
Martin Mariš**Evolution of economic imbalance in regional structure of V4 countries***Vývoj ekonomických disparít v regionálnej štruktúre krajín V4*

Abstract Examination of regional imbalance in territory is warm object of interest from the point of view of policymakers, researchers, academics, entrepreneurs and even ordinary people. Its impact on entire economy is really far-reaching. It encourages unwilling movements of productive factors, mainly labour which seeks for better income and livelihood and capital which craves for higher yield. The result is spontaneous drain of economic productive resources from region and rising claims for subsidizing from state. At present V4 countries are facing to regional imbalance on its territory since establishing the market economy, which keeps naturally growth. Political representatives of V4 countries are trying to tackle these disparities, which are spreading mainly between rural and urbanized regions, by offering new economic policy tools and measures. Their effort from the point of view citizens, academics and other professionals is considering as unsatisfactory. Globalization and internationalization keeps the regions under pressure and demands from policymakers for appropriate measures and results are rising.

Key words regional imbalance - regional policy - transitive period - V4 countries

Abstrakt Skúmanie regionálnej nerovnováhy v území je horúcim objektom záujmu politikov, vedcov, akademikov, podnikateľov a dokonca aj obyčajných ľudí. Jej dopad na celú ekonomiku je naozaj ďalekosiahly. Podnecuje nežiadaný pohyb výrobných faktorov, najmä práce, ktorá si hľadá lepší príjem pre lepšie živobytie a kapitálu, ktorý smeruje k vyššiemu výnosu. Výsledkom je spontánny odliv ekonomicky produktívnych zdrojov z regiónu a rastúce nároky na dotovanie od štátu. V súčasnej dobe krajiny V4 čelia regionálnej nerovnováhe na svojom území od existencie trhového hospodárstva, ktoré umožňuje prirodzený rast. Vlády krajín V4 sa snažia potlačiť tieto rozdiely, ktoré sa rozvíjajú najmä medzi vidieckymi a urbanizovanými regiónmi, prostredníctvom navrhovania nových hospodárskych nástrojov a opatrení. Ich úsilie z pohľadu občanov, akademikov a iných expertov je považované za nedostatočné. Globalizácia a internacionalizácia udržiava regióny pod tlakom a nároky po adekvátnych opatreniach a výsledkoch od vlád rastú.

Kľúčové slová regionálna nerovnováha - regionálna politika - tranzitívne obdobie - krajiny V4

V4 countries as former satellite states of Soviet union, during the transformation period have overcome numerous obstacles on its trajectory of growth and gaining the competitiveness (Enyedi, G., 1990, Csiszarik-Kocsir, Á. et. al, 2013). In the strongly centralized political power system there was no room for regionalism or local initiatives. Regional development targets, e.g. industrial deconcentration, were formulated according to sectoral interests rather than local (regional) interests or desires.

After 1989 they began on building market environment. In these sense we are thinking about structural changes in economy and on labour market. Economic structure of country and its labour market was submitted by process of self-adaptation, as response at competitive pressure of western countries and emerging market economies. Self-adaptation itself, namely on the field of production factors was fairly inelastic in most regions of V4 countries, what became the ground of regional imbalance. The post 1989 economic transformation turned earlier industrial strongholds into areas of comparative disadvantage, changed the relation between public and private actors in favour of the latter and cities and regions became areas for the location of private investment instead of objects of public planning (Lorenzen, A., 1996).

The V4 countries during its transitive period invested amount of resources for mitigating of the imbalance and general social- economic convergence of regions towards to western countries of EU (Balchin, P. - Sýkora, L., 1997). Inequalities increased with the decline in traditional industrial regions and foreign investments targeted on capital cities, selected regional centres and western border regions. Generally it can be stated that most important object of regional policy V4 countries remains spatial remote and economic peripheral regions, which are still facing low level of capital inflows, or emigration of labour. (Sýkora, L., 1994) The very liberal thinking of first transition years was characterized by low political priority of the central government given to physical planning, regional policy, housing policy, etc. The absence of comprehensive national spatial development strategy and consistent regional policy, changes in the local and regional government system and disputes about new planning legislation created contextual and institutional uncertainty.

Public administration occupies a significant place in the system of all elements of social development. Moreover, effective public administration is one of the conditions of EU membership. Public sector is a substantial part of economic system and individual countries differ only by its extent, way of organisation and quality of its functioning (Marišová, E., 2010).

In the process of regional planning and deciding about formulation and implementation of appropriate tools of regional policy is inevitable to come out from current situation of regions, including its evolution during the last period. It is necessary to submit regional structure of V4 countries by examination from the point of development of horizontal and structural indicators, which are able to measure and describe facts. Due to them it is able to find out real facts and propose appropriate measures for gradual creating of market balance in entire regional framework of V4 countries.

Methodology

In the paper we will be focusing on examination of prevalence of regional disparities in two times periods 1990 and 2009. For the base year 1990 we use data prepared by OECD and determined index of imbalance based on GDP/capita. For the year 2009 we use statistical data based on the same indicator and self computed indicator with similar explanatory value, which enables to compare both times periods.

In this area we will focus on analysis of *concentration ratios* two key variables from the point of economic vitality of region – *capital and human resources*. In term of capital we mean the sum of all physical goods produces in given time period, expressed by regional GDP in current prices. In term of human resources we mean the population of region in given time period. An appropriate indicator of concentration level is *coefficient of concentration and concentration ratio*, expressed from statistical analysis of data. For practical visualization *Lorenz curve* will shown on. Analysis of empirical data we perform in the analogue sequence for each region of V4 countries at NUTS III.

Coefficient of concentration represents the proportion of area bounded by Lorenz curve and diagonal of triangle area, bounded by diagonal, x-axis and the vertical line on the x axis point 1.

$$K_k = \frac{P}{T} = \frac{0,5 - S}{0,5} = 1 - 2S$$

where P is area bounded by diagonal and Lorenz curve

T – triangle area; T = 0,5

S = T – P

The area of „S” can be roughly calculated as sum of areas of rectangles whose sides are f_i and $\frac{1}{2} (Z_{i-1} + Z_i)$, by substituting into the relation we get $K_k = 1 - \sum_{i=1}^m f_i (Z_{i-1} + Z_i)$

Concentration ratio is an average of the relative differences between the cumulative relative abundance of groups and the groups cumulative total values in a statistical character set.

$$P_k = \frac{\sum_{i=1}^{m-1} D_i F_i}{\sum_{i=1}^{m-1} F_i} = \frac{\sum_{i=1}^{m-1} \frac{F_i - Z_i}{F_i} F_i}{\sum_{i=1}^{m-1} F_i} = \frac{\sum_{i=1}^{m-1} (F_i - Z_i)}{\sum_{i=1}^{m-1} F_i}$$

Both assuming a value in the interval (0,1) the more closer to one, the concentration is stronger. Our sample and in this case identical with basic sample of regions V4 countries, for purpose of our research we divided into intervals. As a basis for determining the interval frequency distribution of regional GDP of each region, became the national median of regional GDP of V4 countries, expressed in US currency in 2009. The number and width of the interval range we set according of our needs.

In conclusion, the point is to verify the hypothesis that the expansion of regional disparities in the reporting period based on regional growth gap between the most developed and the most lagging regions of V4 countries. As an indicator we consider regional GDP/capita in 2009 for the V4 regions.

Hypothesis we try to check from the sample of regions of V4 countries. In essence, the analysis will be based on an assessment of descriptive characteristics of the sample – moments. In practice, we use third moment of standard variable *skewness* $\mu_{t,3}$

To test normality of the distribution of the sample we use test for normality based on selection *skewness and D'Agostino test*.

The selection skewness can be characterized as follows:

$$A_3 = \frac{\frac{1}{n} \sum_{i=1}^n (X_i - M)^3}{\left[\sqrt{\frac{1}{n} \sum_{i=1}^n (X_i - M)^2} \right]^3}$$

Can be shown that the choice of the normal distribution applies:

$$E(A_3) = 0, \quad D(A_3) = \frac{6(n-2)}{(n+1)(n+3)}$$

Test based on skewness rejects the hypothesis of normal distribution on asymptotic significance level α if:

$$U_3 = \frac{|A_3|}{\sqrt{D(A_3)}} \geq u_{1-\alpha/2}$$

The D'Agostino test can be characterized by using auxiliary variables as follows:

$$b = \frac{3(n^2 + 27n - 70)(n+1)(n+3)}{(n-2)(n+5)(n+7)(n+9)}$$

$$W^2 = \sqrt{2(b-1)} - 1$$

$$d = \frac{1}{\sqrt{\ln W}}, \quad a = \sqrt{\frac{2}{W^2 - 1}}$$

Test characteristics is

$$Z_3 = d \cdot \ln \left[\frac{U_3}{a} + \sqrt{\left(\frac{U_3}{a} \right)^2 + 1} \right]$$

It is valid that it has approximately normal distribution $N(0,1)$. For $n > 8$ we reject hypothesis of normal distribution if $|Z_3| \geq u_{1-\alpha/2}$.

Basically we would like to demonstrate whether the sample meets the assumption of normal distribution. Normal distribution assumes that the statistical units of surveyed random variable will be concentrated in the vicinity of the sample characteristics, which may be average or median. This case will be approximated as a balance in the area in the context of V4 countries. In the event that the normal distribution can be considered that the imbalance between the regions in terms of the ratio of GDP/capita V4 is statistically insignificant. We formulate hypothesis:

H_0 = in the regional structure of the V4 countries, there is no statistically proven more significant imbalance between regions of the V4 countries in terms of the ratio GDP/capita.

H_1 = in the regional structure of the V4 countries, there is a statistically proven more significant imbalance between regions of the V4 countries in terms of the ratio GDP/capita.

Scientific work

Regions of V4 countries based on regional GDP and population

Figure 1

Range of Med. %	Population	Regional GDP in mil. USD	Relative frequency %	Cumulative and rel. Freq.	Share GDP Z_i	$F_i - Z_i$	$(Z_{i-1} + Z_i)f_i$
0 – 50	3639043	42589	5,76	5,76	3,405928	2,35	19,60334
50 - 100	19644633	274596	31,07	36,83	25,366	11,46	893,96
100 - 150	22620141	394326	35,78	72,60	56,90	15,70	2943,26
150 - 200	3524176	79072	5,57	78,18	63,22	14,95	669,58
>200	13797550	459854	21,82	100,00	100,00	x	3562,01
Sum	63225543	1250437	100,00	x	x	44,47	8088,41
				193,36			

Source: Own edition, based on data of statistical office of V4 countries: www.statistics.sk, www.ksh.hu, www.stat.gov.pl, www.czso.cz

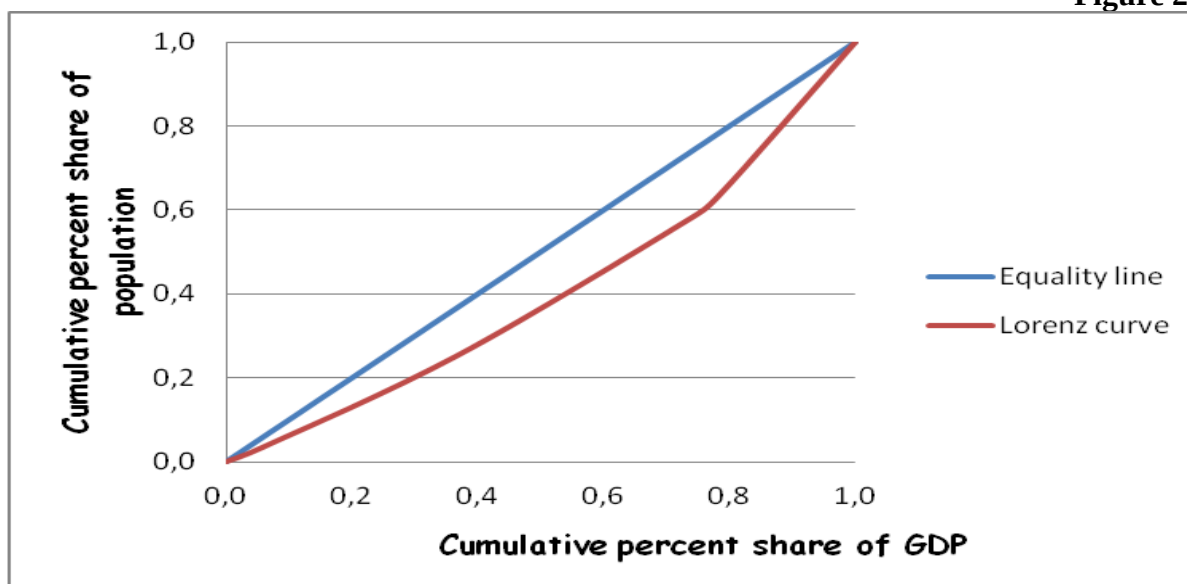
$$R_k = \frac{44,47}{193,36} = 0,167$$

analogical

$$K_k = 1 - 0,8088 \cong 0,191$$

Lorenz curve, V4 countries

Figure 2



Source: Own edition, based on data of figure 1.

When testing the hypothesis of normally distributed statistical sample describing regional GDP/capita at Nuts III of V4 countries we proceed as follows.

Skewness:

$$A_3 = \frac{\frac{1}{108} \cdot 1,522748 \cdot 10^{14}}{\left[\sqrt{\frac{1}{108} \cdot 7,019542 \cdot 10^9} \right]^3} = \frac{1,409952 \cdot 10^{12}}{5,239955 \cdot 10^{11}} = 2,69077 \text{ Variance:}$$

$$D(A_3) = \frac{6(108 - 2)}{(108 + 1)(108 + 3)} = 0,052566$$

Test based on skewness:

$$U_3 = \frac{|2,69077|}{\sqrt{0,052566}} = 11,736 \geq 1,96$$

D'Agostino test:

$$b = \frac{3(n^2 + 27n - 70)(n+1)(n+3)}{(n-2)(n+5)(n+7)(n+9)} = 3,2679$$

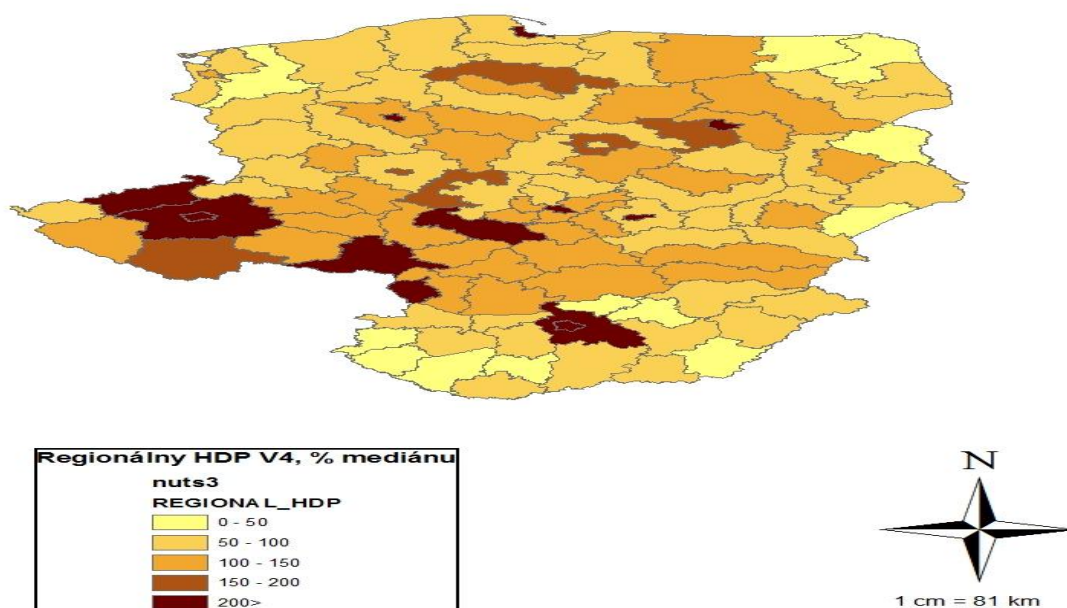
$$W^2 = \sqrt{2(b - 1)} - 1 = 1,1297$$

$$d = \frac{1}{\sqrt{\ln W}} = 4,0489; \quad a = \sqrt{\frac{2}{W^2 - 1}} = 3,9261$$

$$Z_3 = d \cdot \ln \left[\frac{U_3}{a} + \sqrt{\left(\frac{U_3}{a} \right)^2 + 1} \right] = 7,349033 \geq 1,96$$

Empirical results have shown us, that previously calculated rate of skewness indicates a high degree of skewness. The sample is skewed to the left-side asymmetry, which means that the frequency is more concentrated at lower values and character towards higher values are declining. That selection and characterization together with test indicates a relatively heterogeneous set that speaks about spatial imbalance in the territory of the regions of V4 countries. In conclusion, the results of both tests values, far outweigh the tabular value of the normal distribution $u_{1-\alpha/2} = 1,96$; i.e. at the asymptotic significance level $\alpha = 0,05$ accept the alternative hypothesis of the existence of statistically significant imbalances in the overall regional structure of the V4 countries. Furthermore, according to the data resulting from the evaluation of the regional imbalance OECD regions of V4 countries in early 1990, regional imbalance ranged from 0,08 to 0,15 points, according to index imbalance GDP/capita on NUTS II level (OECD, 2011).

In terms of results shown by Lorenz curves, it can be stated that from the beginning, at lower values of the character area between the Lorenz curve and diagonal triangle is narrow and nearly equal to the diagonal, which is more uniformity of distribution of GDP among the population in the regions of V4 countries. At higher values of character, the area gradually increases and the Lorenz curve is close to 1. Intervals of top division in all V4 countries are developed regions with significantly greater proportions in the creation of regional GDP

Regional GDP distribution among V4 countries**Figure 3**

Source: Own edition, based on data of figure 1.

The Conclusion

These regions are in almost all cases, the capital city region and adjacent areas, allowing the concentration of labour and capital in a smaller space. Indeed, most of these regions are also characterized by higher levels of the population, which relatively statistically balances regional imbalances. It can be concluded that the mechanical movement of the population is generally determined by the jobs and wages, which helps to increase the concentration of labour and capital just in developed regions. On the other hand, barriers of the labour mobility steadily diminish and contribute to the displacement of marginalized regions, thus reducing the economic and population share in the total GDP of the country.

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