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**The dynamics of regional inequalities and economic growth in Central and Eastern Europe**

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# The dynamics of regional inequalities and economic growth in Central and Eastern Europe

Wojciech Kisiała<sup>1</sup>, Katarzyna Suszyńska<sup>2</sup>

## Abstract

**Research background:** The processes of economic convergence observed in many developing countries are characterized by reduction of economic differences on the between-country level, which are accompanied by growing internal economic inequalities. This may stem from the fact that in catching-up countries, a more dynamic growth is observed in the economically strongest regions, which is initially reflected in spatial polarization and increasing regional inequalities. However, just as the countries reach higher levels of development, the diffusion of growth-inducing impulses to the remaining areas should lead to the spatial equalizing of the development levels and reducing regional inequalities.

**Purpose of the article:** The aim of the paper is to determine the relations between the level of economic growth in Central and Eastern European (CEE) countries and observed economic inequalities. The theoretical frame adopted to describe and explain those relations was the so-called Williamson hypothesis in which the relation between the scale of regional inequalities and economic growth is illustrated by a curve shaped like an inverted U.

**Methodology/methods:** The research procedure was intended to verify Williamson hypothesis by estimating parabolic econometric models. Indicators of economic growth along with measure of regional inequalities (Williamson's coefficient of variation) were used in the regression modeling. The research period spans over the years 1995-2014.

**Findings & Value added:** In the light of the conducted study of CEE countries, it was possible to observe both convergence symptoms as well as divergence tendencies. It can be thus stated that the analyzed CEE countries followed a similar path to the one observed earlier by Williamson in other developing countries. However, the analyses conducted by the authors on the national and regional levels of CEE countries were equivocal and did not fully support the theoretical assumptions of Williamson's hypothesis.

**Keywords:** *regional inequalities; economic growth; Williamson hypothesis; econometric modeling; Central and Eastern Europe*

**JEL Classification:** *C51, O11, O47, R11*

## Introduction

The dynamics of spatial economic inequalities has long been of interest to economists endeavoring to identify tendencies and explain mechanisms of convergence or polarization of state or regional economies. The issue of economic convergence or divergence although commonly addressed in empirical verification procedures, still gives rise to controversy and basically remains unsolved. The supporters of the convergence hypothesis argue on the basis of neoclassical growth models, that countries (regions) with lower per capita GDP usually achieve higher rates of economic growth, which leads to reduction of economic disparities (Barro, 1991). On the other hand, equally popular are the post Keynesian concepts (promoted by e.g. Myrdal (1957)), which stipulate that economic growth is a spatially cumulative phenomenon. This means that rich countries or regions thanks to accumulated capital and

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access to resources attract next business activities thus diminishing the possibilities of growth for under-developed areas. Although the latter can benefit from the so called spillover effect (i.e. growth impulses induced by expansion of the thriving economies), the benefits may be upended by the backwash effects (negative economic effects inhibiting growth, such as drain of workforce, capital, products and services to the privileged areas). These processes tend to lead to an increase of economic inequalities, which is often referred to as economic divergence.

The heated scientific debate that has been carried out for years is currently gaining special political and practical importance. It is connected to EU regional policy aimed at guaranteeing economic and social cohesion within the Community by reducing spatial imbalances. Pursuing cohesion policy by definition should lead to obtaining convergence, and the role of its institutions is to provide for such distribution of European funds so as to secure equalization of profound differences in growth with respect to spatial distribution (Markowska-Przybyła, 2010).

However, it is not stipulated clearly in the Treaty on which level of territorial organization the inequalities in socioeconomic growth should be rectified – state or interregional (or perhaps even intraregional). This confusion appears to be of significant importance considering the fact that research papers representing new economic geography approach indicate (see e.g. Martin & Ottaviano, 2001; Brakman *et al.*, 2005) that growing dynamics in a given spatial-economic system entails an increase in discrepancies between its parts (Kisiała *et al.*, 2015).

This situation may stem from the fact that in developing countries a more dynamic growth of economically strongest regions can be observed, which is initially reflected by spatial polarization and increasing regional inequalities. However, with time, as the economies are upgraded to higher levels of growth, the processes of growth impulse diffusion to other areas should result in spatial equilibration of growth levels and a decrease of regional disparities (Domański, 2012).

In this context, the aim of the paper was defined as determining the relationship between the level of economic growth and observed economic disparities in Central and Eastern European (CEE) countries. The theoretical frame adopted to describe and explain those relations was the so-called Williamson's hypothesis (1965) in which the relation between the scale of regional inequalities and economic growth is illustrated by a curve shaped like a parabola opening to the bottom.

The time series of the study covered the period of 1995-2014 (analysis on the state level) and 2000-2014 (analysis on the regional level). The time span was determined by availability of statistical data.

### **Williamson's hypothesis of an inverse U-shape curve**

The first attempts to identify patterns in economic inequality evolution were based on research concerning households' income distribution. One of the most wide-spread prognosis of this type was formed by Kuznets (1955) who conjectured that there was a link between the level of inequality in allocation of income between citizens, and the level of economic growth. The results of his research showed that the graphic representation of the subject interdependence was bell-shaped. In the early phase of countries' economic growth process (during industrialization and urbanization of agricultural societies) the disparities increased, then they leveled out to be considerably reduced in the maturity phase of well-developed industrialized economies (see e.g. Barrios & Strobl, 2009; Piketty, 2015).

The spatial dimension of the interdependency described above was introduced by Williamson (1965) who had thoroughly investigated the empirical validity of Kuznetz curve. On replacing the measure of personal income diversity with regional inequality rate, he observed that the regional differentiation was higher in under-developed countries, and lower in well-developed ones. Furthermore, he noted that with time the regional inequalities in the first group of countries showed a growing tendency, while in the latter – they tended to decrease. As a result, he conjectured that there was a link between regional convergence and divergence processes, and the phases of economic growth of the country, and described the relation with an inverse U-shape curve (see Figure 1).

**Figure 1.** Graphic representation of Williamson's hypothesis with an inverse U-shape curve



*Source: own elaboration based on Williamson (1965) and Szörfi (2007).*

In the initial phases of growth of the national economy, interregional differences increased while in the subsequent stages – interregional convergence occurred. Such interdependency could be explained by the fact that in under-developed countries there were few regions that boasted the characteristics of the so called “growth poles”. In these areas, due to high concentration of production factors and better technical equipment of work, one could observe growing productivity and increased pace of development in comparison to other regions of the country. Along with the national growth though, more and more regions gained access to growth factors, such as capital, technology, and new markets. This could be due to the growing production cost and increasing barriers to growth in well-developed regions (e.g. access to infrastructure and public utilities, environmental pollution, lack of new land for development), that accompanied by growing production factor mobility, knowledge and technology diffusion, as well as peoples’ attitudes resulted in placing investments in under-developed regions. Exceeding the growth threshold by under-developed regions triggered convergence processes in the economy structure, workforce efficiency and income per capita (Gawlikowska-Hueckel & Zielińska-Głębocka, 2004; Wang & Ge, 2004; Szörfi, 2007; Barrios & Strobl, 2009).

Williamson (1965) emphasized the two development gaps characteristic for developing countries. The first referred to differences in the level of growth of a country in comparison to well-developed countries. The second reflected the internal economic inequalities observable within the “catching-up” country. According to the mechanism explained by Williamson’s hypothesis, achieving the between-country convergence entailed an increase in regional disparities in the initial phase, and only in the long run an internal development gap was levelled out and regional cohesion obtained.

## Research methodology

The testing of Williamson's hypothesis was conducted by means of econometric modeling. The spatial scope of analysis covered Central Eastern European countries (CEE) that joined the EU in 2004 or later (Bulgaria, Croatia, the Czech Republic, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia, Slovenia and Hungary).

The research started with the selection of variables representing the level of economic growth of countries and their regional disparities (on the state and regional level NUTS 3). The statistical data on the economic growth of countries and regions (GDP per capita) were obtained from the Statistical Office of the European Union Eurostat. A version of the rate based on purchasing power standard (PPS) was used, which facilitated between-country comparison with respect to the level of real income.

As a measure of between-country and intra-national economic inequality, a weighted coefficient of variation  $V_w$  was adopted after Williamson (1965):

$$V_w = \frac{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \frac{l_i}{L}}}{\bar{x}}, \text{ where:}$$

$x_i$  – GDP per capita (in PPS) of the  $i^{\text{th}}$  state (region),

$\bar{x}$  – average GDP *per capita* (in PPS) calculated for all analyzed countries (regions),

$l_i$  – population of the  $i^{\text{th}}$  country (region),

$L$  – total population of all analyzed countries (regions).

Due to the parabolic shape of Williamson's inverse curve, in the course of the research parameters of the second degree polynomial were estimated, using the following analytical form of the regression function:

$$y_t = b_0 + b_1 x_t + b_2 x_t^2 \quad (b_2 \neq 0).$$

This means that Williamson's coefficient of variation in year  $t$  (dependent variable  $y$ ) was explained by the quadratic function of GDP per capita in selected units in year  $t$  (independent variable  $x$ ). The estimation of regression equation parameters was done by the least squares method, according to the rules accepted for linear models with respect to parameters.

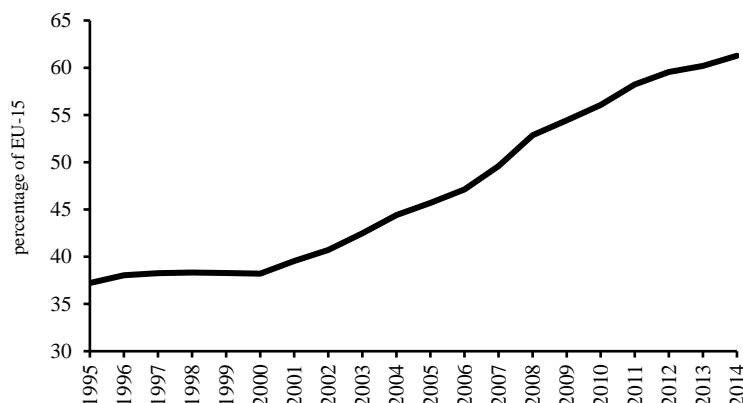
The verification of Williamson's hypothesis comprehended the analysis of configuration of points in scatterplots (spot charts depicting pairs of analyzed variables in subsequent years). It also embraced testing the values and statistical significance of the estimators of the regression function parameters ( $b_1$  and  $b_2$ ). When the estimator  $b_2$  was negative and statistically significant, the function had an inverse U shape, which was in line with Williamson's hypothesis. In any other case, ( $b_2 > 0$  and statistically significant), the chart was U-shaped. The lack of statistical significance of the estimate of parameters indicated the incorrect analytical form of the model.

## Research findings

The conducted analysis showed that in the analyzed period, the level of economic development of the CEE countries approached the level that had been previously reached by EU-15 countries (member countries in the EU prior to the accession of ten countries in 2004). In the years 1995-2014, the average annual growth rate of GDP per capita in the countries surveyed was 5.5%, whereas in the EU-15 it was a meager 2.8%. In the first year of analysis

(1995), GDP per capita in CEE accounted for only 37% of the EU-15 average. By 2014, this relationship increased to 61% (see Figure 2).

**Figure 2.** Dynamics of the economic growth in CEE (PPS per inhabitant in percentage of the EU-15 average)



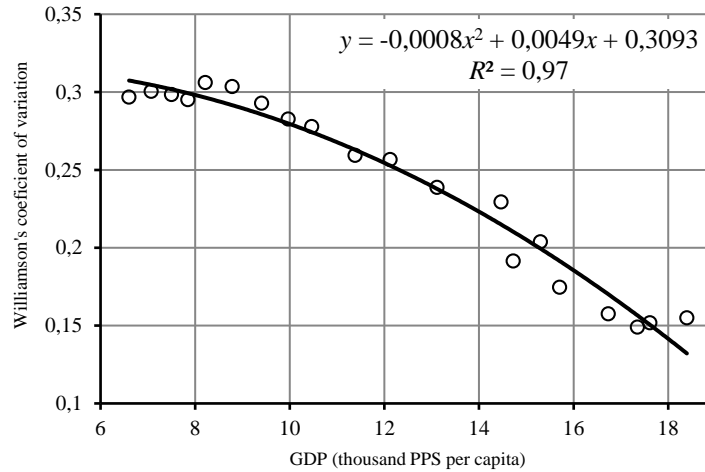
*Source: own elaboration based on Eurostat*

These results demonstrated that the CEE countries entered the path of external convergence with the countries of the “old” Union. The systemic transformation and the EU membership entailed reducing the development gap at the national level. As a result, in the next part of the study it was examined whether the cross-country convergence underwent in accordance with the mechanism described by Williamson.

The regression modeling aimed at determining the statistical parameters of the relationship between the economic growth and disparities and verifying Williamson's hypothesis were carried out for the CEE countries first on the national level, and then NUTS3 level.

During the period under analysis, the CEE economies continued to increase (from 6.6 to 18.3 thousand PPS). Along with the economic growth, the disproportions between the countries surveyed declined substantially. Williamson's coefficient decreased from 0.3 in 1995 to 0.15 in 2014 (see Figure 3). At the beginning of the analyzed period, the variation value was stable oscillating around 0.3. In 2001 it started to decline. Certain deviations from the prevailing downward trend were noted in connection with the economic crisis that began in 2008. The economies of the surveyed countries responded differently to the global shock – large decreases in economic activity were noted in the Baltic States (Estonia, Latvia, Lithuania), much smaller in the Czech Republic and Hungary. In Poland, the increase of GDP per capita was unimpeded.

**Figure 3.** Relation between economic growth and inequalities in CEE countries

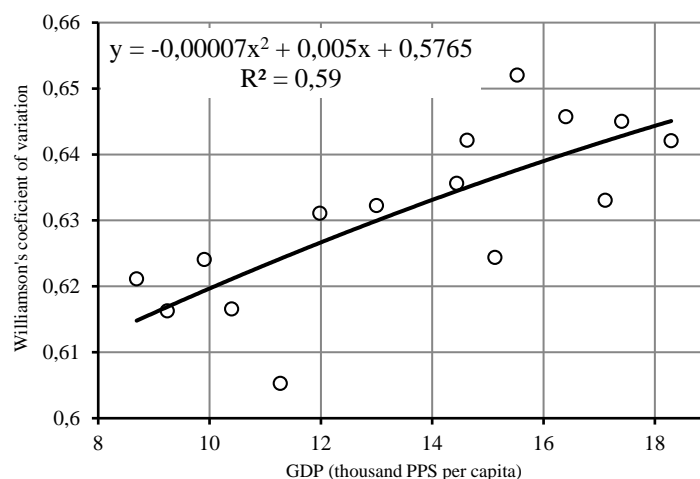


*Source: own elaboration based on Eurostat*

The obtained statistical data allowed for estimation of the parabolic regression function opening downwards ( $b_2 < 0$ ) as shown in Figure 3. The coefficient of determination for the estimated model was 0.97, indicating a very good match between empirical data and data obtained from regression function. The estimation of parameter  $b_2$  was statistically different from zero ( $p$ -value = 0.0025). Thus, it was possible to validate Williamson's inverted-U hypothesis on the relationship between the economic growth and cross-country disparities.

A contradictory picture emerged under the analysis of the relationship between the economic growth and inequalities at the NUTS3 level (see Figure 4). First of all, a significantly higher level of economic inequalities was identified (Williamson's coefficient reached values from 0.62 to 0.64). At the same time, a growing diversification of economic growth at the regional level was observed.

**Figure 4.** Relation between economic growth and regional inequalities in CEE countries (at the NUTS 3 level)



*Source: own elaboration based on Eurostat*



The estimated econometric model of the test relationship at NUTS3 level was not well fitted to the empirical data (it explained only 58% of the regional variation). The regression coefficients, although pointing at the parabola opening to the bottom, were not statistically significant. It was assumed that the test relationship could not be described by a quadratic function, and thus the Williamson's hypothesis could not be positively verified at the NUTS3 level.

The reason for this situation (lack of statistical significance of the independent variables) could be a relatively short period of analysis. It was assumed that the models estimated with data covering subsequent years (2014+) were eligible for inference concerning the nature of the relationship subject to the authors' deliberations.

The growing regional disparities stemmed primarily from the above-average growth rates recorded in metropolitan regions (often comprising capital cities) that remained beyond the reach of other regions. The privileged regions boasted the highest demographic and socio-economic potential and as such benefited most from the development impulses emerging after the period of political transformation in CEE. However, as the so-called diseconomies of scale emerge and the conditions for diffusion of growth impulses occur, further income growth in these regions will no longer outperform growth in other regions. This situation could be interpreted as a symptom of the relationship described by Williamson's inverse U-shaped curve.

## Conclusions

In the light of the research conducted, it may be concluded that in the analyzed group of countries both convergence symptoms (reflected in moving of national economies toward each other), and divergent tendencies (reflected in the increase of economic diversification at NUTS 3 level) were observed. It was also noted that the CEE countries in the process of economic integration with the EU passed an analogous path to the one that had been identified before by Williamson among other developing countries and described in the form of an inverse U-shaped curve.

Williamson's hypothesis that explains the level of regional inequalities as dependent from economic growth could not be verified unequivocally. While the econometric models estimated at the cross-country level confirmed the parabolic shape of the relationship studied, the lack of statistical significance of the independent variables in the regional model indicated a non-parabolic shape of the sought function. Nevertheless, the high values of the coefficients of determination suggested that attempts to explain the variations of economic inequality observed in the analyzed years by the quadratic function of GDP per capita were justified, and the statistical data gathered in subsequent years confirmed the validity of observations that had been made half a century ago.

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