THE EVOLUTION OF THE REGIONAL DISPARITIES IN THE VISEGRAD GROUP IN THE YEARS 1995 – 2014

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In our research, we examined the territorial disparities in the four countries of the Visegrad group, which joined the EU in 2004, for the period between 1995 and 2015. We used as our theoretical starting point the Williamson-hypothesis which focuses on the correlations of economic catching up, with the developed regions growing faster than the less developed ones, because their developed resources are utilized in a better and faster way. According to our initial hypothesis, there is a connection between the regions' economic development and the size of inner regional disparities, so the Williamson-hypothesis can be verified in our research area. We use the weighted logarithmic standard deviations (WLSD) for the measurement of the territorial differences. In the first part of our research, we examined the economic growth and the spatial disparities in the Visegrad countries and also in the European Union. The second part of the research focuses on the exploration of the connection between the GDP per capita and the disparity index of the regions involved in the research. According to our hypothesis, there is a correlation between the regions' differentiation and development, appropriate to the Williamson-curve. So in the regions with higher GDP per capita the inner disparities are smaller, than in the regions with lower GDP per capita. Finally, for the verification of the above mentioned hypothesis, we expanded our research to all regions of the European Union.

Key words: regional disparities, Williamson-hypothesis, logarithmic weighted relative deviation, countries of the Visegrad-group

INTRODUCTION

In 2015 we commemorated the 50th anniversary of Williamson hypothesis which focuses on the interrelations of economic catching up. During the last 50 years it became one of the most commonly cited and criticized methods of regional research.

Our present research focuses on the analysis of regional disparities and the interrelations of the differentiation and development in the area of the Visegrad Group (also called the V4) and of the entire European Union. The main field of our research was therefore the countries of Visegrad Co-operation (Czechia, Slovakia, Poland and Hungary) which show similarities from many aspects, however – from other points of view – significant differences can also be observed among them. The area we have examined is not just an artificially created group, but it can be characterized by centuries-long economic, cultural, political and commercial cooperation. Altogether 13% of the EU population lives in the Visegrad Group countries, these countries extend to the 11% of the European Union's territory and they

generate slightly more than 5% of the GDP of the EU. These statistical figures help to understand which challenges and problems these countries face on the way to enhancement of their European integration. So in our research using mathematic and statistical methods, we outlined the possible future trends of the four countries on the basis of the corresponding data from the period 1995 – 2014.

BIBLIOGRAPHIC OVERVIEW

The theoretical literature on the development of regional disparities and their relationship to social and economic factors is really wide, even if we are focusing on the Visegrad Group countries and examining the last one or two decades.

Smętkowski (2014) underlined that the Central and Eastern European countries which became members of the European Union have significantly caught up in affluence in relation to the 'old' Member States (EU15). He claims in his paper that this was a result of a good economic climate globally until the financial crisis of 2008, and on the other hand, a direct and indirect consequence of their EU accession. This trend was halted by the global economic crisis of 2008, which invites the questions concerning the reactions of the regional structures of the analysed countries and the spatial effects of economic growth during the time of economic prosperity preceding the crisis.

Abrham (2011) found in his study that unbalanced regional development is still the principal technical characteristics for the new member states even after joining the European Union. In all countries except Latvia, an increase or a slump in the interregional disparities has been reported. Also in the case of rural areas, there were no major changes compared to the period prior to the enlargement.

Burda (2013) mentioned an econometric model with a broad range of variables which was used by analysts of PMR Consulting in order to properly assess which factors had an impact on the disparities of growth rates for the individual regions. The model reflected both the changes in the structures of regional economies and spatial effects such as proximity to metropolitan areas. The main advantage of the model was that it allowed PMR analysts to estimate the influence of individual factors (e.g., location by the western border), while also taking into account other variables, such as changes in level of industrialization of the region, which was related to the collapse of unprofitable industrial plants. The model used by PMR econometrists also helped to assess which factors were or were not statistically significant.

Kutscherauer et al. (2010) highlighted that the value of dispersion indicator of regional GDP/inhabitant (dispersion of regional GDP at NUTS[1] 2 level) has fallen down in the whole EU27 within 2001 and 2007 and this indicates a convergence process. Regional disparities have grown up in the newest member countries (this concerns the Czechia, Hungary, Poland and Slovakia too). On the other hand, the most significant reduction in this indicator has happened in Austria, Italy and Spain. The increase in regional differences at the level of NUTS 3 is much more

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[1] NUTS: The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU for the purpose of data collection, development and harmonization of European regional statistics and Socio-economic analyses of the regions. It has a hierarchic system, like NUTS 1: major socio-economic regions, NUTS 2: basic regions for the application of regional policies and NUTS 3: small regions for specific diagnoses (Eurostat).

significant in the new member countries as we can see especially in the cases of Poland, Slovakia and Hungary.

Gurgul and Łach (2011) in their analysis provided evidence to claim that one can observe regional divergence in the income distribution in Polish regions over the past decade. This conclusion was confirmed by conducting an analysis based on two traditional concepts of measuring differences in regional development, namely sigma and beta divergence. It is also worth noting that they found quite strong evidence supporting the assertion that regional inequalities in the income distribution rose faster after EU accession than in the period from 2000 to 2004.

Ratazjac (2012) in his study pointed out the regions of Eastern Poland, metaphorically referred to as "The Eastern Wall" (consisting of five voivodeships, which correspond to NUTS 2 units, like Lublin, Subcarpathia, Podlasie, Świętokrzyska Land, and Warmia-Mazuria) are among the poorest in Poland and also in the European Union. Its markedly lower level of socio-economic development is a consequence of both exogenous and endogenous factors. Even in the pre-accession period domestic steps were taken to stop its advancing pauperization, but the region received a powerful new growth impulse only after Poland joined the EU.

Habanik et al. (2013) in their research analysis provided statistically robust evidence that regional disparities in Slovakia significantly increased over the period 2002 through 2010. It was a period when Slovakia experienced rapid economic growth with GDP per capita increasing by more than 77%. However, the rapid economic growth at the national level in the country as a whole, which converged towards EU standards, was mainly due to the development of the Bratislava agglomeration, while other more rural regions are lagging behind.

SPECIFIC FEATURES OF THE REGIONS OF THE VISEGRAD FOUR

As we wish to extend our examinations to the entire EU28, we need to highlight those peculiar factors which characterize the ex-socialist countries – including the Visegrad group states - in Eastern Europe and which make difference between these countries and the rest of the European Union, especially the former EU15 members. These factors derive both from their geographical location and from their historical past.

From geographic point these countries are located in the heart of Europe, they are exactly at the crossroads between East and West or North and South. Slovakia, Hungary and the Czechia are landlocked countries therefore in their cases the road, railroad and inland water (river) transportation networks have the most important roles.

The "inherited" characteristics also might shed light on the reasons for the regional disparities and the sharp differences one can observe in the regional competitiveness in these countries.

Ženka et al. (2014) pointed out some of these factors, like the Central European regions are generally less densely populated and their economic base, domestic market size and spatial intensity of economic activity is significantly smaller. They also underlined that the largest West European NUTS 2 regions generate comparable or even higher GDP than Czechia or Hungary. Another typical factor is, that there is a clear, historically grounded west–east gradient in economic performance

and transformation success within most of the Central European countries, resulting from the proximity to West European borders. Furthermore, patterns of regional disparities in Central Europe are much more influenced by position in settlement hierarchy; there is often a sharp polarity between metropolitan and non-metropolitan regions, while socio-economic differences among the non-metropolitan regions are relatively low (Ženka et al. 2014).

Mention must be made about the fact that in these countries NUTS2 level regions have no historical background, these regions were just created when these countries joined the European Union (1st May, 2004). Enyedi (2009) points out that still many analyses use rather the counties (NUTS 3) as their analysis may provide a more detailed geographical picture of competitiveness. NUTS 2 regions in Hungary serve mostly for the purpose of EU regional statistics as territorial units for development planning – but these regions have neither elected government units, nor financial resources of their own (Enyedi 2009).

Czechia, Slovakia and Hungary are relatively small countries, therefore they are not divided at NUTS 1 level, so they are one-one NUTS 1 regions. Slovakia has 4 NUTS 2 level and 8 NUTS 3 level regions from among which Bratislava agglomeration region is both a separate NUTS 3 and NUTS 2 region. Czechia has 8 NUTS 2 level regions and 14 NUTS 3 level ones. The Prague agglomeration is also one of the NUTS 2 and NUTS 3 regions. Hungary has 7 NUTS 2 and 20 NUTS 3 level regions. In the case of Hungary Budapest is not a separate NUTS 2 region (even though lively debates are going on arguing that it should be) but together with the surrounding Pest county it forms the Central Hungarian Region at NUTS 2 level. Poland, by far the biggest V4 member has 6 NUTS 1 regions which comprise 16 NUTS 2 and 72 NUTS 3 (sub) regional units (Eurostat 2015).

It has to be mentioned too that in the V4 countries capital cities play super-dominant roles in terms of the economy. They are the recipients of the overwhelming part of the FDI inflow. They are by far the biggest financial, business and academic hubs and they generate much higher per capita GDP than the national averages. We can point out the Bratislava agglomeration (Bratislavský kraj, 2.053 km², 628.686 inhabitants), or Central Hungary region comprising Budapest plus Pest county, 6.919 km², about 2 million inhabitants).

Enyedi (2009) found that regions in Hungary have reached three different stages of economic development:

a) Budapest Metropolitan Region (BMR) is the foremost growth pole of the country. It is a real knowledge based and innovation generating economic region.

b) North-western Hungary is in the stage of investment led development having a knowledge user economy without generating it locally.

c) Northern and Eastern Hungary is in the neo-Fordist stage of economic development, where economic restructuring has just started; under-employment and rural crisis are widespread, with the exception of some larger cities (Enyedi 2009).

Enyedi (2009) pointed out that competitiveness is a complex notion and can be expressed by three interrelated economic parameters of the respective regions: a) per capita GDP, b) labour productivity and c) employment rate.

Korec (2014) underlined that regional GDP per capita is the most often used method for this purpose. For example, this particular indicator has been chosen in the European Union's regional disparities assessment and subsequently within the

process of the rules for regional aid convergence establishment. Regional GDP per capita can be considered as one appropriate indicator of economic development of a region. (Korec 2014).

In our study we will mainly rely on the first one, the per capita GDP, and in our calculations we will use both the current price basis and also the purchasing power parity (PPP) figures.

Korec (2014) highlights that it is not Slovakia solely, but also the three other V4 member countries that are typical for three layers of regional competitiveness formation. The first stage is represented by the capital city regions and it reaches the standard of EU-developed regions, while their competitiveness is grounded in knowledge-economy. The second level is composed by regions of Czechia, Western Slovakia, North-Western Hungary and Polish metropolitan regions, while their competitiveness lies within the export industry, utilizing high-tech manufactories and partially commercial services. The third layer is formed by the remaining regions of Poland, Slovakia and Hungary, located mainly in the Eastern parts of these countries. An absence of competitiveness is obvious, marked as a 'neo-Fordist stage of economy', while the sector restructuralization is in its very beginning phase. According to Korec (2014) the lagging regions of Slovakia are the Southern part of Central Slovakia (AFURs Veľký Krtíš, Lučenec, Rimavská Sobota and Rožňava), and North-East Slovakia (AFURs Poprad, Stará Ľubovňa, Spišská Nová Ves, Poprad and Bardejov).

THE OBJECTIVES AND METHODOLOGY OF THE RESEARCH

In the framework of our research we examined the inner regional disparities of the Visegrad-Group (Czechia, Slovakia, Poland and Hungary) as well as the centre vs. periphery relationship, the dynamism of the economic growth and development and the chances of closing up. We have prepared the examination of the territorial differences at NUTS2 level territorial units of the V4 countries. On the basis of statistical data from the period from 1995 till 2014 and also of our hypotheses, we used mathematical-statistical methods in order to foresee the possible future trends of regional development in the studied countries.

According to our initial hypothesis there is a correlation between the regions' levels of development and the inner regional disparities. For our field of research it is possible to apply the Williamson-hypothesis, according to which the inner regional disparities are smaller in countries with higher GDP levels, while they are bigger in countries with lower GDPs.

In order to measure the regional disparities we used the indicator weighted logarithmic standard deviations (WLSD). In the first part of our study we examined the conformation of regional development and territorial differentiation in the respective countries, in the entire Visegrad-Group and also in all regions of the 28 member states of the European Union. In the second part of our study we tried to find the relationship between the territorial differentiation and the economic development in the mentioned three territorial relations.

MEASURING TERRITORIAL DISPARITIES

The notion of space is inseparable from the concept of inequality. The territorial disparities and regional catching up have always been in the centre of regional research. The Williamson-hypothesis deals with the known relationships of the economic closing up. It states that more developed regions grow more rapidly than the underdeveloped ones as their more developed resources can be utilized better and faster. If there were no appropriate measures implemented, the gap between the developed and underdeveloped regions would widen to such an extent that it would jeopardize the catching up, as to subsidize the lagging zones would take more and more resources away from the development.

One of the classic theories of this topic derives from Williamson, which is frequently cited even nowadays. Williamson's model is founded on the relationship between the levels of the economic development of countries and their inner regional disparities.

Williamson (1965) received a reverse U-shape curve when he plotted the inner territorial differentiation of a region in a function of its level of development (Fig.1.). This curve is applicable properly both if we examine the values of territorial disparities of regions at different levels of development in a given moment and calculated in the same way and also when we define the values in long-term series of these indicators on a given territory.
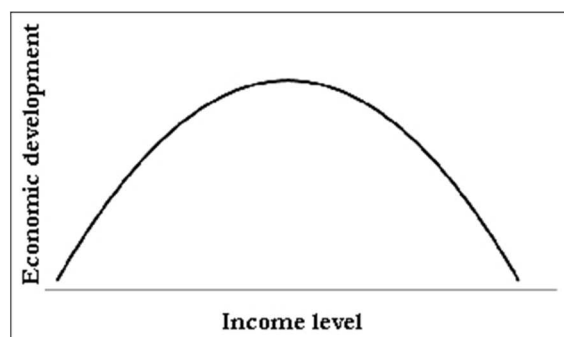

Fig. 1. Williamson's Curve
Source: Own compilation on the basis of Nemes Nagy (2005).

The Williamson-hypothesis has been verified by several successful international experiments and Hungarian (Davies and Hallett 2002, Nemes Nagy 2005, Kiss and Németh 2006 and Szörfi 2006). The authors could successfully verify (by using large sets of samples and long time series) that starting from a relatively lower state of economic development the growth of the level of development would in fact increase the territorial differences. But, after having reached a certain level of development the territorial differences will start to decrease.

In the case of the V4 (besides geographical, historical, cultural and political factors) Nyusztay (2014) pointed out the impacts of the economic cohesion. These four countries are all of limited size, modestly developed, open economies, relying on foreign trade and foreign resources.

Their economies in modern history have been handicapped by age-long deficits of modernization, and their four decades state-socialist planned economies also could not bring about the true modernization and closing up. Furthermore, by the end of the 1980's these countries were characterized by decreasing competitiveness, recession and indebtedness. Their economic cohesion, however, could be strengthened by being relatively interwoven in the framework of the CMEA (Council for Mutual Economic Assistance, Comecon), then, later, the need for restoration of the economic relationships after the trade between them fell suddenly and dramatically. Furthermore the logistical potentials deriving from their geographic proximity (transporting goods on the river Danube, railways or public roads) and the advantages of the economy of scale can also be considered as strengthening factors of economic cohesion (Nyusztay 2014).

In order to carry out our examinations we found it necessary to measure the level of regional incomes and income-disparities. There are various indicators for this purpose, some of which we briefly overview as follows.

MEASURING THE ECONOMIC GROWTH

There are many different methods for the examination of economic growth and competitiveness at the regional level. Enyedi (2009) mentioned the inter-related indicators of per capita GDP, productivity of labour and ratio of employment. The per capita (per inhabitant) output growth can mainly be applied when we wish to define the economic wealth (Lengyel and Rechnitzer 2004). However, to express the increase of the economic development the most widely accepted and most commonly used indicator is per capita GDP.

At first, in our study we examined the development of the economies at national levels on the basis of the average per capita GDP volume indexes, then the annual development of per capita GDP at NUTS 2 level in purchasing power standard (PPS).

MEASURING THE DISPARITIES OF INCOMES

In the bibliography a number of indicators of territorial disparities – standard deviation – can be found. Without the need for complexity we list a few of the most important ones as follows: range, dual index ("Frigyes Éltető"- index), standard deviation, relative deviation, logarithmic deviation, weighted logarithmic standard deviations (WLSD) and Hoover-index.

We decided to use the weighted logarithmic standard deviations (WLSD) as previous analyses (Lampertné Akócsi 2010) had proven that that the income-distribution in the regions of the Visegrad countries were characterized by excessively extreme values which means there was a significant gap between the income levels of the capital cities and the lagging regions. This distorting impact can well be filtered out by the WLSD indicator, therefore we applied the WLSD to detect the territorial disparities of incomes.

Furthermore in case of regional analyses the weighting seems to be one of the most difficult statistical problems (Dusek 2004).

When measuring the regional disparities the application of the indicator should be weighted by the number of population as the extent of the weighted disparities

will be bigger than when applying non-weighted indicators, hence the income disparities will be enlarged and be more visible (Major and Nemes Nagy 1999).

Weighted logarithmic standard deviations (WLSD) are a popular indicator, nowadays commonly used in international research. The practical advantage of logarithming is that it reduces the excessiveness of extreme values without modifying the sequence of the basic data, therefore one or two of these extreme values may have less influence on the indicated extents of disparities (Németh and Kiss 2007).

$$V = \sqrt{\frac{\sum_{i=1}^{n}\left(\log\frac{y_i}{y}\right)f_i}{\sum_{i=1}^{n}f_i}},$$

where y_i – the value of ith territory's specific indicator (per capita GDP), $\bar{y}$ – the weighted average of the above indicator, f_i – weight, the population of ith territory.

Its range of values: $[0, \infty]$ interval.

The WLSD is a standard deviation-type indicator, at the calculation of which – in spite of logarithming – the impacts of the extreme values at the two edges of the distribution (curve) are set off more strongly. A disadvantage of the WLSD is that its interpretation is difficult, even just for the fact that its range of values is not limited from above, but at the same time it is sensitive for the shifts in incomes of the settlements of income levels above and under the average (Németh and Kiss 2007).

RESULTS

Economic growth

At first, we examined the economic growth on the basis of per capita GDP values, calculated using current market prices (see Tab. 2 and Fig. 1). During the period before the EU-accession the growth rate of Czechia used to be the lowest, in the course of the examined four years the annual per capita GDP grew by 2.23% in average which remained behind the average economic growth rate of the present EU 28 by 1.13%. Before the EU accession and even after it for several years the average growth rate of Hungary fell behind by one percent to an average 3.96% so its economic performance became the worst within the Visegrad-group. The other three Visegrad countries showed positive growth. The most significant growth was experienced in Slovakia (7.2% annual average growth during the period of EU accession).

During the economic crisis the Czech and Hungarian economic growth rate decreased, furthermore the per capita GDP average volume index turned negative, which means that GDP shrank in average during the respective four years (2008-2012). Slovakia and Poland were able to sustain their economic growth but the growth rate decreased compared to the preceding years. Then the growth rate of Czechia slightly decreased while in Poland it grew a bit and in Slovakia it almost did not change.

During the recent, post-crisis years (2013 – 2015) the economic growth of the V4 countries is positive again, and in this period Hungary showed the highest economic growth rate.

In the course of the total 15 years of our examinations Poland's the growth rate was the highest. It exceeded the rate for the entire EU 28 by 0.5 percent.

Tab. 1. Increase / decrease of GDP per capita

	1998–2002	2003–2007	2008–2012	2013–2015	1998–2015
	Increases of GDP per capita (%)				
Czechia	2.23	5.23	-0.08	2.15	2.41
Hungary	4.27	3.69	-0.73	3.14	2.53
Poland	3.45	5.16	3.22	2.80	3.75
Slovakia	2.59	7.20	1.89	2.39	3.65
V4	3.13	5.32	1.08	2.62	3.08
EU28	3.36	5.34	1.37	2.74	3.25

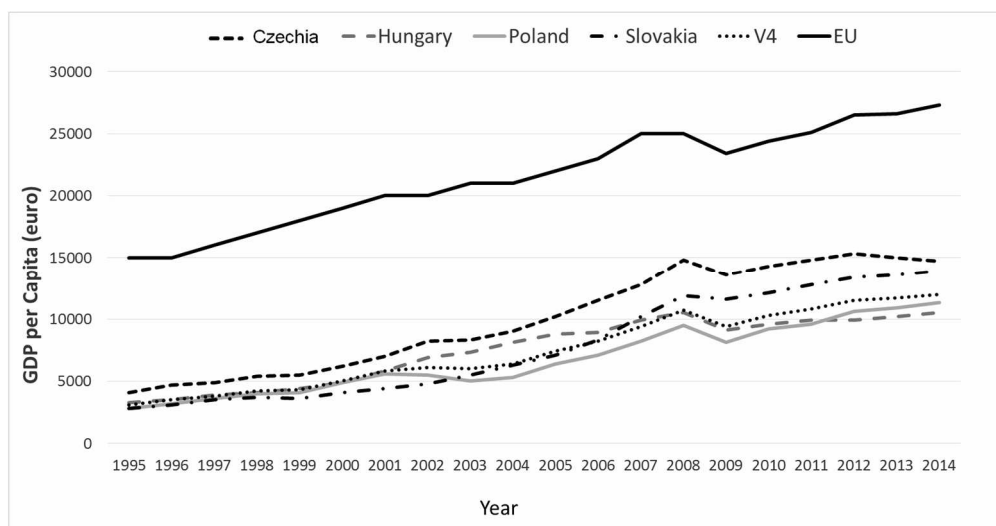Source: Own compilation on the basis of Eurostat Database (Eurostat 2015).

Fig. 2. The changes in GDP per capita
Source: Own compilation on the basis of Eurostat Database (Eurostat 2015).

Differentiation inside the European Union

We examined the regional differentiation within the respective countries, within the V4 group and also within the European Union in the course of a 17 years period of time between 1998 and 2015. To express the territorial differentiation inside the European Union we calculated and interpreted the WLSD index and starting from the basic idea of Williamson, we examined the inter-relations of the regional disparities and level of economic development of the respective countries. The index calculated in this way showed the extent to which the per capita GDP of each region differed from the per capita GDP average of the national averages.

During the examined period the inter-regional differences in their states of development decreased in the entire European Union. This decrease was a result of the consequent cohesion policy of the European Union, the goal of which had been the strengthening of the economic and social cohesion since 1986. The Treaty of Lisbon and the new strategy of the EU (Europe 2020) introduced a third dimension, namely the territorial cohesion. The territorial cohesion has been going on since the early 1990s. As a result of the latter the territorial differences decreased remarkably during the examined period in spite of the enlargement in 2004 and later on.

Plotting the calculated standard deviation indexes in a per capita GDP function and adjusting to the points a quadratic regression we receive the right side of the Williamson-curve. It refers to the fact that in the entire European Union the growing economic development generated decreasing territorial differentiation during the examined period (Fig. 3). We can draw the conclusion from the steepness of the curve that in the case of countries with higher per capita GDP the regional disparities are lower while in those ones where the gross domestic product generation is lower, the regional disparities are higher.
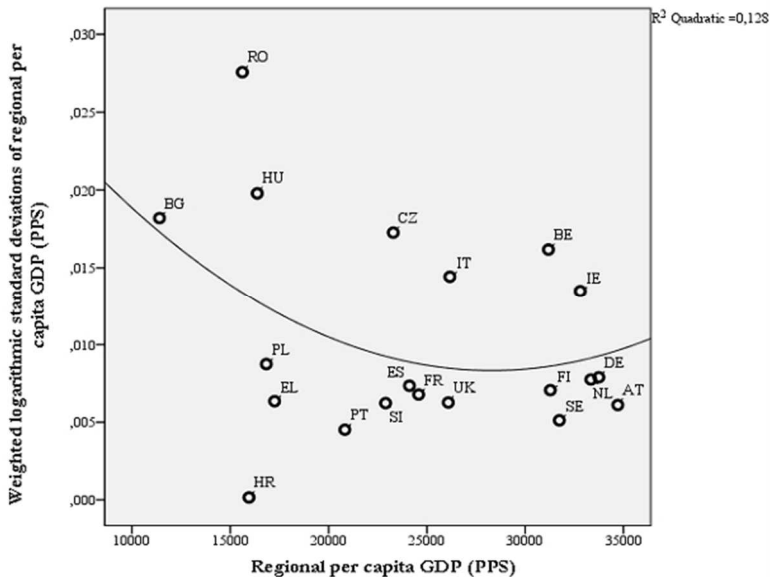

Fig. 3. Williamson Curve in the European Union

Source: Own compilation on the basis of Eurostat Database (Eurostat 2015)

So, Fig. 3 shows the classic Williamson curve on the basis of data from 2014. Our analysis was extended to 21 EU members as we excluded the smaller states which have only one NUTS 2 region (e.g. Estonia, Latvia, Lithuania and Malta) where regional deviation could not be calculated. Furthermore Slovakia's figure had to be omitted from the figure due to its extreme deviation index (0.049). On the basis of the curve we could expect lower regional disparities on the basis of Slovakia's economic development. The figure for Croatia also does not fit well to the regression curve, the reason – among others – can be the fact that the deviation value calculated from the two Croatian NUTS 2 regions cannot characterize well the intra-national disparities compared to other EU members.

The results of our research verify what Park and Brat (1995) stated that the territorial disparities are of different characters in the developing and in the developed countries. Their examinations had proven that the extent of territorial disparities can be considerably bigger in the cases of developing countries.

According to our calculations it can be verified that in the less developed Visegrad countries the economic development increased the territorial differentiation while in the entire European Union the growing incomes accompanied by the decrease of the territorial differences.

Territorial differences in the regions of Visegrad countries

We examined the territorial differentiation in each country of the V4 group on the basis of WLSD index as follows:

$$V_i = \sqrt{\frac{\sum_{j=1}^{n}\left(\log \frac{y_{ij}}{y_i}\right)^2 f_{ij}}{\sum_{j=1}^{n} f_{ij}}},$$

where V_i – standard deviation indicator of ith year, y_{ij} – per capita GDP of ith year, j^{th} region, f_{ij} – number of population of ith year and $\bar{y}_i$ – per capita GDP average of the given country in i^{th} year.

The index we calculated in this way could show the extent to which the per capita GDP of each region differed in average from the per capita GDP of the country in each year.

Having examined the average pace of annual development of the disparity index for the same periods it can be seen that during the examined 14 years the regional differentiation shows a very mixed image. Regarding the averages of the pre-accession years (2001 – 2004) the regional differences shrank only in Hungary, while in Slovakia the situation seemed to be close to stagnant. In the other two V4 countries the regional differences further grew, especially in Czechia, where the growth rate of the regional disparities was twice as high as it was altogether in the examined EU countries. After the EU accession the divergence of Czechia slowed down while the convergence in Hungary continued, on the basis of the standard deviation of per capita GDP at purchasing parity standard.

Tab. 2. Increases / decrease of regional disparities

	2001–2004	2005–2007	2008–2012	2013–2014	2001–2014
	Annual average growth of regional disparities (%)				
Czech Republic	4.79	3.33	-2.19	-2.05	1.01
Hungary	-1.73	-1.33	-2.55	-1.39	-1.89
Poland	2.10	5.51	-0.58	-2.30	1.24
Slovakia	0.09	2.97	4.15	-0.39	2.09
V4	1.31	2.62	-0.29	-1.53	0.61
EU	2.30	4.63	-0.004	-0.91	1.52

Source: Own calculation on the basis of Eurostat Database (Eurostat 2015).

During the years of the economic crisis (2008 – 2012) the regional disparities in Slovakia cannot be compared to any other V4 country. Slovakia was the only one in which the regional differences grew further in this period. During the crisis the annual growth rate of the regional disparities in Slovakia was considerably higher than the average in the V4 group and the EU members.

According to the most recent data the regional disparities started to decrease in all the four Visegrad countries and the convergence rate of Czechia, Poland and Hungary exceeded the EU average. In the course of the entire 14-year period it can be said that only Hungary had a long-lasting convergence process. The average rate is negative, while in the EU the regional disparities in economic development were growing.

The economic development level of the Polish regions seemed to approach the EU average after the accession, Poland could successfully use the possibilities opened by the EU Cohesion Policy to close the gaps between its regions (Fig. 4).
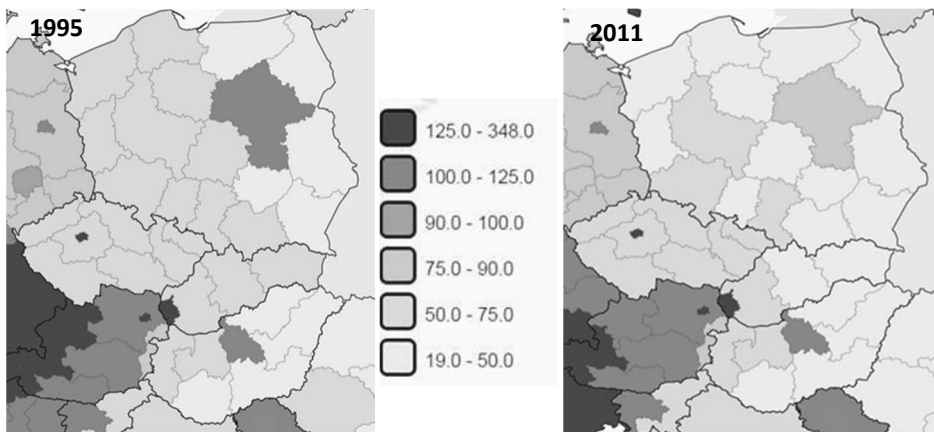

Fig. 4. Gross Domestic Product (GDP) per inhabitant in 1995 and 2011, using purchasing parity standards (PPS), by NUTS 2 regions (% of the EU average, EU = 100)

Source: http://ec.europa.eu/eurostat/web/regions/statistics-illustrated

By plotting the calculated standard deviation indexes by countries in the function of per capita GDP averages which expresses the states of territorial development we will receive the left side of the Williamson-curve. In the examined countries the territorial development or we can say the growing incomes were accompanied by changing extents of territorial differentiation.

The dots on Fig. 5 symbolize the examined years (2000 – 2014). By this figure we can work out how the regional disparities and regional development correlated in the V4 countries. Adjusting a quadratic function to the data for the respective countries clearly shows that the relationship – with the exception of Poland – is similar to a reversed Williamson curve (a reverse U-shape).
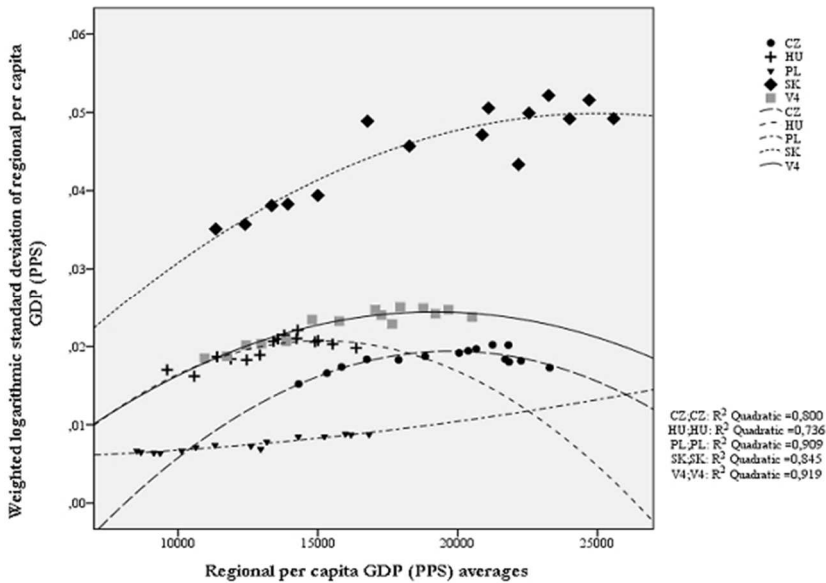
Fig. 5. Modified Williamson curve in Visegrad countries

Source: Own compilation on the basis of Eurostat Database (Eurostat 2015).

As Amos (1988) pointed out, when development starts in those regions which are rich in resources then they will attract more and more labour and capital from the less developed regions and this in a self-exciter way will lead to the further growth of disparities. In each of the four examined countries these developed regions are the regions of the capital cities, the development of which accelerated during the examined period and this generated even bigger regional differences inside the respective countries. This has been even more accelerated by the governments' policies which focused mainly on the acceleration of the overall national development in order to meet the criteria for EU-accession.

From among the Visegrad countries the examined pairs of indicators of Poland are located in the downstream wing of the Williamson curve, here the increase of the economic development was coupled by the systematic growth of the regional disparities and this process did not turn back till 2014. In the other three countries this trend seems to slow down and turn back. The inflexion point of the regression curve can be seen at 2005 – 2006 in the case of Czechia, in Hungary it was around 2010 – 2012 while in Slovakia it happened in 2013 (Fig. 5). So, in these years the process started by which the economic development was decoupled from the economic divergence of the regions.

During the pre-accession period the economic development in the four Visegrad countries grew with an annual average of 3.13% in total. The most recent data show that the economic development of the four countries is following a growing track, and the growth rate of the four states is becoming more balanced in total (Tab. 2).

Now we introduce the reverse Williamson curve of the Visegrad group together with several earlier EU members as follows.

Kertész (2004) underlined that if an underdeveloped economy starts converging towards the international averages then in the national economy either the inter-regional differences will grow bigger or the process of their closing up to each other would slow down.

If we adjust a quadratic regression function to the relationship of the average per capita GDP and the territorial differentiation, besides the left-side, rising part of the Williamson-curve we will receive also the negative (descending) part of the curve. It means that economic catching up of these countries to each other has started since 2011 (Fig. 6).
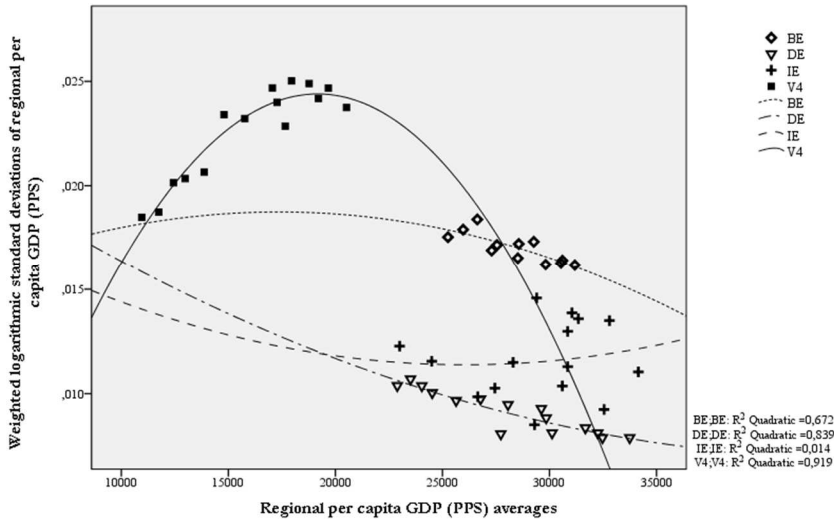

Fig. 6. Modified Williamson curve in the Visegrad group and in several West European countries

Source: Own compilation on the basis of Eurostat Database (Eurostat 2015).

As a result of the economic growth in the V4 countries the regional disparities in terms of economic development grew considerably, but this trend seems to stop and turn back after reaching a certain level of development.

The differences in the level of development can be illustrated by the curves of Belgium, Germany and Ireland which are staying in the descending part of the curve. This means in their cases the increase of economic development will be coupled by decreasing regional disparities. The V4 countries' growth track is much steeper while the more developed regions could proceed on a more balanced track during the recent 15 years.

CONCLUSION

In our research we examined the peculiar course of development of the Visegrad Four and in the framework of this we analysed the state of regional disparities, the centre vs. periphery relationship of the recent years at the macro-regions (NUTS 2) level.

With the applied mathematical-statistical analytical methods, based mainly on the Williamson-hypothesis we could unequivocally verify our hypothesis and other assumptions. Beside all this our results seem to be confirmed by empirical information and facts as well.

We consider that our initial hypothesis (the claim that there was a relationship between the state of economic development of the regions and their inner regional disparities) has been verified. In fact in countries with higher GDPs the internal territorial disparities are smaller while in countries with lower GDPs the internal territorial disparities are higher.

Our examinations verified our assumption that the developed regions could progress on a smoother growth track than the underdeveloped ones.

We also wished to verify that after the EU-accession the growth conditions of the V4 countries improved remarkably and the territorial disparities decreased. This we could prove only partially. In the case of the V4 countries the beginning of these positive processes was delayed by several years. They started in approximately 2007 but soon after, in the autumn of 2008, they stopped because of the global economic crisis. The EU funds for regional development (Cohesion Fund, ERDF, ESF, etc.), however, can provide financial resources to a remarkable extent in the current budgetary period (2014 – 2020) and most of the V4 regions are eligible to use these funds.

The economic growth of the V4 countries was less dynamic than the EU average. According to our examinations there was 3.25% average growth in the EU 28 economic development between 1998 and 2015 while the average of V4 was only 3.08%.

Among the V4 countries the average growth rates of Poland (3.75%) and Slovakia (3.65) exceeded the EU 28 average. It is noticeable that in the case of these two countries the economic growth was positive and exceeded the four-year EU average even during the period (2008 – 2012) when the impacts of the global economic crisis were the strongest. However in the case of Slovakia the impressive economic growth was coupled with a further increase of the regional disparities.

Czechia and Hungary were hit by the global economic crisis to a bigger extent, but the growth indicators of these two countries remained behind the EU averages even after the EU accession (2004). In the case of Hungary it is a positive sign that in the recent years (2013 – 2015) its economic growth (3.14%) became stronger exceeding the averages of both the EU 28 and V4 in this period. However, it is still an open question whether this growth track can be sustainable, namely can she keep on progressing along a stable growth track reaching or even exceeding the EU average growth rate.

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VÝVOJ REGIONÁLNYCH DISPARÍT V KRAJINÁCH VYŠEHRADSKEJ SKUPINY V ROKOCH 1995 – 2014

Podľa Williamsonovej hypotézy, ktorá sa zaoberá známymi koreláciami ekonomickej konvergencie, rastú rozvinuté regióny rýchlejšie ako menej rozvinuté, pretože ich rozvojové zdroje sa využívajú lepšie a rýchlejším spôsobom. Bez vhodných opatrení sa rozdiely zväčšia do takej miery, že to ohrozí konvergenciu, pretože udržiavanie upadajúcich oblastí si bude vyžadovať viac zdrojov určených na rozvoj.

Cieľom tohto príspevku je preskúmať regionálne disparity a vzájomné vzťahy diferenciácie a rozvoja v krajinách Vyšehradskej skupiny (V4), ako aj celej Európskej únie. Vyšehradská skupina (Česko, Maďarsko, Poľsko a Slovensko) nie je len umelo vytvoreným regiónom, ale môže byť charakterizovaná stáročiami trvajúcou ekonomickou, kultúrnou a politickou spoluprácou. Jestvuje bohatá medzinárodná literatúra zaoberajúca sa regionálnymi disparitami a charakteristickými sociálnymi a ekonomickými faktormi v krajinách Vyšehradskej skupiny, a preto príspevok stručne zhŕňa výsledky a závery niekoľkých nedávno publikovaných významných štúdií z tejto oblasti.

Podľa našej hypotézy existuje spojitosť medzi hospodárskym rozvojom regiónov a veľkosťou vnútroregionálnych disparít, takže Williamsonova hypotéza môže byť overená na nami skúmanom území. Na meranie územných rozdielov sme použili váženú logaritmickú smerodajnú odchýlku. V prvej časti našej štúdie sme skúmali štruktúru územných rozdielov krajín EÚ a následne samostatne aj krajín V4. Druhá časť štúdie sa zaoberá skúmaním spojitosti medzi HDP na obyvateľa a indexom regionálnych disparít skúmaných regiónov. Podľa našej hypotézy existuje korelácia medzi diferenciáciou regiónov a stupňom rozvoja zodpovedajúca Williamsonovej krivke. Čím je vyšší HDP na obyvateľa, tým menšie sú vnútorné disparity. Na overenie uvedenej hypotézy sme analýzu nakoniec rozšírili na všetky regióny EÚ.