TERRITORIAL INEQUALITIES IN CENTRAL EUROPE - SPATIAL ANALYSIS OF THE VISEGRAD COUNTRIES

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ABSTRACT - I wish to contribute to the spatial analysis of Europe focusing on the Visegrad Four countries. This paper deals with the economic development of NUTS 2 regions of the named Central European states during the interval 1995-2005. At first, I have given a brief overview of the theories regarding the relationship between the development and territorial inequalities. Thereafter, I have investigated the changes of regional disparities by countries and in time. For a better understanding of the different regional performances, I have grouped the different territories based on the population density and on the economic division. I aimed at proving the existence of the "trade off" phenomenon concerning the regional development; and the changing of the "west-east incline". Finally, I have drawn a conclusion from the outcomes of the analysis.

Keywords: territorial inequalities; regional development; Visegrad countries; regional types

INTRODUCTION

The V4 countries form a unique cluster within the European Union (EU), which show many similarities from historical, political, economic, and social respects. These countries, however, are not only members of the EU, but also parts of a methodological group of World Economy, which is called "Transitional Economies". The Transitional Economies can be divided into subgroups as follows (Svejnar, 2001):

- o Central and Eastern European (CEE) states: V4, members of the former Yugoslavia states, Albania, Bulgaria and Romania;
- o Commonwealth of Independent States (partly the former Soviet Union's states);
- o Baltic States: Estonia, Latvia, Lithuania.

After the serious economic, political collapse of the late eighties, early nineties, the Central and Eastern European countries started to converge to Western Europe from many viewpoints since 1994-96. The former members of the so-called Eastern Block successfully approached their standards of living (i.e. Gross Domestic Products per capita values <GDP pc>) to the developed European standards.
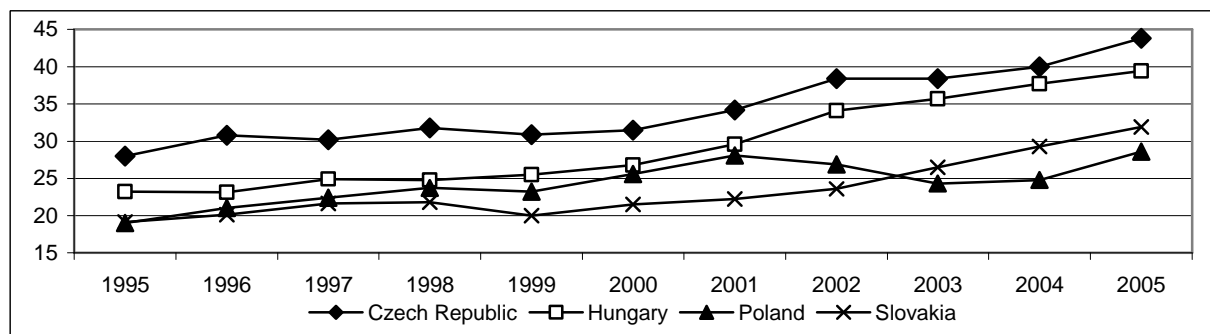

Figure 1. *GDP pc values of selected countries in percentage of the EU average.*
(Source: Own editing based on data by EUROSTAT)

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This positive process was not typical of these countries long ago, as they lagged behind during the 20th Century. The gap between the Western and the Eastern parts of the continent have increased continuously, although with changing intensity, since the beginning of 1900.

Table 1. *Growing gap comparison of GDP pc.*

	GDP per capita (1990 Geary-Khamis dollar)		
	Western Europe	Eastern Europe	Ratio
1950	4579	2111	46.10%
1960	6896	3070	44.52%
1970	10195	4315	42.32%
1980	13197	5786	43.84%
1990	15966	5450	34.14%
1995	16860	4998	29.64%

(Source: own editing based on data by Angus Maddison)

Obviously, it can be stated that the CEE states' position has been significantly improved in the recent years. However what were the tendencies on regional, mezzo level like? Have the disparities increased; or decreased? Has every region equally benefited from this growth? Which regions have performed better and worse?

THEORETICAL BACKGROUND

The analysis of spatial distribution of production factors, economic activities and income has long run traditions compared to other sub-disciplines of the economics.

First, Von Thünen, Weber, Christaller, Lösch, Isard and Henderson dealt with the location of production. The "New Economic Geography" from Krugman can be considered as the starting point of a new period describing the factors and their effects on the regional dispersion of economies (Krugman, 2003).

During the decades, contradictory opinions, approaches have been developed regarding the relation between regional development and disparities. On the one hand, according Solow and neoclassic economists, the regional differences disappear with the growth because of the diminishing returns to capital. On the other hand, by Myrdal and the post-Keynesian theory, growth is a spatially cumulative process, which results increasing inequalities (Bradley, Petrakos, Traistaru, 2005).
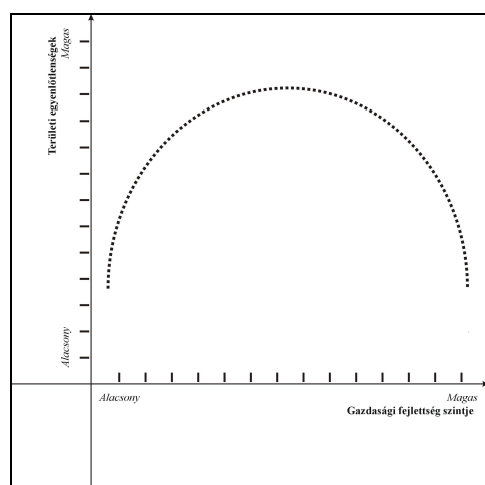
The interdependence between growth and disparities has been analyzed in its complexity by others. Williamson has stated that the degree of spatial inequalities depends on the level of development of the selected territory. At the two extreme points, i.e. low and high level of development, the regional differences show less extent, nevertheless during the transition period tend to increase. Therefore it can be characterized as a reversed U.

Figure 2. *Relation between level of economic development (X) and territorial disparities (Y) by Williamson.*
(Source: Own editing)

The representatives of the so called "trade off" phenomenon say that convergence on national level may result divergence, i.e. growing disparities on sub-national, regional level (Novák-Papdi, 2007).

ANALYSIS OF REGIONAL INEQUALITIES

First of all, the geographical limits of the examination have to be defined in order to determine the units of number. As it was mentioned before, the analysis comprises the V4 states. According to the EU Nomenclature of Territorial Units for Statistics (NUTS), there are 35 territorial units on the NUTS 2 level. The distribution of the regions is shown in the following figure.
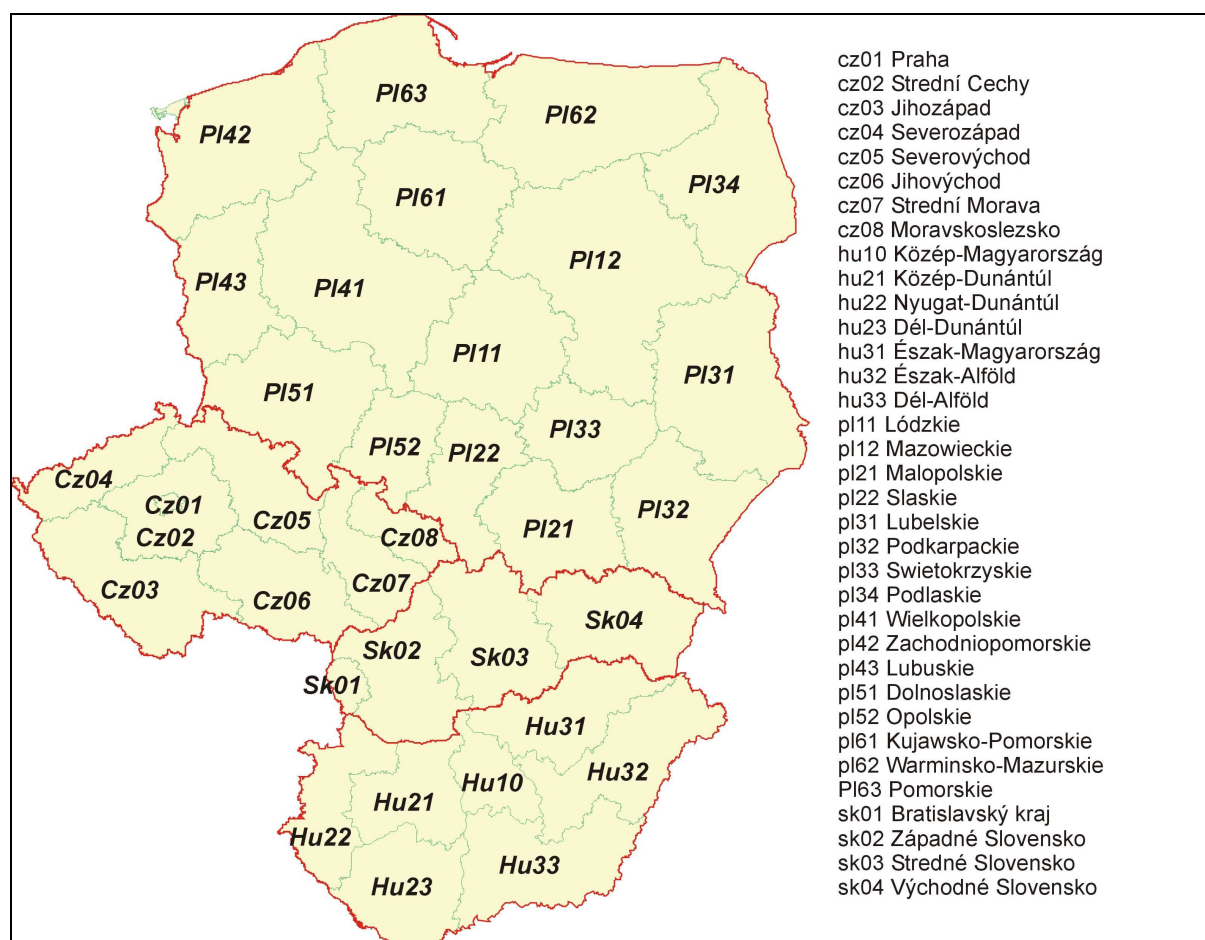

cz01 Praha
cz02 Strední Cechy
cz03 Jihozápad
cz04 Severozápad
cz05 Severovýchod
cz06 Jihovýchod
cz07 Strední Morava
cz08 Moravskoslezsko
hu10 Közép-Magyarország
hu21 Közép-Dunántúl
hu22 Nyugat-Dunántúl
hu23 Dél-Dunántúl
hu31 Észak-Magyarország
hu32 Észak-Alföld
hu33 Dél-Alföld
pl11 Lódzkie
pl12 Mazowieckie
pl21 Malopolskie
pl22 Slaskie
pl31 Lubelskie
pl32 Podkarpackie
pl33 Swietokrzyskie
pl34 Podlaskie
pl41 Wielkopolskie
pl42 Zachodniopomorskie
pl43 Lubuskie
pl51 Dolnoslaskie
pl52 Opolskie
pl61 Kujawsko-Pomorskie
pl62 Warminsko-Mazurskie
Pl63 Pomorskie
sk01 Bratislavský kraj
sk02 Západné Slovensko
sk03 Stredné Slovensko
sk04 Východné Slovensko

Figure 3. *Location of V4 regions (NUTS 2).*
(Source: own editing based on NUTS database)

Evaluation of regional performances

After delimiting the regions involved in the research, I investigate the regional inequalities using the Gross Domestic Product (GDP) per capita indicator. In spite of the total GDP (at current market prices), which shows the economic weight or importance of the regions, the GDP per capita (GDP pc) figure (either at current market prices or in PPP) indicates the level of development concerning the selected units.

Generally, the regional disparities are among the highest in the CEE countries within the EU (Szörfi, 2007). Four of the five countries with the highest value are from the group of transition economies, like Slovakia, Czech Republic, Romania and Hungary (Belgium is the only one as old member state). Poland represents the exception since its lower value ranks the country in the middle of the line.
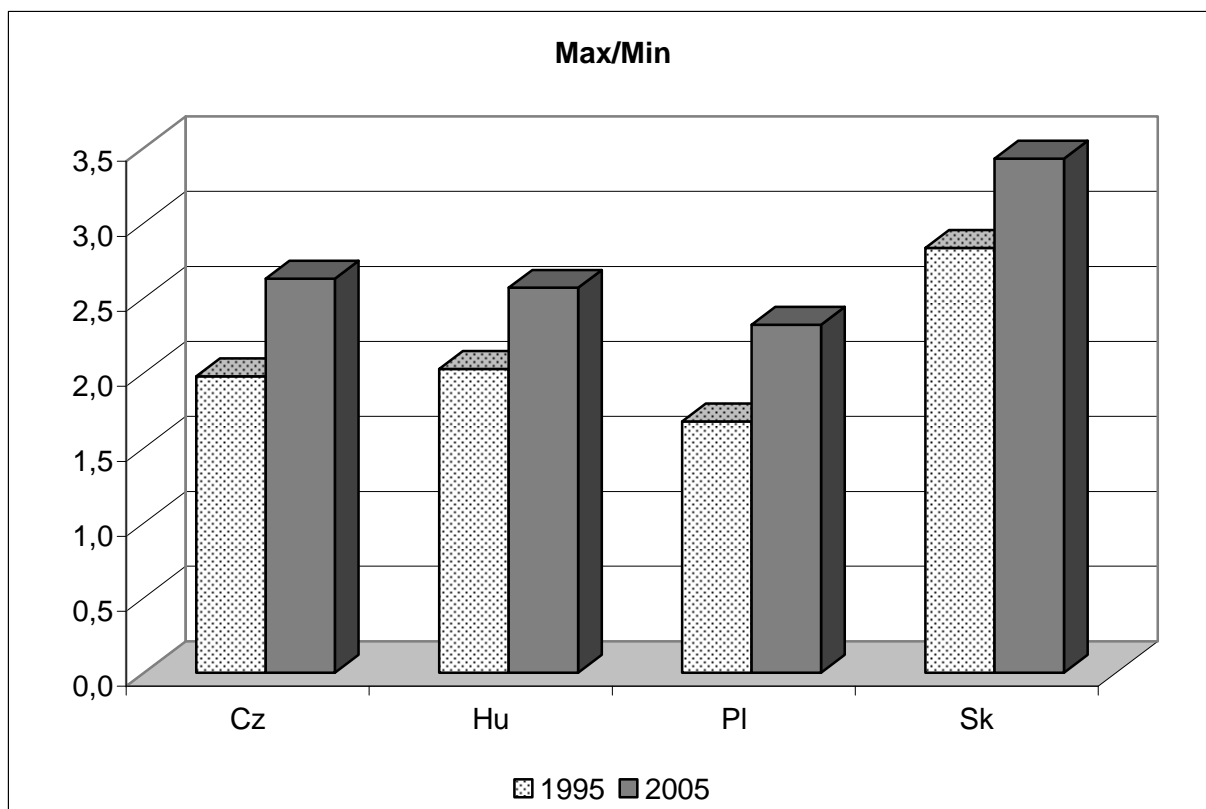
Figure 4. *Regional disparities in the V4 countries (ratio of GDP pc).*
(Source: own editing based on data by EUROSTAT)

The above figure shows not only the ratio of regions with the maximum and minimum GDP pc (MAX/MIN), but also the change in time by countries. The columns prove the previous statement, i.e. the difference is the highest in Slovakia and the lowest in Poland, the Czech Republic and Hungary have approximately the same position. As regards the temporal change, disparity increased most of all in Poland (followed by CZ and HU) and in Slovakia the least. If the capital (the most advanced) regions are extracted from the analysis, the differences decrease significantly; the values drop down to the half and the extent of change from 1995 to 2005 is much less as well.

Using the GDP pc figures of the regions, I have calculated some statistics with the assistance of the SPSS software (Table 2).

The Variance and the Standard Deviation figures show continuous growing trend, especially in the recent years of the analyzed period, when the V4 countries performed a higher economic growth. The Boxplot graph (Figure 5) is the visualized version of the values in the table.

During the interval, the gap among the best and the worst performing regions increased significantly. This fact can be explained with the following:
- o the previously selected 'capital regions' (with number 2-Praha, 11-Budapest, 36-Bratislava) developed much faster than the rest (the growth rates will be shown later);
- o the situation of the least developed regions remained unchanged during the period; additionally the mean hardly changed.

Table 2. *Descriptive statistics of the regions by year.*

		1995a00	1996a00	1997a00	1998a00	1999a00	2000a00	2001a00	2002a00	2003a00	2004a00	2005a00
N	Valid	35	35	35	35	35	35	35	35	35	35	35
	Missing	0	0	0	0	0	0	0	0	0	0	0
Mean		51.549	51.54857	52.76	53.44286	53.64	53.54571	53.40571	54.16571	55.20286	56.68857	58.00286
Std. Error of Mean		3.3938	3.393779	3.495089	3.492579	3.522826	3.56625	3.609895	3.921878	4.084462	4.246879	4.265203
Median		43.700	43.7	44.9	47	47.5	48.6	48.1	47.4	48.3	48.2	49.5
Mode		39.1(a)	39.1	41.5	35.6	36.7	42.8	36.4	36.2	64.2	34.6	45.3
Std. Deviation		20.0779	20.07787	20.67723	20.66237	20.84132	21.09822	21.35643	23.20214	24.164	25.12487	25.23328
Variance		403.121	403.1208	427.5478	426.9337	434.3607	445.1349	456.097	538.3394	583.8991	631.2593	636.7185
Range		92.8	92.8	94.6	94.9	98	101.6	103.3	112	114	119.7	119.7
Minimum		32.8	32.8	33.9	35.3	35.6	34.6	33.7	33.6	33.9	34.6	35.1
Maximum		125.6	125.6	128.5	130.2	133.6	136.2	137	145.6	147.9	154.3	154.8
Sum		1804.2	1804.2	1846.6	1870.5	1877.4	1874.1	1869.2	1895.8	1932.1	1984.1	2030.1

(Source: own calculation with SPSS)   A Multiple modes exist. The smallest value is shown.
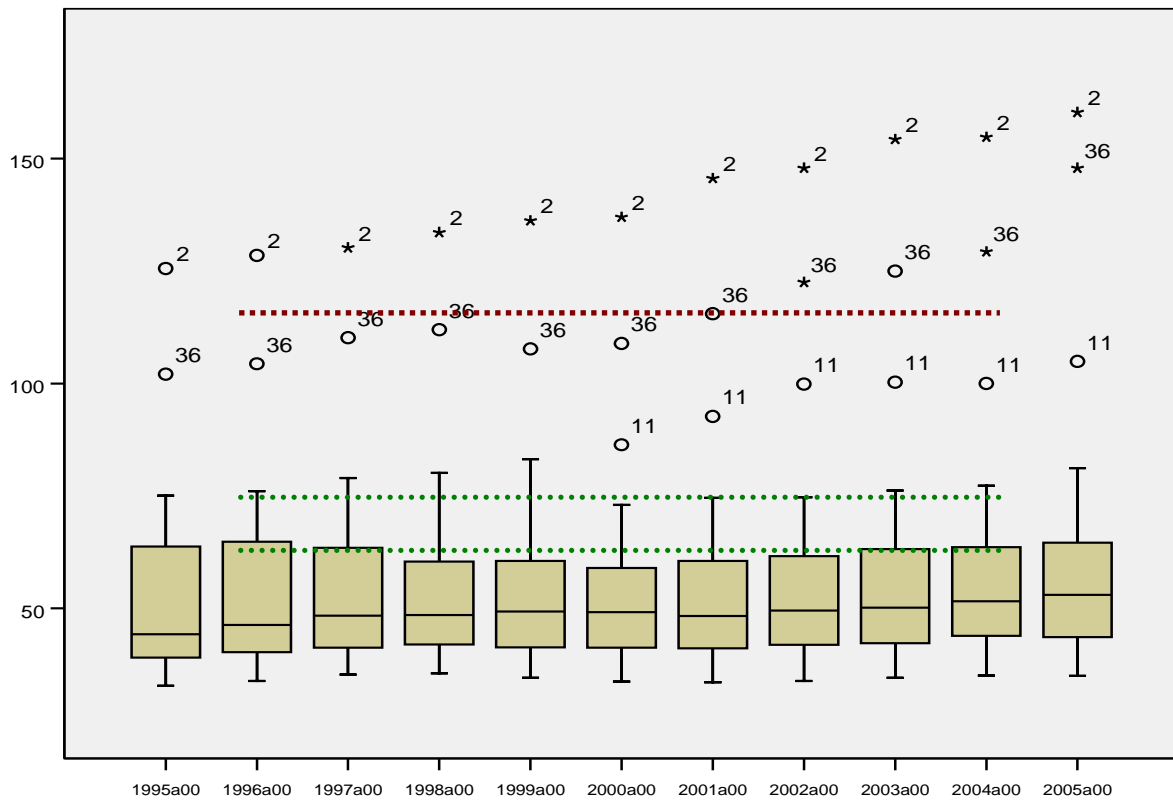
Figure 5. *Boxplot graph of the regions by GDP pc in % of the EU average.*
(Source: own editing based on data by EUROSTAT)

The meaningful polarization can be seen when we group the regions as well. Creating ten equal-size classes, between the maximum and minimum values, the distribution of the units is the following (Figures 6a and 6b). From 1995 to 2005, the bottom classes' number increased and the repartition of region became more disadvantageous, i.e. more regions got to a worse position. In contrast with this, just a few regions could make improvements.
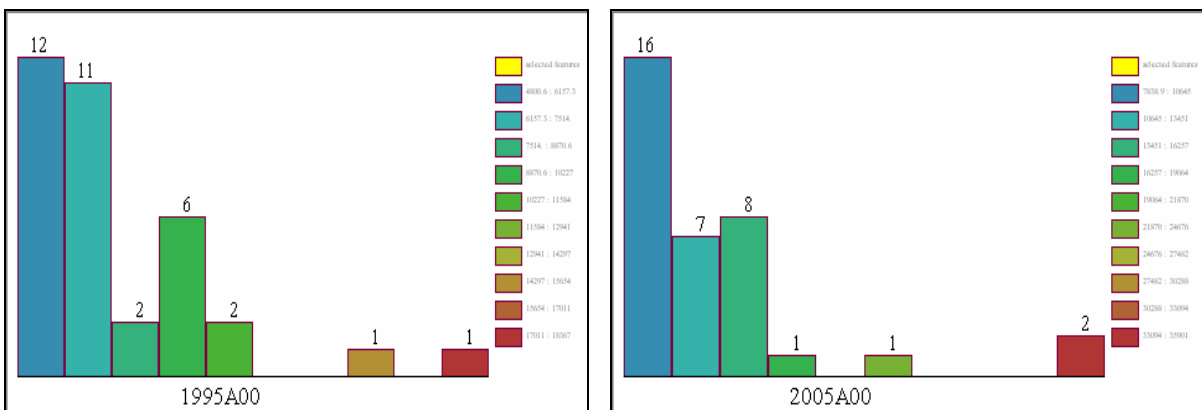
Figures 6 a, b. *Distribution of regions by GDP pc in % of the EU average.*
(Source: own editing based on data by EUROSTAT, with GEODA)

The different regional growth rates caused growing polarization. What are however the extent of the rates exactly? Where are the fastest and slowest regions located?

In this case, the GDP pc (in PPP) is analyzed; the basic year is 1995 and the change to 2005 is measured. The fastest regions could double their figures; the slowest just added one-third of their original values.

The capital regions are ahead, according the volume of growth. Mazowieckie (Warsaw's region) was the most rapid, followed by Bratislavský kraj (Bratislava's region) and Közép-Magyarország (Budapest's region). The five slowest regions are Czech without exception.

On the one hand, Slovakia shows the most balanced growth rates among regions; on the other hand, Czech Republic makes the most extreme. In parallel with this, significant territorial polarization went on in Hungary and Poland as well.

According to the growth rate, four groups of regions have been generated. The geographical distribution of the regions is shown on the following thematic map.
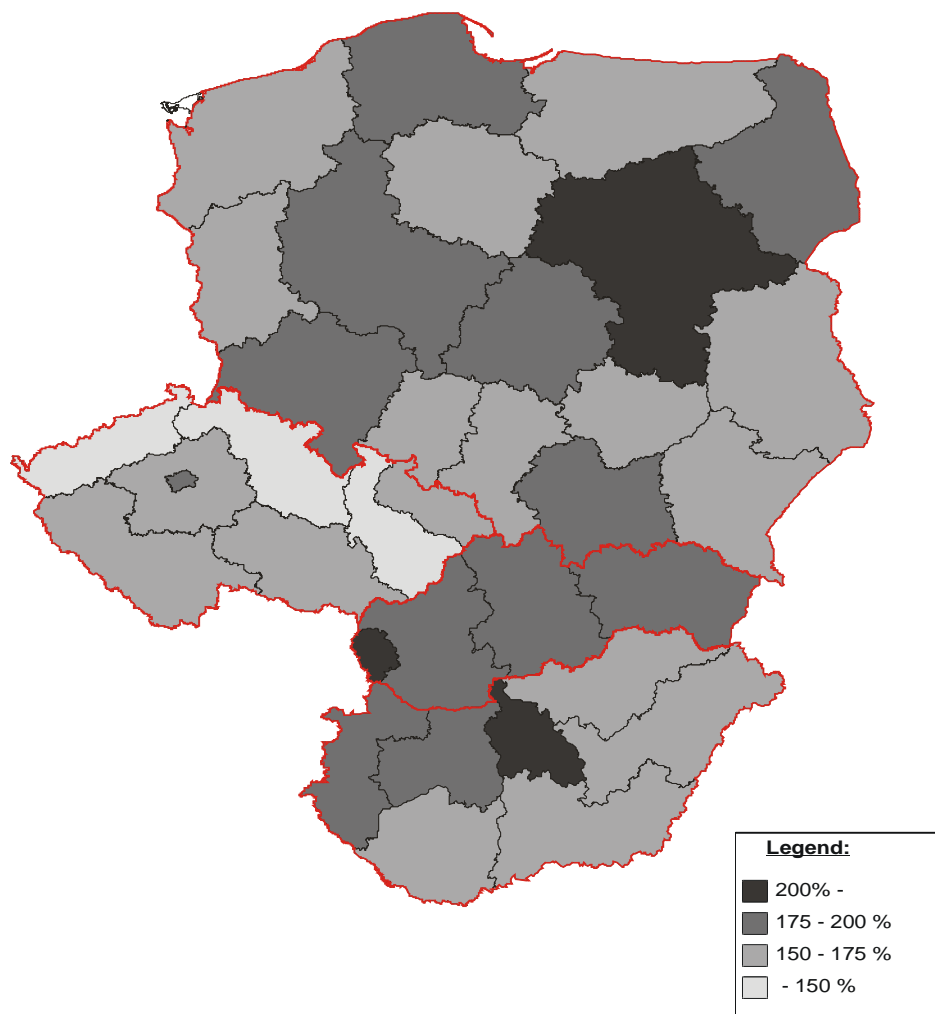

Figure 7. *Different growth dynamic: GDP pc growth, % (2005/1995).*
(Source: own editing based on data by EUROSTAT, with MAPINFO)

In order to understand the higher and the lower growth potentials, it is essential to group the regions and investigate the performance of each cluster. Two attributes of regions are used to carry out this work phase. They are as follows: the population density (urban vs. rural profile) and the economic profile (agriculture vs. industry vs. service oriented).

In the first case, the population density figures are measured and four categories are created:
o   *rural*: less than 90 inhabitants per square kilometre;
o   *intermediate 1*: between 90 and 120 inhabitants per square kilometre;
o   *intermediate 2*: between 120 and 150 inhabitants per square kilometre;
o   *urban*: more than 150 inhabitants per square kilometre.

In the second case, the distribution of economically active population by sectors is measured, resulting three categories:

o   *dominant primary sector*, if the rate (of economic active population) of agriculture is higher than 10 percent;
o   *dominant secondary sector*, if the rate (of economic active population) of industry is higher than 25 percent;
o   *dominant tertiary sector*, if the rate (of economic active population) of services is higher that 60 percent.

The location of the members of each group is shown on the following two thematic maps.

From the respect of the population density, the core regions and Moravia (CZ-PL) and Silesia (PL) are showing denser population distribution. On the opposite side, the rural areas with low concentration of population are located in Hungary and Poland.

As regards the sectorial division, the core regions are dominated by the tertiary sector. The rest regions of the Czech and Slovak Republic belong to the industrial group. Hungary and Poland are showing a more mixed picture possessing different types of regions. The agro-regions are located in these countries as well.
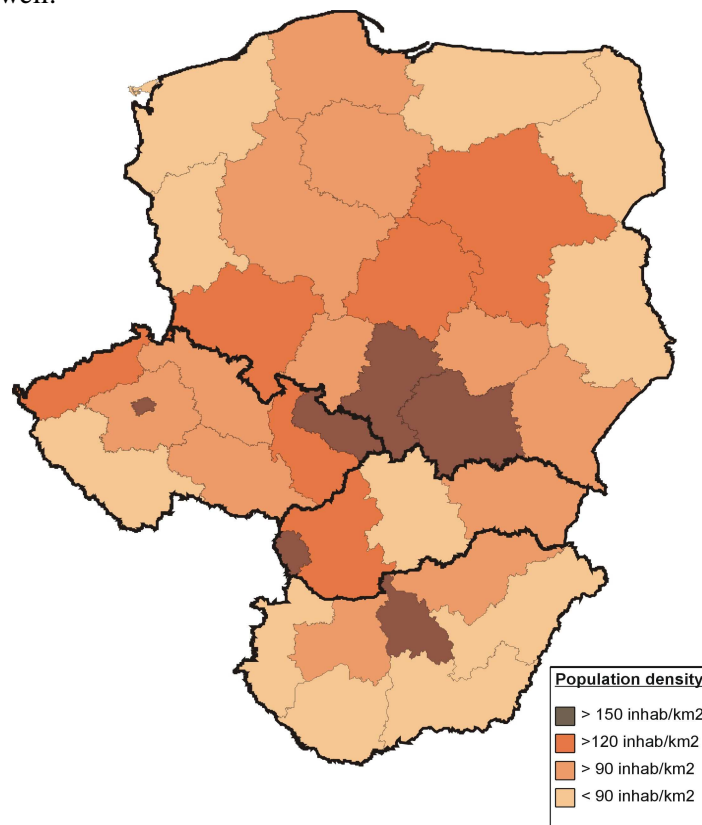

Figure 8. *Regional differences by population density.*
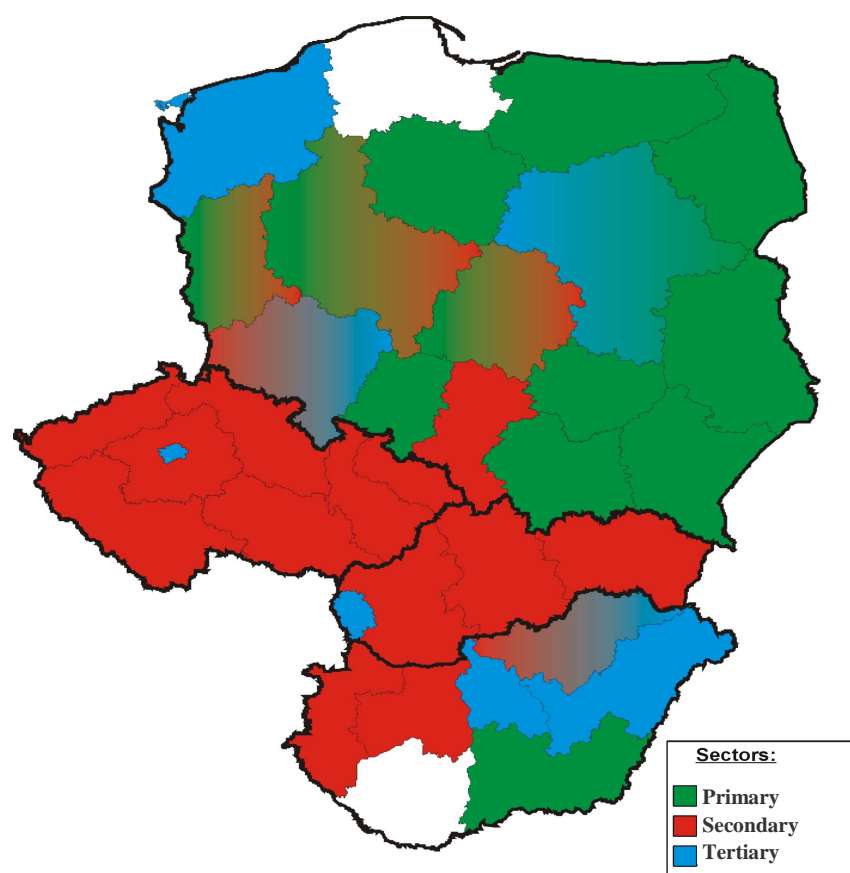(Source: own editing based on data by EUROSTAT, with MAPINFO)

Figure 9. *Regional differences by sectors.*
(Source: own editing based on data by EUROSTAT, with MAPINFO).

Now let us compare the performances of each group.

Based on the results which are displayed in Table 3, it can be stated that the regions with highly concentrated population developed faster than the sparsely populated ones during the interval 1995-2005. The urban areas performed about one and a half higher growth than the rural areas. The two intermediate groups achieved almost the same level of increase.

Taking into account the GDP pc capita figures in percent of EU average, the degree of convergence is demonstrated. Just the urban regions could converge significantly; almost reaching the EU average at the end of period. In spite of this, the intermediate and rural regions have shown less grade of convergence.

Table 3. *Regional differences by population density.*

	Annual percentage change of GDP, %	GDP per capita in % of EU average (PPS, 1995)	GDP per capita in % of EU average (PPS, 2005)
Pop density > 150 inhab/sqkm	4.25	75.92	96.23
Pop density > 150 inhab/sqkm	3.48	53.03	59.85
Pop density > 90 inhab/sqkm	3.57	46.45	51.28
Pop density < 90 inhab/sqkm	3.01	43.01	46.85

(Source: own editing based on data by EUROSTAT)

Analyzing the relation between the economic structure and the growth of the regions, significant differences are found as well. In this case, the regions driven by the tertiary sector lead before the areas which have major secondary and primary sectors. Consequently, the position compared to the EU average of the tertiary group has improved in largest degree. The exact figures of calculation are presented in the following table.

Table 4. *Regional differences by sectors.*

	Annual percentage change of GDP, %	**GDP per capita in % of EU average (PPS, 1995)**	**GDP per capita in % of EU average (PPS, 2005)**
Primary sector	3.17	39.41	45.35
Secondary sector	3.60	52.51	57.18
Tertiary sector	4.09	65.28	84.76

(Source: own editing based on data by EUROSTAT)

In the theoretical part of this paper, the "trade off" phenomenon has been described among others. By observing and measuring the growth rates, a question may be asked: if there is interaction between the change of growth rate and the disparities especially in the V4 countries. For proving the existence of "trade off", the changes in rates have to be visualized.
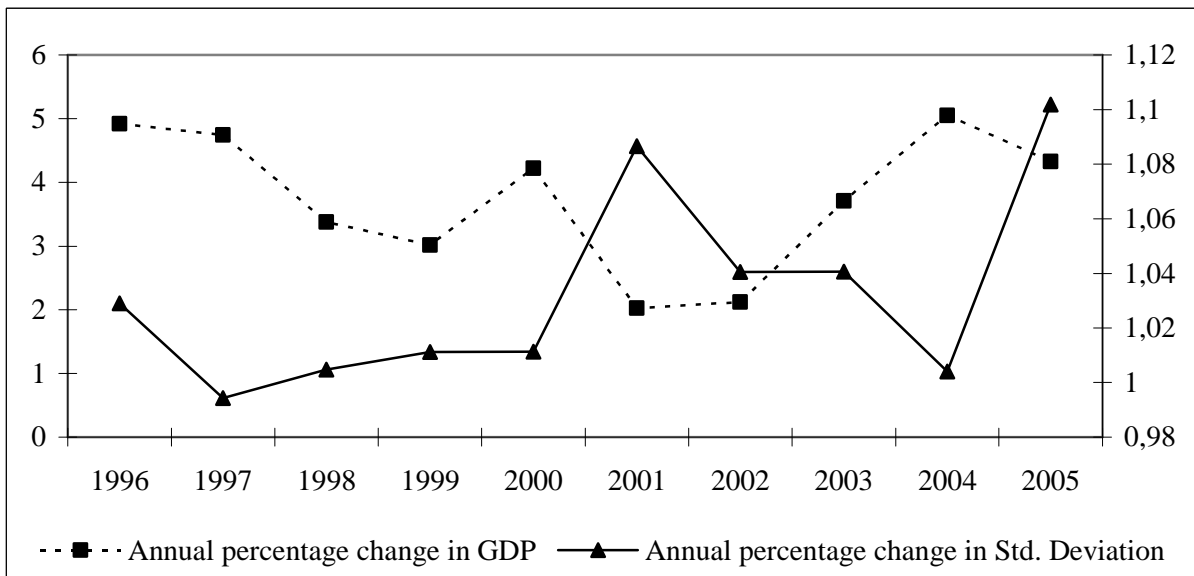

Figure 10. *Annual percentage change of GDP pc and Standard Deviation.*
(Source: own editing based on data by EUROSTAT)

In the past years, the two lines, although shifted in time, have described more or less similar paths. First, the change in GDP jumped (in 2000 and 2004), which was followed by growth in change of Std. Deviation. Consequently, the higher GDP growth results higher rate of change in disparities.

Finally, I intend to introduce the geographical aspect of the changes. It is a well known thesis that the further a region is located from the core area of Europe, the less advanced it is. Accordingly, the level of development continuously decreases from west to east, which describes a "west-east incline". How has the scale of this incline modified in the past years? The answer can be given if the GDP pc figures are put into the system of coordinates by geographical location (on axis X).
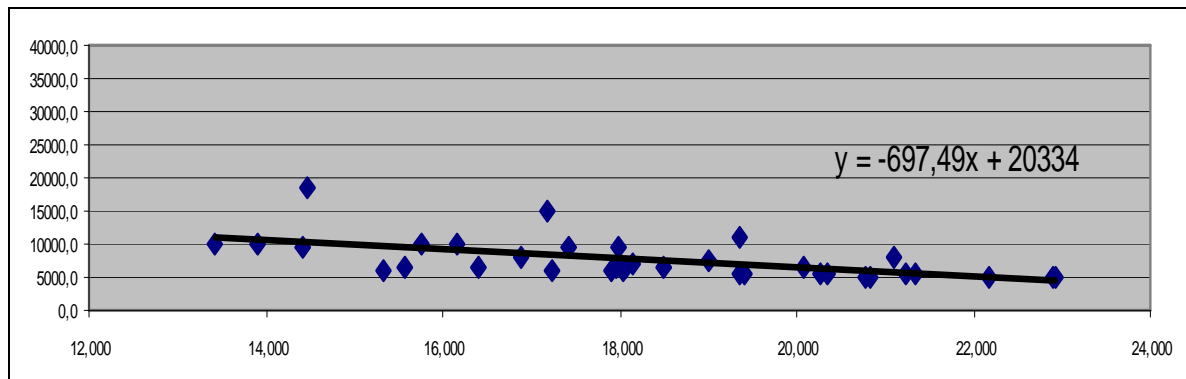
Figure 11 a. *Distribution of regions by geographical location in 1995.*
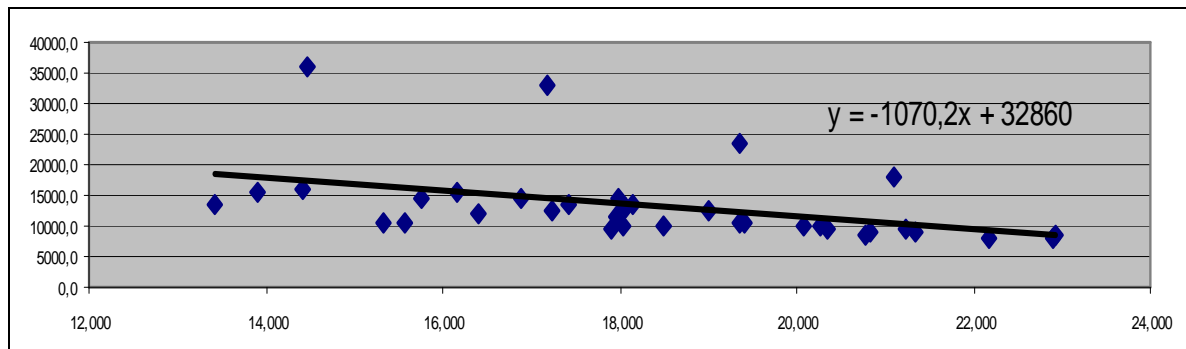(Source: own editing based on data by EUROSTAT)

Figure 11 b. *Distribution of regions by geographical location in 2005.*
(Source: own editing based on data by EUROSTAT)

The growing inequality is obvious; i.e. the western regions could converge better than the eastern ones. The equation of the function can prove the increasing differences as well.

CONCLUSION

In the chapter, I summarize the statements and lessons learnt from the results, outcomes of the analyses:

- o the V4 countries could converge to Western European (EU) average measured on national level;
- o at the same time, the territorial disparities on regional level increased dramatically;
- o the polarization in every country means that the capital region has significantly higher growth potential and a faster convergence, some reasons for this phenomenon:
- o these regions are centres for a politically, economical strongly centralized states;
- o many companies selected headquarters or location within this regions;
- o they have huge market and relatively high income per capita figures;
- o service sector plays outstanding role in their economies;
- o they have well qualified human resource;
- o there are a number of trade and logistics centres in the regions.
- o in contrast with the previous, there are regions which although increased their GDP, the GDP per capita values did not get closer the EU average;
- o in many cases, the national convergences were due only to the growing capital regions;

- o the urban areas and the regions with dominant tertiary sector showed higher growth rates and real convergence to the EU average; the rural and agro- or industrial regions performed weaker;
- o the „trade off" phenomenon can be observed in CEE countries, which states that increase in the GDP growth determined increase in the change of Std. Deviation;
- o the geographical location of the regions determines the chance for growth, i.e. the western regions grew faster during the period 1995-2005, than the eastern ones.

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