

Analysis of the territorial disparities in the Visegrad Four Countries
-Measurement and visualisation of territorial processes at regional level in Central Europe-

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The different theories of development and growth have long term traditions (North 1955, Friedmann 1966, Haggett 1983 and others). According to some researchers the growth and development results territorial disparities and inequalities (Myrdal 1957, Krugman 1991, Boudeville 1966, Illés 1983). By others (Rostow 1960, Friedmann 1966, Richardson 1980) the economic growth, the social development, the evaluation of the welfare state goes hand in hand with the territorial equation and the balancing of the spatial structure.

The Visegrad Four (V4) countries (Czech Republic, Hungary, Poland and Slovakia) form a unique cluster of the European Union, which show many similarities from political, economic and social respects. The countries could converge to the EU average measured at national level in the past years and do not show significant differences; at regional level however significant polarization could be observed.

We attempt in our essay to investigate, measure and visualize the regional effects of the social, economic processes and infrastructural changes during the time interval of 1995-2005 at NUTS 2 level. In addition to we intend to create a typology concerning the regions of the target area in order to make a deeper analysis of the individual clusters and the factors of their development.

For the analyses data derived from national and European Union statistical offices are used with the application of univariate and multivariate statistical methods. The results are going to be visualized on map with the help of GIS (Geographical Information System) software.

Generally it can be stated that the territorial disparities increased in the V4 countries during the mentioned period; since the capital and core areas showed dynamic growth in contradiction of the lagging behind, peripheries. This paper aims to reveal the reasons and factors of success and failures as well.

I. Theoretical approach

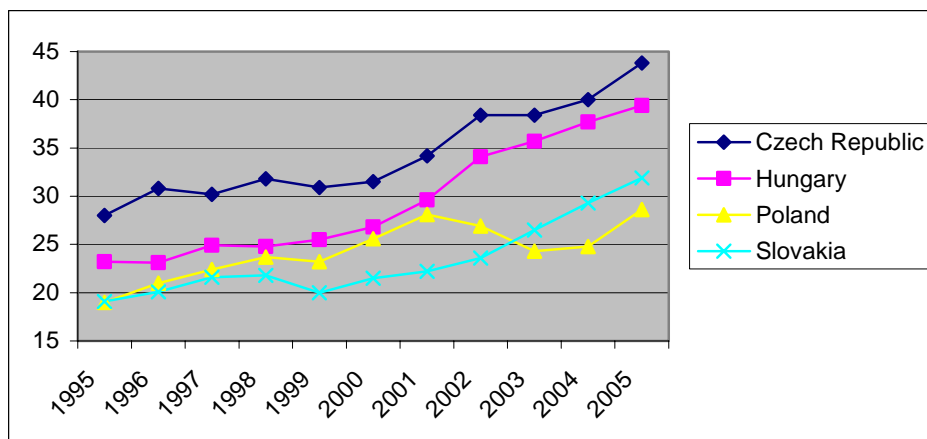
The investigation of territorial disparities and regional convergence-divergence are in the centre of professional interest nowadays within the European Union. There are many reasons for this stressed status:

- the integration has expanded in sections in the past decades (1990, 1995, 2004 and 2007) accordingly the socio-economic heterogeneity significantly rose within the EU, which drew the attention to the analysis of the efficiency of Common Regional Policy;
- the EU has to compete with faster and rapidly growing actors, countries on the global market; which called the Competitiveness and Innovation Framework Programme into being and put the examination of territorial competitiveness into focus;
- the Statistical Office of the European Communities (EUROSTAT) provides a lot of data concerning the European Economic Space which makes both cross-sectional and time series analyses possible;
- the above mentioned issues are generating a number of papers on regional growth and its effect on regional differences.

II. V4 countries

After the serious economic, political collapse of the late eighties, early nineties the Eastern and Central 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) to the developed European standards.

Figure 1: GDP per capita values of selected countries in percentage of the EU average



Source: own editing based on data by EUROStat.

This positive process has not been 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 increased although with changing intensity but continuously since the beginning of 1900.

Table 1: growing gap comparison of GDP per capita

	<i>GDP per capita (1990 G-K dollars)</i>		
	<i>Western Europe</i>	<i>Eastern Europe</i>	<i>Ratio</i>
1900	2893	1438	49,71%
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 Eastern Central European states' positions were significantly improved in the recent years. However what are the tendencies on regional, mezzo level like? Has every region equally benefit from this growth? Have the disparities increased; or just the opposite decreased?

The different theories of development and growth have long term traditions (North 1955, Friedmann 1966, Haggett 1983 and others). According to some researchers the growth and development results territorial disparities and inequalities (Myrdal 1957, Krugman 1991, Boudeville 1966, Illés 1983). By others (Rostow 1960, Friedmann 1966, Richardson 1980) the economic growth, the social development, the evaluation of the welfare state goes hand in hand with the territorial equation and the balancing of the spatial structure.

In this paper the authors attempt to investigate, measure and visualize the changing regional disparities in the Visegrad Group. The Visegrad Group is representing a multi-purpose (economic, political, cultural, etc.) cooperation, re-established in 1991, with the following members: Czech Republic, Hungary, Poland and Slovakia. The basically used indicator was the Gross Domestic Product; recorded by the Eurostat. Besides some other data have been applied regarding labour market conditions. The analysed period is a decade, from 1995 to 2005.

II. Analysis of the regions

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 European Union's (EU) NUTS there are 35 territorial units on the second level. The distribution of the regions by countries is shown in the following table and in Annex 1.

Table 2: V4 regions (NUTS 2) by countries

cz Czech Republic	pl21 Malopolskie
cz01 Praha	pl22 Slaskie
cz02 Strední Cechy	pl31 Lubelskie
cz03 Jihozápad	pl32 Podkarpackie
cz04 Severozápad	pl33 Swietokrzyskie
cz05 Severovýchod	pl34 Podlaskie
cz06 Jihovýchod	pl41 Wielkopolskie
cz07 Strední Morava	pl42 Zachodniopomorskie
cz08 Moravskoslezsko	pl43 Lubuskie
hu Hungary	pl51 Dolnoslaskie
hu10 Közép-Magyarország	pl52 Opolskie
hu21 Közép-Dunántúl	pl61 Kujawsko-Pomorskie
hu22 Nyugat-Dunántúl	pl62 Warminsko-Mazurskie
hu23 Dél-Dunántúl	pl63 Pomorskie
hu31 Észak-Magyarország	sk Slovakia
hu32 Észak-Alföld	sk01 Bratislavský kraj
hu33 Dél-Alföld	sk02 Západné Slovensko
pl Poland	sk03 Stredné Slovensko
pl11 Łódzkie	sk04 Východné Slovensko
pl12 Mazowieckie	

Source: NUTS database.

II.1 Analysis of disparities by GDP in absolute and relative sense

First of all the GDP per capita (on Purchasing Power Parities) figures are compared. From 1995 to 2005 significant changes can be recorded among the regions, although the ‘capital regions’ still dominate the number of units. 2005 six of the ‘Top 10’ regions are Czech, two of them are Hungarian and 1-1 is Polish and Slovak. In third column of the next table those regions are marked with green which could better their positions, the reds worsened, the yellow colour indicates the unchanged regions.

Table 3: rank of region by GDP per capita from 1995 to 2005

<i>Rank 1995</i>	<i>#</i>	<i>Rank 2005</i>	<i>GDP per capita, 2005, PPS</i>
cz01 Praha	1	cz01 Praha	35900,6
sk01 Bratislavský kraj	2	sk01 Bratislavský kraj	33124,1
hu10 Közép-Magyarország	3	hu10 Közép-Magyarország	23489,0
cz03 Jihozápad	4	pl12 Mazowieckie	18184,4
cz04 Severozápad	5	cz02 Strední Cechy	15792,4
cz06 Jihovýchod	6	cz03 Jihozápad	15671,5
cz05 Severovýchod	7	cz06 Jihovýchod	15252,2
cz07 Strední Morava	8	cz08 Moravskoslezsko	14633,2
cz08 Moravskoslezsko	9	cz05 Severovýchod	14539,0
cz02 Strední Cechy	10	hu22 Nyugat-Dunántúl	14274,9
pl12 Mazowieckie	11	cz04 Severozápad	13658,2
hu22 Nyugat-Dunántúl	12	hu21 Közép-Dunántúl	13528,7
pl22 Slaskie	13	cz07 Strední Morava	13393,1
hu21 Közép-Dunántúl	14	sk02 Západné Slovensko	12779,2

sk02 Západné Slovensko	15	pl22 Slaskie	12386,0
pl51 Dolnoslaskie	16	pl41 Wielkopolskie	12277,7
pl42 Zachodniopomorskie	17	pl51 Dolnoslaskie	11862,2
pl63 Pomorskie	18	pl63 Pomorskie	11280,9
hu33 Dél-Alföld	19	pl42 Zachodniopomorskie	10660,1
pl61 Kujawsko-Pomorskie	20	pl11 Łódzkie	10545,0
hu23 Dél-Dunántúl	21	sk03 Stredné Slovensko	10455,0
pl41 Wielkopolskie	22	pl43 Lubuskie	10357,1
pl43 Lubuskie	23	pl61 Kujawsko-Pomorskie	10012,9
pl52 Opolskie	24	hu23 Dél-Dunántúl	9982,9
pl11 Łódzkie	25	pl21 Malopolskie	9798,5
sk03 Stredné Slovensko	26	hu33 Dél-Alföld	9756,8
hu31 Észak-Magyarország	27	sk04 Východné Slovensko	9662,9
pl21 Malopolskie	28	pl52 Opolskie	9514,2
hu32 Észak-Alföld	29	hu31 Észak-Magyarország	9483,6
sk04 Východné Slovensko	30	hu32 Észak-Alföld	9153,4
pl62 Warminsko-Mazurskie	31	pl62 Warminsko-Mazurskie	8781,9
pl33 Swietokrzyskie	32	pl33 Swietokrzyskie	8586,2
pl31 Lubelskie	33	pl34 Podlaskie	8500,5
pl34 Podlaskie	34	pl32 Podkarpackie	7926,6
pl32 Podkarpackie	35	pl31 Lubelskie	7838,9

Source: own edition by EUROStat data.

As regards the ‘Bottom 10’ regions in 2005, Poland gives seven, 3 among them are Hungarian and only one is Slovak. Remarkable that all the three Slovak region (out of the capital region) could better their positions in the rank.

If the previous data are compared to the EU 27 average (GDP per capita in % of the EU average) the convergence or divergence of regions can be demonstrated. Some statistical methods (by SPSS) are applied in order to make quantitative calculations.

Table 4: Statistics of the regions by years

		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	52,760	53,443	53,640	53,546	53,406	54,166	55,203	56,689	58,003	59,066
Std. Error of Mean		3,3938	3,4951	3,4926	3,5228	3,5663	3,6099	3,9219	4,0845	4,2469	4,2652	4,7055
Median		43,700	44,900	47,000	47,500	48,600	48,100	47,400	48,300	48,200	49,500	50,400
Mode		39,1(a)	41,5	35,6(a)	36,7	42,8(a)	36,4	36,2(a)	64,2	34,6(a)	45,3	35,0(a)
Std. Deviation		20,0779	20,6772	20,6624	20,8413	21,0982	21,3564	23,2021	24,1640	25,1249	25,2333	27,8383
Variance		403,121	427,548	426,934	434,361	445,135	456,097	538,339	583,899	631,259	636,719	774,971
Range		92,8	94,6	94,9	98,0	101,6	103,3	112,0	114,0	119,7	119,7	125,3
Minimum		32,8	33,9	35,3	35,6	34,6	33,7	33,6	33,9	34,6	35,1	35,0
Maximum		125,6	128,5	130,2	133,6	136,2	137,0	145,6	147,9	154,3	154,8	160,3
Sum		1804,2	1846,6	1870,5	1877,4	1874,1	1869,2	1895,8	1932,1	1984,1	2030,1	2067,3

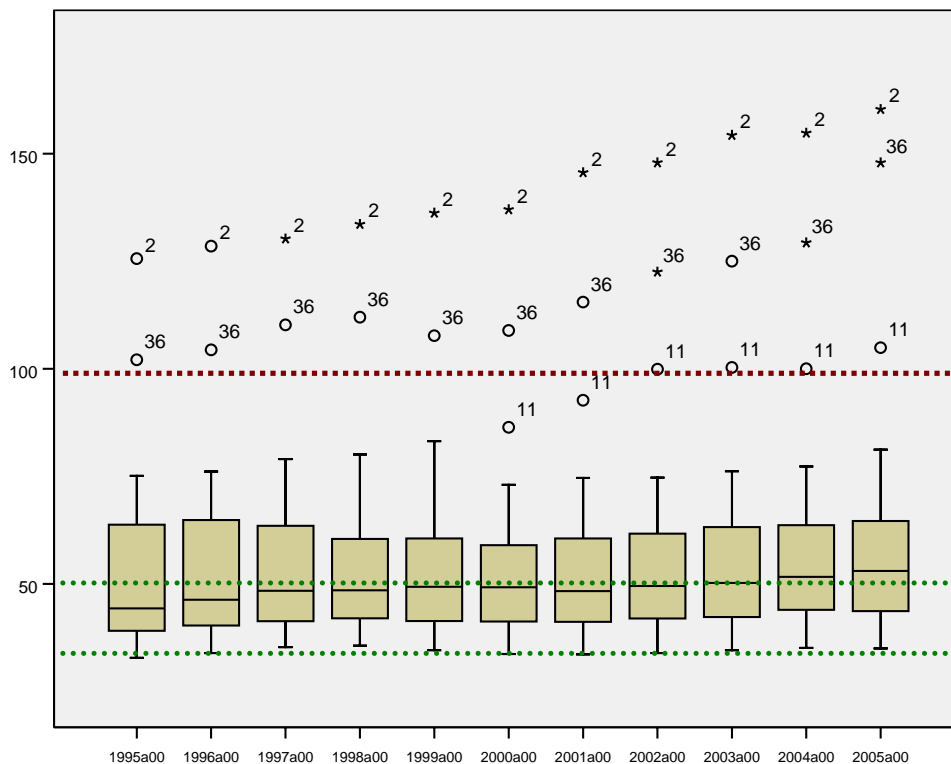
a Multiple modes exist. The smallest value is shown

The Variance (Standard Deviation) shows continuous, growing trends, especially in the last years of analysed period, when the V4 group performed a higher economic growth. The Boxplot graph is the visualized version of the values in the Table 4.

During the interval the gap among the best and the worst performing regions increased dramatically. This fact can be explained with the followings:

- o the previously selected ‘capital regions’ (with number 2, 11, 36) grew much faster than the rest (the growth rates will be shown later);
- o the performance of the poorest regions remained unchanged during the period;
- o additionally the mean hardly changed.

Figure 2: Boxplot graph of the regions by GDP per capita in % of the EU average



The different regional growth rates caused growing standard deviation. But what are the extents of the rates exactly? Where the fastest and slowest regions are located?

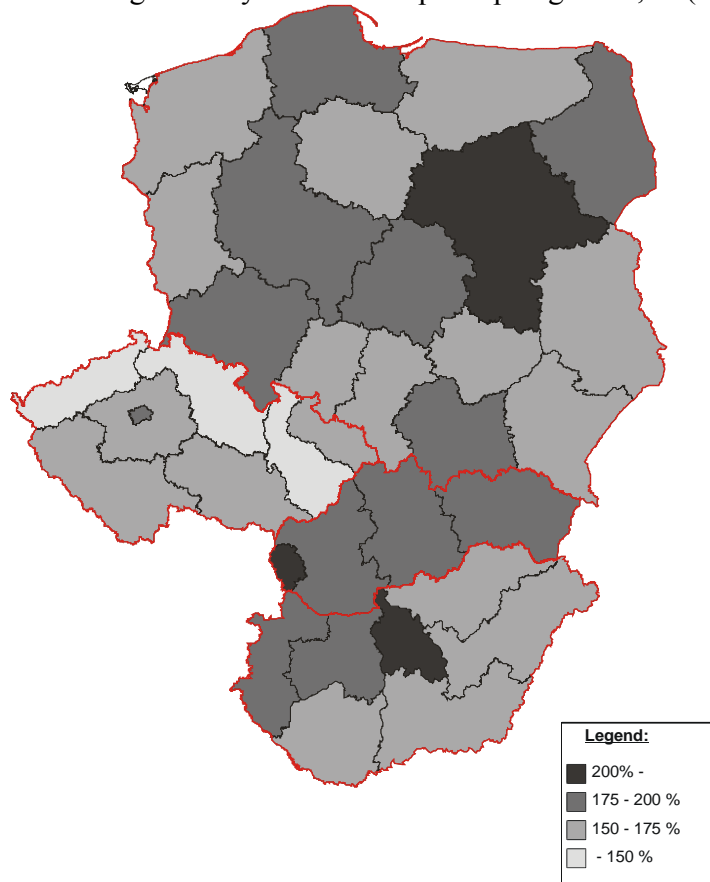
In this case the GDP per capita in PPS is analysed. The basis year is 1995 and the change of this indicator to 2005 in each region is measured. The fastest regions could double their figures; the slowest just added one-third of their original values.

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 without exception Czech.

On 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 moved on in Hungary and Poland as well.

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

Figure 3: different growth dynamic: GDP per capita growth, % (2005/1995)



Source: own edition.

Naturally the strong deviation among the regional growth rates result changes in the concentration of GDP. Here the distribution of GDP (at current market prices) is investigated among seven groups. Firstly the regions were ranked by their GDP, after then grouped. Every group comprises five regions.

Table 5: volume of GDP and share in total of each group

		GDP at current market prices		Change 2005-1995
		1995	2005	
Group 1	€	65916,4	172844,0	106927,6
	% in total	33,19%	36,61%	3,42%
Group 2	€	35270,0	80267,8	44997,8
	% in total	17,76%	17,00%	-0,76%
Group 3	€	26033,1	57449,7	31416,6
	% in total	13,11%	12,17%	-0,94%
Group 4	€	22426,2	49877,9	27451,7
	% in total	11,29%	10,56%	-0,73%
Group 5	€	18809,2	44626,7	25817,5
	% in total	9,47%	9,45%	-0,02%

Group 6	€	16211,2	37855,5	21644,3
	% in total	8,16%	8,02%	-0,14%
Group 7	€	13966,6	29212,3	15245,7
	% in total	7,03%	6,19%	-0,84%

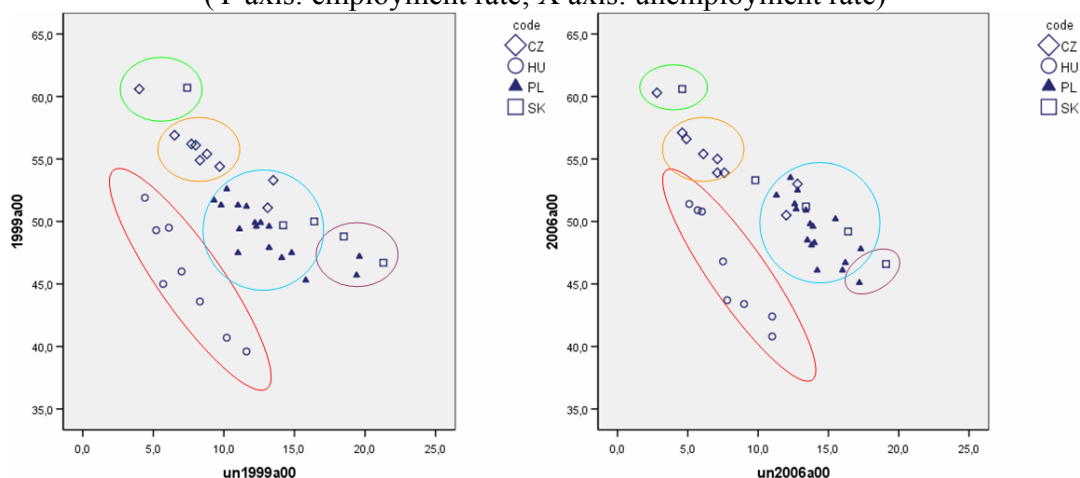
Source: own edition based on EUROStat Data.

By the statistics although every group could increase its GDP, just the Group 1 could enlarge its share in the V4's total GDP. Consequently the regions with the largest GDP in 1995 benefited from the process i.e. became more expanded to 2005, so further concentration occurred in the analysed decade. In parallel with this the rest's groups position weakened.

II.2 Analysis of disparities by labour market data

The human resource is one of the most important among the endogenous factors which influence the regional development. After the Lisbon Treaty the employment rate and unemployment rate are the most relevant attributes regarding the human resource in the EU context. Therefore the V4 regions are analysed from both aspects in this chapter.

Figure 4: labour market positions of the regions
(Y axis: employment rate; X axis: unemployment rate)



Source: own compilation by SPSS based on EUROStat data.

The regions are marked in the coordinate systems indicating the labour market positions of the different units (unemployment and the employment). With some exception the high unemployment rate and a low level of employment are representing the main barriers and what is more important that most of the regions could not better their positions. The exceptions: especially Praha and Bratislavský kraj, which approach the Lisbon goals.

The rest of the Czech regions have a relatively good and bettering location in the system with higher, but stagnating employment rate and low rate of unemployment.

The Slovak regions (except the capital region) made the largest improvement by decreasing the unemployment rate although significant changes did not happen in the field of employment.

Most of the Hungarian and Polish regions could not better their position from either viewpoints, even some of them got a worse location by increasing unemployment rate. The low level of employment is still, in 2006 a huge barrier for the Hungarian regions.

II.3 Rank the regions with the help of Bennett Method

Finally we intend to put the regions' different performances together with the Bennett Method. This procedure make feasible to rank the units indicating the gaps among them. In this case three indicators have been used as follows: GDP per capita in €; employment and unemployment rates. The ranking have been twice executed first with data from 1999, second data from 2005 in order to present some changes between the two ranks.

In both cases Prague won the competition, what is more interesting with perfect performances (therefore the 300-300 percentage evaluation). Nevertheless just a few regions could approach to this higher limit, as: Bratislavský kraj, Közép-Magyarország, Jihozápad, Střední Čechy, Severovýchod. The rest unfortunately got more remote the top and this fact also resulted the growing gap in this comparison as well.

Table 6: the results of the Bennett Method

	<i>Rank 1995</i>	<i>Rank 2005</i>
cz01 Praha	300,00%	300,00%
sk01 Bratislavský kraj	224,77%	252,08%
hu10 Közép-Magyarország	222,03%	225,07%
cz03 Jihozápad	203,08%	207,27%
cz02 Střední Čechy	190,40%	205,45%
cz05 Severovýchod	190,47%	195,49%
hu22 Nyugat-Dunántúl	225,05%	186,25%
hu21 Közép-Dunántúl	186,82%	179,42%
cz06 Jihovýchod	184,75%	177,76%
cz07 Střední Morava	173,00%	160,53%
pl12 Mazowieckie	185,32%	152,90%
cz04 Severozápad	160,79%	152,12%
cz08 Moravskoslezsko	155,82%	149,91%
sk02 Západné Slovensko	141,81%	147,45%
hu33 Dél-Alföld	175,87%	144,96%
hu23 Dél-Dunántúl	152,94%	142,20%
hu32 Észak-Alföld	133,43%	135,50%
pl41 Wielkopolskie	165,71%	132,54%
pl21 Malopolskie	161,72%	128,65%
hu31 Észak-Magyarország	127,81%	128,44%
pl34 Podlaskie	147,32%	127,56%
pl31 Lubelskie	148,27%	126,93%
pl11 Łódzkie	149,87%	125,09%
sk03 Středné Slovensko	129,47%	124,16%
pl22 Slaskie	155,66%	122,72%

pl63 Pomorskie	156,41%	121,82%
pl52 Opolskie	138,15%	121,21%
pl43 Lubuskie	134,79%	120,78%
pl61 Kujawsko-Pomorskie	143,11%	119,36%
pl32 Podkarpackie	141,72%	117,97%
pl51 Dolnoslaskie	145,30%	117,73%
pl33 Swietokrzyskie	141,81%	115,23%
sk04 Východné Slovensko	120,97%	114,58%
pl42 Zachodniopomorskie	136,65%	114,36%
pl62 Warminsko-Mazurskie	125,97%	110,49%

Source: own calculation and edition based on EUROStat data.

III. Conclusions

In the last part of the paper we summarize the statements and lessons learnt or derived from the results, outcomes of analyses:

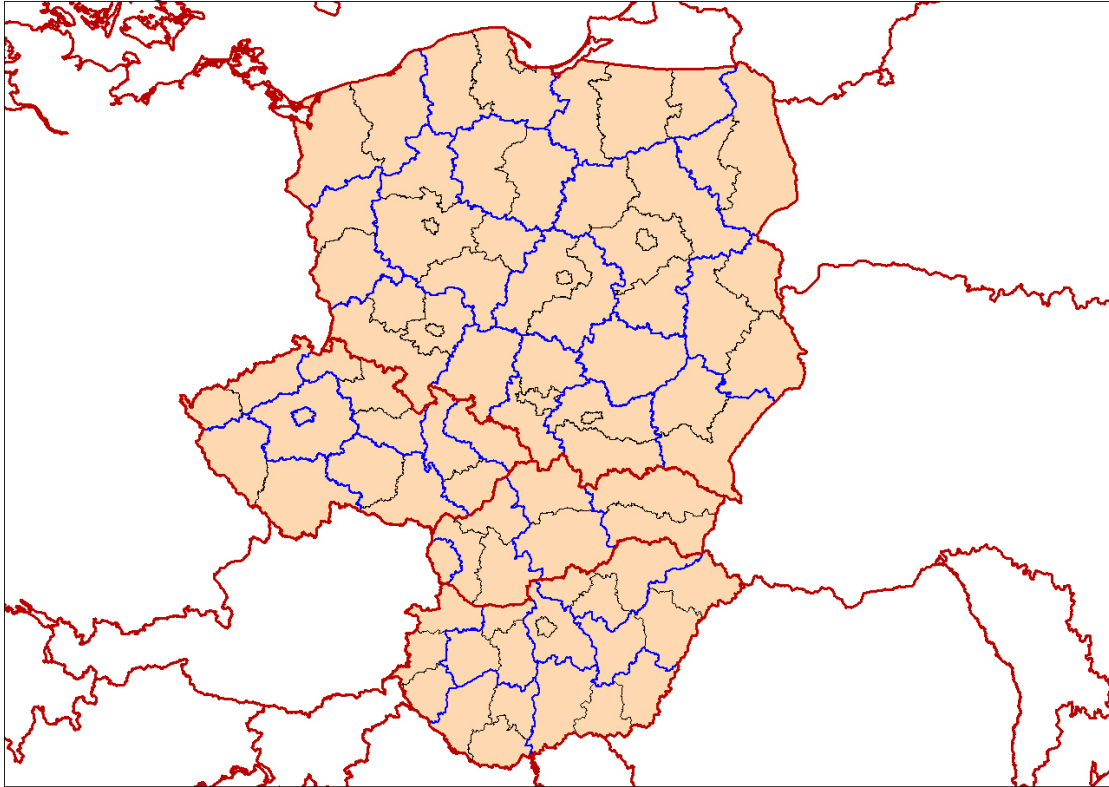
- the V4 countries could converge to Western European (EU) average measured on national level;
- at the same time the territorial disparities on regional level increased dramatically;
- the polarization in every country means that the capital region has significantly higher growth potential and a faster convergence, some reasons for this phenomenon:
 - these regions are centres for a politically, economical strongly centralized states;
 - many companies selected hq or location within this regions;
 - they have huge market and relatively high income per capita figures;
 - service sector plays outstanding role in their economies;
 - they have well qualified human resource;
 - there are a number of trade and logistics centres in the regions.
- in contrast with the previous there are regions which although increased their GDP, but the GDP per capita values did not get closer the EU average;
- in many cases the national convergences were due to just the growing capital regions (for instance the Czech Republic in the late 90es);
- the under-developed regions react more sensitive to the national stagnation or slow down (for instance: Hungary in the recent years);
- Slovakia provide a good example, as the rapid economic growth has positive effect on the regions growth potentials;
- most of the regions perform poorly on the labour market, and just a few of them could better their position.
- the low level of employment (especially in Hungary) and the high level of unemployment (especially in Slovakia and Poland) are still massive problems.

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ANNEXES

Annex 1: regions in the V4 countries



Source: own edition by MapInfo.