

REGIONAL DISPARITIES IN LEVEL AND DYNAMICS OF GROSS DOMESTIC PRODUCT AT NUTS-3 REGIONS IN CENTRAL EUROPE AND THE BALTIC STATES

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Abstract. The article deals with regional disparities in the level and dynamics of Gross Domestic Product (GDP) in Central Europe and the Baltic States. The analysis was made for NUTS-3 regions divided into rural, intermediate and urban types according to the Eurostat classification. The aim of the study was to identify the regional disparities in economic development level, its dynamics, dispersion and changes in the period 2004-2013 using Eurostat data on GDP per inhabitant in percentage of the EU-28 average. Also the dispersion and its changes over time in different types of regions were analysed. The fastest growth of GDP was identified in the Baltic States, also in their rural areas. In 5 of 6 analysed countries, the level of GDP in relation to the EU average was rising, the only country with no progress in GDP in the period 2004-2013 was Hungary, where nearly half of the regions retreated in economic development in relation to the EU-28 average. The dynamics of GDP was higher in the group of urban regions, lowest in the group of rural and intermediate areas. Calculations showed a weak negative statistical dependence between level and dynamics of GDP in the rural and intermediate regions. Generally, the dispersion of GDP was highest in Poland in all type of regions, in Slovakia and Hungary in the rural areas and in the Czech Republic in the urban regions.

Key words: GDP disparities, dynamics, NUTS-3, Central Europe, Baltic States.

JEL code: R11, P25

Introduction

Regional disparities in GDP dynamics were often subject of scientific studies (among others: Krueger A., 2011; Wojnicka E., 2008). Studies at NUTS-3 level were rather rare and analyses taking into account the typology of regions (with special interest in the rural areas) in Central Europe and the Baltic States were not performed before.

The main aim of the paper is to identify the regional disparities in economic development level and its dynamics in different types of regions. The level of GDP was compared to its dynamics in order to identify convergence process in one of its meanings (Barro, R., J., Sala-i-Martin, X., 2004). The author does not aspire to assess the reasons of these processes or disparities, which can be the aim of a next detailed study. Statistical analyses of convergence were not subject of this study as they were subject of many studies before (Bal-Domanska, B., 2011; Pietak, L., 2015; Wojewodzka-Wiewiorska, A., Dudek, H., 2016; Wojcik, P., 2008). In addition, the dispersion and its changes over time were analysed in order to verify the thesis of cohesion among the regions.

The main indicator used in the study was the Gross Domestic Product (GDP) at current market prices by NUTS 3 regions with the unit purchasing power standards (PPS) per inhabitant in percentage of the EU average, published by Eurostat (Eurostat, 2016). The study period was set to the years 2004-2013, with the beginning in the year of EU accession and end in 2013 as the data for 2014 were at the time of retrieving not available for all NUTS 3 regions.

Descriptive methods were used, the data was presented using tables, graphs elaborated with Excel and Statistica software.

The analysis was performed on all 135 NUTS-3 regions in selected 7 countries from Central Europe: the Czech Republic (since 2016 also another official shorter name Czechia is possible to be used (International Organization for Standardization, 2017)), Hungary, Poland and Slovakia and the Baltic States: Estonia, Latvia and Lithuania. The regions were divided into three groups according to the classification by Eurostat. The typology classifies the NUTS-3 regions into three groups: predominantly urban, intermediate and predominantly rural regions depending on the share of the rural population (Eurostat, 2013). This classification was used

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having in mind that at the EU level, there is no uniform definition for rural areas (Abrham, J., 2011), and that various classifications are used worldwide (Rakowska, J., 2014). The Eurostat data concerning GDP were combined with the regions' typology, which had to be updated by the author as a result of changes in NUTS-3 division made in the year 2015. For each region the average change of GDP in the period 2004-2013 and other descriptive statistics were calculated.

Research results and discussion

1. GDP level and dynamics

The extreme values of GDP in the analysed regions are presented in Tab.1. The lowest GDP per capita in relation to the EU average in urban and intermediate regions was identified in Poland both in 2004 and 2013. In the rural areas in 2004 the *poorest* region was located in eastern Latvia and in 2013 in the northern Hungary. The

best developed (GDP is often used as an indicator of economic development) rural areas were in 2004 located in the Hungarian-Austrian-Slovak borderland. In the year 2013 two regions in this category were identified: Trnavsky kraj (neighbouring Bratislava) and Plocki, where Polish enterprise with the highest revenues is located - PKN Orlen oil company, ranked 454 in the Fortune Global 500 list (Global 500, 2016).

Among urban regions the best development level was identified in the capitals: in 2004 in Prague, in 2013 in Bratislava Region, also the metropolitan Estonian region (classified by Eurostat as intermediate) was the GDP leader in both compared years. Fast economic growth of Bratislava can be an effect of high concentration of financial services, significant foreign investments and developed industry (Volkswagen automotive cluster, Slovnaft) (Skregions, 2017).

Table 1

**NUTS-3 regions of different types with highest and lowest GDP in 2004 and 2013
region – country (GDP as a % of EU-28 average)**

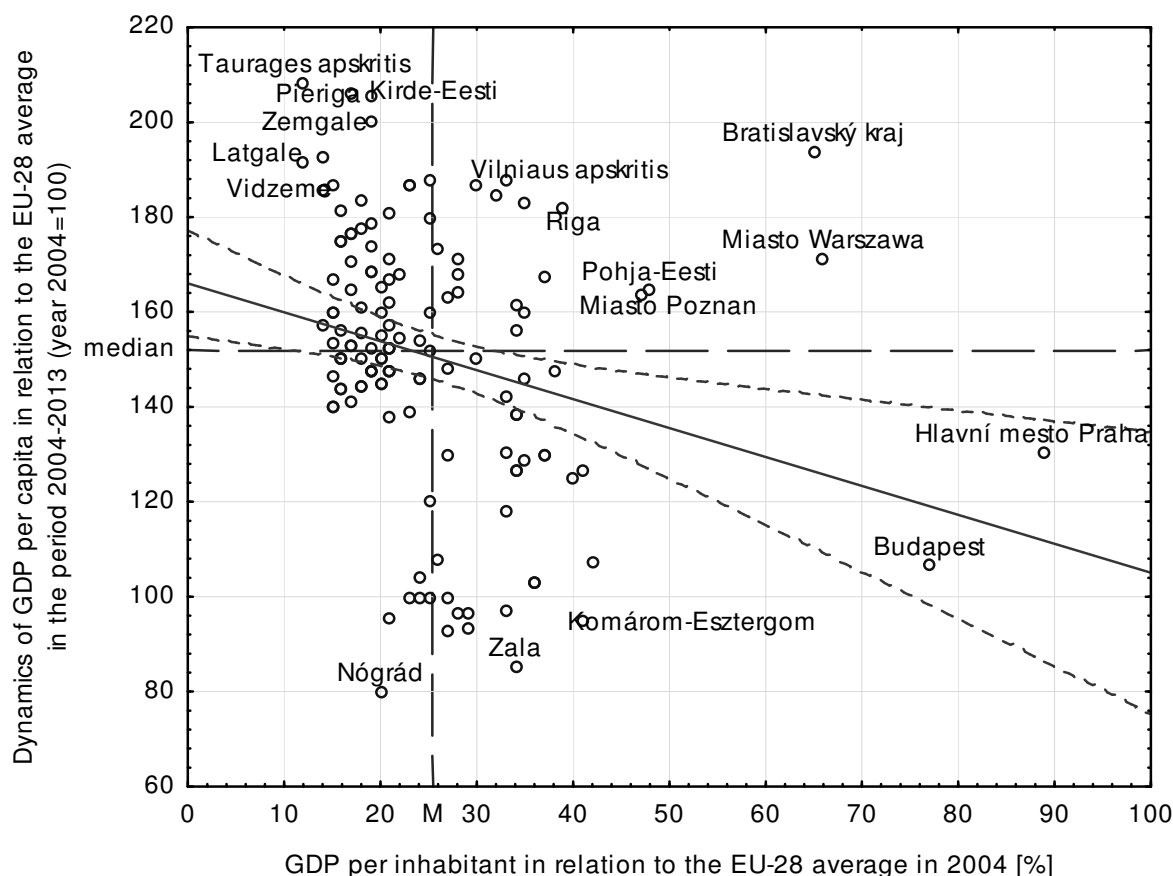
Types of regions:	2004		2013	
	Lowest GDP	Highest GDP	Lowest GDP	Highest GDP
urban	Bytomski, Krakowski - PL (16)	Praha - CZ (89)	Bytomski - PL (28)	Bratislava - SK (126)
intermediate	Nyski - PL (15)	Pohja-Eesti - EE (48)	Elcki - PL (22)	Pohja-Eesti - EE (79)
rural	Latgale - LV (12)	Gyor-Moson-Sopron - HU (42)	Nograd - HU (16)	Trnavsky kraj - SK, Plocki - PL (56)

Source: author's elaborations based on Eurostat data

Fig 1. shows the relation between the value and dynamics of GDP per capita among all analysed regions. Although the capital regions of Czechia and Hungary have had a higher GDP at the beginning of the study period, their dynamics was relatively lower than in the capitals of the Baltic States. The exceptions are Bratislava and Warsaw, where both the level and the dynamics were high.

The regression belt shows a weak negative statistical dependence between level and dynamics of GDP. In the analysis performed for

three separate groups the calculated correlation coefficients (R) were statistically significant for rural ($R=-0.55$) and intermediate regions ($R=-0.35$). Also the graphs showed a negative correlation in the rural areas and a weak negative relationship in the group of intermediate regions, which means that some less developed rural regions were developing faster in the period 2004-2013, although it does not necessarily have to mean convergence processes (Geodecki, T., 2006). In the group of urban regions the correlations were insignificant.



Source: author's elaboration based on Eurostat data

Fig. 1. The level and dynamics of Gross Domestic Product per capita in relation to the UE-28 average in NUTS-3 regions

Generally, the dynamics of GDP was higher in the group of urban regions (Tab. 2), which confirms results of other studies (Smetkowski, M., 2015; Szlachta, J., Dziemianowicz, W., Szmigiel-Rawska, K., 2011). The dynamics of GDP was lowest in the group of rural areas, the growth in the intermediate regions did not take on the lowest values, but surprisingly the difference between those two groups was very little.

The analysis for countries shows interesting differences. Rural regions were developing fastest in the Baltic States and Slovakia. In Latvia the difference in dynamics between rural and urban areas was very little, while in the Czech Republic the change of GDP was even higher in the rural areas than in the metropolises. The only country with decreasing values of GDP in relation to the EU average was Hungary (in the country in total, especially in the intermediate regions).

Table 2

Dynamics of GDP per capita in relation to the EU average in the period 2004-2013 in different types of regions (year 2004=100)

Country	Urban regions	Intermediate regions	Rural regions	Country total
LV	194	152	190	185
LT	183	187	174	178
SK	194	170	174	175
EE	-*	185	164	172
PL	163	156	156	158
CZ	128	131	133	131
HU	106	96	100	99
Total	162	149	148	150

*) No regions classified as urban in Estonia

Source: author's calculations based on Eurostat data

2. GDP dispersion and changes

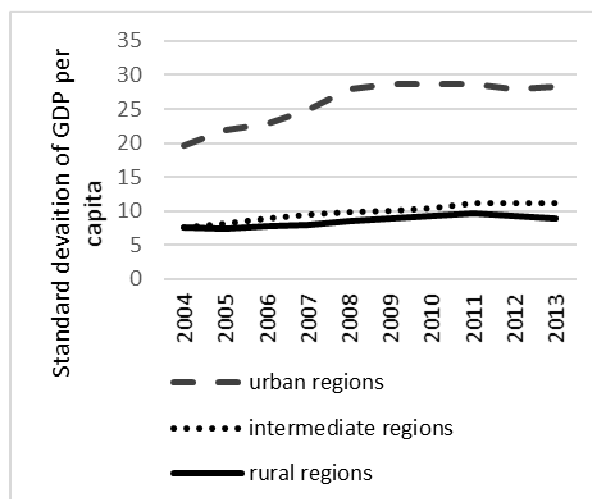
The disparities of Gross Domestic Product in NUTS-3 urban, intermediate and rural regions were shown in Fig. 3. In the rural areas, the

highest differences between NUTS-3 regions in both analysed years were identified in Poland, Hungary and Slovakia. Generally, the dispersion of GDP was highest in Poland in each type of regions. Comparing graphs for both years can lead to conclusion that the absolute differences in this feature were rising in most countries, although in Hungary and Slovakia this spread increased in the slightest extent.

Standard deviation was used to measure the variability of GDP in the period 2004-2013 (Fig. 2.).

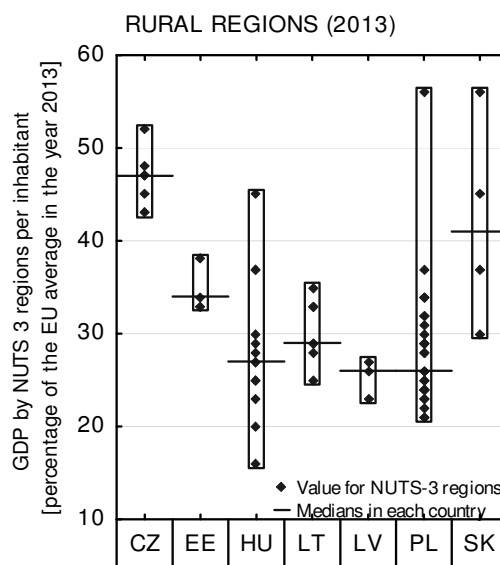
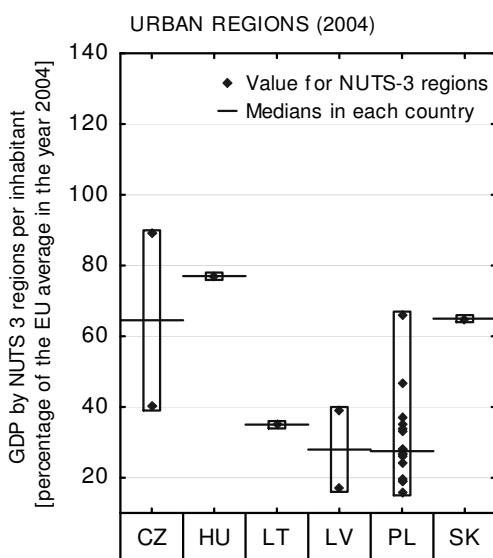
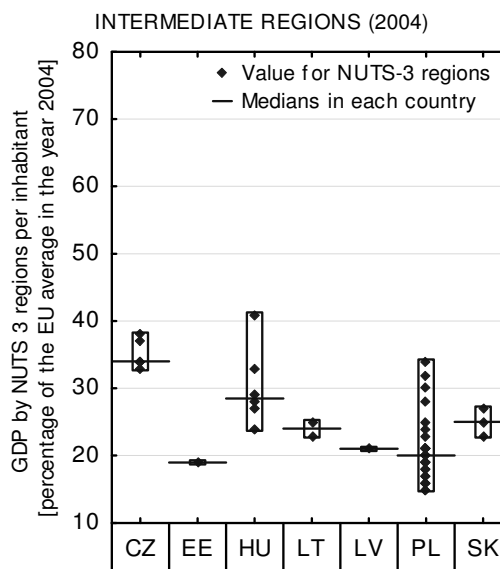
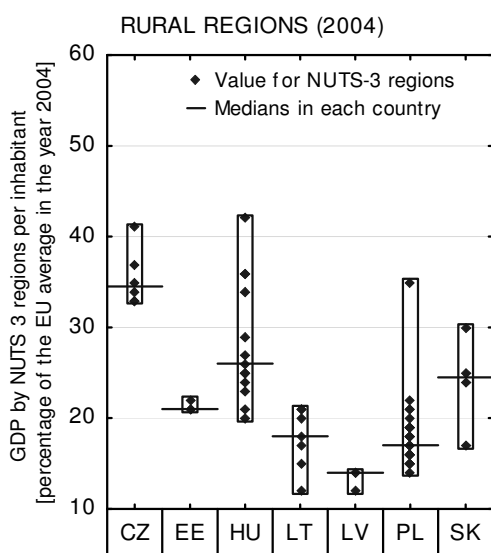
Absolute differences in the level of GDP were higher and increasing fastest in the urban regions. This was caused by a very high growth of the metropolitan areas, mainly the capital cities (compare with Fig. 1.). Differences in rural

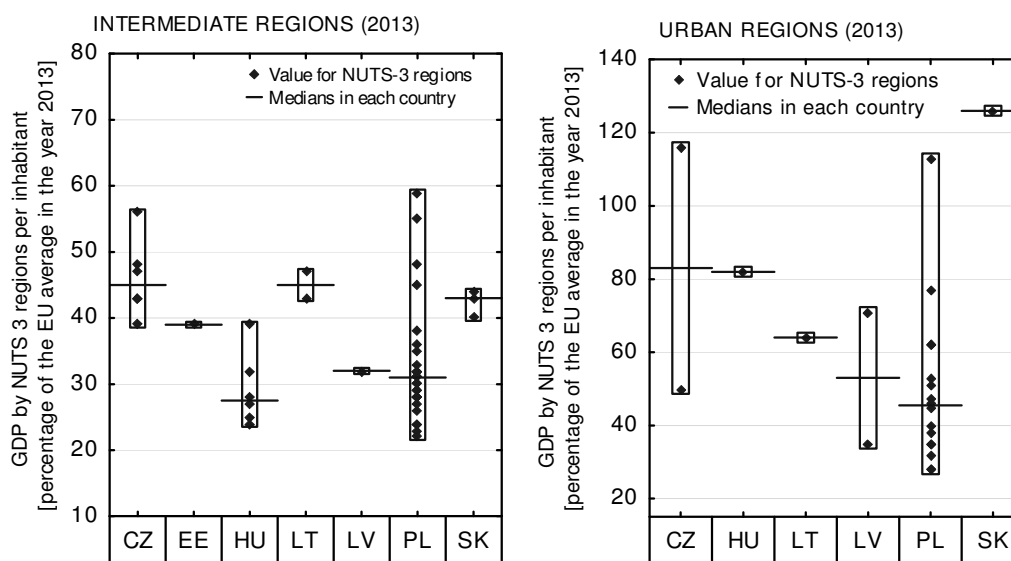
and intermediate regions were also rising, but much slower than in the urban regions.



Source: author's elaboration based on Eurostat data

Fig. 2. The differences of Gross Domestic Product in NUTS-3 urban, intermediate and rural regions in the period 2004-2013





Source: author's elaboration based on Eurostat data

Fig. 3. The disparities of Gross Domestic Product in NUTS-3 urban, intermediate and rural regions

In the figure one can also observe that in 5 of 6 analysed countries the level of GDP in relation to the EU average was rising, only Hungarian rural and intermediate areas characterised stagnation – 4 regions did not improve their position in relation to the average EU GDP, and 9 regions even retreated in this indicator values in the period after accession to the EU.

The dispersion of GDP was presented using variation coefficient calculated with the following formula:

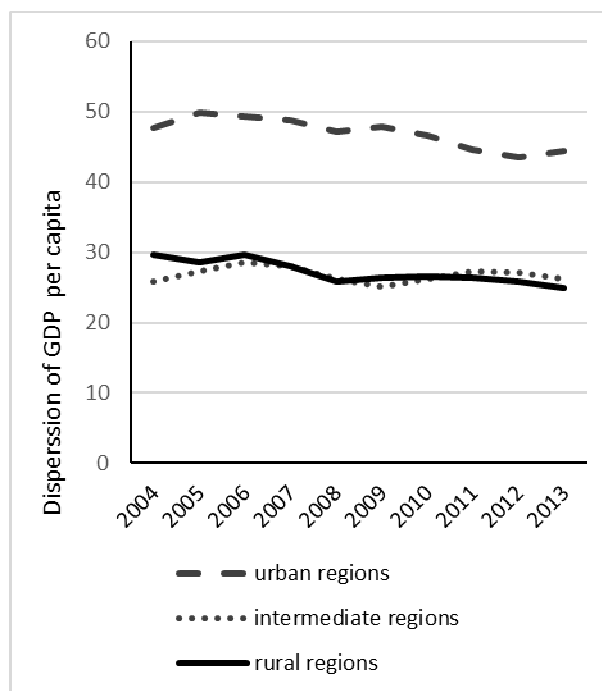
$$V = \frac{SD}{M} \quad (1)$$

Where:

V - is the variation coefficient,

SD - standard deviation; M - mean value.

Fig. 4. shows that the differentiation of NUTS-3 regions was medium in the rural and intermediate areas, and large in the urban regions. The dispersion was slightly decreasing in the period 2004-2013 in all types of regions,



Source: author's elaboration based on Eurostat data

Fig. 4. Changes of GDP dispersion in the period 2004-2013

Conclusions, proposals, recommendations

The main aim of the paper was to identify the regional disparities in the level and dynamics of Gross Domestic Product as the main indicator of economic development. The author analysed different types of regions according to the Eurostat classification of predominantly urban, intermediate and rural areas. According to the

Eurostat data the study can lead to the following conclusions:

- 1) The fastest growth of GDP was identified in the Baltic States, also in their rural areas. In 5 of 6 analysed countries the level of GDP in relation to the EU average was rising, the only country with no progress in GDP in the period 2004-2013 was Hungary, where nearly half of the regions retreated in economic development in relation to the EU-28 average.
- 2) The dynamics of GDP was higher in the group of urban regions, and lower in the group of rural and intermediate areas, but the differences between these two groups were insignificant.
- 3) Calculations showed a weak negative statistical dependence between level and dynamics of GDP in the rural and intermediate regions.
- 4) The dispersion of GDP was highest in Poland in all type of regions, in Slovakia, in Hungary in the rural areas and in the Czech Republic in the urban regions.

- 5) The absolute differences in the level of GDP were increasing while dispersion was decreasing in the analysed period in all types of regions.

On the basis of this study one can conclude that economic growth in Central Europe and the Baltic States was highly differentiated. The growth leaders were the Baltic States and Slovakia, all those countries characterised a fast development not only in the capitals but also in the rural areas. Poland was the country with highest regional differences between regions, even within one type of them. Hungary was the only country where rural and intermediate areas characterised stagnation or decrease of GDP values in relation to the average EU-28.

This paper was not devoted to identifying the factors of development or reasons for the different growth of NUTS-3 regions. Next analyses could be aiming at explaining the here identified differences on regional and international level, with a particular focus on the most dynamic rural areas.

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