

## SPATIAL DISTRIBUTION OF ECONOMIC ACTIVITIES AND INTERNAL ECONOMIC INTEGRATION IN ROMANIA

Ihor YASKAL<sup>\*</sup>, Liviu-George MAHA<sup>\*\*</sup>, Oksana PETRASHCHAK<sup>\*</sup>

<sup>\*</sup>Yuriy Fedkovych Chernivtsi National University, Ukraine

<sup>\*\*</sup>Alexandru Ioan Cuza University of Iași, Romania

**Abstract:** This paper aims to consider two tendencies in economy simultaneously: internal integration within the country and localization of economic activities. Firstly, we examine the quantitative measurement of internal economic integration in Romania. Different methods of economic integration measuring have been developed over time, so we have defined and discussed three approaches. To estimate a level of internal integration the link between the region's share in the total output and production factors was estimated and the pattern of distribution of these shares among the regions of Romania was assessed. The calculations have underlined an increasing tendency to deepen the internal economic integration of the Romanian economy. Secondly, the analysis of spatial distribution of economic activity has demonstrated that the capital region Bucharest-Ifov concentrates the biggest share of employment and production. This indicates that initially there were higher economic activities and a labor deficit has been created, which was later covered by moving employees from other regions. As a result, the capital region concentrates 14.35% of the civil economically active population and 26.78% of the regional gross domestic product in 2014. By computing the location coefficient, we have observed that the counties with the biggest shares in the total GDP are characterized by a higher level of specialization simultaneously in many sectors.

**Key Words:** *production factor distribution, Kullback-Leibler divergence, internal economic integration, spatial distribution of economic activities, specialization, location quotient.*

### Introduction

The acceleration of globalization and geopolitical changes have recently given more attention to the role of market mechanisms in the allocation of resources within the economic landscape. Until the global financial crisis of 2008/09, the free market and globalization were associated with a relatively high level of economic growth and the expansion of the new middle class in the emerging economies, accompanied by a "new, complex and uneven geography of inequality" (Pike et al. 2016). Many thoughts have emerged recently that the era of globalization is fundamentally changing, even ending. To confirm this, data on world trade are given which is characterized by slow growth. Since 2010, world trade has grown only 2% annually, combined with the fact that the world-wide production of goods and services is growing by more than 3%. This means that the ratio of trade to GDP is decreasing (Eichengreen 2016). Such trajectory indicates a revival of protectionism. Also, the globalization process enhances the importance of the location of economic activities. The changes in regional performance, associated with the last decades of globalization, have also altered the way in which we view the economic development of regions. This explains the research intensification of the spatial development of economic activity – economy of localization.

The growing attention to localization can be explained by the need to respond to the changes generated by the global economy, job losses and uneven distribution of consumer demand. In general, localization is interpreted as a process that changes global tendencies in the favor of a local one. At the same time, depending on the context, the term "local" predominantly means a

part of the country, although in some cases it is associated with the country itself (sometimes even with a group of countries) (Hines 2000). In general, the localization policy is directed for increasing control over the economy by communities and regions. Increased community cohesion, reduction of poverty and inequality, greater access to livelihoods, better social infrastructure and environmental protection, and, consequently, the improvement of all aspects of security should be the result. The purpose of the localization process is to promote the emergence of a business owned by the local owners who use the local resources on a sustainability basis, who hire local employees with decent pay and serve mostly the local consumers (Shuman 1998). This means growing self-sufficiency in the local economy and a lower dependence on imports and the central government or institutions.

At the same time, in the process of transformations and reforms in the transition economy, the question of strengthening the interaction between regions as the main factor of sustainable economic growth attracts more and more attention according to the unanimous opinion of scientists and practitioners. The integrated development of the regions in the country can provide an increase in the efficiency of using the advantages of territorial labor division, realization of regional natural resource and scientific and production potential, and, therefore, contribute to the economic development of the country as a whole. The effectiveness of these processes depends directly on the coordinated interaction of market structures and the development of integration links at different territorial levels. Broadly defined, spatial interaction refers to a wide array of flows subject to various types of spatial frictions, such as traded goods, migrations, capital movements, interregional grants, remittances, and the interregional transmission of knowledge and the business cycle effects (Behrens and Thisse 2007). This is directly connected with the problem of economic security of the state and the processes of competitiveness formation. Therefore, the studying of the integration processes between regions within the country is extremely relevant today.

Globalization has also drawn attention to the often neglected role of space. It has made localities and their interactions more important for economic growth and prosperity (Rodriguez-Pose 2011). The location (i.e. regions, the regional environment) becomes the epicenter of competitiveness. The region concentrates natural resources, human capital, scientific and industrial potential, it creates and strengthens competitive advantages which are the core of economic development and success.

Based on the mentioned above, we can talk about the relationship between the spatial distribution of economic activity and the integration between the regions of a particular country. In our opinion, interregional integration within the country intensifies the territorial division of labor and specialization, and the growth of specialization and, in turn, it strengthens the concentration of activities in certain places. And as a result of integration processes, cooperation intensifies, which enhances the development of integration processes. The tendency of economic activity to concentrate in space has always been an important topic for research both for economists and economic geographers. Awareness of what factors shape the economic landscape can better understand regional and national differences and the influence to these processes with the appropriately selected tools.

Many scientists investigate the integration processes and there is a wide literature devoted to economic localization. But in contrast to the existing research, this paper aims to consider two tendencies in economy simultaneously: the internal integration within the country and the localization of economic activities. The article is organized as follows. The next section contains a brief theoretical background of analyzed issues. After that we discuss the results gained from calculations and analysis and the last section concludes.

## **Methodology**

### *Economic integration*

At a time when national borders are gradually eliminated, it is especially important to investigate the level of interactions between the regions of one country to enable the government to respond adequately to the changing economic environment. Otherwise, there are increasing threats of economic separatism and the disintegration of the state itself. Of course, the separatist tendencies lay more often in the political, cultural, linguistic and religious area, but the economic background is not completely excluded. This problem is typical for many countries. Ghosh examines the long-run growth performance and the regional divergence in per capita income across 15 major Indian states during the pre- and post-reform periods. The evidence shows that the divergence has increased in the post-reform period, mainly due to inter-state variations in the production structures, human capital and infrastructure (Ghosh 2008). Frey and Wieselhuber (2011) conducted an empirical analysis of the growth process on the regional level using the annual gross regional product (GRP) data for the period 1998-2008, on the 16 Kazakh regions and they stressed out that there was no evidence for regional convergence in Kazakhstan. Turganbayev (2016) explored regional convergence in Kazakhstan by income data and showed that incomes across the regions of Kazakhstan diverged over the whole period of 1993-2014 and the period of 1993-2006, and converged during the period of 2006-2014. After controlling for the rate of investment and population growth, it is evident that regional convergence occurred over the whole period of 1993-2014 (Turganbayev 2016).

This issue is investigated also in other countries: China (Herrmann-Pillath et al. 2014), Germany (Zuiddam 2016), Ukraine (Yaskal 2013) and ASEAN-members (Sethupramote 2015).

### *Different methods of economic integration measuring*

Because a single indicator to measure economic integration does not exist, several techniques and instruments have been developed over time. We have indicated three main approaches.

**Approach #1** (Bowen et al. 2010, 2011 Method). Authors derive three theoretical propositions regarding the distribution of output and the stocks of productive factors expected to arise among the members of a fully integrated economic area (IEA) in which goods and factors are freely mobile and policies are harmonized. The first proposition states that each member's share of the total area output will equal its share of the total area stock of each productive factor. Since this equal-share property applies to each IEA member, it does not directly address the important question of the distribution of output and factor shares across members. This question is addressed instead by the second theoretical proposition: the distribution of output and factor shares across IEA members will conform to a rank-share distribution that exhibits the Zipf's law. Zipf's law specifies a particular relationship among the member shares, namely, that the share of, for example, the output of the largest member is twice that of the second largest member; three times that of the third largest member, etc. The explanation for the emergence of Zipf's law for the distribution of member shares derives from the expected randomness of these shares when policies are fully harmonized across area members. The third theoretical proposition is that, given the Zipf's law, the long-run distribution of output and factors across area members is unique and it depends only on the number of IEA members. This latter result is significant, since it means that the relative position of each IEA member only depends on the total number of members. This methodology was proposed by Bowen et al. (2010, 2011). They assess the level of economic integration between the U.S. states and EU members, based on Regional Trade Agreements. Noteworthy, this approach is used for estimating the level of integration within a country (i.e. USA), and between countries within a particular group (i.e. EU, NAFTA, etc.).

**Approach #2.** It is based on the most general measure of integration, concentrating on

spillovers in economic growth: if a geographical area is integrated economically, there should be spatial interdependencies between the levels of economic growth in the different regions. This co-movement can be caused not only by market forces, but also by other forms of linkages, established, for example, through large-scale government projects or centralized redistribution. This method was used by Herrmann-Pillath et al. (2014). Their objective is to understand how growth rates in Chinese prefectures are correlated across and within provincial and cultural borders. For this purpose, they look specifically at neighbouring prefectures, that is, prefectures with common borders. The idea is that, if economy is integrated, neighbors should exhibit particularly strong links to each other and thus exhibit stronger co-movement of growth rates, as opposed to prefectures distant from each other. If administrative or cultural differences create obstacles for the emergence of economic ties, these links should be absent and the co-movement of growth among neighbouring prefectures should be the same as among a random pair of distant prefectures. To identify the effect, two main approaches are used: regressions for dyads of prefectures and spatial econometrics.

As for the authors, the using of this methodology is driven by two considerations. First, it is the data availability. A possible alternative to studying intra-provincial integration if prefectural data are available would be to estimate provincial border effects from the gravity equations; yet the data on the inter-prefectural trade is not available (this is not a deficit of Chinese data: in many countries in the world, because there are no internal customs controlling goods and factor flows, there are no reliable statistics on the inter-regional trade). Furthermore, the border effect in gravity equations shows just that there is some disruption of trade and factor flows at the border, but it does not allow any clear statement regarding the significance of the intra-provincial integration in terms of its economic effect on the performance of the local economies. Second, an advantage of the measures we use is that it does not rely on particular channels of economic integration (i.e. trade or migration). There are different channels through which spillovers can happen, among others, linkages via trade and investment, imitation of technologies and knowledge diffusion, migration, or demand pull.

**Approach #3.** A number of papers investigate the correlation of growth rates and the coincidence of business cycles as a measure of economic integration and on spatial spillovers (Xu 2002, Xu and Voon 2003, Ying 2003, Sandberg 2004, Golley and Groenewold 2007, Poncet and Barthélemy 2008, Huang et al. 2015).

Sure, this list is not completed. There are several other methods and indicators of economic integration. But they combine the existing models. For example, Storonyanska (2009) used some parameters based models of convergence and got important conclusions after the factor analysis. At the same time, Yevdokymenko and Yaskal (2012) proposed a method for detecting the approximate directions of interregional production and resource integration in industry and the manufacturing industry using the Euclidean distance, the fuzzy clustering and the gravity model.

Zuiddam (2016) gives a short description of three groups of measurement indicators: institution-based indicators, outcome-based indicators, and factor-based indicators. Most popular measures are outcome-based indicators and they are some sort of cross-country flow variable. Institution-based indicators reflect the level of institutional convergence or the policy harmonization across countries. Therefore, the institutional convergence alone is an incomplete indicator. Outcome-based indicators are the most common methods for measuring the economic integration between countries. These indicators combine foreign trade or investment flows between countries with gravity equations to evaluate these flows. One particular popular factor-based is the income convergence. The mechanism behind income convergence through economic integration is the equation of the marginal products of labor, when production factors are completely mobile.

#### *Evaluation of localization review*

There are a wide range of methodological frameworks and techniques for the evaluation of localization. The measures developed are either in the form of indexes (Ellison and Glaeser 1997, Maurel and Sédillot 1999, Devereux et al. 2004, Mori et al. 2005) or in the form of numerical methods (Feser and Sweeney 2002, Duranton and Overman 2005, Marcon and Puech 2010). A more detailed review of the methodological contributions to the accurate measurement of localization is presented in Fratesi (2008), Strotebeck (2010), Billings and Johnson (2016).

In order to evaluate the spatial concentration of each economic activity, we compute the location quotient (LQ) for regions. Of course, this indicator has a number of shortcomings, as it was indicated by Fratesi 2008, but despite this, it still remains one of the most popular (Liao 2012, Mota and Brandão 2013, Morrissey 2016).

In this paper, we have employed the Bowen et al. 2010, 2011 method, in order to examine the quantitative measurement of the internal economic integration in Romania. Most papers limit their attention to NUTS 2 level data (development regions and macro regions). However, the highly aggregate nature of statistics at macro regional level masks important tendencies in regional integration. Nevertheless, this literature has paid very limited attention to the inter-counties (NUTS 3) links. This paper tries to fill this gap.

The chapter is organized as follows. Section one offers a short theoretical explanation of distribution of output, labor and capital across the integrated economic space (within a country) and it discusses the data used for estimating the factor and output distribution among Romanian regions. Section two presents the empirical results of the economic integration evaluation and the spatial distribution of economic activities. The third section summarizes the main findings.

#### *Theoretical background and data*

Bowen et al. (2010, 2011) consider the distribution of output and production factors among the members of an integrated economic space (IES), in which goods and factors of production (resources) are mobile and policies are harmonized. Thus, as an IES, we shall consider the national economy of Romania (set of regional economies), and by the members of the IES – the Romanian regions. The theoretical background for the distribution of the output and factors of production among regions – equal-share relationship and rank-share distributions and Zipf's law – are characterized and described in detail in Bowen et al. (2010, 2011).

We have started from the assumption that the long-term distribution of shares among the regions of the integrated economic space exhibits the Zipf's law. This means that the theoretical share value of each region could be calculated on the basis of the number of members. In our case, we used three groups of regions: macro regions, development regions and counties. The theoretical share values for the regions of Romania are given in Table 1.

For the Romanian regions, the output was measured by the gross domestic product (GDP) by corresponding regions. The development regions correspond to the NUTS 2 level divisions in the European Union. The factor "labor" for each macro region, development region and county was measured by the number of civil economically active population which characterizes the potential labor force and employment population rate, consisting of the civil employed population and the registered unemployed<sup>1)</sup>.

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1) Data on civil economically active population by regions are available at:  
<http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=en&ind=FOM102A>

Table 1

**Theoretical share values assuming that the distribution of share exhibits the Zipf's Law**

Group of regions	Theoretical share values (descending)
4 macroregions (NUTS 2)	0.4800; 0.2400; 0.1600; 0.1200
8 development regions (NUTS 2)	0.3679; 0.1840; 0.1226; 0.0920; 0.0736; 0.0613; 0.0526; 0.0460
42 counties (NUTS 3)	0.2311; 0.1156; 0.0770; 0.0578; 0.0462; 0.0385; 0.0330; 0.0289; 0.0257; 0.0231; 0.0210; 0.0193; 0.0178; 0.0165; 0.0154; 0.0144; 0.0136; 0.0128; 0.0122; 0.0116; 0.0110; 0.0105; 0.0100; 0.0096; 0.0092; 0.0089; 0.0086; 0.0083; 0.0080; 0.0077; 0.0075; 0.0072; 0.0070; 0.0068; 0.0066; 0.0064; 0.0062; 0.0061; 0.0059; 0.0058; 0.0056; 0.0055

Source: own calculations

The estimation of a county's physical capital stock faces some difficulties. There is no statistical data regarding the tangible assets and investments by counties in Romania. However, every enterprise possesses some amount of fixed capital. Assuming more of the enterprises in the county means a greater amount of fixed capital. So, if we operate with shares of counties and their ranks, not with numbers itself, we have decided to use the number of enterprises by counties instead of the physical capital. We can suppose that a county's share of enterprises in total partly reflects the share of the physic capital of this county in total. And a difference in the number of enterprises between counties reflects the differences in stock of the physical capital<sup>2)</sup>. The procedure used by Munnell (1990), Garofalo and Yamarik (2002), as well as Bowen et al. (2010, 2011), does not offer appropriate results for the Romanian regions.

## Results and Discussion

### *The equal-share relationship*

We will further verify the validity of the equal-share relationship hypothesis by analyzing the "weak" form of this relationship, namely whether that there is conformity (pair-wise) between the rankings of the output and the factor shares across regions in Romania, as Yaskal (2013) did for Ukraine.

Table 2 offers data for the Spearman rank correlation coefficient calculus for the pair-wise rankings of shares for each county between 1995 and 2015. The fairly high correlation confirms the consistent distribution between the pair-wise ranks. The correlation coefficients are in some cases close to 1, which proves an almost perfect monotonic relationship between the GRP and the capital shares. The rank correlation with the human capital is generally lower and it is demonstrating a weaker confirmation of the relationship of equal shares. Except for some differences between counties (population, area, resources etc.), this result may indicate the smaller "contribution" of human capital in the GRP of Romanian regions compared to the "contribution" of capital. At the same time, we can mention the existence of a lower correlation with the share of human capital, which can be caused by a lower mobility of this factor, comparing to the capital.

2) Data on number of enterprises by regions are available at:  
<http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=en&ind=INT1010>

*Table 2*

**Spearman rank correlations between share values\***

<b>Year</b>	<b>Output-Physical capital</b>	<b>Output-Human capital</b>	<b>Physical capital-Human capital</b>
<b>1995</b>	-	0.937	-
<b>1996</b>	-	0.925	-
<b>1997</b>	0.930	0.934	0.895
<b>1998</b>	0.921	0.901	0.886
<b>1999</b>	0.925	0.879	0.873
<b>2000</b>	0.930	0.881	0.874
<b>2001</b>	0.927	0.896	0.892
<b>2002</b>	0.947	0.917	0.904
<b>2003</b>	0.939	0.912	0.894
<b>2004</b>	0.952	0.922	0.905
<b>2005</b>	0.950	0.911	0.900
<b>2006</b>	0.944	0.910	0.914
<b>2007</b>	0.951	0.917	0.915
<b>2008</b>	0.955	0.933	0.922
<b>2009</b>	0.955	0.922	0.914
<b>2010</b>	0.954	0.911	0.910
<b>2011</b>	0.952	0.905	0.909
<b>2012</b>	0.951	0.909	0.907
<b>2013</b>	0.953	0.924	0.916
<b>2014</b>	0.962	0.932	0.917
<b>2015</b>	-	-	0.920
*Correlation coefficients are significant from the null-hypothesis at the level 0.01.			
"-": data are not available			
Source: own calculations			

There is an evident general increasing tendency for all Spearman correlation coefficients within the analyzed period. This means that the proportion of the investigated regions is characterized by smaller differences. These results confirm the “weaker” form of the equal-share relationship. The increase of the correlation coefficients may indicate that the equalization of marginal returns between regions becomes more perfect.

*Spatial distribution of economic activity*

The Appendix (tables from A1 to A4) describes the evolution of output and employment shares distribution and their rankings for the NUTS 3 and NUTS 2 Romanian regions. In particular, Tables A1 and A2 show the ranking and output share value for the 42 counties and 8 development regions in 1995, 2001, 2006, 2010 and 2014, along with the changes in rank and share values between these years. Tables A3 and A4 show the ranking and employment share value for the similar regions and years.

Table A1 shows that Bucharest has constantly increased its share of production during 1995-2010. This share has increased by 10.61% between 1995 and 2014. Besides Bucharest, the shares of Ilfov (1.05), Cluj (0.97), Constanta (0.93), Timis (0.92) and Prahova (0.61) have increased the most. If Cluj, Constanta, Prahova and Timis counties were earlier among the leaders in terms of output, Ilfov made an abrupt “jump” in the ranking (+21) due to its location near the capital city. The growth of county-leader’s shares of the regional GDP occurred by

reducing the shares of 30 (1995-2001), 21 (2001-2006), 29 (2006-2010) and 31 counties (2010-2014). Among the counties that have significantly reduced their position in the ranking are Vrancea (-10), Neamt (-8), Galati (-6) and Ialomita (-7), Teleorman (-6). At the same time, there was also a reduction of the share output of these counties: Vrancea (-0.78), Neamt (-0.9), Galati (-1.18), Ialomita (-0.72), Teleorman (-0.71).

Table A2 also shows a steady increase of the capital region: the output share of Bucharest-Ifov increased by 11.67 and this is only one positive change for the analyzed period. The other development regions decreased their shares of production. It is interesting that during 2010-2014, the shares of the four regions have increased, but during the whole period (1995-2014) only one maintained the ascending path.

If we consider the distribution of employment ranking and shares (Tables A3 and A4), the leading positions are occupied by the same counties, plus Bihor. The growth of the county-leaders by employment was due to the reduction of the shares of 19 counties between 1995 and 2001, 32 counties between 2001 and 2006, 27 counties between 2006 and 2010 and 26 counties between 2010 and 2014. The counties which reduced their position in the ranking were Galati (rank: -6; share value: -0.65), Hunedoara (rank: -6; share value: -0.6), Gorj (rank: -6; share value: -0.38). For example, Hunedoara and Gorj lost some important economic activities, being specialized in mining, and it became the main reason of such reduction. Table 4 shows a much more uniform distribution of employment shares between regions, but also one can see a growth of concentration of employment in the Bucharest-Ifov region. The dramatic growth of the capital region's share occurred during the 2001-2006 period, while the production share had increased before, namely between 1995 and 2001. This indicates that initially there were higher economic activities and a labor deficit has been created, which was later covered by the moving employees from other regions (for the same period, 32 counties decreased their share, and only 10 increased it). Another reason of huge concentration of economic activities in the Romanian capital is that the public sector in this country is important and almost all government agencies are located in the capital city. So, it is more appropriate to run business in the capital. As a result, the capital region concentrates 14.35% of the civil economically active population and 26.78% of the regional gross domestic product in 2014.

We can note that the trend towards the concentration of economic activity in the capital is a common feature for the transition countries (and not only). According to Eurostat, in a majority of the multi-regional EU Member States, capital city regions were generally those with the highest average GDP per capita; the only exceptions to this rule were Germany, Italy and the Netherlands. The capital city regions of Bulgaria, the Czech Republic, Denmark, Ireland, France, Croatia, Portugal, Slovenia, Slovakia and Sweden were the only regions from each of these EU Member States where GDP per capita was higher than the national average in 2014. Also, Romania is characterized by considerable differences in the levels of GDP per capita between the regions of the same country (with the United Kingdom, France and Slovakia) (Eurostat 2016).

The capital agglomeration grows significantly faster than the other regions. One can assume that the capital in a transition economy plays the role of "region-gate" through which the country gets new knowledge, technologies and investments. Bucharest-Ifov is the most development region, with a labor force predominantly specialized in services and constructions, the highest employment rate and a significant contribution of the younger and higher educated persons (Dachin and Popa 2011). This is a positive effect from the growth of capital. The negative side is the abrupt growth of the capital region, which causes the deepening of regional disparities (Antonescu 2012).

It is worth noting the growth of regional disparities within the development regions. The Western region takes the 7<sup>th</sup> position by the output share during the study period (Table A2). At



the same time, the counties' shares which are included in this region vary in opposite directions. Only Timis increased by 0.92 (rank -1), but other counties reduced their share: Caras-Severin by 0.24 (rank +6), Arad by 0.13 (rank +3) and Hunedoara by 0.65 (rank -5). The same trajectory is observed in the South-Muntenia region: Prahova increased by 0.61 (rank -1) and Giurgiu by 0.01 (rank +6), while other counties reduced their share: Arges by 0.55 (rank did not change), Dambovită by 0.44 (rank did not change), Teleorman by 0.71 (rank -6), Ialomița by 0.72 (rank -7) and Calarasi by 0.41 (rank -3). The South-Muntenia region takes the 2<sup>nd</sup> position during the analyzed period (Table A2).

Tables A1 to A4 allow making some considerations about the direction of spatial distribution of economic activity in Romania. The data indicate the growth of output and employment shares of the capital and the counties from the Western and Central regions. In return, counties from Eastern regions (North-East and South-East) have decreased their share values. Constanta is the exception because its employment share value has increased over the period. This county has a competitive advantage due to the main Romanian seaport which is located here. The situation of Constanta proves the correctness of McCord and Sachs's argumentation (2013: 6): "an economy's physical access to sea-based ports is crucial for economic development".

These trends allow ascertain about evidence of forming clear leading counties within the Romanian development regions. This conclusion can be confirmed by the share of the county in the regional gross product of the region (Table 3).

Table 3 shows that there are a few counties in each development region with a GDP share much larger than others. Moreover, each region has several leaders, except of the capital region. The capital is the indisputable leader, as it was emphasized in the separate development region. Noteworthy trends are being observed in the changing of shares. Counties-leaders' share in each development region are changing in different directions. For example, in the Nord-Western region, the share of Cluj has increased, but Bihor's share has decreased; in the Centre region the shares of Brasov and Sibiu have increased, but the share of Mures has decreased etc. The South-Western Oltenia is the exception because both leaders' shares have increased.

This means that the economic activity in the first, second and fourth macro regions grows slower (the macro region's GDP share value in total GDP has decreased from 24.2% in 1995 to 22.4% in 2014, for the first; from 26.8% in 1995 to 21.3% in 2014, for the second, and from 18.4% in 1995 to 16.4% in 2014, for the fourth). At the same time, the GDP share value of macro region 3 (including the capital) has increased from 30.3% (1995) to 39.8 (2014).

In order to confirm these tendencies, we have grouped the counties with the biggest share, and we have calculated their regional product and some ratios (Fig. 1). The Ialomița and Calarasi counties were included in the Eastern group due to their geographical proximity to the South-East development region.

Figure 1 shows that the Western and Central counties' GDP has increased faster than the Eastern one. The growing role of the regional economy in Western and Central districts is shown from the ratios between the corresponding groups. In 1995, the Eastern and Western groups' GDP was almost equal, but in 2007 the ratio was 1.44. Moreover, after this year this disparity has been decreased. So, the economy of Western Romania makes a greater impact on the national economy than the Eastern part of the country. We can see the same situation with Western-Central / Eastern Ratio which increased even faster. This phenomenon was predicted by Resmini (2003), who tried to understand what type of regions would gain and what type of regions would lose from the EU enlargement processes. She claimed that "proximity to the EU has stimulated a catching up process which has contributed to overcome the disadvantage of being located in a peripheral position with respect to capital cities" (Resmini 2003: 219).

Table 3

## Counties with the biggest GDP shares

Development region	County-leader (s)	Share in development region's GDP, %										
		1995	2000	2004	2006	2007	2008	2010	2011	2012	2013	2014
North-West	Cluj	29.3	33.3	33.1	33.5	35.8	35.2	36	37.4	38.1	38.7	38.9
	Bihor	23.6	23.2	24.3	24	23.1	22.7	22.3	20.8	19.5	19.5	19.9
	Brasov	27.5	27.9	27.3	27.4	28.2	28.3	30.1	29.6	29.9	30.1	30.1
Center	Mures	21.5	21.8	21.7	20.7	19.5	19.5	18.4	18.5	19.5	19.3	19.7
	Sibiu	16	16.7	18	19.4	18.9	19.8	19.6	19.7	19.5	19.4	19
	Iasi	24.3	25.6	25.4	26.4	27	27.6	29	28.9	28.6	30.1	30.7
North-East	Bacau	22.4	22	22.8	22.1	21.4	21.8	21.7	20.5	20.5	19.1	19.1
	Constanta	31.3	36.5	35.6	38.4	36.7	35.7	37.4	37.3	41.2	42.8	45.1
South-East	Galati	23.2	20.6	20.3	18.5	19.2	19.6	19.5	19.1	17.5	17	16.8
	Prahova	28.1	30.2	28.2	30.8	30.6	30.6	27.6	29.8	30.2	33.6	37.6
South-Muntenia	Arges	21.2	23.4	24.8	27.1	26.9	26.1	25	23.9	22.2	21.7	20.6
	Bucharest-Ilfov	90	92.6	90.1	89.1	90.2	90.4	90.5	90.4	88.8	90	90.4
South-West Oltenia	Dolj	28.8	28.9	30.6	31	31.3	33.3	32.1	32.1	32.1	32.6	34.3
	Gorj	19.2	21.2	21.3	21	21.8	20	23	23	22.7	22.6	20.6
West	Timis	38.1	39.2	40.7	43.8	44.1	47.7	48.3	49	46.5	49	48.5
	Arad	23.7	24.6	24.2	23.6	22.2	21.5	21.7	22.3	22.4	22.7	22.5

Source: own calculations based on data from the National Institute of Statistics

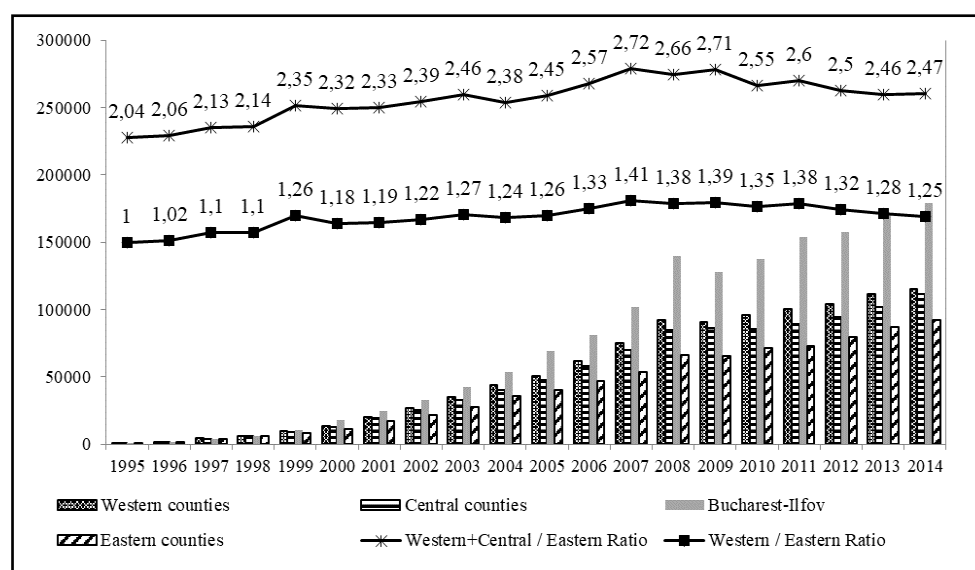


Fig. 1 – Regional GDP of different groups of counties

Source: own calculations based on data from National Institute of Statistics

The previous material can be summarized as follows. The economic activity in Romania has a clear tendency to concentrate in several leading counties. They attract production factors from other counties, so leaders' share increases and other counties' share reduces in the meantime. The proof of this statement is that the number of districts which have increased their share in the total GDP and employment is smaller than the number of districts which have reduced their share. This concentration leads to the fact that some counties are growing at the expense of others, thereby increasing regional disparities. In addition, the economic activity "shifts" from East to the West (Cluj,

Timis, Arad, Dolj, Gorj), the Centre (Brasov, Sibiu) and the capital region (Bucharest-Ilfov). Among the Eastern counties, only Constanta and Iasi occupy a dominant position.

#### *Measures of internal economic integration*

For estimating the level of economic integration between the Romanian regions, we further need an index for measuring the distance between the distribution of the actual and theoretical specific weights. Since the Kullback-Leibler divergence (KLD) is used to measure the difference between two probability distributions (Kullback and Leibler 1951), we can similarly use KLD to measure the distance between the actual and the theoretical share distributions:

$$KLD(\bar{S} : S_t) = \frac{1}{3} \sum_{j=Y,K,L} \left( \sum_{m=1}^M \bar{S}_{mj} \ln \left( \frac{\bar{S}_{mj}}{S_{mjt}} \right) \right) \quad (1)$$

where  $S_{mjt}$  – observed proportion at the time, and  $\bar{S}_{mj}$  – independent of time the theoretical part.

The values of KLD range between zero and infinity. It is equal to zero (which is interpreted as

the full integration) when the proportions are pair-wise equal, i.e.  $\bar{S}_{mj} = S_{mjt}$  as of the date

$t$  and for all  $m$  and  $j$ . Otherwise, the detected deviations indicate how far the group of investigated regions is from the complete integration. According to Bowen et al. (2010: 403), the formalization of equation (1) has one drawback: "...it is not symmetric, in the sense that a deviation between an actual and theoretical share can be negative or positive". Therefore, you cannot tell if a zero value of KLD arise due to equidistant shares around a common mean or due to a zero distance between shares. Thus, as in Bowen et al. (2010), the symmetrical version of Kullback-Leibler divergence (SKLD) is preferred:

$$SKLD(\bar{S} : S_t) = \frac{1}{3} \sum_{j=Y,K,L} \left( \sum_{m=1}^M (\bar{S}_{mj} - S_{mjt}) \ln \left( \frac{\bar{S}_{mj}}{S_{mjt}} \right) \right) \quad (2)$$

The SKLD values are usually higher for the respective KLD, since all deviations between the actual and the theoretical shares in the index SKLD are positive (Bowen et al. 2010). Since the parameters (1) and (2) show the extent of divergence, we consider appropriate to calculate the inverse indicators to obtain the integration level, the inverse of the KLD and SKLD being marked as I-KLD and I-SKLD respectively. To better compare the dynamics and the level of integration between the different types of regions for the period, we have graphically represented the value of the I-SKLD in Figure 2.

The results show that the level of economic integration between the regions in Romania has gradually increased since 1997, despite some changes in the direction of reduction. The deterioration of the economic environment in 2009-2010 obviously led to unequal changes in the specific weights of output and production factors of the regions in total, and thus they increased the discrepancy between the theoretical and the actual distribution of shares.

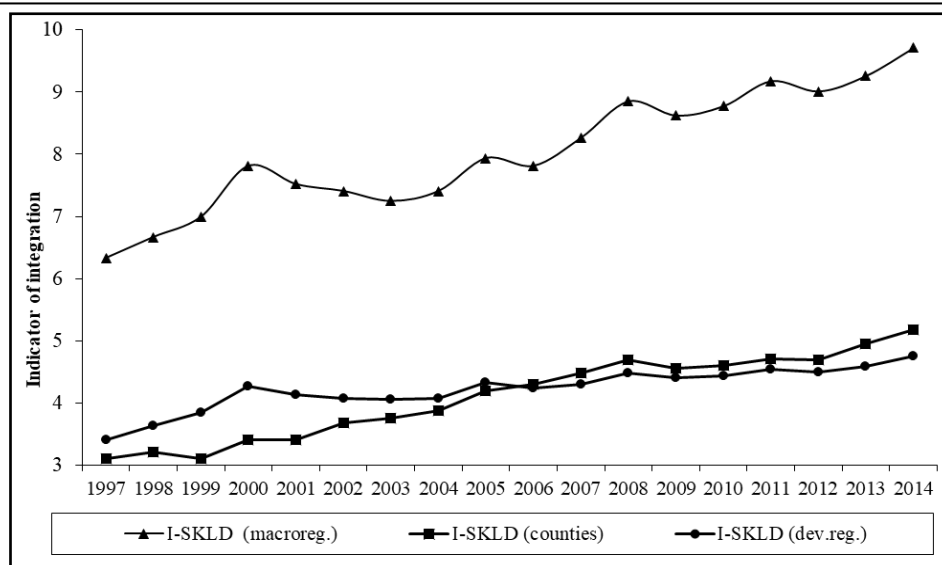


Fig. 2 – Level of interregional integration in Romania

Source: own calculations

We have obtained interesting results regarding the level of integration between the NUTS 3 regions. From the start of the period, the differences between the indicators of integration for the counties and the development regions were higher, but, from 2000, they have decreased. During 2004-2012, the level of integration for the counties and the development regions was almost the same. And then, the differences also became higher. This finding means that the development regions in Romania respect correct economic tendencies. So, a big difference between I-SKLD for NUTS 2 and NUTS 3 shows that carrying out regional research only for macro regions is not enough. It is necessary to pay attention to the lower level of regions in order to avoid the impact of aggregation data.

#### *Internal integration and localization of economic activities*

From Tables A1-A4, we can see that only a few counties' shares are growing constantly, while the share of the absolute majority reduced. We have compared the share of county-leaders (Table 3) with the level of specialization of these counties. In order to evaluate the spatial specialization of each sector by NUTS 3, we computed the location coefficient. The location quotient (LQ) is the most commonly used measure of specialization (Billings and Johnson 2012). The conventional LQ is a measure of an industry's presence in a particular location compared to the general spatial distribution of the economic activity. For a given industry, the LQ is calculated as the ratio of its share of total employment in a sub-region relative to that industry's share of total employment in the broader region. The results of the calculations are presented in Table 4 (2008) and Table 5 (2014). The coefficients greater than one are bold selected, and this indicates the specialization of the region in a particular sector.

Based on the data from Tables 4 and 5, we observe that the counties with the biggest shares in the total GDP are characterized by a higher level of specialization simultaneously in many sectors. For instance, Constanta (the share increased from 3.68 in 2008 to 5.07 in 2014) has a strong level of specialization in such sectors: Electricity, gas, steam and air conditioning production and supply; Water supply; sewerage, waste management and decontamination

activities; Construction; Transport and storage; Hotels and restaurants. At the same time, Timis concentrates a higher level of employment in the sectors: Manufacturing; Information and communication; Real estate activities; Other activities of the national economy. One needs to pay attention to the capital, Bucharest, which concentrates nearly a quarter of the total national GDP.

Tables 4 and 5 show the increase of the capital position, Bucharest, which has the biggest GRP share and is the clear leader of ranking during the analyzed period. The capital metropolis specializes almost in all sectors, except Agriculture, forestry and fishing and Industry. That means a high level of diversification of the city economy. The location quotients with a value greater than 2 indicate that Bucharest concentrates almost all the activity in these sectors: Information and communication; Financial intermediation and insurance; Professional, scientific and technical activities; Activities of administrative services and of support services; Shows, culture and recreation activities. In this case, it is possible to use further methods for determining the future dynamics of the economic activities (Vykyuk et al. 2016).

In 2014, compared with 2008, there are the following trends. In 2008, Bucharest had the highest coefficients of localization (more than 3) in such areas as: Information and communication (4.36); Financial intermediation and insurance (3.2); Shows, culture and recreation activities (3.54); Activities of administrative services and of support services (3.01). The level of localization has significantly decreased in three areas from the four mentioned above: Information and communication (3.36); Financial Shows, culture and recreation activities (2.01); Activities of administrative services and of support services (2.5). At the same time, the coefficients of localization in some counties increased. This fact may be an indication of the economic activities diversification in the regions as well as an evidence of the establishment of other business centers in the country, specialized in certain types of economic activity. However, the capital city has not lost its position in the share of GDP, even though some regions have also increased. This was due to a slight increase in the coefficients of localization by other types of economic activity. The domination of the capital is peculiar not only for Romania but also for other post-Soviet countries. This is explained by the fact that the capital city is the largest city in the country and it represents the national industrial, scientific and cultural center. It also attracts the localization of central offices of large companies. Another reason is that most companies registered in Bucharest have subsidiaries in the other regions, and they report and pay taxes at the place of registration, i.e. in the capital city.

Also we point out that the sector 'Agriculture, forestry and fishing' has almost the same localization level in both years compared, while the sector 'Industry' is characterized by essential changes. Industry became more localized in: Bihor, Brasov, Arges, Timis and Arad (Manufacturing); Mures, Sibiu and Gorj (Mining and quarrying). The last one has huge LQ values in the areas: 'Mining and quarrying' (12.23), 'Electricity, gas, steam and air conditioning production and supply' (5.12) and 'Water supply; sewerage, waste management and decontamination activities' (1.35), in 2014. Counties which are specialized in Construction are the same although the value of the localization quotient has changed.

The sector 'Wholesale and retail; repair of motor vehicles and motorcycles' has also become more concentrated in 2014 (6 counties) than in 2008 (9 counties). It means that large entities are more common in this type of business and more efficient. And such structures, as usual, are located in particular places. As we can see, the number of these places has declined.

Some changes have occurred also in the localization of service activities. For instance, 'Information and communication', in 2008, was very localized: it was located in Bucharest (LQ = 4,36), Timis (LQ = 1,81) and Cluj (LQ = 1,13) only. During the analyzed period, this activity disseminated from certain centers to other counties: Brasov (LQ = 1,27) and Iasi (LQ = 1,11), in 2014. We think that the main

Table 4

## Counties and their LQ in 2008

Source: own calculations

Development region	County-leader (s)	Agriculture, forestry and fishing	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning production and supply	Water supply; sewerage, waste management and decontamination activities	Construction	Wholesale and retail; repair of motor vehicles and motorcycles	Hotels and restaurants	Information and communication	Financial intermediation and insurance	Real estate and activities	Professional, scientific and technical activities	Activities of administrative services and of support services	Public administration and defense; social insurance of public sector	Education	Health and social assistance	Shows, culture and recreation activities	Other activities of national economy	County output share in the total GDP (%)		
North-West	Cluj	0.79	1.00	0.42	1.04	0.80	1.01	1.12	1.17	1.08	1.10	1.13	1.30	1.00	1.17	0.81	0.63	1.25	1.22	1.26	1.17	3.98
	Bihor	1.12	1.12	0.90	1.18	0.93	0.62	0.76	1.02	0.99	1.00	0.51	0.65	0.81	0.82	0.41	0.74	1.00	1.10	0.41	0.47	2.57
Center	Brasov	0.47	1.20	0.40	1.25	1.07	1.12	1.49	1.28	1.21	1.94	0.89	0.91	1.32	1.06	0.98	0.88	1.17	0.90	0.76	0.94	3.14
	Mures	1.05	1.14	1.36	1.16	1.04	0.87	0.77	0.94	1.09	1.12	0.45	0.82	0.47	0.60	0.48	0.77	1.08	1.17	1.01	1.07	2.16
North-East	Sibiu	0.55	1.45	1.31	1.52	0.83	0.91	0.94	1.09	1.21	1.69	0.70	1.16	0.72	0.61	1.21	0.73	1.09	1.00	0.70	1.25	2.19
	Iasi	1.14	0.81	0.04	0.81	1.01	1.21	1.10	0.90	0.80	0.86	0.79	0.68	1.20	0.84	0.84	0.83	1.44	1.43	0.90	0.98	2.92
South-East	Bacau	1.07	0.99	1.92	0.93	1.20	1.08	1.34	0.96	0.79	0.56	0.45	0.70	0.83	0.47	0.72	0.89	1.18	1.10	0.56	1.04	2.31
	Constantia	0.74	0.86	0.70	0.77	1.49	1.80	1.46	1.11	1.96	1.84	0.56	0.87	1.03	0.67	1.36	0.90	0.84	0.99	1.09	1.43	3.68
South-Muntenia	Galati	1.04	1.01	0.31	1.01	1.50	1.23	1.13	0.91	1.12	0.86	0.61	0.80	0.81	0.79	0.98	1.00	1.06	0.97	0.61	1.06	2.02
	Prahova	0.77	1.33	2.35	1.33	0.92	1.02	1.19	0.95	1.15	1.32	0.62	0.64	1.11	1.10	0.83	0.84	0.81	0.97	0.60	0.74	3.78
Bucharest-Ifov	Arges	0.98	1.34	1.05	1.40	1.17	0.81	1.06	0.84	0.81	0.95	0.29	0.76	0.73	0.99	0.72	0.90	0.97	0.75	0.55	0.79	3.23
	Bucharest	0.01	0.66	0.24	0.63	1.18	0.94	1.75	1.43	1.25	1.31	4.36	3.20	2.24	2.95	3.01	1.41	1.03	1.03	3.54	1.86	24.1
South-West Oltenia	Dolj	1.41	0.79	0.66	0.77	1.35	0.87	0.83	1.01	0.77	0.76	0.50	0.65	0.61	0.55	0.64	0.99	1.03	1.02	0.46	0.63	2.59
	Gorj	1.01	1.23	12.03	0.61	3.38	1.08	1.25	0.70	0.79	0.81	0.29	0.59	0.54	0.61	1.50	1.14	1.03	1.00	0.40	0.42	1.55
West	Timis	0.78	1.24	0.42	1.33	0.80	0.86	0.86	1.05	0.99	1.15	1.81	0.76	1.17	0.93	0.77	0.65	1.04	1.10	1.09	1.46	4.74
	Arad	0.81	1.41	0.62	1.52	0.77	0.86	0.78	1.11	1.13	0.80	0.48	0.75	1.16	0.79	0.52	0.88	0.87	0.54	0.87	1.29	2.13

Table 5

## Counties and their LQ in 2014

Source: own calculations

reason of this fact is the high level of competitiveness between the information and communication firms in Bucharest, Timis and Cluj. As well, we should take attention to the 'Education' activity. It has become more localized in 2014 ( $LQ > 1$  have 9 counties) than in 2008 ( $LQ > 1$  have 11 counties). It is noteworthy that almost all certain county-leaders in the education sector (Cluj, Mures, Sibiu, Iasi, Bacau, Galati, Dolj and Gorj) have increased their specialization.

### **Conclusions**

This paper aims to consider two tendencies in the economy: the internal integration within the country and the localization of economic activities. We discuss the relationship between the spatial distribution of the economic activity and the integration between the regions of a particular country. In our opinion, the interregional integration within the country intensifies the territorial division of labor and specialization, and the growth of specialization, and, in turn, it strengthens the concentration of activities in certain places. And, as a result of the integration processes, cooperation intensifies, which enhances the development of integration processes. We investigated the spatial interactions within a particular country. In our case, the integrated economic space is the national economy of Romania and its units – macro regions, developed regions and counties. We have discussed the connection between the international and interregional (internal) integration. The reorientation of economic relations from the regions of the country to the foreign trade is an additional factor of reduction for the intra-regional interaction, which hinders the development of territorial labor division, as a result space as if "shrinking". The smaller the size of the necessary for economic activity space, the slower the economic development is being realized, which is further slowing the economic growth.

We have empirically tested three theoretical propositions as regards to the distribution of output and factors of the Romanian economy. The results strongly support the theoretical predictions of an equal-share relationship for the Romanian counties. The calculation of the Spearman rank correlation showed a significant connection between the presence of specific weights of regions in the total output and production factors.

The prediction that the distribution of output and factor shares across counties conforms to a rank-share distribution exhibits the Zipf's law. Also, for the most recent data, the measure of the extent of integration indicated that the level of economic integration between the regions in Romania is gradually increasing. We find a big difference between the NUTS 2 and NUTS 3 interregional integration; therefore it is necessary to investigate regional development on the lower regional level. Also, the small differences between the indicators of integration for the counties and development regions mean that the development regions in Romania represent a correct economic activity. The increase of the integration indicator between the Romanian NUTS 2 and NUTS 3 regions suggests that the effectiveness in the reallocation of resources within the country also increases.

The spatial distribution of the economic activity shows a big concentration of activity in the capital region (Bucharest-Ilfov), but this is a common tendency for the transition countries. The capital metropolis specializes in almost all sectors, except for Agriculture, forestry and fishing and Industry. That means a high level of diversification for the city economy. There are several county-leaders also. These counties attract production factors from other counties, so the leader's share increases, while the other counties' share reduces in the meantime. The analysis of output and factor shares of the Romanian counties during 1995-2014 concludes that the economic activity in Romania grew faster in the Western and Central regions and slower in the Eastern regions.

We can point out that, for the analyzed period, the level of integration of the national economy of Romania has increased, and, at the same time, the specialization level of the leading



counties by the share in the total GRP has also increased. However, these trends have caused a rising inequality in the distribution of the economic activity.

Appendix

Table A1

**Distribution and rank of Romanian counties' output shares during 1995-2014**

County*	Share Rank (1 =largest share)					Change***				
	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014
Bucharest	1	1	1	1	1	0	0	0	0	0
Prahova	2	5	5	5	3	-3	0	0	2	-1
Constanta	3	2	3	4	2	1	-1	-1	2	1
Timis	4	4	2	2	5	0	2	0	-3	-1
Cluj	5	3	4	3	4	2	-1	1	-1	1
Brasov	6	6	7	6	6	0	-1	1	0	0
Iasi	7	7	8	8	7	0	-1	0	1	0
Arges	8	8	6	7	8	0	2	-1	-1	0
Galati	9	13	16	15	16	-4	-3	1	-1	-7
Bacau	10	11	12	12	15	-1	-1	0	-3	-5
Bihor	11	10	9	10	11	1	1	-1	-1	0
Mures	12	9	14	16	12	3	-5	-2	4	0
Dolj	13	12	11	9	10	1	1	2	-1	3
Suceava	14	15	17	18	17	-1	-2	-1	1	-3
Hunedoara	15	16	18	20	20	-1	-2	-2	0	-5
Neamt	16	19	24	25	24	-3	-5	-1	1	-8
Arad	17	14	13	14	14	3	1	-1	0	3
Dambovita	18	21	19	17	18	-3	2	2	-1	0
Sibiu	19	17	15	13	13	2	2	2	0	6
Valcea	20	22	22	24	25	-2	0	-2	-1	-5
Maramures	21	25	21	22	21	-4	4	-1	1	0
Buzau	22	24	25	23	23	-2	-1	2	0	-1
Vrancea	22	32	31	31	32	-10	1	0	-1	-10
Gorj	24	18	20	19	22	6	-2	1	-3	2
Olt	25	23	26	26	26	2	-3	0	0	-1
Alba	26	26	23	21	19	0	3	2	2	7
Teleorman	27	27	33	33	33	0	-6	0	0	-6
Ialomita	28	35	36	37	35	-7	-1	-1	2	-7
Satu Mare	29	28	27	28	27	1	1	-1	1	2
Ilfov	30	20	10	11	9	10	10	-1	2	21
Braila	31	29	28	29	28	2	1	-1	1	3
Harghita	32	31	29	30	29	1	2	-1	1	3
Botosani	33	33	34	34	34	0	-1	0	0	-1
Vaslui	34	37	35	38	37	-3	2	-3	1	-3
Calarasi	35	38	41	35	38	-3	-3	6	-3	-3
Caras-Severin	36	30	30	27	30	6	0	3	-3	6
Bistrita-Nasaud	37	36	32	32	31	1	4	0	1	6
Covasna	38	39	40	42	42	-1	-1	-2	0	-4
Mehedinti	38	34	37	41	41	4	-3	-4	0	-3
Salaj	40	41	38	39	39	-1	3	-1	0	1
Tulcea	41	40	39	40	40	1	1	-1	0	1
Giurgiu	42	42	42	36	36	0	0	6	0	6

Appendix Table A1  
**Distribution and rank of Romanian counties' output shares during 1995-2014**

County*	Share Value**					Change****				
	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014
Bucharest	13.60	19.41	20.84	23.28	24.21	5.81	1.43	2.45	0.93	10.61
Prahova	4.27	3.72	3.91	3.46	4.88	-0.55	0.19	-0.45	1.42	0.61
Constanta	4.14	4.17	4.33	3.98	5.07	0.03	0.16	-0.35	1.09	0.93
Timis	3.54	3.79	4.42	4.86	4.46	0.25	0.63	0.44	-0.40	0.92
Cluj	3.49	3.83	3.97	4.06	4.46	0.34	0.14	0.09	0.40	0.97
Brasov	3.39	3.46	3.16	3.38	3.30	0.07	-0.30	0.23	-0.09	-0.09
Iasi	3.30	3.13	2.90	3.05	3.08	-0.17	-0.24	0.15	0.03	-0.22
Arges	3.23	2.98	3.44	3.13	2.68	-0.25	0.46	-0.31	-0.45	-0.55
Galati	3.07	2.47	2.08	2.07	1.89	-0.61	-0.38	-0.01	-0.18	-1.18
Bacau	3.04	2.65	2.43	2.28	1.92	-0.39	-0.22	-0.15	-0.36	-1.12
Bihor	2.81	2.75	2.85	2.52	2.29	-0.06	0.10	-0.33	-0.23	-0.52
Mures	2.65	2.75	2.38	2.06	2.16	0.10	-0.37	-0.32	0.10	-0.49
Dolj	2.64	2.59	2.53	2.55	2.48	-0.05	-0.06	0.02	-0.07	-0.16
Suceava	2.35	2.20	2.03	1.88	1.83	-0.15	-0.18	-0.15	-0.04	-0.52
Hunedoara	2.29	2.10	2.02	1.77	1.63	-0.19	-0.08	-0.25	-0.14	-0.65
Neamt	2.22	1.84	1.66	1.36	1.32	-0.39	-0.17	-0.30	-0.04	-0.90
Arad	2.20	2.33	2.38	2.19	2.07	0.12	0.06	-0.20	-0.12	-0.13
Dambovita	2.18	1.75	1.83	1.94	1.74	-0.43	0.08	0.11	-0.21	-0.44
Sibiu	1.97	2.06	2.24	2.20	2.08	0.10	0.18	-0.04	-0.12	0.12
Valcea	1.90	1.70	1.67	1.41	1.29	-0.21	-0.03	-0.26	-0.12	-0.62
Maramures	1.87	1.57	1.68	1.60	1.63	-0.30	0.11	-0.08	0.03	-0.24
Buzau	1.79	1.66	1.53	1.47	1.41	-0.13	-0.13	-0.06	-0.06	-0.37
Vrancea	1.79	1.23	1.18	1.08	1.01	-0.56	-0.05	-0.10	-0.07	-0.78
Gorj	1.76	1.92	1.71	1.83	1.49	0.16	-0.21	0.12	-0.33	-0.26
Olt	1.76	1.69	1.32	1.34	1.27	-0.07	-0.37	0.03	-0.08	-0.49
Alba	1.73	1.54	1.66	1.75	1.65	-0.19	0.12	0.09	-0.10	-0.08
Teleorman	1.71	1.50	1.09	1.05	1.00	-0.21	-0.42	-0.03	-0.05	-0.71
Ialomita	1.64	1.07	0.94	0.92	0.92	-0.57	-0.13	-0.02	0.01	-0.72
Satu Mare	1.53	1.50	1.29	1.18	1.21	-0.03	-0.20	-0.11	0.04	-0.32
Ifov	1.52	1.75	2.54	2.45	2.57	0.24	0.79	-0.09	0.11	1.05
Braila	1.50	1.34	1.28	1.17	1.10	-0.16	-0.06	-0.11	-0.07	-0.40
Harghita	1.47	1.25	1.27	1.11	1.06	-0.23	0.03	-0.16	-0.05	-0.41
Botosani	1.36	1.16	1.02	1.03	0.99	-0.20	-0.14	0.00	-0.03	-0.37
Vaslui	1.30	1.06	0.95	0.91	0.90	-0.24	-0.11	-0.04	-0.01	-0.40
Calarasi	1.28	1.00	0.79	1.02	0.88	-0.28	-0.21	0.23	-0.15	-0.41
Caras-Severin	1.27	1.32	1.26	1.25	1.02	0.05	-0.06	-0.01	-0.23	-0.24
Bistrita-Nasaud	1.20	1.07	1.17	1.07	1.02	-0.14	0.11	-0.10	-0.06	-0.19
Covasna	1.10	0.98	0.80	0.73	0.71	-0.12	-0.18	-0.08	-0.02	-0.40
Mehedinti	1.10	1.10	0.93	0.81	0.71	0.00	-0.17	-0.12	-0.10	-0.39
Salaj	1.02	0.85	0.90	0.85	0.86	-0.17	0.05	-0.06	0.01	-0.15
Tulcea	0.95	0.86	0.86	0.85	0.77	-0.10	0.00	-0.01	-0.08	-0.18
Giurgiu	0.90	0.85	0.71	0.99	0.90	-0.05	-0.15	0.29	-0.09	0.01

Table A2

**Distribution and rank of Romanian development regions' output shares during 1995-2014**

Region*	Share Rank (1 =largest share)										Share Value**									
	Change***										Change****									
	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014
South - Muntenia	1	2	2	2	2	-1	0	0	0	-1	15.2	12.87	12.69	12.51	12.99	-2.33	-0.18	-0.18	0.48	-2.21
Bucharest - Ilfov	2	1	1	1	1	1	0	0	0	1	15.11	21.16	23.38	25.73	26.78	6.05	2.22	2.35	1.05	11.67
North - East	3	3	6	6	6	0	-3	0	0	-3	13.58	12.04	10.98	10.5	10.05	-1.54	-1.06	-0.48	-0.45	-3.53
South - East	4	5	5	5	4	-1	0	0	1	0	13.24	11.72	11.26	10.63	11.26	-1.52	-0.46	-0.63	0.63	-1.98
Center	5	3	4	4	5	2	-1	0	-1	0	12.3	12.04	11.51	11.23	10.96	-0.26	-0.53	-0.28	-0.27	-1.34
North - West	6	6	3	3	3	0	3	0	0	3	11.91	11.56	11.87	11.28	11.47	-0.35	0.31	-0.59	0.19	-0.44
West	7	7	7	7	7	0	0	0	0	0	9.29	9.53	10.09	10.06	9.18	0.24	0.56	-0.03	-0.88	-0.11
South - West Oltenia	8	8	8	8	8	0	0	0	0	0	9.15	9	8.15	7.94	7.23	-0.15	-0.85	-0.21	-0.71	-1.92

Table A3

**Distribution and rank of Romanian counties' employment shares during 1995-2014**

Region*	Share Rank (1 =largest share)										Change***				
	Change****										Change****				
	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014	1995	2001	2006	2010	2014
Bucharest	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0
Prahova	2	5	5	4	5	-3	0	1	-1	-3	2	5	5	4	5
Iasi	3	2	4	6	6	1	-2	-2	0	-3	3	2	4	6	6
Cluj	4	4	3	2	2	0	1	1	0	2	4	4	3	2	2
Constanta	5	7	6	5	4	-2	1	1	1	1	5	7	6	5	4
Timis	6	6	2	3	3	0	4	-1	0	3	6	6	2	3	3
Arges	7	10	9	9	9	-3	1	0	0	-2	7	10	9	9	9
Dolj	8	3	7	7	7	5	-4	0	0	1	8	3	7	7	7
Suceava	9	8	10	10	11	1	-2	0	-1	-2	9	8	10	10	11
Bacau	10	11	13	13	13	-1	-2	0	0	-3	10	11	13	13	13
Galati	11	15	14	18	17	-4	1	-4	1	-6	11	15	14	18	17
Mures	12	14	11	11	12	-2	3	0	-1	0	12	14	11	11	12
Brasov	13	12	12	12	10	1	0	0	2	3	13	12	12	12	10
Hunedoara	14	18	19	19	20	-4	-1	0	-1	-6	14	18	19	19	20
Neamt	15	13	17	17	18	2	-4	0	-1	-3	15	13	17	17	18
Bihor	16	9	8	8	8	7	1	0	0	8	16	9	8	8	8
Maramures	17	16	18	16	15	1	-2	2	1	2	17	16	18	16	15
Dambovita	18	17	16	14	16	1	1	2	-2	2	18	17	16	14	16
Arad	19	21	15	14	14	-2	6	1	0	5	19	21	15	14	14
Valcea	20	23	24	22	25	-3	-1	2	-3	-5	20	23	24	22	25
Ort	21	20	23	23	22	1	-3	0	1	-1	21	20	23	23	22
Buzau	22	19	20	20	20	3	-1	0	0	2	22	19	20	20	20
Teleorman	23	22	25	25	26	1	-3	0	-1	-3	23	22	25	25	26
Botosani	24	24	27	28	28	0	-3	-1	0	-4	24	24	27	28	28
Gorj	25	28	29	31	31	-3	-1	-2	0	-6	25	28	29	31	31
Alba	26	25	21	24	24	1	4	-3	0	2	26	25	21	24	24
Vaslui	27	26	26	27	28	1	0	-1	-1	-1	27	26	26	27	28
Sibiu	28	27	22	21	19	1	5	1	2	9	28	27	22	21	19
Vrancea	29	30	30	30	30	-1	0	0	0	-1	29	30	30	30	30
Satu Mare	30	29	28	29	27	1	1	-1	2	3	30	29	28	29	27
Caras-Severin	31	32	35	35	35	-1	-3	0	0	-4	31	32	35	35	35
Braila	32	33	33	33	34	-1	0	0	-1	-2	32	33	33	33	34
Harghita	33	31	32	32	32	2	-1	0	0	1	33	31	32	32	32
Bistrita-Nasaud	34	35	34	34	33	-1	1	0	1	1	34	35	34	34	33
Mehedinti	35	34	36	36	36	1	-2	0	0	-1	35	34	36	36	36
Calarasi	36	36	37	37	38	0	-1	0	-1	-2	36	36	37	37	38
Ialomita	37	37	38	39	38	0	-1	-1	1	-1	37	37	38	39	38
Tulcea	38	41	40	42	42	-3	1	-2	0	-4	38	41	40	42	42
Covasna	39	42	41	41	41	-3	1	0	0	-2	39	42	41	41	41
Salaj	40	39	39	38	37	1	0	1	1	3	40	39	39	38	37
Giurgiu	41	40	42	40	40	1	-2	2	0	1	41	40	42	40	40
Ilfov	42	38	31	26	23	4	7	5	3	19	42	38	31	26	23

Table A3

## Distribution and rank of Romanian counties' employment shares during 1995-2014

Region*	Share Value**									
						Change***				
	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014
Bucharest	7.91	8.21	11.35	12.03	12.41	0.30	3.14	0.68	0.38	4.50
Prahova	4.00	3.50	3.47	3.49	3.39	-0.50	-0.03	0.01	-0.09	-0.61
Iasi	3.74	3.72	3.49	3.41	3.31	-0.02	-0.23	-0.08	-0.10	-0.43
Cluj	3.31	3.51	3.65	3.80	3.97	0.20	0.15	0.15	0.17	0.68
Constanta	3.27	3.24	3.45	3.44	3.41	-0.03	0.21	-0.01	-0.03	0.14
Timis	3.18	3.31	3.71	3.68	3.83	0.13	0.40	-0.03	0.15	0.65
Arges	3.12	3.09	2.97	2.90	2.91	-0.04	-0.12	-0.07	0.01	-0.21
Dolj	3.12	3.52	3.23	3.30	3.19	0.41	-0.30	0.07	-0.11	0.07
Suceava	3.08	3.16	2.81	2.86	2.77	0.08	-0.35	0.05	-0.09	-0.31
Bacau	3.04	2.94	2.67	2.52	2.46	-0.11	-0.27	-0.15	-0.06	-0.58
Galati	2.92	2.70	2.45	2.28	2.27	-0.23	-0.25	-0.17	-0.01	-0.65
Mures	2.84	2.72	2.79	2.76	2.74	-0.12	0.07	-0.04	-0.01	-0.10
Brasov	2.82	2.80	2.76	2.73	2.82	-0.02	-0.04	-0.02	0.09	0.00
Hunedoara	2.73	2.41	2.30	2.17	2.13	-0.33	-0.10	-0.14	-0.04	-0.60
Neamt	2.71	2.77	2.31	2.30	2.22	0.06	-0.46	-0.01	-0.08	-0.48
Bihor	2.70	3.09	3.15	3.14	3.08	0.39	0.06	0.00	-0.06	0.38
Maramures	2.35	2.42	2.31	2.31	2.32	0.07	-0.11	0.00	0.01	-0.03
Dambovita	2.21	2.41	2.37	2.35	2.30	0.20	-0.04	-0.02	-0.05	0.09
Arad	2.20	2.18	2.37	2.35	2.45	-0.02	0.19	-0.02	0.10	0.25
Valcea	2.17	2.12	1.96	2.00	1.92	-0.05	-0.16	0.04	-0.08	-0.25
Olt	2.17	2.22	2.03	1.96	1.97	0.05	-0.19	-0.07	0.01	-0.20
Buzau	2.15	2.32	2.18	2.14	2.13	0.17	-0.15	-0.04	-0.01	-0.02
Ialeormani	2.07	2.16	1.93	1.90	1.90	0.09	-0.23	-0.02	0.00	-0.17
Botosani	2.01	2.08	1.79	1.72	1.71	0.07	-0.29	-0.07	-0.01	-0.30
Gorj	1.97	1.85	1.68	1.64	1.59	-0.12	-0.17	-0.04	-0.05	-0.38
Alba	1.93	2.05	2.06	1.94	1.93	0.12	0.01	-0.12	-0.01	0.00
Vaslui	1.93	2.03	1.82	1.74	1.71	0.10	-0.22	-0.07	-0.03	-0.22
Sibiu	1.91	1.95	2.03	2.07	2.15	0.04	0.08	0.04	0.08	0.24
Vrancea	1.86	1.74	1.66	1.71	1.65	-0.12	-0.08	0.04	-0.06	-0.21
Satu Mare	1.76	1.78	1.71	1.72	1.75	0.02	-0.06	0.00	0.03	-0.01
Caras-Severin	1.75	1.62	1.41	1.39	1.32	-0.13	-0.21	-0.02	-0.07	-0.43
Braila	1.63	1.56	1.51	1.50	1.45	-0.07	-0.05	-0.02	-0.05	-0.18
Harghita	1.61	1.63	1.56	1.61	1.56	0.02	-0.07	0.05	-0.05	-0.05
Bistrita-Nasaud	1.41	1.44	1.42	1.49	1.51	0.03	-0.02	0.07	0.02	0.10
Mehedinti	1.38	1.51	1.38	1.30	1.29	0.13	-0.13	-0.08	-0.01	-0.09
Calarasi	1.33	1.30	1.22	1.22	1.17	-0.04	-0.08	0.00	-0.05	-0.16
Ialomita	1.26	1.26	1.20	1.18	1.17	0.00	-0.06	-0.02	-0.01	-0.08
Gulcea	1.20	1.09	1.03	0.97	0.98	-0.11	-0.06	-0.06	0.01	-0.22
Covasna	1.17	1.03	1.03	1.00	1.00	-0.14	0.00	-0.03	0.00	-0.17
Salaj	1.14	1.22	1.19	1.18	1.20	0.08	-0.04	-0.01	0.02	0.06
Giurgiu	1.10	1.14	1.02	1.04	1.04	0.04	-0.12	0.01	0.01	-0.08
Ifov	1.08	1.23	1.59	1.80	1.95	0.15	0.36	0.20	0.15	0.87

Table A4

**Distribution and rank of Romanian development regions' employment shares during 1995-2014**

Region*	Share Rank (1 =largest share)										Share Value**									
	Change***										Change****									
	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014	1995	2001	2006	2010	2014	1995-2001	2001-2006	2006-2010	2010-2014	1995-2014
North - East	1	1	1	1	2	0	0	0	-1	-1	16.52	16.7	14.88	14.55	14.18	0.18	-1.82	-0.33	-0.37	-2.34
South - Muntenia	2	2	2	2	3	0	0	0	-1	-1	15.09	14.85	14.17	14.07	13.88	-0.24	-0.68	-0.1	-0.19	-1.21
South - East	3	4	5	6	6	-1	-1	-1	0	-3	13.04	12.65	12.28	12.03	11.89	-0.39	-0.37	-0.25	-0.14	-1.15
North - West	4	3	3	4	4	1	0	-1	0	0	12.66	13.45	13.42	13.63	13.83	0.79	-0.03	0.21	0.2	1.17
Center	5	5	6	5	5	0	-1	1	0	0	12.28	12.17	12.23	12.11	12.2	-0.11	0.06	-0.12	0.09	-0.08
South - West Oltenia	6	6	7	7	7	0	-1	0	0	-1	10.81	11.22	10.27	10.2	9.95	0.41	-0.95	-0.07	-0.25	-0.86
West	7	7	8	8	8	0	-1	0	0	-1	9.86	9.52	9.8	9.59	9.73	-0.34	0.28	-0.21	0.14	-0.13
Bucharest - Ilfov	8	8	4	3	1	0	4	1	2	7	9.74	9.44	12.94	13.83	14.35	-0.3	3.5	0.89	0.52	4.61

Source: own calculations

\*Sorted by rank in 1995

\*\*Share values in percent

\*\*\*A positive change indicates a higher rank in the end year relative to the start year

\*\*\*\*A positive value indicates a higher share value in the end year relative to the start year

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Correspondence: Yuriy Fedkovych Chernivtsi National University, 2 Kotsjubynskyi Str., 58012, Chernivtsi, Ukraine.

Email: igoryaskal@gmail.com

