DIFFERENT ASPECTS OF REGIONAL DEVELOPMENT IN EAST-CENTRAL EUROPE

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ABSTRACT – The aim of this paper is to explore and analyze the main characteristics of East-Central Europe's spatial structure, including its changes during the recent years. In many territorial researches, there is an intention to define different types of regions and to establish territorial regularities, create models, etc. In this case, we analysed the regions of East-Central Europe based on their comprehensive socio-economic data and described the most important characteristics of the spatial structure of this macroregion from different perspectives. Some results show that the social and economic core areas are highly separated from each other and the development "image" of East-Central Europe has remained the same viewing from the aspects of bigger, homogenous areas, but became more mosaic with the appearance of some separated and improving regions, strengthening the model of the "Bunch of Grapes", not the "Boomerang". Other results show that it is difficult to create a spatial structure model for this macroregion, because the results may depend on the viewpoints.

Keywords: regional development, spatial structure, East-Central Europe

INTRODUCTION

In the 1990s and 2000s, a number of studies addressed the regional development inequalities of the East-Central Europe. These usually offered different territorial borders, different methods and the results are not only developed and undeveloped areas, centres, peripheries, etc., but also spatial structure models. In our opinion, there is sometimes a little confusion between these approaches, because no matter what is in the focus, a distinction should be made about what issues are covered: the spatial concentration of society and economy or the quality of life, incomes. In practice different types of data is related to the different approaches: the statistical indicators of social and economic concentrations are, for example, population and GDP, the latter – related to population – is many times used as the indicator of the quality of life (GDP per population). The combination of these indicators may result in different types of regions; in our study, we use this method. What is also important: is there a central area in this macroregion in the 2010s?

Our paper is organized as follows. First, the theoretical foundation about the notion of spatial structure is summarized, mainly based on our earlier studies about the theme. Second, we describe the macroregion's position in the spatial structure of Europe, and finally, based on the literature synthesis and our own calculations (based on Eurostat regional data), we analyze and characterize the macroregion's socioeconomic performance. Last section concludes.

THE SPATIAL STRUCTURE

The spatial structure means, firstly, a generalized model of a geographic phenomenon (Elissalde B., Saint-Julien T., 2004), and, secondly, a generalized illustration of a unique geographic area (continent, country, region, settlement, etc.). In this study, our interpretation is the second one. In terms of regional researches, the notion of spatial structure is used frequently and documents mention

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many phenomena that have spatial structure (population, agriculture, industry, etc.). In this paper, we focus on the complex, comprehensive social-economic spatial structure.

There are different opinions about the actual meaning of this type of spatial structure (e.g. Benedek J., 2000; Faragó L., 2004; Nemes Nagy J., 2009; Rechnitzer J., 2012). We can distinguish three groups based on the interpretation of the phenomenon (Szabó P., 2008a). The spatial structure can mean components only, positions of components, or components and their positions. In our theoretical interpretation, the second one is adequate because it reflects to the main difference between space (components and their positions) and spatial structure (different positions of components), but in this paper our interpretation is the third one, because it is the most practical. Moreover, in many research papers and regional policy documents related to our topic this viewpoint is accepted.

There is another main statement connected to the issue (Szabó P., 2008a), namely: in the territorial research works, there are two ways to describe the classical spatial structure. In the first case, the spatial structure refers to the elements of social-economic and geographical environment; it is a geographical opinion (presence, territorial concentration) in our conception and it is often related to the core-periphery relation (focusing on the nodes) and the physical connections between them (axes, corridors). In the second case, spatial structure is refers mostly to the qualitative or sometimes quantitative differences between regions and often focuses on the more developed and less developed areas (zones). These two approaches are not separated, they sometimes appear together in territorial researches; in our study, we use this method because the different aspects of regional inequalities are in focus.

Finally, it can be established that the visualizations of spatial structure in different researches and regional policy papers are much diversified (Dühr S., 2004; Szabó P., 2010), but the components are usually the same: nodes, corridors (or axes) and zones. In this paper, the nodes and zones of the spatial structure of East-Central Europe are analyzed.

THE POSITION OF EAST-CENTRAL EUROPE IN THE SPATIAL STRUCTURE OF EUROPE

Before analyzing the spatial structure of East-Central Europe, the borders of the macroregion need to be identified. The questions about how to divide Europe within the field of geography and history started to rise only in the second half of the 19th century, but these science-based divisions usually were implicitly political and ideological and had impact on the spatial processes of the society (Probáld, 2007). As Mező M. (2001, p. 83) puts it: "Usually there's no doubt about the borders of Northern-, Western-, and Southern-Europe in scientist circles, but the notion of Central-Europe is rather problematic to define for the scientists". As the many approaches show, to identify the exact borders of our research area is not simple, as it never was. The definition of several macroregions could be not only in geographical, but also in political, historical, or ethnical sense as well. As Janos (2000, p. 4) emphasized in his work: "[…] in speaking about East-Central Europe we are dealing with a geographical entity without precise physical or political boundaries […]". In our current work we include Poland, Czech Republic, Hungary, Slovakia (the Visegrád Group), and Slovenia, Croatia, Romania, and Austria to our research and analysis. The area of this macroregion is about 930 thousand km^2 (21.5% of the EU's area) and 100 million people live here (20% of the EU's population).

There are different approaches about the spatial structure of Europe (Szabó P., 2008b, 2009). Some experts emphasize the classic centres (and new centres) and the peripheries, and the relation between them. The main centre is the backbone of Europe (from Southern England to Northern Italy), known as the "Blue Banana", an idea coming from R. Brunet (1989), and there is another new form for the centre: the "Pentagon" (EC, 1999). Other experts mainly focus on the nodes (i.e. the large cities), supposing that Europe is a polycentric continent; the best-known model to this idea is the "Bunch of Grapes" created by K. R. Kunzman (1992). Others stand for the system of nodes/zones and corridors, and other experts have established that our continent's spatial structure has to be viewed from a complex aspect (there are nodes, corridors, developed and undeveloped zones etc.).

And hence our first important research question attached to this: what is the position of our macroregion in the spatial structure of Europe in the light of the different models? It is generally

accepted that East Central Europe is outside the core area ("Blue Banana"), it is a semi-periphery in the context of core–periphery relations and not reached by large, old and new social-economic zones, except for some figures of spatial structure, e.g. the "Red Octopus" by Van der Meer (1998). There are spatial development directions of arrows that extend into this macroregion. In European context, the level of development is average, but low when comparing it to the EU. We find economic-social nodes in this macroregion, but these are only "gamma-cities" (the most important centre is Wien as a "beta-city", then Warsaw, Prague, Budapest, Bratislava, and Bucharest are the next ones) and there are no polycentric urban regions compared to Western Europe (it is only the urban region of Katowice and the Wien–Bratislava city pair, like geographical groups of cities, that could be mentioned) (ESPON 1.1.1., 2011). The transport corridors of the area are parts of the TEN-T network, but in European context, they have a semi-peripheral position with mid-volume traffic flows, the main important corridors are only around the capitals and in the western part of Austria (it reflects, for example, the volume of the main roads, according to www.kti.hu). In East-Central Europe, long economic development corridors are missing compared to Western Europe.

THE CHANGING SPATIAL STRUCTURE

In the 1990s and 2000s, a number of studies (researches and regional policy documents) addressed the territorial characteristics of the East-Central Europe. These usually offered different territorial borders (which countries and regions are the parts of this macroregion), different methods, but mostly worked with the same Eurostat data. Some of them contain models of spatial structure of East-Central Europe (developed and undeveloped areas, centres, peripheries, etc.), one of them being the famous "East-Central European Boomerang" as the new centre of this macroregion, created by Grzegorz Gorzelak in 1996.

Our analysis is based on regional (NUTS 3) Eurostat data. We must mention that there are not big differences between the areas of the regions (NUTS 3) (the relative standard deviation is about 50%), so there are minor differences between the maps of population and GDP, and that of population density and GDP density. The main difference is between the maps of the population density/GDP density and GDP per capita: in our study, we deal with these latter relations.

Firstly, we focus on the territorial concentrations in the spatial structure: the social and economic nodes. There is no doubt that in our days, the main nodes are the cities in the world. These are collection points and a large part of the population and economy is concentrated in them. They are also present in Europe and in East-Central Europe. In this macroregion, capital cities have more important roles due to the history of the countries (these were highly centralized) and they function as the area's "gate cities". Although the population of the capital cities have not changed, the population of their agglomeration is slowly increasing. New economic sectors are concentrated in the cities, so the GDP share of the capitals according to their country's total production has also become higher (Figure 1). Even so, some differences exist between them: in the polycentric Poland, the weight of capital is not large (<15%); in the Czech Republic, Slovakia, Romania, and Austria, where the capital city has some economic counterweights/anti-poles, the share of capital is about 25%, while in Hungary, Slovenia, and Croatia the share is very large (about 35%). Furthermore, in the past years the shares have increased in every case.

If we look at other cities in this macroregion, we can establish that there are prosperous cities and there are cities with worse performance. It is related to the extent of the concentration of society and economy and to the ratio between them. Many cities have a large population, but have low economic weight; others have a strong economic weight compared to their population. It is one of the main characteristics of the East-Central European nodes: the poor big cities reflect low GDP per capita and often high unemployment rates, too. Based on this, we can differentiate the big cities in this macroregion. The most important social-economic centres are the capital cities, in European context with high (Wien), medium (Warsaw, Prague, Budapest, and Bucharest) or low (Bratislava, Zagreb, Ljubljana) concentration of social and economic performance. Following them, there are large cities with different weights of the population and the GDP. There are socio-economic nodes (Łódź, Wroclaw, Poznan, Krakow, Brno, Ostrava, Kosice, etc.), economic nodes (Graz, Linz, Salzburg,

Innsbruck, etc.), and social nodes (Szczecin, Bydgoszcz, Lublin, Craiova, Constanţa, Timişoara, Braşov, etc.). This categorization could be further refined, but this basic structure is drawing attention also to the different types of cities in this macroregion.

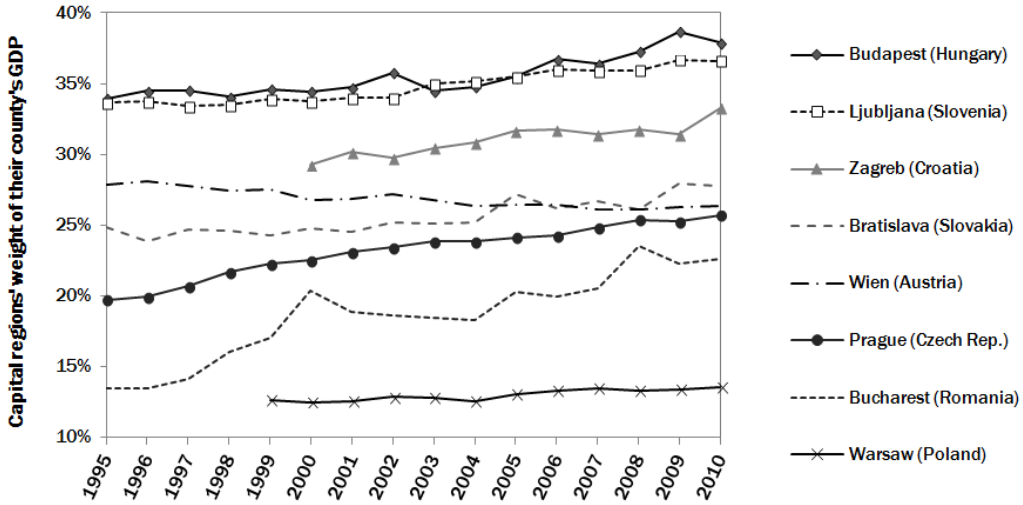

Figure 1. *The increasing weight of capital cities in the countries' GDP*
Source: Eurostat

The spatial concentration of the society and the economic activity is moderate or even low in rural areas and much higher in the regions with some important economic, cultural, or infrastructural specialization (e.g. industrial areas, transport nodes, financial centres, etc.). To identify these densely populated spaces, we calculated the population density indicator of the NUTS 3 regions. It has to be emphasized that in East-Central Europe there are huge differences between certain areas according to their population density. There is no doubt about the fact that the regions containing the most important cities are the most populous. Just to mention the highest: the city of Bucharest has a population about 2 million people, but its area is only 238 square kilometres, therefore it has a population density of 8,173 inh. per km^2, that is more than 70 times higher than the EU average.

The least densely populated regions can be found especially in the mountain areas of Austria (due to the Alps) and that of Croatia (e.g. Lika-Senj County, which has the lowest population density across the regions); areas that had been previously inhabited by Serbs and were almost emptied afterwards (regions near the Bosnian border). Bigger, homogenous and rarely inhabited areas are only located in the northwestern seaside parts of Poland and near the Polish-Belarus border. Major parts of Romania and Austria, the southern regions of the Czech Republic and northern areas of Poland also have low population density: they cannot exceed the 75% limit according to the value of EU27 regional average. More important in our viewpoint – and for the elements of spatial structure – are the agglomerations around the main cities, i.e. their neighbouring regions, which are more than twice as densely populated as the EU average (Bucharest–Ilfov, Budapest–Pest County, Ljubljana–Central Slovenia, etc.). Silesia has the largest territorial extent: the Upper-Silesian agglomeration is one of the highest polycentric megalopolises in Central-Europe with almost 2.5 million inhabitants and some notable administrative, industrial and cultural centres located on its territory (Katowice, Bytom, Zabrze, Gliwice). As mentioned before, the highest values can be found in the capital cities and in the main city-regions – the latter due to their equalized settlement-system mostly in Poland.

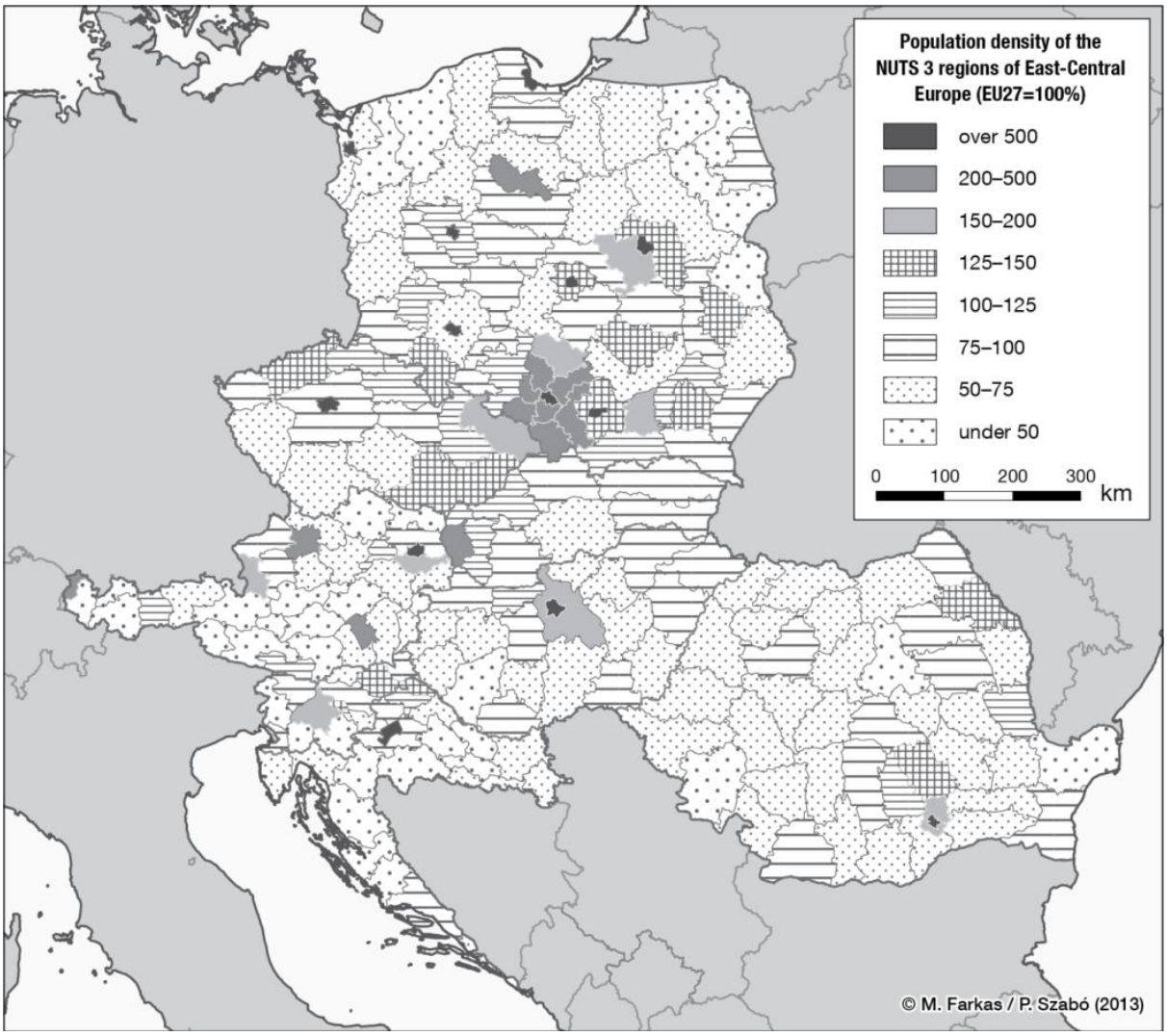

Figure 2. *Regional differences of the population density in East-Central Europe (2010)*
Source: Eurostat

The most important areas of economic activity nearly have the same regional differences (see Figure 3) that we saw while looking at the socio-spatial concentrations (i.e. the most populated areas) of East-Central Europe. The indicator we used here (the "GDP-density") is a little unusual in development analyses: it reflects the core areas of economic production, so it is more attached to *geographical* space than the often-cited GDP per capita. When creating the thematic map for this indicator, we made seven categories: the "absolute winner" is the Wien region, with a value more than 180 million € per km^2, which is 50 percent higher than the next-ranked Bucharest, and two times higher than the 3rd placed Warsaw. The "Top 10" includes two more capitals (Prague and Budapest) and another five Polish city-regions (Poznan, Krakow, Wroclaw, Łódź, and Katowice). So these core areas – besides their social significance – have the highest economic performance in the East-Central Europe, as well as the formerly cited Silesian region and many of the Austrian urban areas. The lowest values characterize the major part of Poland, the alpine regions of Austria, the eastern and southwestern areas of Hungary, and almost the whole country of Croatia and Romania. Most of the regions of the Czech Republic (especially divided by a northwest–southeast line) and those around the main cities of Poland, as well as West Slovakia and the areas outside the mountains in Austria have average economic productivity.

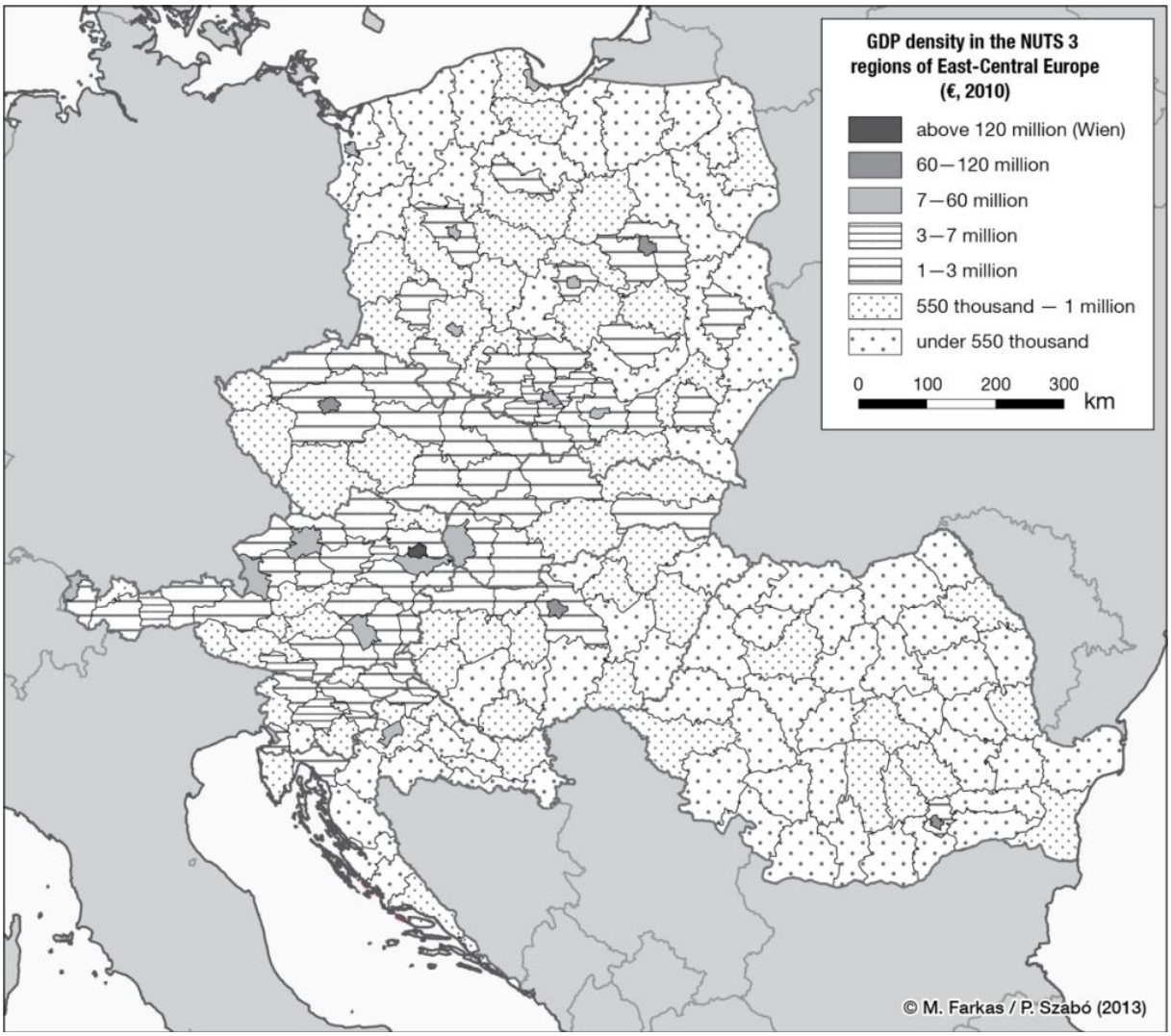

Figure 3. *Regional differences of GDP density in East-Central Europe (2010)*
Source: Eurostat

We could emphasize that the social and economic centres and core areas are highly separated from each other, mostly located in and around the bigger cities, only the Silesian conurbation can be identified as a more or less homogenous region.

Finally, the developed and underdeveloped regions are in focus, based on the indicator of GDP per capita. This indicator is the best known and is the generally used measure of development level in regional analyses. Here we have to note that it has received more and more criticism from different sides of science because it fails to capture the well-being of the nations and is an inappropriate indicator of development (Szabó P., Farkas, 2012). This is why, from the beginning of the 1960's, there were several attempts to replace it with another, better at times, complex indicator. Notwithstanding, in our viewpoint it is suitable to measure the regional differences and to describe the spatial structure of East-Central Europe and is available for all NUTS 3 regions in our research area.

In recent years, and especially after 2004 and onwards, there has been a growing literature about the regional differences of the macroregion, many of them with the aim to categorize certain regions and to identify the most or less developed zones of the area (Tagai G., 2004, Horváth Gy., 2009; Kuttor D., 2009; Artelaris P., 2010, Lengyel I., 2012). In their analyses, different methods were used from the potential-model across factor and cluster analysis to principal component method, but in

each case, the results were the same referring to an east–west divide and an urban–rural dichotomy in East-Central Europe[3]. For example, according to these attempts, the northeastern regions of Poland (the Warmian-Masurian and the Podlaskie Voivodeship) were always members of the least developed regions with Austrian *Bundesländer* on the other side.

The aim of this subchapter is to compare the economic development performance of NUTS 3 regions and describe its main changes between 2005 and 2010. The years were chosen for two reasons: the former represents the situation soon after the EU accession; the latter is the last year we had available data. Our main object is to open up the dividing lines of development, to identify coherent developed *zones* and the changes of inequalities.

As a response to the latter question, different methods and indicators were used and calculated. In economic and regional science literature, the *weighted relative standard deviation* (henceforth: WRSD) is an often used formula of inequalities. Our results show that disparities decreased during this five-year period (the value of WRSD was 60.3% in 2005 and 56.2% in 2010) referring to the convergence across regions. Another approach to the changes of inequalities is testing the *ß-convergence*, which supposes that during a given period the less developed regions grow faster than the more developed ones, so disparities start to reduce (for the pioneer work see Barro and Sala-i-Martin, 1992). This process can easily be tested with a simple linear regression, where the dependent variable is the growth rate of the GDP in a given period ($\Delta \ln y_i$, here 2005–2010) and the independent is the value of GDP in the starting point ($\ln y_{i0}$, here 2005). So the equation is:

$$\Delta \ln y_i = \alpha + \beta \ln y_{i0} + \varepsilon_t$$

where α and β are the unknown parameters, ε_t is the impact of causal coefficient, whose assumed value is zero. Using SPSS 17.0 for the calculations, our results confirm the assumptions: the β of the regression has negative sign (which refers to the above-mentioned phenomena), with a value of −0.13, while the α parameter is 1.418. To sum it up, both of our calculations show the decreasing inequalities across the regions of East-Central Europe from 2005 to 2010. What follows is the investigation of how this convergence shaped the regional differences, that is to say, the spatial structure. The figure presenting the development situation of the regions in 2005 (on the left) clearly shows the formerly cited break lines of the macroregion. From the western part of East-Central Europe to the east, the levels of development are continuously lower, only the capital-regions could emerge from their hinterlands. As a simplified model and to define homogenous zones, Western Austria has the highest economic performance with nearly 50% higher GDP per capita values than the EU average, and then the rest of the country and some Slovenian regions constitute the similarly developed area: all of these exceed the continental average (the most regular region is that of Liezen in Austria, with a value of 100.3% collated with it). The next very similar zone contains almost the whole country of the Czech Republic, from West Slovakia and Northern Transdanubia in Hungary to the coastal side of Croatia, as a generalized "half-circle". In 2005, out of the analyzed 218 regions, 121 were members of the lowest developed areas, mostly from the eastern and southern parts of the macroregion, and only seven could reach the 150% limit.

[3] We add, that the research unit of these works was usually NUTS 2 and almost all of them had different notion about East-Central Europe. Some included, for example, Bulgaria, the ex-East-Germany or the Baltic States, while others only analyzed the regions of "Visegrád Group". This indicates the formerly-mentioned fact about the dissimilar ideas of the macroregion.

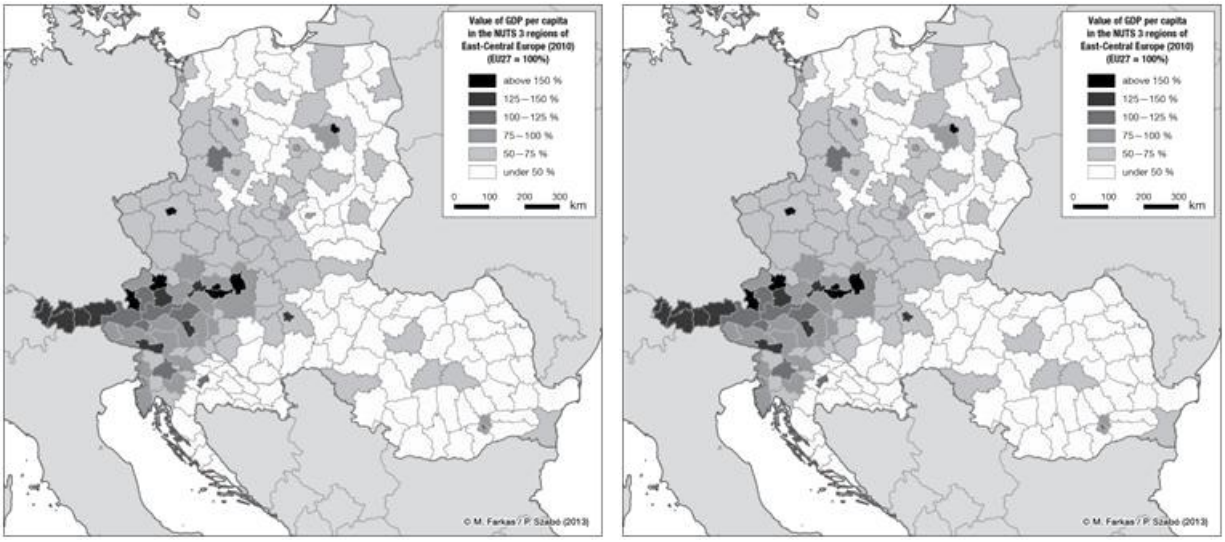

Figure 4. *Regional differences based on the GDP per capita (2005 and 2010)*

By 2010, the number of the least developed regions lessened to 98, while the category between 50 to 75%, and 75 to 100% widened - the former from 48 to 63, the latter from 24 to 29. On the contrary, the composition and the number of the most developed ones did not change remarkably - both in 2005 and 2010 seven regions were the top of the rank and only Graz fell back one category. Bratislava stepped forward, while Sankt Pölten entered the second category enlarging its number from 10 to 11. Therefore, the main reason of convergence is the pulling up of the undeveloped regions and not the falling back of the developed ones. The spatial image of regional differences did not change dramatically, especially not on the western areas. The borders of the regions included in the 50-75% group veered towards the east, containing some West Polish areas next to the German border and the regions of Žilina and Banská Bystrica in Slovakia. The situation of some other Polish and some Romanian regions also improved.

As a consequence of these changes, the development "image" of East-Central Europe remained the same in terms of its aspect as bigger, homogenous areas, but became more mosaic-like, with the appearance of some separated and improving regions, strengthening the model of the "bunch of grapes".

THE COMPLEX VIEWPOINT – TYPING THE REGIONS

Finally, we summarize the former results in order to categorize the regions based on the following connection of indicators: GDP/area = GDP/population × population/area (Table 1, Figure 5).

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Table 1. *Types of regions according to two statistical indicators*

High population density	Less developed urban areas (moderate GDP density)	More developed urban areas (high GDP density)
Low population density	Less developed rural areas (low GDP density)	More developed rural areas (moderate GDP density)
	Low GDP per capita	**High GDP per capita**

The first group (more developed urban regions) contains the capital city agglomerations, the main Austrian city regions (the centres are Linz, Salzburg, Graz, Klagenfurt, Innsbruck, Bregenz), some main Polish city regions (Wroclaw, Poznan, Krakow, Łódź, Katowice, Torun) and Polish

polycentric city regions (half part of the metropolis around Katowice, i.e. "the Polish Silesia" and region of Gdansk–Gdynia–Sopot, known as the "Tricity"), one Slovenian urban region (with Maribor at its centre), one Czech urban region (Brno) and one West-Slovakian region (the second suburban zone of Bratislava). In our analysis, the main cities (capital cities, big cities) and their suburban zones were merged and we calculated the average values in order to reduce the differences which derive from the characteristics of NUTS.

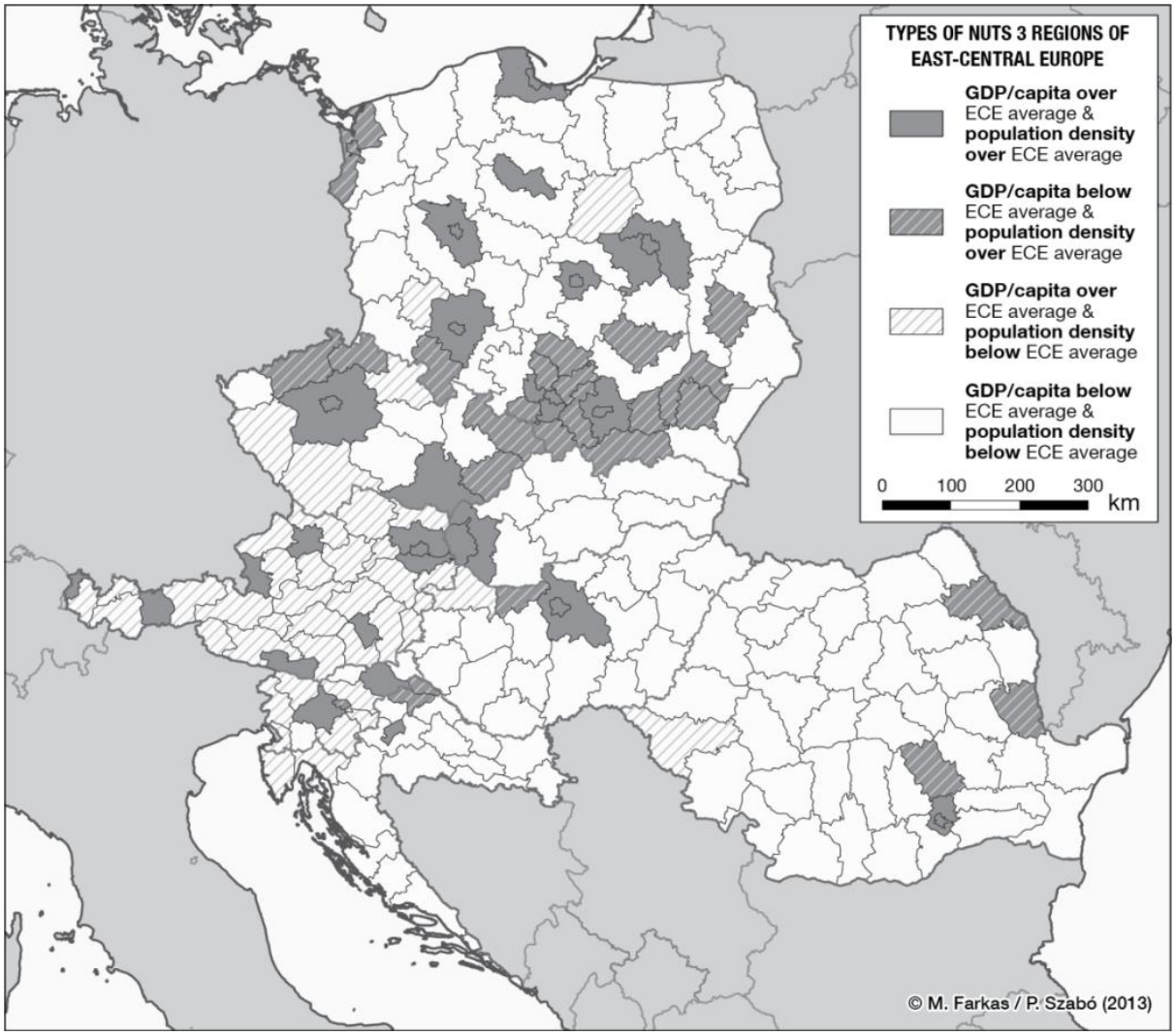

Figure 5. *Types of regions in East-Central Europe*

Members of the second group have high population density, but the GDP per capita is below the average of the macroregion, so the GDP density is moderate. The theory of the case in these regions is that the centre is a big city, but not a prosperous centre, and it cannot affect its narrow hinterland ("poor" urban regions); or the city is prosperous, but between the city and its surrounding area there is a wide gap. In this category, there are some Czech regions, whose GDP per capita values are close to the average, such as the city regions of Ústí nad Labem, Liberec, Zlin, and Moravian-Silesian region (with Ostrava). Polish regions are also in this category (with Szczecin, Lublin, Częstochowa, etc.) as well as the half part of the large polycentric region of Katowice. They are followed by three Romanian, two Croatian, one Hungarian and one Slovenian region. These regions

are not excessively sticking out of their country, only the population density is slightly higher than in other parts of the country and there are not prosperous cities.

The third group consists of the regions with moderate GDP density values, but the other two factors are in contrast: the population density is low and GDP per capita is high (more developed rural regions). Here are most of the Austrian and Slovenian regions and some Czech, Croatian, Polish, and one Hungarian and one Romanian region. In these rural areas, the quality of life is high based on the prosperous local economy, opposite to less developed urban regions, where society is concentrated, but economy is quite weak.

The fourth group (less developed rural regions) has the most elements. Huge parts of Hungary, Romania, Slovakia, and Croatia constitute this category. A lot of Polish, some Czech and Slovenian regions are here as well. It is the classic territorial problem of regional policy: the poor and sparsely populated rural areas (however, these regions are not homogenous at microregional level, Pénzes J., 2013).

We could emphasize that the boundaries between the groups are not marked. Regions of Innsbruck, Klagenfurt (A), Trnavský kraj (SK), Legnicko-Glogowski (PL) could be identified as more developed urban or rural regions; Bydgosko-Torunski (PL) or Moravskoslezský kraj (CZ) as less or more developed urban regions; Weinvirtel (A), Jihocecký kraj (CZ) as less or more developed rural regions, and many others – especially in Romania and Poland – could be either less developed urban or rural regions.

Looking at the countries, we can set out that Hungary, Romania, Slovak Republic and Croatia are similar from the standpoint, that there is a spatial duality in effect between the capital city agglomeration (more developed urban region) and the less developed rural regions. Austria is the other similar case: there are more developed urban and rural regions. On the contrary, Poland, the Czech Republic and Slovenia are more complex in terms of types of regions. This also suggests that the national regional policies have partly different challenges in different countries in this macroregion.

CONCLUSION

In many territorial researches, there is an intention to define different types of regions and to establish territorial regularities, create models, etc. It is based on the fact that the geographical space is not constituted by a set of unique places occupying random locations (Elissalde B., Saint-Julien T., 2004), therefore, spatial structures exist. In this case – when analyzing the regions of East-Central Europe based on their comprehensive socio-economic data and describing the most important characteristics of the spatial structure of this macroregion – there is a possibility for it also, because of the common history and similar territorial, social and economic processes. Some results reflect to this, while, at the same time, other results show that it is difficult to generalize and the East-Central Europe is not a homogenous geographical entity: the countries have special territorial characteristics and there are more special regions.

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