1994. Complexity: Metaphors, models, and reality. Proceedings of the Santa Fe Institute, Vol. XIX.

Dooley, K.J. 2002. Organizational Complexity. In International Encyclopedia of Business and Management, ed. M. Warner. London: Thompson Learning.

Eisendhardt, K.M. 1989. Building theories from case study research. Academy of Management Review Vol. 14: 532-550.

Freeman, L.C. 1979. Centrality in Social Networks: I. Conceptual clarification. Social Networks Vol. 1: 215-239.

Gell-Mann, M. 1994. The quark and the jaguar. New York: Freeman & Co.

Giuliani, E. 2007. The selective nature of knowledge networks in clusters: evidence from the wine industry, Journal of Economic Geography Vol. 7: 139-168.

Granovetter, M. 1973. The strength of weak ties. American Journal of Sociology Vol. 78: 1360-1380.

Grant, R.M. 1998. Contemporary Strategy Analysis. Concepts, Techniques, Applications. Blackwell: Oxford.

Haken, H. 1977. Synergetics: An introduction. Berlin: Springer-Verlag.

Hamel, G., and Prahalad, C.K. 1994. Competing for the Future. Boston (MA): Harvard Business School Press.

Henry, N., and Pinch, S. 2002. Spatializing knowledge: Placing the knowledge community of Motor Sport valley. In Mapping Strategic Knowledge, ed. A.S. Huff and M. Jenkins. 137-169. London: Sage.

Janis, I. 1972. Victims of groupthink. Boston: Houghton-Mifflin.

Johnson, N.L. 2000. Developmental Insights into Evolving Systems: Roles of Diversity, Non-Selection, Self-Organization, Symbiosis. In Artificial Life VII, ed. M. Bedau. Cambridge (MA): MIT Press.

Jones, G.R. 2000. Organizational Theory. Reading (MA): Addison-Wesley.

Kauffman, S. A. 1993. The origins of order: Self-organization and selection in evolution. New York: Oxford University Press.

Kauffman, S.A. 1995. At home in the universe: the search for laws of self-organization and complexity. New York: Oxford University Press.

Kauffman, S.A., Lobo, J., and Macready, W.G. 2000. Optimal search on a technology landscape. Journal of Economic Behavior and Organization Vol. 43: 141-166.

Krugman, P.R. 1991. Geography and Trade. Cambridge (MA): MIT Press.

Lane, D. 2002. Complexity and Local Interactions: Towards a Theory of Industrial Districts, Complexity and Industrial Districts. In Complexity and Industrial Clusters, ed. A.Q. Curzio and M. Fortis. Heidelberg: Physica-Verlag.

Le Moigne, J. L. 1990. La Modélisation des Systèmes Complexes. Paris: Dunod.

LeBaron, B. 2001. Financial market efficiency in a coevolutionary environment. Paper presented at Workshop on Simulation of Social Agents: Architectures and Institutions: 33-51. Argonne National Laboratory and The University of Chicago.

Leonard-Barton, D. 1995. Wellsprings of Knowledge. Boston: Harvard Business School Press.

Levinthal, D.A. 1997. Adaptation on Rugged Landscapes. Management Science Vol., 43: 934-950.

Levy, D.L. 2000. Applications and Limitations of Complexity Theory in Organization Theory and Strategy. In Handbook of Strategic Management, ed. J. Rabin, G. J. Miller and W.B. Hildreth. New York: Marcel Dekker.

Lewin, R. 1992. Complexity: Life at the edge of chaos. Chicago: University of Chicago Press.

Lundvall, B. and Johnson, B. 1994. The learning economy. Journal of Industry Studies Vol. 1 (2): 23-42.

Mainzer, K. 2004. Thinking in complexity. New York: Springer-Verlag.

Malmberg, A., and Maskell, P. 2004. The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering. In Networks, ed. G. Grabher and W.W. Powell. Cheltenham: Edward Elgar.

Marshall, A. 1920. Principles of Economics. London: Macmillan.

Maskell, P. 2001. Towards a Knowledge-based Theory of the Geographical Cluster. Industrial and Corporate Change Vol. 10: 921 - 943.

McEvily B., and Zaheer, A., 1999. Bridging ties: a source of firm heterogeneity in competitive capabilities, . Straetegic Management Journal Vol. 20: 1133-1156.

McKelvey, B. 2004. Toward a 0th Law of Thermodynamics: Order Creation Complexity Dynamics from Physics and Biology to Bioeconomics. Journal of Bioeconomics Vol. 6: 65-96.

Mckelvey, B., and Maguire, S. 1999. Complexity and Management: Moving From Fad To Firm Foundations. Emergence Vol. 1(2): 19–61.

Mitleton-Kelly, E. 2003. Complex Systems And Evolutionary Perspectives Of Organisations: The Application Of Complexity Theory To Organisations. Amsterdam: Elsevier.

Morgan, K. 1997. The learning region: Institutions, innovation and regional renewal. Regional Studies Vol. 31: 491-503.

Pines, D. 1988. Emerging syntheses in science, Proceedings of the Santa Fe Institute Vol. I.

Piore, M., and Sabel, C.F. 1984. The Second Industrial Divide. New York: Basic Books.

Porter, M. 1998. Clusters and the new economics of competition. Harvard Business Review Vol. 76: 77-90.

Powell, W.W. 1987. Hybrid organizational arrangements: new form or transitional development. California Management Review Vol. 19 (4): 67-87.

Prigogine, I. 1955. An introduction to thermodynamics of irreversible process. Springfield (IL): Thomas.

Prusak, L. 1997. Knowledge in organisations. Washington: Butterworth-Heinemann.

Rivkin, J.W., and Siggelkow, N.J. 2002. Organizational Sticking Points on NK Landscape. Complexity Vol. 7 (5): 31-43.

Sammarra, A. and Belussi, F. 2006. Evolution and relocation in fashion-led Italian districts: evidences from two case-studies. Entrepreneurship & Regional Development Vol. 18: 543-562.

Sanchez, R. 1993. Strategic flexibility, firm organization, and managerial work in dynamic markets. Advances in Strategic Management Vol. 9: 251-291.

Simon, H.A. 1996. The sciences of the artificial. Cambridge (MA): MIT Press.

Storper, M. 1997. The regional world: Territorial development in a global economy. New York: Guilford Press.

Storper, M., and Harrison, B. 1990. Flexibility, hierarchy and regional development: the changing structure of industrial production system and their forms of governance in the 1990s. Working paper, School of Architecture and Urban Planning, University of California, Los Angeles.

Tallman, S., Jenkins, M., Henry, N., and Pinch, S. 2004. Knowledge, clusters, and competitive advantage. Academy of Management Review Vol. 29 (2): 258-271.

Wasserman, S., and Faust, K. 1994. Social Network Analysis. Methods and Applications. Cambridge: Cambridge University Press.

Yin, R. 1989. Case Study research: Design and methods. Newbury Park, CA: Sage.

Zipf, G. K. 1949. Human behavior and the principle of least effort. New York: Hafner.

Announcements, Conferences, News

«New ideas and new generations of regional policy in Eastern Europe »
International Conference 7-8 April 2016, Pécs, Hungary

Conference Overview[1]

The international conference organized by the Institute for Regional Studies -Centre for Economic and Regional Studies-Hungarian Academy of Sciences, titled «New ideas and new generations of regional policy in Eastern Europe» was organized in Pécs (Hotel Palatinus), Hungary, in the south-west of the country close to its border with Croatia, was held on April 7-8 2016. The turn-out was impressive with over 150 participants from 15 countries (Hungary, Poland ,Croatia, Serbia, Slovenia, the Czech Republic, Latvia, Albania, Romania, Turkey, etc) who attended the conference, where the successful work was conducted in 8 thematic sessions (socio-economic inequalities, regional policy, cohesion, sustainability, migration, border regions, territorial capital, rural innovations, smart city).A major objective of the event, alongside the presentation of the most advanced research results on territorial research and the debate on current issues was to contribute to strengthening the international relationships of researchers and to encourage new cooperation.

In the new Cohesion Policy period the EU member states have more options to signify their specificities, to search for more adequate solutions to their particular challenges. The conference attempted to refresh the discussions on domestic regional issues, and to create partnerships and facilitate cooperation among upcoming regional science younger scholars and elders from Western Europe, Central Europe, as well as from East Europe and the Balkans. Besides these objectives, the conference fostered more fruitful relations and cooperation with experts from all regions to share experiences with intent to improve the way regional studies and development policies are conducted.

[1] Conference overview by Dr Eleni N. Stamatiou

Western Regional Science Association 55th Annual Meeting
Hilton Waikoloa Village, The Big Island of Hawai'i February 14–17, 2016

Conference Overview[1]

The 55th annual meeting was all a multi-conference on regional development could hope for: great sessions, friendly and hospitable local inhabitants of these exotic islands, beautiful beaches with palm trees, warm and sunny weather, excellent conference company from well known academic institutions and great local food choices.

The main topics discussed included:Transportation Alternatives, All About Cities, Geography of Human Capital, Gone Fishing, Infrastructure and Resources, Trade and Development, Migration, Remote Regions: Sources of Population Change, Housing and Urban Planning, Going Green, Transportation, Land Use, and the Built Environment, Industry and Economic Development, Mobility: City Mouse, Country Mouse, The Urban Environment, Remote Regions: Improving Benefits from Resource Development in the North - ReSDA I, Climate Change, Climate Policy, Valuing Residential Land, Firms and Economic Evolution,Trade and Investment,Methods and Measurements, Employment and Labor Force Participation, Urban and Regional Change, Remote Regions: Improving Benefits from Resource Development in the North - ReSDA II, Geography of Economic Activity, Cities, Neighborhoods, and Interaction, Regions and Development, Defining Growth and Success, Demography Matters, Governance, Culture and Development, Location in Space: Applications, Policy, Place, and the Environment, Entrepreneurship,Regional Science Academy, Graduate Migration, The Quantified City, Dealing With Disasters, Regional Fiscal Issues.

The conference was a great success.

The participants exceeded 1500 which originated from over 40 countries (China, Saudi Arabia , UAE, Korea, Japan, USA, Mexico, Sweden , Norway , The Netherlands ,Poland, Switzerland, France, United Kingdom, Austria , Spain, Italy , Hong Kong ,Australia, etc ,to name a few.) Well reputed and published University professors, researchers and experts contributed to some of the more innovative current trends in regional development as it is practiced around the world. The social program of the conference was also outstanding, it included visits to local attractions –and well publicized points of interest.

[1] Conference overview by Dr. Richard-Nicolas Lacroix

Academic Profiles

Professor Agim Kukeli

Agim Kukeli is a Professor of Economics at the Akron University, Ohio's Polytechnic University, in the USA. He has gain a Ph.D. in Economics at the Colorado State University in 2004 and has made further qualifications in his field of study in the University of Missouri (USA), in California and Washington. His primary field of study is focused on the International and Monetary Economics, while his secondary interest is focused on Macroeconomics and Political Economics.

His first teaching experience started in 2001 at the Colorado State University (USA) as a teaching instructor of economics. In 2004, professor Kukeli became part of the Department of Business in the Mesa State College (USA) and during the period of (2006 – 2010) taught at the University "Aleksandër Moisiu" Durres (Albania), on which carried also the position of the Rector. Recently, he is a professor at the Acron University (USA). Some of his adjunct faculty positions are: University of New York Tirana (Albania), University of New York, Prague (Czech Republic), Front Range Community College (USA), International University of Struge (Macedonia), State University of Tetova (Macedonia) and Black Hills State University (USA). The courses taught by professor Kukeli are numerous: Micro and Macroeconomics, Econometrics, International Trade & Business (MBA), Bank and Finance, International Finance Management, Labour Economics, Research Methods in Finance (M.Sc.), Quantitave Methods (PhD), etc.

Professor Kukeli is member of several international organizations in the USA like: Association of International Dynamic Game Theory, American Economic Association, Academy of Economics and Finance, Association of Institutional Economics and International Academy of Business and Public Administration Disciplines. He is a specialist of the Albanian economy and during 2012 – 2013 used to be economic adviser to the Prime Minister of Albania.

He has given his contribution in the field of scientific research by mentoring five dissertation research studies and publishing more than 20 articles concerning the foreign direct investment, challenges in transition economies, real options, Albanian economy, game theory, "shock therapy", etc. Professor Kukeli is awarded for his excellence in teaching from Colorado State University in the USA (2003) and from University of New York Tirana, Albania (2007).

Academic profile made by:
Dorjana Nano, RSI Journal Editor

Associate Professor Nunzia Carbonara

Nunzia Carbonara received the Laurea degree in Electronic Engineering in 1994 and the Ph.D. in Engineering of Advanced Production Systems in 2000, both from Politecnico di Bari (Italy).

In 2001 she has been a visiting research fellow at the Enterprise, Research and Development Centre of the University of Central England, Business School, Birmingham.

She joined the Department of Mechanical and management Engineering of Politecnico di Bari (Italy) as Assistant Professor in Management Engineering in 2002.

As for the teaching activity, Nunzia Carbonara held the courses: Business Management, Organization Systems and Human Resource Management, in the Faculty of Management Engineering at the Politecnico di Bari; Business Economics and Organization in the faculty of Law at the University of Bari.

Her research interests include the evolution and development of geographical clusters, the competitive advantage of clusters, complexity theory and agent-based simulation, and the knowledge management processes.

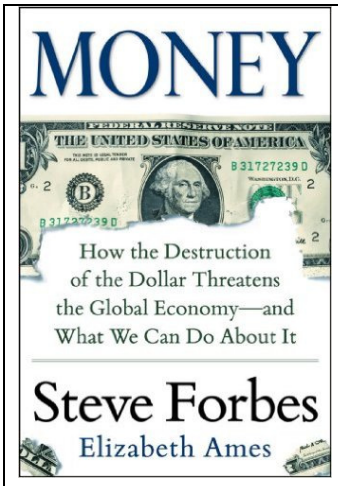
Dr. Carbonara is author of more than 80 papers, 30 of which have been published by international scientific journals or within international books. Some of these papers are: “Cognitive Maps To Analyze New Product Development Processes: A Case Study”, “Information And Communication Technology And Geographical Clusters: Opportunities And Spread”, “Innovation Processes Within Geographical Clusters: A Cognitive Approach”, “Making Geographical Clusters More Successful: Complexity-based Policies”, “The Role Of Knowledge Heterogeneity On The Innovative Capability Of Industrial Districts”, “A Three-layer Analysis Framework For Public Private Partnerships At Country, Sector, And Project Levels”, “Industrial District Heterogeneity And Comparative Advantage: Evidence From Italy” etc.

Nunzia Carbonara in 2007 has been chair of the track “Towards a complexity science-based theory of geographical clusters”, of the EURAM Conference.

She is part of the Organization Committee and the Scientific Committee for the 12th Uddevalla Symposium “Geography of Innovation and Entrepreneurship”, Bari, June 2009, and co-chair of the upcoming International Conference on Industrial Engineering and Engineering Management (Hong Kong, December 2009).

Academic profile made by:
Doc. Dr. Antoneta Polo, RSI – Journal Editor

Book Reviews



Book Title: Money: How the Destruction of the Dollar Threatens the Global Economy - and What We Can Do About It

Authors: Steve Forbes, Elizabeth Ames
ISBN: 978-0-07-182370-8 MHID: 0-07-182370-0

Since the U.S. abandoned a gold-linked dollar, the world's governments have slid into a dangerous ignorance of the fundamental monetary principles that guided the world's most successful economies for centuries. Today's wrong-headed monetary policies are now setting the stage for a new global economic and social catastrophe that could rival the recent financial crisis and even the horrors of the 1930s. Coauthored by Steve Forbes, one of the world's leading experts on finance, Money shows you why that doesn't need to happen--and how to prevent it.

The book is structured into eight chapters, through which, you will know more about money than most people in the highest government positions today. Money explains why a return to sound money is absolutely essential if the U.S. and other nations are ever to overcome today's problems. Stable money, Steve Forbes and Elizabeth Ames argue, is the only way to a true recovery and a stable and prosperous economy.

In Money, Forbes and Ames answer these crucial questions: What is the difference between money and value? What is real wealth? How does sound money contribute to a well-functioning society? How have our money policy errors led to the current problems in global financial markets? What can we do now to reestablish the strength of the dollar and other currencies?

The authors argue that the most effective way to return to a sound money policy and a healthy economy is to put the dollar back on a gold standard, and they outline the several different forms a gold standard could take. They also share invaluable suggestions for how to preserve our wealth and where to invest our money.

Money is essential reading for anyone interested in this crucially important subject.

Book Review by Doc. Dr. Antoneta POLO,
RSI Journal editor

Book Title: Tourism and Culture in the Age of Innovation
Authors: Katsoni Vicky, Stratigea Anastasia
ISBN: 978-3-319-27527-7

Tourism is considered as one of the most important sectors for development and economic growth of a country. This book focuses on cultural tourism as it develops into the second decade of the new millennium. It presents recent hospitality and tourism research findings from various sources, including academic researchers and scholars, industry professionals, etc. It discusses the latest tourism industry trends and identifies gaps in the research from a pragmatic and applied perspective. The book is structured into four parts: Cultural Tourism and Regional Development, Emerging Forms of Tourism, Methodologies, Tools and Approaches for Managing Tourist Destinations and the last, ICT Developments and Tourism: New Perspectives.

The link between cultural heritage and sustainable development is one of major importance and carries a multitude of meanings and implications for both parties. Cultural heritage is all-the-more inherently related if not embedded within the process of development. Also, nowadays, new cultural tourism is focused on the integration of production and consumption, and it creates linkages between suppliers and consumers. Instead of passive consumption, cultural tourists demonstrate a proactive approach to meeting their needs, wanting to actively participate in experiences while travelling. On the other side, suppliers focus their attention on the close interaction with consumers and co-creation of high quality experiences.

The evaluation of the innovation can be useful in establishing the competitive position and strategic enterprises of the sector. These and other problems are described very well in this book.

The book is the outcome of the effort of many people, who participated at the 2nd International Conference organized by the International Association of Cultural and Digital Tourism (IACuDiT) in Athens, May 21–24, 2015.

Book Review by Doc. Dr. Antoneta POLO,
RSI Journal editor

THE REGIONAL SCIENCE INQUIRY JOURNAL (RSI J)
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