The impact of EU accession on the economic performance of the countries' internal (NUTS 3) regions[*][1]

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Abstract

The research objective of the presented study is to find out the consequences of the EU accession on internal regions in terms of regional convergence or divergence. The conception of analysis is based on the convergence theory which states that all industrial systems would converge because of the determinant effects of technological development. The samples for empirical analysis include NUTS 3 regions within the "new" EU countries (the countries of the former socialist bloc that entered the EU in 2004 and 2007) and Croatia as a "control country", the economic performance of which is measured by real GDP per capita for 2000-2011, the applied method – basic panel data analysis. The main findings of the research allow to argue that positively perceived trend of actual declining of economic performance's interregional variation within the "new" EU countries is not the consequence of joining the EU. The basic conclusion with regard to the results of the research is that the "new" EU countries are undergoing a natural inverted U-shaped trend of changes of their economic performance's interregional

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variation that depends both on the country average GDP's per capita growth and on the length of the period of self-development under the conditions of market economy rather than on the factor of unionization as such within the EU.

Key words: *"new" EU countries, internal regions, economic performance, regional convergence, regional divergence*

JEL classification: *O11, O18, R58*

1. Introduction

There are many empirical evidences in literature about the existence of cross-country convergence in economic performance (Barro, 1991; Barro and Sala-i-Martin, 1991; Ranjpour and Karimi, 2008; Sala-i-Martin, 1990, 1996). At the same time, the equality of the economic performance of countries' internal regions as well as the role of the factor of countries' unionization – for instance, within the European Union, has not been investigated carefully.

The present study is a result of both the systematic and rather extended scientific interest of the researchers of the Institute of Social Research at Daugavpils University to the field of convergence and divergence in the economic performance of the EU regions (Lavrinenko and Voronov, 2008; Lavrinenko, 2010; Lavrinenko et al., 2012, 2013; Voronov et al., 2014), which [economic performance of territories] in economic science is traditionally measured by GDP per capita (Ramkissoon, 2002; Simpson, 2014; Stiglitz et al., 2014). In this study, the authors are interested in so-called σ(sigma)-convergence that is defined as a reduction in the variation (inequality, differentiation, disproportions) of levels of economic performance of regions (in its turn, the opposite process is defined as σ-divergence).

The authors, having summarized the results of a number of the latest European studies (Dall'erba and Le Gallo, 2003; Paas et al., 2006; Forster et al., 2005; Ranjpour and Karimi, 2008) on σ-convergence at different territorial levels – among countries and among internal regions, concluded that for a quarter of a century there was convergence of the level of development between relatively poor and rich countries of the EU. The countries of Central and Eastern Europe that entered the EU have a higher level of regional differences in comparison to the "old" EU countries. In addition, the inequality among large and small regions in many "new" countries of the EU is increasing due to the rapid development of metropolitan regions and major towns in comparison to other, especially small, regions (Voronov et al., 2014).

More than forty years ago J.G. Williamson (1965) found that the development of a sovereign state promotes the growing of regional differences at the early stages of self-development of the economy. At the same time, further the economic growth contributes to convergence, i.e. convergence of the levels of the economic

development of the regions. This process can be illustrated by the inverted U-shape curve. The main argument of J. Williamson's statement is the fact that at the early stages of self-development of national economy there are several growth poles in the country, where the capital and the qualified labour force are concentrated. As a result of a more rapid growth in productivity, economic growth accelerates in these pole and leads to the increase of the regional differences (divergence). At the later stages of the development the costs in the growth poles rise, so that the capital is likely to flow to other regions with lower labour costs. This fact along with the effects of equal transmission of knowledge may increase the reallocation of the productivity factors through the sectors of economy and regions; this leads to convergence of the levels of regional development.

Some researchers call the strengthening of regional divergence of economic performance at the early stages of countries' self-development "a catalyst of economic development" (Gusev, 2014). At the same time, they note that the excessive economic inequality acts as a barrier for interregional investment flows. In this case, in developed administrative-territorial units, the capital "stagnates", and their economic "take-off" from the deprived areas is getting more rapid. Practice shows that as the inequality between rich and poor regions is increasing, the opportunities for interregional capital inflow are reducing. Accordingly, the market mechanism to ensure the uniform development of the country is disrupted, and the government intervention becomes up-to-date. Moreover, the rates of economic growth have long-term negative effect. For example, the annual economic losses caused by the high regional economic differentiation in Russia is 3% of GDP (Hill and Gaddy, 2003; Mel'nikova, 2008).

Thus, on the basis of the results of the authors' own and other scientific researches in the field of convergence of regional economic development, the authors *forward out the hypothesis* that needs for empirical evidence to be found in the present study: the countries in Central and Eastern Europe (the countries of former socialist bloc) that entered the EU in 2004 and 2007 are undergoing a natural inverted U-shaped trend of changes of their GDP's per capita interregional variation that depends both on the GDP and on the length of the period of self-development in economy rather than on the factor of unionization as such within the EU. Hence, in terms of interregional variation, for the economic performance of the investigated countries' internal (NUTS 3) regions the consequences of entering the EU are not direct, but indirect due to sufficiently rapid economic growth of the countries under investigation after their entering the EU.

The remainder of the paper is organized as follows: Section 2 provides literature review on territorial convergence of economic performance, Section 3 outlines research methodology followed by a description of the empirical data and analysis in Section 4, Section 5 presents the results and discussion, and, finally, Section 6 offers conclusions.

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2. Literature review on territorial convergence of economic performance

In the past decades, there are more and more studies devoted to the equalization of the levels of regional and state development, i.e. their convergence. The issue on the presence of convergence among the states and regions with different level of economic development emerged in the 1960s-1970s of the previous century after R. Solow had introduced his model of economic growth (Solow, 1957), which brought to a conclusion connected with a higher economic growth in the countries that are far from the stationary state (a state, when capitalization of labour remains steady) in comparison with those countries that are closer to it. Thus, the less developed economies are slowly catching up the developed ones; this makes the essence of the neo-classical hypothesis of β (beta)-convergence (Barro and Sala-i-Martin, 1992a).

Among the scientists systematically engaged into the field of convergence, who have made a large contribution into its study, there are the works by R.J. Barro and X. Sala-i-Martin (Sala-i-Martin, 1990, 1994, 1995, 1996; Barro, 1991; Barro and Sala-i-Martin, 1991, 1992a, 1992b, 1995, 1997; Barro et al., 1995), P.C. Cheshire and his colleagues (Cheshire and Hay, 1989; Cheshire and Carbonaro, 1995; Cheshire and Magrini, 2000, 2002), D. Quah (1993, 1996a, 1996b, 1996c, 1997), and others.

In economic literature, there is no any unified interpretation of convergence. The conceptions of β-convergence ("convergence in growth rates") and σ-convergence ("spatial convergence") are the most widely-spread. Taking into consideration that there are a lot of conducted investigations and published papers on territorial convergence and the fact that the given article is devoted to the study of σ-convergence of internal regions, the presented analysis of literature covers only the results of the studies on σ-convergence of economic performance of internal regions of different countries and groups of countries.

The investigations on σ-convergence of economic performance of territories carried out by Xavier Sala-i-Martin are the most systemic in terms of the geographical scope of territories and the diversity of the territorial scope – from macro- to meso-level (Sala-i-Martin, 1994, 1995, 1996). Despite the fact that the empirical investigations of X. Sala-i-Martin were carried out more than 20 years ago and their results are not rather relevant for the present analysis, they are particularly interesting for the given research as they are in compliance with the conclusions drawn by many scholars that relatively rapid economic growth of national economy generally intensifies the processes of interregional divergence in the country, and vice versa (Williamson, 1965; Armstrong, 1995; Zverev and Colomac, 2010).

The processes of σ-convergence of economic performance of internal regions are rather actively being studied in Russia (Lavrovskiy, 1999; Granberg and Zaiceva, 2003; Postnikova and Shil'cin, 2007; Zverev and Colomac, 2010; Sabel'nikova,

2012). Empirical researches have shown that in Russia the period of time between 1995 and 2009 was characterized by regional divergence – inequality more than doubled. However, this process was not homogeneous: some periods were characterized by convergence. In general, the presence of divergence over the period allowed testing the club convergence, i.e. analysing the presence of convergence clubs in Russia – groups of regions with inner convergence (Sabel'nikova, 2012). D.V. Zverev and J.A. Colomac (2010), who studied σ-convergence of economic performance of regions in Russia in the same period (1995 – 2006), analyze the gained results in more detail. They note that a slight decrease in the dispersion of the average GDP per capita was observed in Russian regions from the very beginning of the considered period up to 1998; this period was characterized by deep transformational recession. In the country, the recovery period and high growth rates were accompanied by an increase of productivity differentials in regional economies. Thus, Russia repeated the experience of many countries that demonstrated a widening of the distance in the development of its territories during the rapid economic growth.

The research methodology, presented in the next section of the article, is based on sound conceptual and methodical approaches to the latest theoretical-methodological and empirical researches carried out in the field of σ-convergence. It is intended to find out:

1) whether the increase in the interregional variation of economic performance in the "new" countries of the EU is persistent;

2) whether the above-mentioned increase in the differences between the regions in the "new" EU countries is the result of the entry of these countries into the European Union or the interregional variation of the economic performance in these countries is determined by the factors mentioned in the hypothesis of the present study (the end of Section 1).

3. Research methodology

In the methodological part of the article, the first necessary step is to clarify the terms: primarily – the concept of *regional convergence*, which is the subject of the present study. Regional convergence is understood as a process of temporal convergence of the levels of economic performance of regions in a country (Sabel'nikova, 2012). Consequently, regional divergence is viewed as a process opposite to regional convergence, i.e. the process of temporal differentiation of the levels of economic performance of the regions in each country considered. Following the idea proposed by S. Magrini (2004), the authors will continue using a combined variant – regional (di)convergence. To define this term it is crucial

not to confuse the process of regional (di)convergence, that belongs exactly to the internal regions of a country, with the process of (di)convergence of the levels of economic performance of the regions of different countries: for instance, in the European Union, which has also been studied by many researchers (Armstrong, 1995; Marques and Soukiazis, 1998; Paas et al., 2006; Magrini, 2004).

The subject of the given study is regional (di)convergence in the so-called "new" EU countries, i.e. in Central and Eastern European countries that joined the EU either in 2004 (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, Slovenia) or in 2007 (Bulgaria and Romania). The studied period is between 2000 and 2011, which covers some years before (4 years) and after (8 years) the reference countries entered the EU (except for Bulgaria and Romania). The study level of regional (di)convergence – regions NUTS 3 in the above-mentioned countries, i.e. that level of administrative and territorial division of each country, which marks territories of 150 000 – 800 000 people (European Communities, 2007). In the Czech Republic there are 14 such territories (Kraje), in Estonia – 5 (Groups of Maakond), in Hungary – 20 (Megyek+Budapest), in Latvia – 6 (Regioni), in Lithuania – 10 (Apskritys), in Poland – 66 (Podregiony), in the Slovak Republic – 8 (Kraje), in Slovenia – 12 (Statisticne regije) (European Communities, 2007), in Bulgaria – 28, in Romania – 42 (European Commission, 2014a). For comparison, the authors will consider the process of regional (di)convergence in Croatia, which entered the EU in 2013: for the same period and at the same level of NUTS 3 (Croatia has 21 such territories – European Commission, 2014a).

The countries chosen for the analysis share certain similarities that allow to group them together as an object of the present study:

1) they all (except for Bulgaria and Romania) have a 10-year experience of the EU membership that allows statistically correctly and reliably to analyze the processes of regional (di)convergence in these countries before and after they entered the EU, evaluating the consequences of entering the EU for the economic performance of the internal regions of these countries;

2) they all are the countries of former socialist bloc that survived sufficiently long periods of administrative command economy and moved to market economy at the beginning of the 1990s, that predetermines a certain entity of the levels and tendencies of the development in their economies.

Croatia shares with the 10 countries under considerations the last similarity, though it has only a one-year experience of being a EU member, and thus, the process of regional (di)convergence in Croatia is interesting and useful for comparison.

The concept of σ-convergence allows to determine the dynamics of regional (di) convergence in any country. Its mechanism is described by the following formula (Cirkunov, 2010):

$$\sigma\text{-convergence} = \sigma t(Yt, ... , Yn) \,/\, meant\,(Yt, ...,Yn) \cdot 100, \tag{1}$$

where:

– σt is the standard deviation (the square root of the variance);

– *Yt, ... , Yn* denote real GDP per capita (or another indicator) in the considered regions (*n* is a number of regions);

– *meant* (*Yt, ... , Yn*) is an average value of the indicator in the regions gained in the same period of time.

σ-convergence is measured from 0 to 1, however, for clarity's sake in graphical representations of calculations a number multiplied by 100 is often used (Tochickaya et al., 2008; Sala-i-Martin, 1996). The rule: the closer the index of σ-convergence is to zero the higher the convergence.

In contemporary economics, following the seminal contribution by J.A. Hausman and W.E. Taylor (1981), J. Heckman (1981), W.J. Baumol (1986) later refined by R. Barro (1991) and R. Barro and X. Sala-i-Martin (1991, 1992a, 1992b), a large number of studies has made use of cross-sectional growth regressions to see whether regions are converging towards steady state paths and, if so, at what speed (Swaine, 1998; Hoover and Perez, 2004). Later, in order to control for unobserved heterogeneities that bias conventional cross-sectional convergence regressions and to deal with endogeneity concerns, *panel data methods* have been adopted and widely used (Levin and Lin, 1993; Davies and Lahiri, 1995; Hsiao et al., 1999; Kumer and Ullah, 2000; Maddala, 2001; Bond et al., 2001; Magrini, 2004; Ratnikova, 2006; Dustmann and Rochina-Barrachina, 2007 and many others).

Panel data refers to spatial microeconomic sample traced over time, i.e. panel data contain observations of the same economic units obtained in successive time periods (Ratnikova, 2006). Panel data comprise three dimensions: features – objects – time. Their usage gives a number of significant advantages, when estimating parameters of regression, since they allow both time series analysis and analysis of spatial samples.

According to Nobel Laureate 2000, J. Heckman, the creation of such databases is the main achievement of the 20th century (Heckman, 2001). The use of these sources revealed new perspectives in the development of economics and mathematical methods serving it. The early econometric models, which were based on the data of spatial samples or time series, had an aggregated nature and described the behaviour of averaged objects, which were called by A. Marshall as "representative consumer" or "representative firm". Over time, it was found out that quite often these models were not very effective tools to analyse economic phenomena and to work out recommendations on economic and social policies. Very often, neither values nor signs of the coefficients calculated by taking into account regressions of aggregate time series could meet the assumptions of economic theory as there was

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a serious displacement of aggregation. This was mentioned in the works of R.A. Fisher (1921), and C. Eisenhart (1947) – a long time before contemporary "wave" of using panel data.

Coming back specifically to the aim of the research methodology of the present study (that was presented in the article at the end of Section 2), the authors consider it necessary to make a clear empirical interpretation of the logical and mathematical statements:

– "there is (or there is not) a continuation in the trends of increase in the interregional variation of economic performance in the "new" EU countries";

– "growth (or reduction) of inequality between the regions in the "new" EU countries is (or is not) a consequence of the accession of these countries to the European Union".

To make a scientific and statistically-grounded conclusion about the first thesis, on the basis of existing statistics it is necessary (using the terms of the convergence theory) to calculate which of the two trends – regional convergence or regional divergence – can be found in the countries under study (2000-2011). It is essential:

1) to calculate the coefficients of interregional variation of the average GDP per capita for NUTS 3 regions in the countries under study (2000-2011);

2) to calculate the percentage change and to state whether this change is directed to the increase or decrease of the coefficients of variation for each of the country at the end of the period under study (2011) in comparison to its beginning (2000) (Lavrinenko, 2010);

3) to characterize in details the identified process of regional (di)convergence in the countries under study (2000-2011), paying attention to its stability and speed;

4) to compare the results with a "control" country, Croatia, that entered the EU only a year ago.

In its turn, in order to determine whether the identified growth (or reduction) of inequality between the regions in the "new" EU countries, i.e. the process of regional (di)convergence, is a consequence of the accession of these countries to the European Union or the interregional variation of the economic performance in these countries is indirectly determined by more rapid growth of the reference countries after their entry to the EU, the following steps should be taken:

1) to measure the influence of the factor of unionization within the EU made on the country's average value of GDP per capita by calculating Kendall's correlation coefficient between country's average GDP per capita (in EUR) and entering the EU (yes or no);

2) to measure the influence of the factor of unionization within the EU made on the country's interregional variation of GDP per capita by calculating Kendall's correlation coefficient between country's interregional variation of GDP per capita (coefficient of variation) and entering the EU (yes or no);

3) to carry out the procedure of partial correlation between interregional correlation of GDP per capita and joining the EU, blocking the variable "GDP per capita" and by this having checked whether the changes in country's interregional variation of economic performance are interconnected with its entering the EU.

4. Empirical data and analysis

Empirical basis for the calculations in this study: panel data of the European Commission's Eurostat database on GDP at current market prices by NUTS 3 regions of ten "new" EU countries – Bulgaria (BG), the Czech Republic (CZ), Estonia (EE), Hungary (HU), Lithuania (LT), Latvia (LV), Poland (PL), Romania (RO), Slovenia (SL), the Slovak Republic (SK), as well as "control country" – Croatia (HR) – for the period of 2000-2011. Unfortunately, such panel data are not available for the period before 2000 and after 2011, and in this study it is certainly a weakness of the empirical analysis because it deals only with a 4-year period before the accession of most of the reference countries to the EU (which is not enough) and does not take into account 2012 and 2013. But still, in general, it allows the authors to answer the research question stated in this article: how did the EU accession of "new" countries influence the average GDP per capita and its interregional variation? Thus, the main objective is to determine the impact of the EU accession on the economic performance of the countries' internal regions.

Estimation of regional (di)convergence in the "new" countries of the EU. The calculation of coefficients of interregional variation (which characterizes σ-convergence) of the average GDP per capita for NUTS 3 regions in the countries under study (2000-2011) was carried out in a traditional way – the ratio of the standard deviation to the mean of the sample (Sala-i-Martin, 1996; Marques and Soukiazis, 1998).

At the beginning of the period under analysis the most observable stratification of the internal regions in terms of economic performance happened in Latvia (in 2000, coefficient of interregional variation was 0.504), it is followed by the Slovak Republic, Estonia, Poland, Hungary, Romania, the Czech Republic, Bulgaria, Lithuania, Slovenia and Slovenia to complete the last, having the lowest differentiation of the internal regions in terms of economic performance (in 2000, coefficient of interregional variation was 0.185). It should be noted that by the end of the study period (2011) Slovenia retained its leading position

among the countries under study, having the lowest regional stratification level of economic performance (in 2011, coefficient of interregional variation was 0.226), and the Slovak Republic had the first position, having the highest coefficient of interregional variation – 0.578 (see Table 1).

Table 1: Panel data on coefficients of interregional variation of the average GDP per capita for NUTS 3 regions, "new" countries of the EU and Croatia[*], 2000–2011

Year	BG	RO	CZ	EE	HU	LT	LV	PL	SL	SK	HR
2000	0.265	0.343	0.308	0.419	0.376	0.249	0.504	0.400	0.185	0.469	0.291
2001	0.271	0.314	0.331	0.430	0.363	0.270	0.522	0.389	0.195	0.477	0.295
2002	0.283	0.346	0.342	0.450	0.393	0.298	0.525	0.403	0.201	0.497	0.286
2003	0.289	0.337	0.357	0.472	0.382	0.302	0.537	0.397	0.219	0.492	0.305
2004	0.296	0.337	0.355	0.507	0.392	0.300	0.536	0.399	0.222	0.497	0.329
2005	0.322	0.409	0.360	0.483	0.411	0.319	0.559	0.412	0.226	0.565	0.327
2006	0.381	0.406	0.366	0.512	0.435	0.347	0.605	0.422	0.240	0.537	0.320
2007	0.431	0.414	0.381	0.482	0.435	0.361	0.543	0.425	0.238	0.548	0.322
2008	0.446	0.439	0.392	0.470	0.441	0.326	0.540	0.415	0.232	0.521	0.317
2009	0.488	0.419	0.380	0.517	0.457	0.332	0.485	0.431	0.238	0.573	0.321
2010	0.495	0.417	0.384	0.467	0.449	0.321	0.493	0.440	0.237	0.562	0.354
2011	0.468	0.448	0.374	0.485	0.460	0.310	0.426	0.436	0.226	0.578	0.337

[*] Croatia is a „control country" in the empirical analysis of the present research.

Note: The period when each country under study entered the EU is presented in grey.

Source: elaborated by the authors on the basis of the European Commission, 2014a

The next step of the empirical analysis is calculation of percentage change, considering whether this change is directed to the increase or decrease of the coefficients of variation for each of the country at the end of the period under study (2011) in comparison to its beginning (2000).

As it is displayed in Figure 1, in all the countries under study (with the exception of Latvia that was a leader in interregional variation of GDP per capita in 2000) in the studied period between 2000 and 2011 there was a process of regional divergence by the GDP per capita, i.e. interregional differentiation at the level of economic performance in the countries under study (except for Latvia) was increasing. Thus, in general, the assumption that there is a continuation in the trends of increase in the interregional variation of economic performance in the "new" EU countries has been confirmed by current empirical data.

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Figure 1: Percentage change of coefficient of interregional variation of GDP per capita in 2000 and 2011 in the "new" EU countries and Croatia
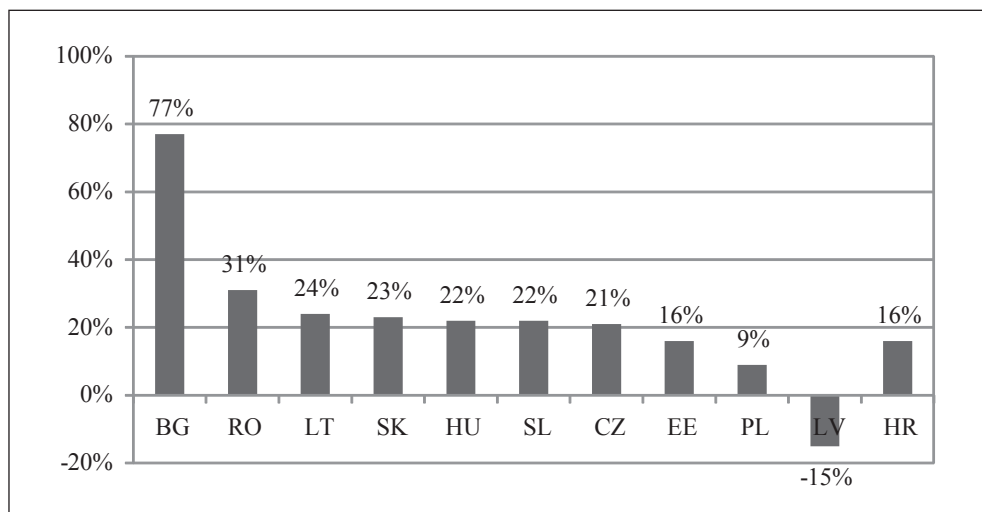
Source: elaborated by the authors on the basis of the European Commission, 2014a

Table 2: Panel data on annual change of coefficients of interregional variation of the average GDP per capita for NUTS 3 regions, "new" countries of the EU and Croatia, 2001–2011 (in comparison with the previous year)

| Year	BG	RO	CZ	EE	HU	LT	LV*	PL	SL	SK	HR
2001	0.006	-0.029	0.023	0.011	-0.013	0.021	0.018	-0.011	0.01	0.008	0.004
2002	0.012	0.032	0.011	0.02	0.03	0.028	0.003	0.014	0.006	0.020	-0.009
2003	0.006	-0.009	0.015	0.022	-0.011	0.004	0.012	-0.006	0.018	-0.005	0.019
2004	0.007	0.000	-0.002	0.035	0.01	-0.002	-0.001	0.002	0.003	0.005	0.024
2005	0.026	0.072	0.005	-0.024	0.019	0.019	0.023	0.013	0.004	0.068	-0.002
2006	0.059	-0.003	0.006	0.029	0.024	0.028	0.046	0.01	0.014	-0.028	-0.007
2007	0.05	0.008	0.015	-0.03	0.000	0.014	-0.062	0.003	-0.002	0.011	0.002
2008	0.015	0.025	0.011	-0.012	0.006	-0.035	-0.003	-0.01	-0.006	-0.027	-0.005
2009	0.042	-0.02	-0.012	0.047	0.016	0.006	-0.055	0.016	0.006	0.052	0.004
2010	0.007	-0.002	0.004	-0.050	-0.008	-0.011	0.008	0.009	-0.001	-0.011	0.033
2011	-0.027	0.031	-0.010	0.018	0.011	-0.011	-0.067	-0.004	-0.011	0.016	-0.017
Ave-rage annual change	0.018	0.010	0.006	0.006	0.008	0.006	-0.007	0.003	0.004	0.010	0.004

Note: the period when each country under study entered the EU is presented in grey.
Source: elaborated by the authors on the basis of the European Commission, 2014a

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In relation to the average annual growth rate of interregional variation of economic performance in the countries under study, the data displayed in Table 2 allows to conclude that the most rapid process of regional divergence that happened during the decade under study took place in Bulgaria, which is followed then by Romania and the Slovak Republic. The data obtained by means of correlation analysis (based on the 10 countries under study) of two variables – initial coefficient of variation (2000) and its average annual change – show that there is no statistically significant interdependence between them (Pearson's correlation: r = -0.132, p = 0.716), i.e. it is not possible to state that the lower the degree of interregional variation of economic performance in the country is, the more rapidly the process of regional divergence is, and vice versa. Nevertheless, it is rather interesting that Latvia is the only country out of the reference countries, where in the past decade there was observed a process of regional convergence of economic performance – at the starting point (in 2000) it had the highest level of stratification between its internal regions.

The next Figure presents a regional (di)convergence in "control country", Croatia, which in the time period under study was not a member of the EU, but it has a lot common historical and socio-economic features shared with the reference countries (for more details see Section 3 of the present article).

Figure 2: Graphic visualization of the processes of regional (di)convergence in Croatia[*] in comparison with Latvia and Slovenia, 2000–2011, coefficient of variation
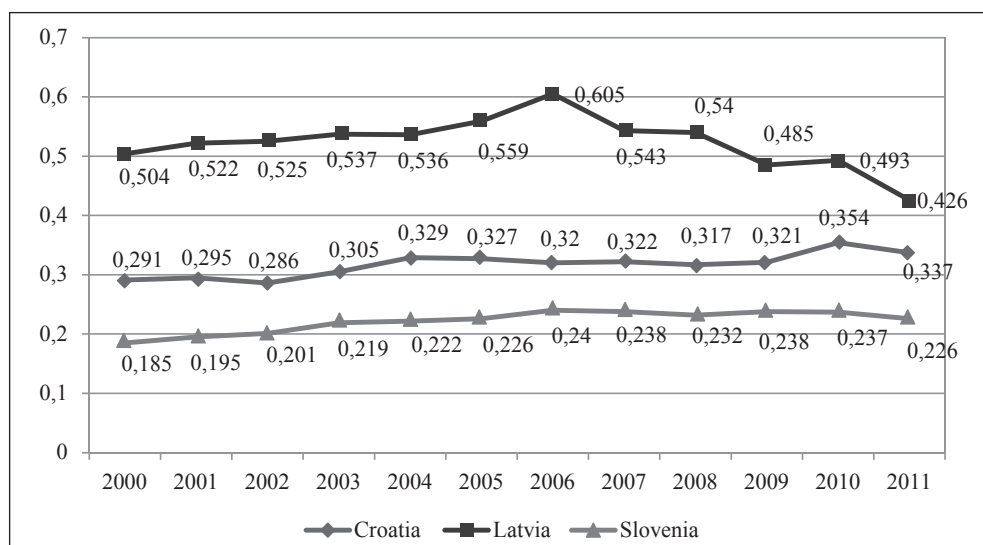
[*] Croatia is a „control country" in the empirical analysis of the present research, in this Figure it is compared with Latvia and Slovenia (two "new" countries of the EU), which respectively have the highest and the lowest level of stratification of internal regions according to their economic performance.

Source: elaborated by the authors on the basis of Table 1

As it is shown in Figures 1 and 2, and in Tables 1 and 2, in Croatia the past decade was marked by a process of regional divergence of economic performance (just in the same way as it happened almost in all countries under study). It reached its peak in 2010, and then turned to regional convergence – as in most of the reference countries.

The next Table presents panel data on the average GDP per capita in the countries under study obtained in 2000-2011, i.e. before and after the entry of these countries to the EU. These data are crucial to estimate the consequences of joining the EU for countries' economic performance and regional (di)convergence.

Table 3: Panel data on the average GDP at current market prices in the "new" EU countries and Croatia, in EUR by PPS per inhabitant, 2000–2011

Year	BG	RO	CZ	EE	HU	LT	LV	PL	SL	SK	HR
2000	5400	5000	13500	8600	10300	7500	6900	9200	15200	9500	9500
2001	5900	5500	14400	9200	11500	8300	7600	9400	15800	10300	10000
2002	6500	6000	15000	10200	12500	9100	8400	9900	16800	11100	10700
2003	6900	6500	15800	11300	12900	10300	9100	10100	17300	11500	11300
2004	7500	7400	16900	12400	13600	11100	10100	10900	18700	12300	12100
2005	8200	7800	17800	13800	14200	12300	11100	11500	19600	13500	12800
2006	9000	9100	18900	15600	14900	13600	12500	12300	20700	14900	13700
2007	10000	10400	20600	17500	15300	15500	14300	13600	22100	16900	15100
2008	10900	11700	20200	17200	15900	16100	14600	14100	22700	18100	15800
2009	10300	11100	19400	14900	15300	13600	12700	14200	20200	17000	14500
2010	10800	11700	19700	15600	16100	15100	13500	15400	20600	18100	14300
2011	11700	12200	20300	17400	16900	16900	15000	16400	21200	18900	15300

Note: the period when each country under study entered the EU is presented in grey.

Source: the European Commission, 2014a

Estimation of the consequences of joining the EU for countries' economic performance and regional (di)convergence. In accordance with the steps to be taken, that are described at the end of the previous methodological section, in order to find out whether the identified process of regional divergence of economic performance in the "new" EU countries was stimulated by their entry into the European Union or it was indirectly determined by more rapid economic growth in the reference countries after their joining the EU, using correlation analysis, it is necessary to measure: 1) the influence of the factor of unionization within the EU made on the country's average value of GDP per capita; 2) the influence of the factor of unionization within the EU made on the country's interregional variation of GDP; 3) partial correlation between interregional variation of GDP per capita and joining the EU, blocking the

variable "GDP per capita". The results of the calculations obtained by using Kendall's correlation coefficient are generalized in the next Table.

Table 4: Correlations between average GDP per capita, its interregional variation and countries' joining the EU, 2000–2011, n = 10 countries

Country – the "new" EU member	Kendall's correlation coefficient between country's average GDP per capita (in EUR) and joining the EU (yes or no)	Kendall's correlation coefficient between country's interregional variation of GDP per capita (coefficient of variation) and joining the EU (yes or no)	Partial correlation between interregional variation of GDP per capita and joining the EU, with blocked variable "GDP per capita"
Bulgaria	r=0.728[**], p=0.004	r=0.728[**], p=0.004	r=0.628, p=0.039
Romania	r=0.734[**], p=0.004	r=0.734[**], p=0.004	r=-0.252, p=0.454
Czech Republic	r=0.696[**], p=0.007	r=0.653[*], p=0.011	r=-0.282, p=0.401
Estonia	r=0.702[**], p=0.006	r=0.609[*], p=0.017	r=0.561, p=0.073
Hungary	r=0.702[**], p=0.006	r=0.658[*], p=0.011	r=0.099, p=0.772
Lithuania	r=0.702[**], p=0.006	r=0.653[*], p=0.011	r=0.269, p=0.424
Latvia	r=0.696[**], p=0.007	r=0.131, p=0.610	r=0.321, p=0.336
Poland	r=0.696[**], p=0.007	r=0.609[*], p=0.017	r=0.052, p=0.880
Slovenia	r=0.696[**], p=0.007	r=0.707[**], p=0.006	r=0.331, p=0.320
Slovak Republic	r=0.702[**], p=0.006	r=0.680[**], p=0.008	r=0.369, p=0.263

[*] Correlation is significant at the 0.05 level (2-tailed)

[**] Correlation is significant at the 0.01 level (2-tailed)

Source: elaborated by the authors on the basis of Table 1 and 3

Table's 4 data show that the average GDP per capita in the countries of Central and Eastern Europe correlates with the factor of their membership in the EU: the economic performance of the "new" EU countries before their accession to the EU was significantly lower, then after the accession. In its turn, the statistically significant and rather strong correlation interdependence between interregional variations of countries' GDP per capita can be found only when the influence of GDP per capita is not blocked irrespective whether the country is or is not a member of the EU. If to control, i.e. practically to neutralize, the influence of the variable "GDP per capita" in partial correlation, the fact of the accession of a country into the EU and interregional variation of GDP per capita in this country are no longer interconnected.

The results of correlation analysis about statistically significant growth of the economic performance (empirically – average GDP per capita) of the "new" EU countries after their accession to the EU might be true, but authors have a "control country" – Croatia, which was not the EU member during the studied period, but

experienced the same trend both average GDP per capita and its variation between internal regions as investigated "new" EU countries (compare Figure 3 with Figures from Appendix, see Table 3).

Figure 3: Trends of Croatian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Croatia, 2000–2011, % (2000=100%), n = 21 regions
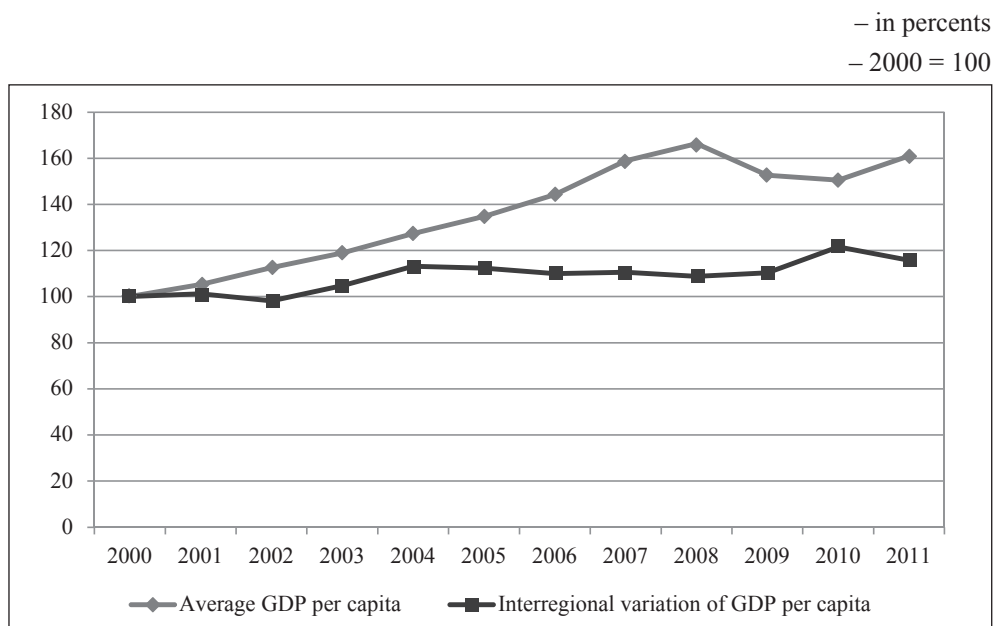
– in percents

– 2000 = 100

* Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).
Source: calculated and worked out by the authors on the basis of European Commission, 2014a

Thus, in the present article it has been empirically reinforced that the strengthening of the regional divergence, observed by the authors in the "new" EU countries during the past decade (to be precise, up to 2011), is not a consequence of the accession of these countries to the EU. Moreover, the unionization of the countries of Central and Eastern Europe with the EU did not introduce changes into the economic performance of the reference countries, which is measured by the average GDP per capita. The improvement of the economic performance of the countries under study, which is a result of the length of countries' self-development under the conditions of market economy rather than unionization within the European Union, strengthened the processes of regional divergence within these countries. Consequently, the growing stratification of the economic performance of the inner regions is a type of "payment" for the "new" EU countries' moving to

market economy from administrative command one, for the increase of its average GDP per capita in 2000s after its dramatic decrease in early 1990s. Croatia also shares this experience with the "new" EU countries due to its transition to market economy in 1990s.

5. Results and discussion

The results of the carried out research show that in terms of economic performance and its interregional variation a large increase in overall GDP per capita followed by strengthening of regional divergence of economic performance in the "new" EU countries for a first glance turned out to be the main consequence of their accession to the EU. Though, comparing the "new" EU countries with Croatia, which was not EU member during the period under study, but had the similar trends of the average GDP per capita and its interregional variation as target countries investigated within this research, it becomes clear that real determinant of the growth of economic performance of the "new" EU countries is more than decade of self-development of these countries in market economy, which just synchronized with the entering of countries of Central and Eastern Europe in the EU.

How to explain these results and their economic significance? The authors agree with the opinion of J.G. Williamson, which has been repeatedly cited in this article, that due to the increased growth of metropolitan regions, which usually accompanies the general economic growth of a self-developing country, there is a regional divergence of economic performance. But over time, the economic cost of capital cities become too high, and the capital starts "spreading" into the regions. During the last year of the period under study (2011) in most of the reference countries, despite the continuing growth of average GDP per capita, there was the same trend of regional convergence (i.e. decrease of regional divergence) of economic performance observed (see Table 2), following the inverted U-shaped trend of regional divergence described by J.G. Williamson (1965), and we have the basis to expect the continuing of this trend in the future.

Taking into account the fact that economic inequality of internal regions is inevitable in parallel with economic growth of a country at early stages of moving to market economy, it is possible to assume the existence of a certain maximum (optimal) level of such inequality, which once being exceeded will have a negative impact on the economic growth. A.B. Gusev (2014) using econometric modelling, found minimum and maximum permitted values of economic inequality in regions, considering them a factor that stimulates the growth of GDP.

As to the EU courtiers, the authors of the article have obtained results that are an additional argument to state that European integration, promoting convergence in the countries, does not lead to the convergence of their internal regions (Martin,

2008). There are several mechanisms, which brought trade integration to the equalization of the levels of the development in the EU countries, but it did not equalize the levels of economic performance of the regions in these countries. Due to a number of structural and institutional factors, in contrast to the rich regions, the poor regions could not use their competitive advantages, while the poor countries, competing with the rich ones could do it.

Thus, the viability (on political and social levels) of the policy regarding the equalization of the levels of economic performance between the internal regions of the countries, which enter the European Union (or any other union of states), depends on the ability to distribute fairly the benefits derived from the economic activity of the country within a new union between its internal regions. The practical result of the discussions of strengthening inequality in regional development of the EU countries was a significant increase of the cohesion policy budget, including exactly for regional convergence (European Commission, 2014b), as well as consolidation of the goal to equalize the level of economic performance of the regions in the first section of the Single European Act. However, the results of several studies (Becker, 2012; Becker et al., 2010, 2012) show that these European funds remained mainly in the most economically developed regions (with a greater ability to attract these funds); this situation reinforced the processes of regional divergence in the "new" EU countries.

6. Conclusions

Results of the research can be classified as a new contribution to economic science in terms of empirical analysis and explanation of regional (di)convergence processes within EU countries, i.e. processes of temporal (di)convergence of the levels of economic performance of regions in a country (not between regions of different countries). In the present research, the authors have proved the hypothesis that the "new" EU countries (the countries of the former socialist bloc) that entered the EU in 2004 and 2007 are undergoing a natural inverted U-shaped trend of changes of their GDP's per capita interregional variation that depends both on the GDP growth and on the length of the period of self-development under the conditions of market economy rather than on the factor of unionization as such within the EU. At present, the "new" EU countries are expected to enter the period of the slowdown in interregional variation of economic performance, which started in 2011. The presence of a 3-year time lag to obtain empirical data on GDP per capita for NUTS 3 regions of EU countries does not allow to confirm this assumption with the latest statistical data; thus, this is a task of the future studies. Another important empirical limitation in this study was the lack of pan-European comparable data on GDP per capita for NUTS 3 regions of EU countries before 2000, which significantly reduces the quality of the results of the empirical analysis. However, at the level

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of each separate country, this problem can be solved. If the researcher turns to the data of national statistics, the processes of regional (di)convergence can be studied in more depth, but without any comparison with other EU countries. The quality of the economic growth in the "new" EU countries with a high level of regional divergence of economic performance is deficient, because it is achieved by economic ballooning of the traditionally prosperous economic regions against the backdrop of the increasing backlog of the deprived areas. Thus, another task for the future research in this area, as well as in the field of regional economic policy in the "new" EU countries can be suggested: to find and maintain an optimal level of the interregional variation of economic performance, the excess of which has a negative impact on the economic growth of the country in general. For regional economic and development policy of a country, which is either a candidate country for the EU accession or has recently become a EU member state, for instance, Croatia, the obtained results neither mean that it could expect from the unionization act some significant changes in trends of economic performance of a country as a whole nor in trends of interregional variation of economic performance within a country. As the research data show, all these changes – both positive and negative – are determined by the length of the period of independent development of a country under the conditions of market economy and general GDP growth rather than on the factor of unionization. So, nowadays an improvement of economic performance of a country as a whole and of its internal regions cannot be declared by policy-makers as the reason for joining any union of countries – for instance, the EU.

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Posljedice ulaska zemalja u EU na gospodarsku uspješnost njihovih internih regija (NUTS 3)[1]

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Sažetak

Cilj istraživanja ovog rada je utvrditi posljedice ulaska zemalja u EU na interne regije u smislu regionalne konvergencije ili divergencije. Koncepcija analize temelji se na teoriji konvergencije u kojoj se tvrdi da industrijski sustavi konvergiraju zbog određenih učinaka tehnološkog razvoja. Uzorci za empirijsku analizu su NUTS 3 regije unutar „novih" zemalja EU-a (zemlje bivšeg socijalističkog bloka koje su ušle u EU 2004. i 2007.) i Hrvatska kao „kontrolna zemlja", čiji se gospodarski učinak mjeri realnim BDP-om po stanovniku za period od 2000. do 2011., a primijenjena metoda je osnovna analiza panel podataka. Glavni rezultati istraživanja omogućuju da se pokaže da pozitivno percipirani trend stvarnog pada gospodarske uspješnosti u međuregionalnoj varijaciji unutar „novih" zemalja EU-a nije posljedica ulaska u Europsku uniju.
S obzirom na rezultate istraživanja, osnovni zaključak jest da „nove" države EU-a prolaze kroz prirodni obrnuti U-trend promjena svojih gospodarskih razvojnih varijacija koje ovise o rastu prosječnog BDP-a po stanovniku i o dužini razdoblja samo-razvoja pod uvjetima tržišnog gospodarstva a ne o faktoru „unionizacije" unutar Europske unije.

Ključne riječi: *„nove" EU zemlje, interne regije, gospodarska uspješnost, regionalna konvergencija, regionalna divergencija*

JEL klasifikacija: *O11, O18, R58*

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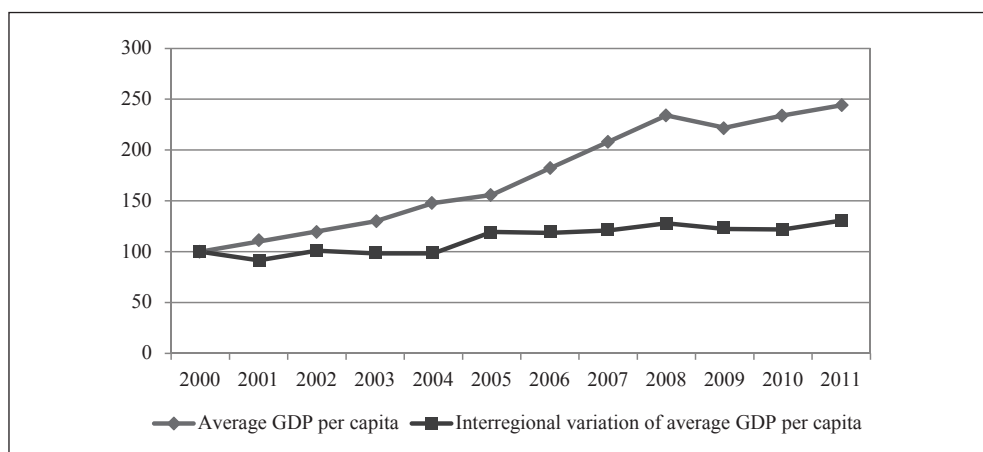
Appendix

Figure 4: Trends of Bulgarian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Bulgaria, 2000–2011, % (2000=100%), n = 28 regions
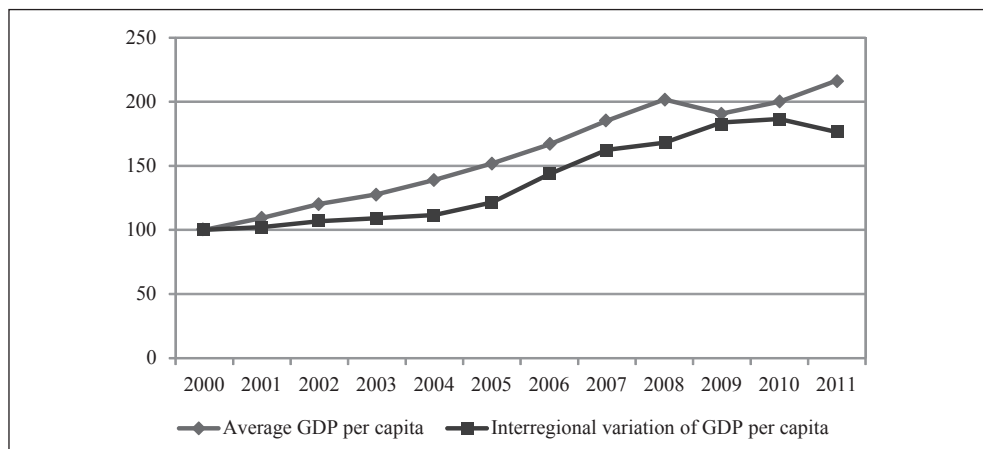
[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a
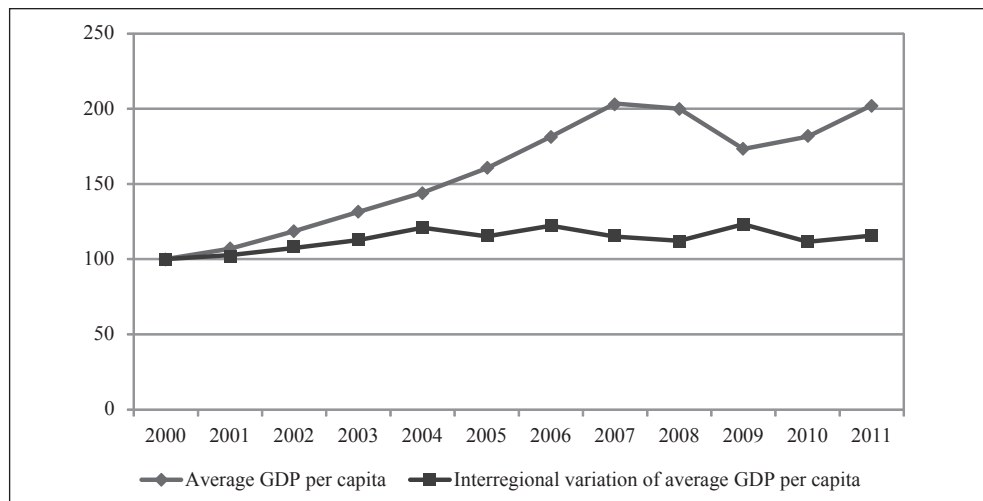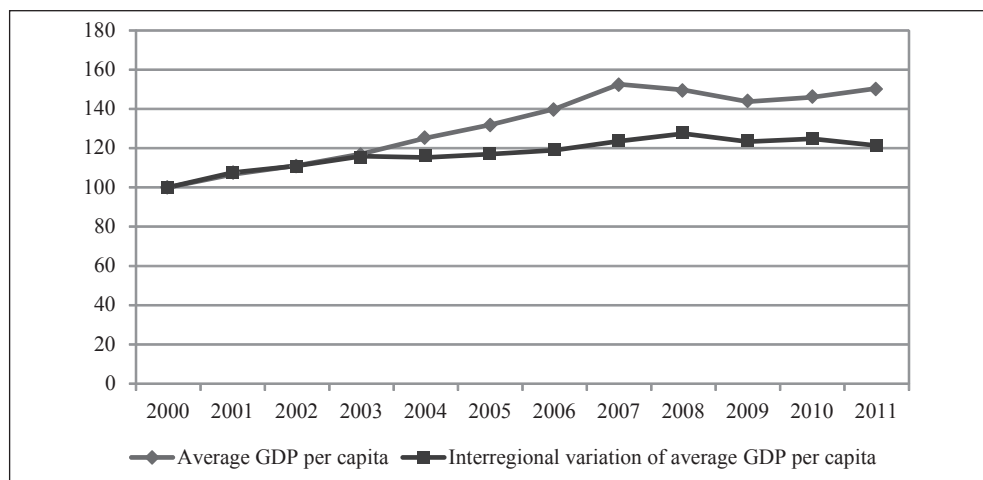
Figure 5: Trends of Romanian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Romania, 2000–2011, % (2000=100%), n = 42 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

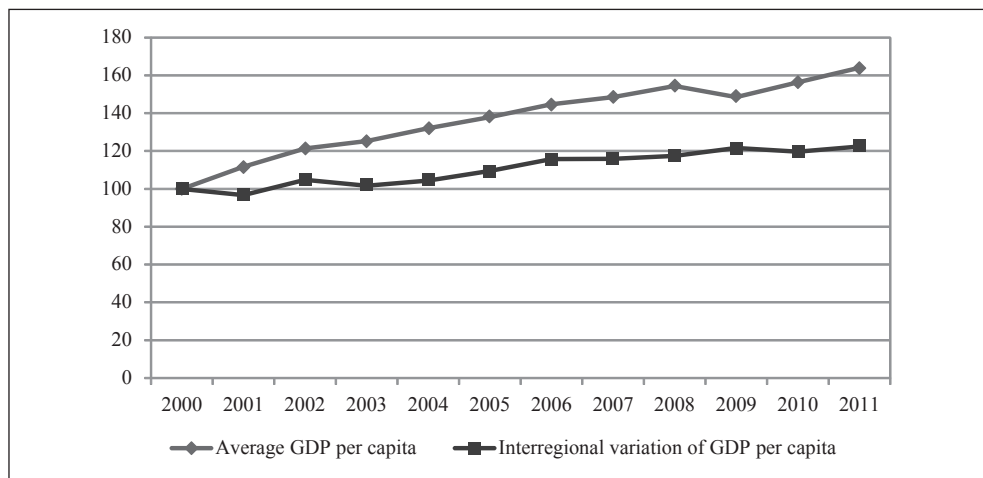Source: calculated and worked out by the authors on the basis of European Commission, 2014a

Figure 6: Trends of Estonian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Estonia, 2000–2011, % (2000=100%), n = 5 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a
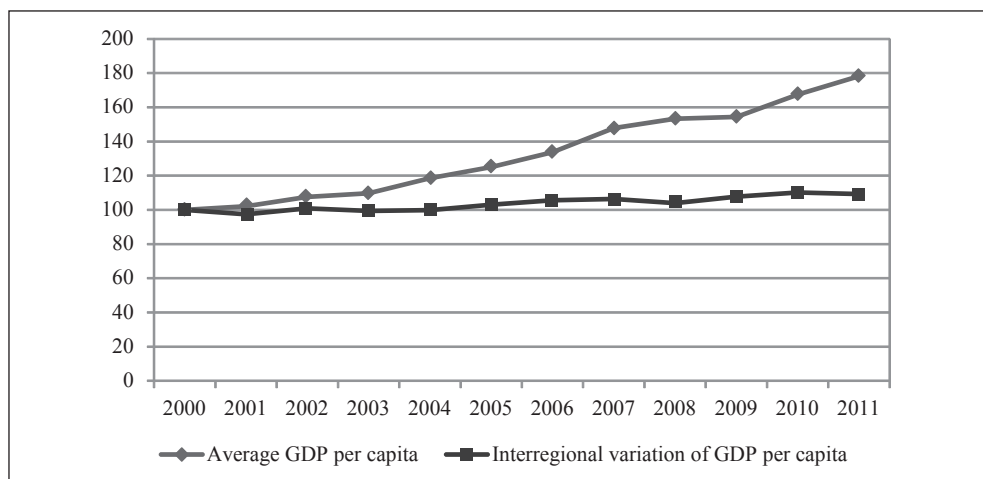
Figure 7: Trends of Czecn average GDP per capita and its variation[*] between internal regions (NUTS 3) of the Czech Republic, 2000–2011, % (2000=100%), n = 14 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a

Figure 8: Trends of Hungarian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Hungary, 2000–2011, % (2000=100%), n = 20 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a
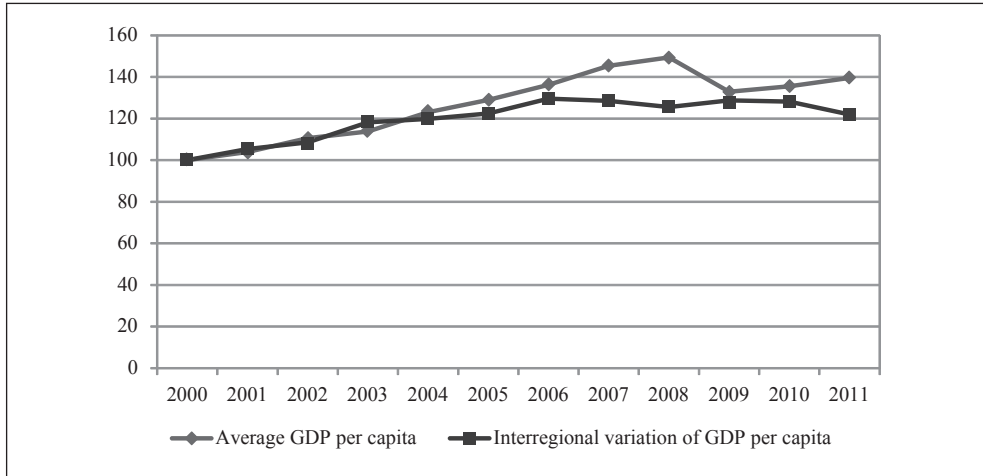
Figure 9: Trends of Polish average GDP per capita and its variation* between internal regions (NUTS 3) of Poland, 2000–2011, % (2000=100%), n = 66 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a

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Figure 10: Trends of Slovenian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Slovenia, 2000–2011, % (2000=100%), n = 12 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

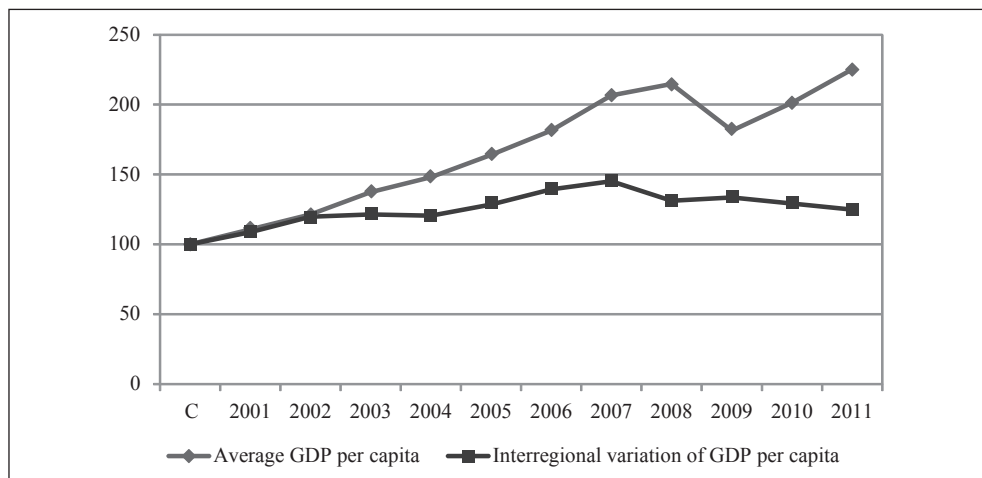Source: calculated and worked out by the authors on the basis of European Commission, 2014a

Figure 11: Trends of Slovakian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Slovak Republic, 2000–2011, % (2000=100%), n = 8 regions
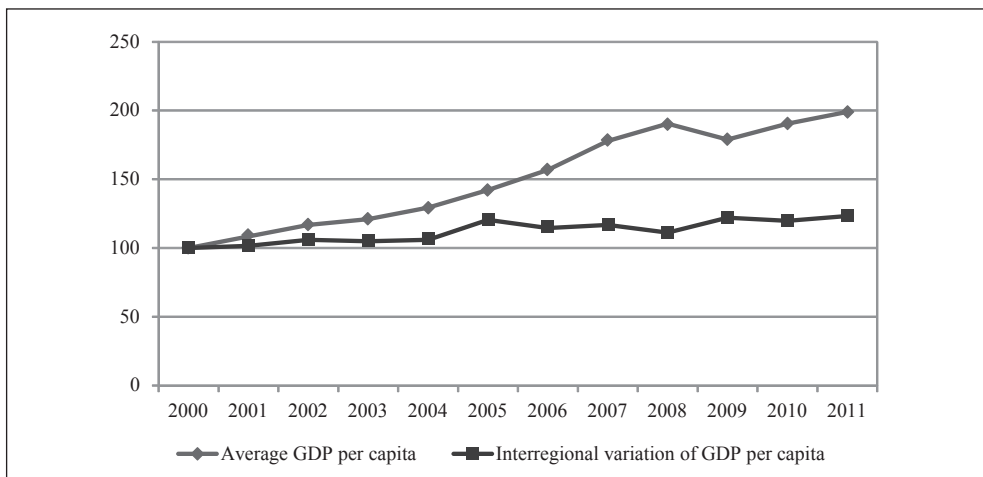
[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

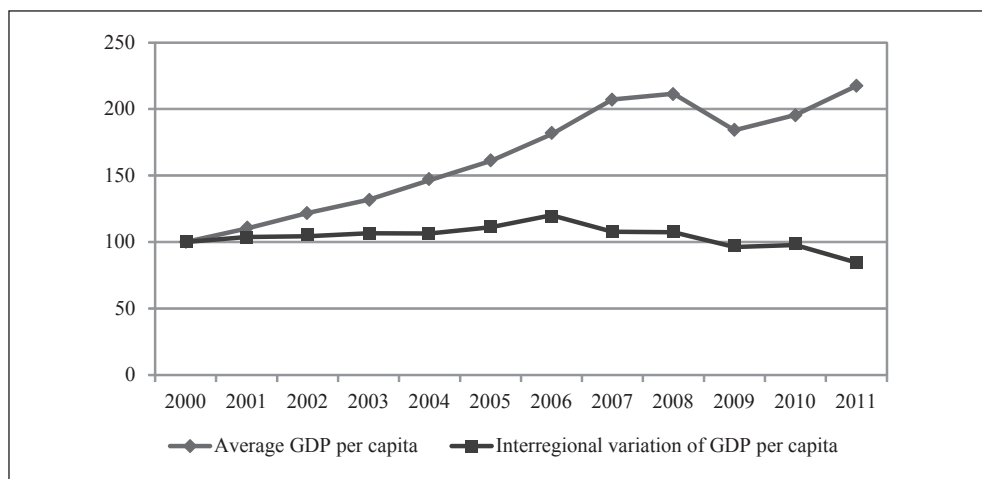Source: calculated and worked out by the authors on the basis of European Commission, 2014a

Figure 12: Trends of Lithuanian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Lithuania, 2000–2011, % (2000=100%), n = 10 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a

Figure 13: Trends of Latvian average GDP per capita and its variation[*] between internal regions (NUTS 3) of Latvia, 2000–2011, % (2000=100%), n = 6 regions

[*] Coefficient of variation, characterized σ-convergence and obtained by the ratio of the standard deviation to the mean of the sample (Marques and Soukiazis, 1998).

Source: calculated and worked out by the authors on the basis of European Commission, 2014a