Identifying Regional Economic Disparities and Convergence in Romania

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Regional convergence is a key objective of cohesion and balanced development at regional level. The existences of regional imbalances do nothing only delay the achievement this objective, requiring the emergence of viable and appropriate measures of the new European context.

This article aims to use the appropriate models based on dispersion method (variance) to identify the dynamics and amplitude differences in the level of regional development in European Union and Romania.

The results of this research indicate first that the disparities between development regions in Romania have growth more rapidly in recent years, but the EU integration may have enhanced per-capita income convergence processes. These findings may be able to find new tools to reduce income inequalities in next programming period.

Keywords: Regional disparities, Convergence, Concentration, Distribution analysis

JEL Classification: R11, R12, F02

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Introduction

Effect of concentration tendencies (clustering), disparities between regions and within them are determined by a number of external phenomena (globalization, integration) or internal (clustering, the emergence of growth poles / development, local institutions involved in different aspects of the economic life, etc.). Regional disparities take the form of differences in per capita income level and determine, at a time, a chain reaction of companies, authorities, residents, etc., trying to counteract their escalation.

Most regional science theories analyzed and explained the causes of regional disparities and tried to provide answers to the question why some regions are growing faster than others. The explanations are numerous and relate to the values of the reference period (the existence of favourable natural conditions, the presence of important and valuable resources, location, innovation, institutions and regional policies, global context, national, regional, etc.)

Recently, analysis of regional disparities entails addressing the convergence between countries that decide to eliminate the barriers of any kind. It manifests more than obvious interest for spatial analysis models of inequality, regional differences in the size reduction of income, infrastructure, etc.


Issues related to regional inequalities, convergence and space dynamics have an important place in current economic literature, although addressing these issues is still insufficiently explored. Thus, there can be identified three specific areas of convergence applications: real convergence, nominal and institutional. For Romania, the current context of integration,
all three types of convergence is of particular interest given the wide discrepancies from other EU Member States.

In this article we limit our scope to address two important aspects: highlighting regional economic disparities and identify the main trends of convergence in Romania.

The first part presents some general considerations on theoretical approaches on regional disparities and convergence and reviews the most used methods to assess the dynamics of regional series. In the second part there will be made applications on Romania, to the eight development regions.

Article entitled "Identifying disparities and regional economic convergence in Romania" analyzes the evolution and convergence of regional disparities in Romania.

**Disparities, space and convergence**

In general, the concept of disparity (disparity, inequality, imbalance, etc.) is used both by analysts, academics and practitioners to express differences identified using appropriate mathematical techniques, using specific indicators or indices.

Depending on the context examined, the concept has several facets, being accompanied by other elements that support it: convergence, polarization, clustering, concentration, dispersion, etc. Usually, how to assess the level or degree of disparity is determined by:

1. The territorial dimension to the reporting (regional, sub-regional, national, supranational, etc.);
2. The period considered in regional analysis.

While theoretical approaches on regional disparities tend to focus on detailed analysis of the nature of income differences within a territory, in a period of time, the convergence literature envisages the catch (catch-up) countries poor to the rich.

The role of space (territory) is recognized recently in the literature on regional convergence, while the older approaches to regional imbalances have been characterized by relative silence on the complications that can have regional level.
Analysis of regional disparities has become really important, especially in the last two decades; this is visible, especially in increasing the number of empirical studies on convergence (Rey S., Janikas M, 2005).

Empirical studies on convergence and growth can be divided into two distinct categories:

1. Confirmation studies of growth theories, leading to build econometric equations estimated based on the observation of the economy at different levels, including at regional level;
2. Exploratory studies applying innovative techniques to generate hypotheses about the dynamics of the economic system.

The presented synthetic main theoretical approaches that were aimed mainly imbalances and regional convergence dynamics analysis.

**Theoretical approaches of regional convergence**

Generally, the term convergence is commonly used in comparative economic analysis regarding economic integration in order to identify trends entities (national, sectorial, regional) to a landmark considered the most performant or of medium level.

Convergence studies take into consideration how the involved factors in a process or another (integration, globalization, etc.) acts to reduce disparities between the analyzed entities. Reducing disparities requires close values established performance indicators and ensuring reduce disparities in development of these entities.

In literature, there can be identified three specific convergences of application domains:

1. Real convergence - to eliminate disparities between countries or regions in the development level given by income per capita and labour productivity;
2. Nominal convergence – is applied in monetary policy and refers to achieving economic stability and the transition to the euro;
3. Institutional convergence - requires compatibility in terms of structure and functioning of institutions.

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In Romania, all three types of convergence above is a particular concern given the important difference from other EU Member States. In this study we limit our scope to address a few key aspects of real convergence in the developing regions (statistical or planning).

Generally, theoretical approaches on regional convergence have focused attention on the process of catching-up (catch up): the less developed regions make significant efforts to catch up the rich regions.

The main trends of the current process of convergence - crowding and dispersion - are analyzed and interpreted on recent approaches of regional theory:

1. Endogenous growth theory (Lucas, P. Romer, P. Nijkamp)
2. New economic geography (P. Krugman)

Endogenous growth theory focuses on the concentration of economic activities due to the effect of increasing the profit level of investment in human capital and research and development. According to this theory, the concentration of the factors mentioned above in the central area and not in the peripheral area is the result of the economic integration process. Economic growth at regional level, including those based on innovation (Schumpeter’s growth theory) are effective at change, adaptation, and less than optimal allocation adjustment of certain locations, and focused on integration and trade. Regional economic growth is taking place on the basis of the gaining process of innovation – learning - knowledge - assimilation associated to labour.


New economic geography theory takes into account the following hypothesis: regional clusters are the effect of clustering phenomena of work forces in certain areas and which have important relationships. According to this theory, high transport costs protect companies from small markets. With lower cost of transport is increasing competition among firms and ultimately, lower dispersion forces. Theory emphasizes, in particular, market integration, economies of scale, transport and local markets, promoting the combined effects of economic concentration in the centre
region, the benefits from labor market and location of advanced technologies (Krugman 1991, Fujita, Venables, 1999).

According to the institutional theory, the key element for development of a region is the institutions that determine the technological frontiers of the economic hierarchy. The reason is the fact that these institutions can control the economy's ability to use and develop their own resources in a particular way. When institutional capacity is unevenly distributed in space, institutional factors contribute to agglomeration of economic activity, strengthening the more advanced activities in most developed areas. An important feature of these institutions is that it facilitates innovation, research and development, business support, all known as "innovative systems" (Lundvall, 1992; Nelson, 1993).

In the theoretical approaches mentioned above, the polarization of economic activities is a slow, inevitable and convergent process in terms of GDP per capita. At regional level is recognized the importance of political measures and actions necessary to ensure balance between the work forces and tendencies of agglomeration (concentration).

Myrdal is the first to propose and promote regional concept in the theory of circular and cumulative economic processes (1957), which explains the increase in international differences in development from similar initial conditions. The movement of capital, migration and trade in goods and services are continued and even increased international and regional inequalities. The liberalization of trade, less developed regions, lack of human capital and innovative technologies are required to specialize in production of goods, especially primary goods with inelastic demand (low elasticity) in relation to price and income. Developed regions become poles of attraction and absorb increasing amounts of capital and labour force from less developed regions.

Neoclassical theories even if they anticipated long-term unconditional convergence (club convergence), failed to clarify the basic conditions that may affect regional disparities (including in times of crisis, recession, etc.). Despite all the efforts made on the proposed reforms in the integration process, there is still a natural tendency, universally valid, that the polarization process is leading ultimately to greater regional differences. Since 1956, Williamson believes that the convergence process, inter-regional relations and public policy factors interact for the main clusters. Thus, a
faster increase in growth poles (e.g., capital regions) causes an increase in regional disparities. In a later stage of development, regional disparities can be reduced to a level of aggregation higher than revenues. The distribution is the emergence of agglomeration diseconomies (high cost of labour work or the effect of congestion), and continue with the growth poles. Thus, regions lagging behind in some countries can benefit from technology diffusion. There are many economists who believe that the new Member States can be assigned to the process called "catch-up" (to catch).

Relations between national economic growth and regional imbalances can be graphically presented with a form of an inverted U curve (Williamson curve). The new European Union member states find their place on the upward curve, while the old members are placed on the flat. The curve drawn by Williamson, this category of countries recorded increases in regional disparities, which makes them to be represented on the left side of income Y in Figure 1.

![Williamson curve](image-url)

**Figure 1: Williamson curve**


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5 Prof. ing. František Turnovec CSc, "Regional Disparities in the EU", www.ies.fsv.cuni.cz
Compared with the old theories, new approaches to regional convergence have in the spotlight the following:

- Increasing importance of intangible factors (including economic policies) in the widening of regional disparities also the investment associated with innovation, research and development capabilities and human capital skills are sources of growth of the disparities between regions;

- New approaches are complementary and update old methods proposed by neoclassical theory, by extending the object of research, methods and techniques used, especially by modern methods of calculation and processing with computer and programming;

- You may also notice a much more anchored in reality interpretation of regional economies, which are part of the convergence process (both in terms of speed and in terms of growth rates).

- Summarizing, one can see that, in terms of theoretical approaches, regional convergence has attracted comments and critics alike, who helped develop the field of wide interest. However, with all the developments made, we cannot yet speak of a magic formula, specifying the exact solution or solutions that ensure convergence of regional structures, characterized by high diversity, both in terms of different conditions development (natural, human, infrastructure, innovative structures, etc.), traditions, mentalities and different growth rates.

**Indicators and analysis techniques**

At the basis of the analysis of regional disparities are a number of methods and indicators, based in a scientific manner, assumptions and conclusions
presented in space research. These methods of spatial analysis focuses on territorial series, which consist of a range of values of features ordered in administrative-territorial units (ATU) to which it belongs. Territorial series operate with complex units, such as villages, towns, cities, counties, regions, countries etc.

Territorial series features are:

- independence of terms - specific levels of different ATU not mutually conditioned, this feature allows the separate characterization of each unit by comparing with another unit or its inclusion in the overall level of the series;
- homogeneity of the series - all terms must have the same economic and social content, the same statistical definition of scope;
- similarity of terms - there is an identical time of observation or recording period;
- variability in terms - the combination of the main factors is determined by the specificity of the whole territorial series, with the casual crowd factors that cause differentiation from one unit to another;
- graphical representation - is performed using a cartogram or cartodiagram amid ATU maps. Each unit is shaded according to distinct qualitative types.

Currently, the comparative analyses at the local level and degrees of ATU is particularly important for the national and international community in terms of measuring the differences in development between regions and achieving appropriate strategies.

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**Indicators**

Regional disparities analysis using statistical techniques of territorial analysis based on a system of specific indicators, corresponding with the nature of the terms and purpose.

The regional analysis can be found the following groups of indicators:

A. absolute indicators ((yi) level indicators and absolute indicators (Δi / j = yi - yj));

B. relative indicators: Ex.: Territorial indicators (I / j = yi / yj), relative gap: Δ% i / j = (yi- yj / yj) x100 = 100 (ii / j - 1), territorial concentration coefficient (Gini coefficient Struck, energy information, etc..) and relative sizes of structure gi = yi / yi Σ;

C. medium indicators: average is the arithmetic or geometric averages (median, module).

In the European Union of the 27 Member States, issues of convergence has been set a common set of indicators and criteria that can help achieve a shared vision on the impact of certain action in order to reduce disparities. The indicators selected for evaluation of cohesion policy and regional development are: GDP per capita, unemployment, life expectancy at birth and educational level. Their use is affected by the availability of data at sub-national (regional) level in the EU.

In order to obtain a satisfactory picture of regional performance, the use of methods can be achieved by combining structural indicators, as follows:

1. indicators of physical disparities - climate, center-periphery distance, accessibility and population density;
2. economic disparities indicators - income, the structure of industrial activity, economic prospects, etc.;
3. social disparities indicators - unemployment, labor force structure, labor force, skills and living standards.

Analysis and interpretation of the above groups of indicators provides an overview of the situation at local level and, by comparison, evidence of regional disparities.

Analysis techniques
Generally, one can say that regional science has "borrowed" from statistics those techniques that may contribute to making scientific results. In regional studies, dispersion parameters (variance) are most commonly used because they can synthesize, in a scalar, information on inequalities in distribution. This means that each assessment of the aggregate inequalities contain information related to distribution, which sometimes leads to different results (for this reason it is important for empirical analyzes to check robustness of the conclusions).

In the analysis of regional convergence, there are some restrictions on the use of statistical techniques, which are determined by using a series of non-heterogeneous computing and can lead to unrealistic results in impaired perception and convergence trends (Petrakos G. 2005). The alternative is to attach different values to each observation in part reflecting their relative contribution. For example, as regional income variable (GDP), the indicator can be weighted by the population of the territory. In some cases, data and statistical information may be asymmetric, which leads to difficulties in calculating the respective indices.
The trends presented in the regional analysis are based on the use of techniques to estimate the non-parametric, allowing the presentation of functional features. In this case, there are some specific advantages determined by generalities or flexibility associated to the approached parameters.

Assessment of regional imbalances is achieved through the appropriate statistical formulas for calculating values. From this point of view, taking into account differences in size between territorial levels can lead to conclusions about trends.

In conclusion, we can say that there is a constant concern of economics to estimate and assess the dynamics of territorial entities, taking into account existing conditions and reported time periods. Regional analysis models designed in particular to explain the causes of economic and social disparities between appearance and within regions in order to identify the best measures to counter the effects of their appearance or deepening.

**Applications on study of regional disparities and convergence in Romania**

In Romania, development regions are "areas which correspond to county groups, established by their voluntary association based on agreement signed by the representatives of county councils, as well as by those of the General Council of Bucharest; regions represent the framework of design, implementation and evaluation of regional development policies, as well as collection of specific statistical data, in accordance with European
regulations issued by Eurostat for the second territorial classification level, NUTS II, existing within the EU”\(^7\).

**Analysis regional context**

For Romania, the economic disparities and convergence analysis context is given by the presence of the eight development regions (statistical regions), created after integration of the European Union (2007). These regions were created taking into account the potential functional integration criterion, around some polarizing centers (Iasi, Timisoara, Craiova, etc.), having correspondence with NUTS 2 system of the European Union. When creating regions, it was also considered other criteria such as: criterion of complimentarily of resources, of economic and social activity, functional connection, etc.

The 8 development regions created according to Regional Development Law no. 151/1998 (amended by Law 315/2004) are the following (Table 1):

<table>
<thead>
<tr>
<th>Table 1: Development regions in Romania Eurostat Code</th>
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<tr>
<td>NUTS 2 Region</td>
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<td>RO11</td>
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<td>RO22</td>
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<td>RO31</td>
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\(^7\) Eurostat – Official Bureau of European Statistics
Analysis of regional disparities will be further made upon development regions listed above, during 2000-2009, using direct and derived indicators specific for some areas of economic activity.

Analysis and interpretation

A. Economic performances

Identification of regional disparities in terms of economic performance was achieved by applying dispersion (variation) method upon GDP / capita. (PPC) during 1997-2008. Knowing that the Bucharest-Ilfov region is placed among the most developed regions in the EU compared to the other regions and, in particular, with North-East and South regions, two situations were made: "with and without Bucharest-Ilfov region". From the analysis of dispersion values, the following aspects resulted:

- In the situation “with Bucharest-Ilfov region”, the evolution of GDP dispersion value / capita at regional level recorded differences from a minimum of 4875 Euros / capita (1997) to a maximum of 12.300 Euros / capita. Determination of maximum / minimum level of GDP /capita. (PPC) shows an increase of regional disparities, from 2/1 (2000) at 4/1 (2008). Evolution of variation coefficient value was an increase one, from 21.3% to 54.1%;
- In the situation "without region Bucharest-Ilfov", it can be ascertain a relatively small variance between regions, only 2% (from 42.5% to 44.3%). Also, the average regional GDP / capita shows an increase from a minimum of 3087.5 Euros / capita (1997) to 8702.5 Euros / capita (2008);
- Regarding the evolution of other terms of the variance - the minimum / maximum value, variability and amplitude, they follow a rising trend, confirming the emphasis of regional disparities in
Romania regarding the economic performance expressed as GDP/capita (PPC). Thus, the minimum value increased by 6.5% (3600 Euros/capita to 7200 Euros/capita), while the maximum value increased by 13.39% (from 7100 Euros/capita to 21,100 Euros/capita) and the variation coefficient value records an increase of 8.84%. Annual growth rate of the maximum value is superior to the minimum value, which make us state that there is a tendency of increasing divergences in the regional economic performance (Figure 2).

**Figure 2:** Variance indicators- GDP/capita at regional level, 1997-2008 (with and without Bucharest-Ilfiov region)

Reported the average value of EU-27, there is a growing of importance of national GDP/capita due to the increase of its weight from 8.43% (1999) to about 25.9% in 2008 (increase of about three times). This did not also influence the position occupied by Romania at EU-27 level, which holds the penultimate place as regards GDP/capita, being slightly ahead of Bulgaria (Figure 3).

Source: Own calculations
In the regional structure, it may be identified certain tendencies in the evolution of regional GDP weight into national GDP, as follows:

- during 2000-2008, it is found an increase of Bucharest-Ilfov region contribution at the formation of national GDP (from 22% to 25.3%);
- the other regions recorded similar weights in the achievement of total GDP, ranging from a minimum of 8.15% (South-West region) and a maximum of 12.7% (South-Muntenia);
- also, there were regions that increased their contribution to the formation of national GDP: South Muntenia, West and Bucharest-Ilfov, while the other regions recorded decreases in the above-mentioned indicator value weight (Figure 4).

**Figure 1:** Evolution of GDP/capita weight of Romania into GDP/capita of EU-27, between 1999-2008 (% altogether)

*Source: Own calculations*
Increasing GDP / capita in 2008 compared to 2000 was different from one region to another, the greatest increase being recorded in Bucharest-Illfov (by 3.98 times), followed by West (2.39 times) and North West (2.36 times), the lowest growth being recorded in the South-East (1.98 times) and North-East (2 times).

In terms of trends of GDP / capita at regional level, in 2000 it is observed a high concentration of values in a relatively narrow range. Subsequently, (in 2001), concentration trend is emphasized and occurred a dispersion trend which is continued until 2008, the regions entering a competition process and the detachment of those developed from the poor ones. There is also a compact group of regions, which recorded similar values of the GDP / capita, but with obvious trend of dispersion between them (Figure 5).

**Figure 2:** Evolution of regional GDP weight in national total, 2000-2008 (%)

*Source: Own calculations*
Figure 3: Evolution of regional/capita GDP concentration between 2000-2008 (lei/capita)

Source: Own calculations

This trend of increasing regional disparities is also confirmed by the use of a concentration method by means of Lorenz-Gini curve: it can be noticed the movement of curve for 2008 towards the first bisector and curve related to the year 2000, which comes to support the allegations outlined above (Figure 6).

Figure 4: Lorenz-Gini concentration curve calculated for the evolution of regional GDP, 2000-2008 period

Source: Own calculations
Thus, we may observe a significant concentration of regional GDP, with growth trend: the Gini coefficient value increased from 35.8% in 2000 to 38.83% in 2008 (increase of 3%).

Along with the trend of increasing regional dispersion of economic performance expressed by the GDP / capita, there is also relative trend of convergence of this indicator to the EU-27 average, caused by the growth rate which is higher to the value recorded by 2008 (Figure 7).

**Figure 5:** Regional convergence expressed by the evolution of GDP/capita (PPC) – Romania and EU-27, 1999-2008 (euro/capita)

In conclusion, following the analysis of regional economic performance in Romania, two major trends may be found: a first relatively slight trend of convergence with the EU-27 and the second trend is that of increasing disparities between the eight NUTS 2 regions, as a result of emphasizing economic concentrations in attractive areas, which may ensure a high standard of living and activities with high profitability.

**Demography**

Population of a region is one of the most important matters when discussing on economic development and identifying disparities in the territory. This indicator is the basis for incorporation of a region into a NUTS (1, 2 or 3) category and, at the same time, the weighting criterion of some performance indicators (GDP, VAB, SMEs, etc.). Often, the existence of a large population in a region may be an advantage, provided that this
population has skills that may be characterized by a high level of specialization, etc.

Population variability at the level of those eight development regions, during 2000-2009, showed a downward trend (-0.49%), which means the gaps on this indicator are diminishing. In 2009, the West region recorded a minimum population of 1,912 million inhabitants, while the maximum population of 3,714 million in the North-East region (Figure 8).

**Figure 6: Variability indicators – total population at regional level, 2000-2009**

Variation coefficient of 2009 was 21.8%, decreasing by 0.18% as compared to its value in 2000, of about 26.1%. Both regional population values (minimum and maximum) are decreasing as compared to 2000, the indicator variation being relatively small during the analyzed period.

Along with the decreasing of population number, its density also decreased both at national and at regional level. Thus, during 2000-2009, population density decreased from 94.1 inhabitants/km² to 90.1 inhabitants/km². The most significant decreases in density values were recorded by the South-West Oltenia (-6.33%), West (-5.81%), South Muntenia (-5.67%), Center (-4.45 %) and North-West (-4.44%). The smallest decrease was reported in Bucharest-IIfov region, namely -0.51%.

When comparing regional indicator, very large differences are found between Bucharest-IIfov region and the other seven regions:
population density in Bucharest-Ilfov region was, in 2009, of 1239.2 inhabitants/km², while in the Western region was 60 inhabitants/km², in the central region, it was 74 inhabitants/km², in the South-West region, it was 77 inhabitants/km² (ratio is 20-1). Average population density in the EU-27 is 116 inhabitants/km².

Regarding the incorporation of a region in a NUTS 2 category, the limits are given by the population number: between 800,000 and 3 million inhabitants. These limits are not met (there have not been met since their founding in 1998) by all development regions in Romania, which have values above the maximum one set by the EU.

Regions with a population of over three million inhabitants the North-East (3.7 million inhabitants) and South-Muntenia (3.2 million inhabitants). Moreover, the two regions (especially the North-East region), are on the last places in the EU-27 as regards GDP / capita and performance, but are ranked in the top 20 NUTS 2 regions in terms of population size. From this point of view, we may reassert, in the next programming periods, the need for a territorial reorganization on better functional bases, by increasing the number of regions, which could lead to reduction of served population and to a better management of development process as a whole.

**Labor**

Another important indicator, commonly used in the analysis of regional disparities is employed population. This indicator provides information on trends on the labor market and its reactions to different internal or external stimuli.

Being in close correlation with demographic indicators, which recorded drastic decreases in the last decade, employment in general and employed population, in particular, followed the same trend of quantitative decrease (effective numerical reduction), but mostly a qualitative one (through migration of well trained labor to more developed EU regions). Average annual employment rate was negative (-2.44%), with a higher negative value, as compared to the total population.

As regards the variance of the analyzed indicator, the trend was of decrease in most development regions, which implies a certain territorial convergence on the labor market. Also, the variation coefficient value
variation recorded a downward trend during the reviewed period- from 26.1% (2000) to 15.3% (2009) (Figure 9).

The downward trend of variance value for the employed population shows us that there is an internal phenomenon of labor migration from one region to another and even within the same region, which causes the reduction of regional disparities. This is also supported by similar weights of regions in terms of employment, they varying on a relatively narrow scale: from a minimum of 9.7% owned by Western region to a maximum of 14.5% in Bucharest-Ilfov region. The other regions have similar weights: North West region - 13.75% of total, South Muntenia Region - 13.79%, North-East region - 14.37% (2009).

Research-innovation

Following the analysis and interpretation of indicators specific to the research and innovation field, information can be obtained on the development of a region, the competitive advantages it has, as compared to other regions and how it may be acted for supporting this field, considered to be a key factor for the evolution of current knowledge society.

For analysis of regional disparities in the R-D (Research-Development) field, two indicators were selected and analyzed: employees...
in the research and development activity (number of persons) and the number of innovative companies.

Thus, the average annual growth rate of employees in the R-D field, during 2000-2009, was about 1.46%, the variation coefficient following a similar increase: from 107.9% in 2000 to 109.9% in 2009. The variation coefficient is a relatively high value compared to the other coefficients analyzed so far.

The ratio between the maximum number of researchers (in Bucharest-Ilfov region - 19,577 researchers) and the minimum number (in the South- East region - 1865 employees) is 10 to 1.

Degree of regional innovation characterized by the number of innovative enterprises is still in favor of Bucharest-Ilfov region, which accounts for 23.91% of total, the last place being owned by South- West Oltenia, with only 4.83% of total. The weights shown known changes over time: thus, during 2006-2008, as compared to 2000-2002, the number of innovative enterprises increased in some regions (e.g. in Bucharest-Ilfov - from 21.23% to 23.91%, in the South- East region- from 9.91% to 14.11%), while in other regions, this weight has experienced a decline (in the Central region - from 19.22% to 13.18%, in Western region - from 7.32% to 6.17%).

It may be noted that most research centers are located in Bucharest-Ilfov region, many of which are state owned (Figure 10).

**Figure 8: Variability indicators – Employees in R-D field**

*Source: Own calculations*
According to a project prepared by a group of researchers and focused on evaluating the innovation degree at regional level based on specific indicators (potential of innovation management, potential for knowledge creation, innovation and system integration, innovation performance and property rights), the following conclusions were obtained:

- Bucharest-Ilfov region has a degree of innovation (2010) of 72.96%, in an increasing process as compared to 2008, by about 2.85%, this is followed, from far from, by the North-East region, with a degree of innovation of 37.19%, in a decreasing process as compared to 2008; the region with the lowest degree of innovation is the Western region (25.11%), decreasing as compared to 2008;

- Difference between the maximum and minimum value of innovation degree is 2.9 to 1 (Figure 11).

**Figure 9**: Evolution of innovation degree at regional level, 2008-2010

*Source: Data processing - The “INNOREG” project - Model and computer program for determining the degree of innovation in the development regions"

An important part of modern regional theories on regional disparities identifies activities related to innovation as being the main sources of competitive advantage, but also a triggering factor of territorial economic disparities. Innovative regions have advantages, but are dependent on knowledge dissemination. There is an important mechanism by which this sector evolves and becomes effective. Regional policy, by its

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8 The “INNOREG” project - Model and computer program for determining the degree of innovation in the development regions" (ref. no. 92079/2008) runs within the program "Partnerships in priority areas", promoted by the Ministry of Education, Youth and Sports.
measures and actions must take into account all these issues, when it proposes to aim at reducing disparities in research-innovation field.

**Health**

Regionally, the health domain is a factor that may characterize the overall level of development, the related indicators entering the composition of human development index (HDI), calculated by the international institutions and bodies to reveal the living conditions and welfare.

In this regard, we have also included in the analysis of regional disparities the health specific indicators to show its trends during 2000-2009. “Number of doctors” indicator was selected and its variation was calculated at the level of those eight development regions. Thus, one may find the increase in the value of the variation coefficient, from 26.5% in 2000 to 36% in 2009. This implies a reduction of convergence in health sector and an increase in territorial disparities.

Annual growth in the number of doctors is 1.07%, amplitude of variation reaching the value of 109.5% (year 2009). The minimum number of doctors (4515) is found in the South region, while the maximum number is found in Bucharest-Ilfov region. Analysis of this indicator variability during the reference period 2000-2009 shows an inflection point in 2005, when the variation coefficient reached 40.6%. After that, the variation coefficient decreased in 2009, to a value of about 36%. (Figure 12)

![Figure 10: Variability indicators – number of doctors at regional level](source: Own calculations)
At the same time, it is reported a growth in the number of doctors compared to 1000 inhabitants in most regions and at national level (2.28%). The largest increases were recorded in the West (8.7%), Bucharest-Ilfov (5.71%), South Muntenia (4.6%) and North West regions (3.36%) (Figure 13).

![Evolutia numărului de medici la 1000 loc., la nivel regional, 2000, 2009](image)

**Figure 11:** Evolution of number of doctors at 1000 inhabitants for the years 2000, 2009

Source: Own calculations

Regions that recorded decreases of this indicator are: North-East (-3.11%), South-West (-1.16%) and South-East (-0.92%). In case of this indicator, there are also found large discrepancies in the development regions, the ratio between the maximum and the minimum value being 3 to 1.

**Infrastructure**

Infrastructure, in general, is an important indicator characterizing the regional accessibility, being taken into account when talking about the attractiveness of an area.

When analyzing regional disparities in infrastructure, it was selected the indicator named “density of public roads per 100 km²”, during the reference period 2000-2009.

Thus, the region having the largest network of public roads is Bucharest-Ilfov (48.9 km per 100 km²), followed from far by the South-West region (36 km per 100 km²) and South-Muntenia region (36.5 km per 100
km²). In contrast, the region with the worst public roads infrastructure is South-East (30 km per 100 km²). The average annual growth rate of indicator for public road density per 100 km² is 0.51% for the period reviewed.

The variation coefficient was, in 2009, 16.2%, up from 2000 when it recorded a value of 14.6% (increase of about 1.13%) (Figure 14).

**Figure 12:** Variability indicators – Density of public roads per 100 km² at regional level

A transport infrastructure is a pre-requisite, but not sufficient condition for regional development and competitiveness, an important factor that can determine the location of economic activities and some sectors. Investments in infrastructure are essential for the reduction of distances between regions, especially between peripheral and central regions. Transport infrastructure plays an important role in reducing regional disparities, facilitating trade and labour migration. Improvement of infrastructure reduces the time and cost of goods transport and increases productivity and comparative advantages of different regions.

Most of transport infrastructure remains in the responsibility of central and local authorities (government) and is an important component of structural and regional policy. Given that each region has specific and
particular needs in this field, both in terms of infrastructure and transport means, it is necessary to ensure a close level of development at territorial level and reduction of inequalities between them, because the system transport should be regarded unitary, as a network of EU and national roads.

**Conclusions**

This article reviews, both in theoretical and practical terms, the evolution of regional disparities and convergence process in Romania.

Used both by analysts, ideologists and practitioners, the concept of disparity expresses the differences identified using appropriate mathematical techniques, using specific indicators or indices. This concept has several sides, being accompanied by other elements that support it: convergence, polarization, clustering, concentration, dispersion, etc.

In general, theoretical approaches on regional convergence have focused their attention on the catch-up process (catch up): the less developed regions make significant efforts to catch up the rich ones. The main trends identified within this process - agglomeration and dispersion - are analyzed and interpreted in a recent regional approach: endogenous growth theory, new economic geography and institution theory (Scott W.R., Dimaggio P., Powell W.).

Theories on regional disparities and convergence indicate a limited variety of techniques and analyses to reflect this. Integration of economic methods into spatial analyses highlights the effects of spatial dependence and heterogeneity upon convergence. We can say that regional science has "borrowed" from statistics those techniques that may contribute to scientific substantiation of some results and, in particular, to identify trends recorded in the convergence process within some state communities.

In most regional studies, analyzes reflect territorial imbalances assessed using traditional methods, the most commonly used being the dispersion parameters (variance), because they can synthesize, in a scalar way, information on inequalities in distribution.

For Romania, during 2000-2009, there was an increase of regional disparities, both in terms of economic performance and from other points of view (population, infrastructure, innovation), some fields recording higher
variation coefficients compared with others. In this respect, one can identify two types of disparities:

- Low to medium disparities (identified at the following indicators: population number, density of public roads, number of doctors, number of unemployed);
- Large disparities (indicators such as: number of employees in the Research-Development field, number of doctors, GDP/capita);

There is a reduction of regional disparities, in particular, on the indicators that characterize the labor market: active population and employed population, which recorded decreases in the variation coefficient.

In conclusion, for Romania, there is an emphasize of disparities between the eight development regions, especially in terms of economic performance. These disparities are emphasized when taking into account Bucharest-Ilfov region, on the one hand, and the other regions, on the other hand.

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