

## Determinants of Real Convergence in Central and Eastern Europe

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**Abstract:** This paper deals with the process of convergence of the Central and Eastern European (CEE) countries towards the EU and attempts to identify the main driving factors behind this process. In these regards, we first provide an overview of the real convergence through an analysis of several economic variables – rate of approximation of real GDP per capita and price levels, trade integration, harmonization of the economic structure and achievements in the labor market. In addition, we offer a formal econometric evidence on the main determinants of the convergence process, based on a panel data for 10 CEE countries during 2000-2015 period, estimated with fixed effects. The results of our study imply that higher savings and investment ratio, higher labour productivity, more efficient labour markets (lower unemployment) and macroeconomic stability (lower inflation and lower budget deficits) are conducive to real convergence. However, quite surprisingly, we find that the close trade integration with the EU is associated with lower level of real convergence.

**Keywords:** Real convergence, Central and Eastern Europe, European Union, Panel data models, Fixed-effects estimator.

**JEL Codes:** O47, O11, O19, F36

### 1. Introduction

The accession process of former communist economies from CEE in the EU is a long-term process conditioned on the fulfillment of numerous political, legal and economic criteria. Meeting these criteria should create a satisfactory level of political, legal and economic convergence with EU standards. Unlike the first two criteria, the economic criteria are only partially formalized and mainly relate to nominal economic variables defined and provided in the Maastricht Treaty: price stability, sustainability of public finance, foreign exchange rate stability and parity of long-term interest rates. Analyses of the changes in these variables are usually used to evaluate the nominal convergence of a country. In addition to the formal economic criteria, economic literature in this area identifies some other criteria ensuring the convergence of economic structures and cohesion in the member states and candidate countries for EU membership.

Convergence is a process describing the progress of a country towards elimination of disparities in the levels of outputs and income. In literature there are two basic measures of the

process of real convergence, known as  $\beta$ -convergence and  $\sigma$ -convergence. The first indicator shows the tendency of poorer countries to approach the level of development of richer countries (the usual tendency of poorer countries to grow faster than more developed countries). The realization of this convergence depends on internal economic policies and other country specific factors, and fundamentally shows how long the convergence process will last. The second indicator shows the tendency of reducing the differences in the level of income per capita between different countries over time (Barro and Sala-i Martin 1990, Barro *et al.* 1991). Similarly, Galor (1996) distinguishes three types of convergence: absolute (unconditional) convergence, conditional convergence, and convergence clubs, depending on whether the initial conditions and the economic structure are taken into account. Van de Coevering (1996) defines convergence as a two-dimensional process: the catch-up of the level of income as well as the business cycle synchronization.

The main research task in this paper is to evaluate the progress of CEE economies towards meeting the criteria for nominal and real convergence by

employing various economic variables. In these regards, we provide some basic descriptive statistics, which shows the developments in several areas during the period between 1997 and 2014. Bearing in mind the multi-dimensional nature of real convergence, we analyze the process of real convergence of CEE economies by employing the following indicators: GDP per capita (according to the purchasing power parity), trade openness and trade integration with the EU, unemployment and poverty, relative labour productivity and wages, and the economic structure as represented by the composition of GDP (See Miron *et al.* 2009). In addition, we offer a formal econometric evidence on the main determinants of the real convergence process. Based on a panel data for 10 countries during 2000-2015, estimated by the fixed-effects estimator, we find the following main results: the standard variables in the growth literature (domestic savings and investment ratios), higher labour productivity and banking sector reforms are positively associated with real convergence. On the other hand, we find a negative association between unemployment, inflation, and budget deficits. All these findings are in line with our *a priori* expectations about the signs of the regression coefficients. In addition, we obtain one puzzling result – the negative association between real convergence and the trade integration with the EU, which calls for further research in order to be rationalized.

As for the structure of the paper, the next section provides an overview of the empirical literature on the real convergence process in the CEE countries; Section 3 presents some basic descriptive statistics on various indicators related to the convergence process; Section 4 offers empirical evidence on the real convergence of CEE countries, while the last section concludes.

## 2. Brief Review of The Empirical Literature on Real Convergence in The EU

The creation of the Economic and Monetary Union (EMU) and the subsequent large-scale accession of the former transition economies has spurred the research in the nominal and real convergence in the EU. In what follows we list only a selected papers in this field. Barro *et al.* (1991) study the convergence process in 73 regions within the EU during 1950-1985 and find

that the convergence proceeds slowly at the rate of 2% annually. In the same manner, weak evidence for the convergence within the EMU can be found in Roubini *et al.* (2007). Doyle *et al.* (2001) analyse the long-term prospects for convergence of the CEE economies and conclude that the growth potential in these countries is driven mostly by the total factor productivity, conditioned on preserving sound macroeconomic environment. Studying the general price-level differentials, Égert (2007) shows that the former transition economies are characterized by lower prices in virtually all groups of goods and services. However, he finds a limited role of the Balassa-Samuelson effect in the convergence of the price level due to the incomplete pass-through from labour productivity to prices. According to his comprehensive study the convergence in the price level is mostly driven by the prices of tradables and non-market nontradables.

Lavracu Zumer (2003), Halmailand Vászary (2010), Alexe (2012), Sopek (2013), and Dubra (2014) investigate the real convergence process during several time periods – before the large accession episode, after the accession of the new member-states, and the period following the Global financial and economic crisis. These papers provide evidence that during the post-accession period the new member-states are characterized by higher rates of  $\beta$ -convergence, mostly as a result of the growth in domestic demand, especially, private consumption and investment. However, recently, the convergence process has slowed down or even stopped in some countries as a consequence of the Global financial and economic crisis. In these regards, on the basis of their long-term growth projections, Halmailand Vászary (2010) conclude that the convergence process is likely to stop around 2030 leaving most of the new member-states considerably below the average GDP per capita level in the EU.

## 3. Measuring Real Convergence – Some Stylized Facts

### 3.1. GDP Per Capita According To Purchasing Power Parity

Figure 1 shows the convergence in income and price level for a sample of 12 CEE countries, which, along with the new member-states, for reference includes Macedonia, too. Measured by

the most widely used real convergence indicator, GDP per capita as calculated according to Purchasing Power Parity (PPP), the dynamics of real convergence is highest in the Baltic States (growth of 30-36 p.p.). Also, there is a significant advancement in Romania, Slovakia, Bulgaria, and Poland (growth of 21-26 p.p.). The dynamics of real convergence of the Macedonian economy is almost identical to Croatia and the Czech Republic, and higher than Slovenia (cumulative growth of only 5 p.p.). However, in this comparisons we must take into account the starting level of income of individual countries: in 1997, the GDP per capita of Slovenia was 78% of the EU average, it was 76% in the Czech Republic, and 51% in Croatia 51%. This is important because, according to the neoclassical theory of growth, economies with a lower starting level of income have a tendency to grow faster than economies with higher initial income level.

Additionally, Figure 1 shows that the process of income convergence is always accompanied with the convergence in the price level to the EU average. In fact, in many countries, there is an almost identical convergence of GDP per capita and the price level (the 45°line). In addition to the general trend of real convergence in the last 20 years, it is interesting to analyze the achievements of individual countries in separate periods of time (Table 1). For this purpose, we have identified three sub-periods: 1997-2003, as the period before the accession of the ten countries in the

EU; 2004-2008, as the period following the accession of the new member states in the EU; and 2009-2014, as the period after the Global financial and economic crisis. This way we attempt to explore the dynamics of real convergence before their entry into the EU, the effects from the entry into the EU, and the effects of the crisis on the real convergence process.

During the pre-accession period, the Baltic countries and Hungary were the leaders in the convergence process while there was virtually no convergence in Poland, Macedonia, Romania and the Czech Republic. Indeed, one can conclude that the convergence process was very slow in most of the CEE countries, probably reflecting the low progress in macroeconomic, structural and institutional reforms. In most of the analyzed countries, the most important real convergence dynamics has been realized in the period 2004-2008, which indicates positive effects from EU membership. During these years, Slovakia, Romania and the Baltic countries were the leaders in the convergence process while the Czech Republic and Hungary experienced very slow convergence towards the EU average level of income. In the period after 2008, reflecting the adverse consequences of the crisis, there is a certain slowdown in the convergence of all countries (with the exception of Poland). In fact, Croatia and Slovenia experienced considerable divergence during the post-crisis period.

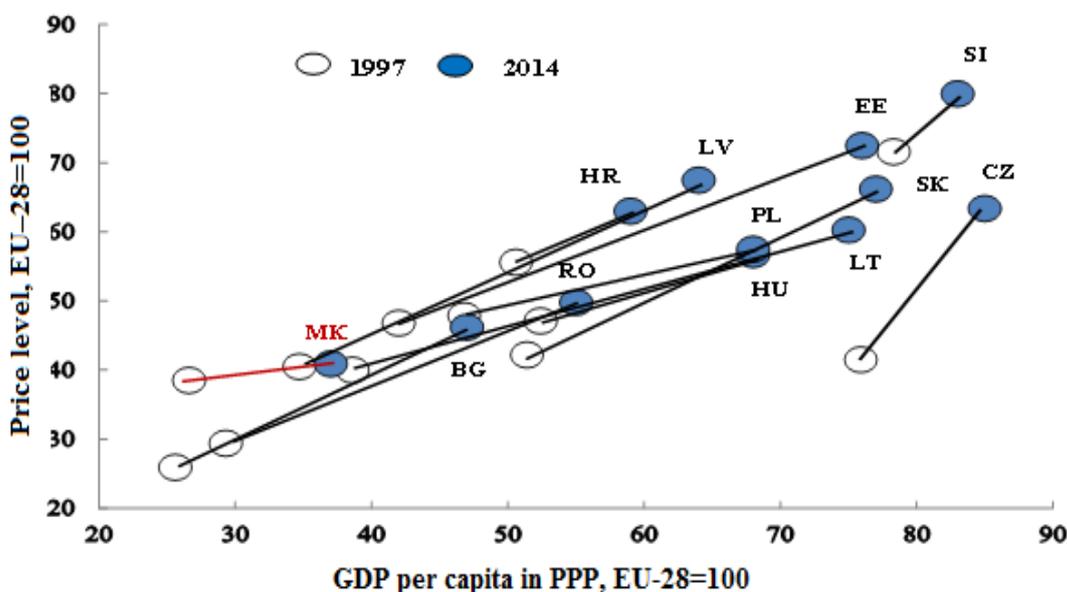


Figure 1. Convergence of GDP per capita and the price level in the new member states, 1997-2014

Notes: Price level, EU-28=100; GDP per capita in PPP, EU-28=100. Source: EUROSTAT, own calculations and adjustments

Table 1. GDP per capita (PPP) of CEE countries, 1997-2014

Country	1997-2003	2004-2008	2009-2014	1997-2014
Lithuania	10	14	12	36
Estonia	10	16	8	34
Latvia	10	15	4	29
Romania	2	17	7	26
Slovakia	4	17	5	26
Bulgaria	7	11	3	21
Poland	1	6	14	21
Hungary	10	1	5	16
Macedonia	0	7	4	10
Czech Republic	1	4	4	9
Croatia	5	7	-4	8
Slovenia	5	6	-6	5

Note: Changes throughout the period, EY-28=100, in p.p.

Source: EUROSTAT, own calculations and adjustments

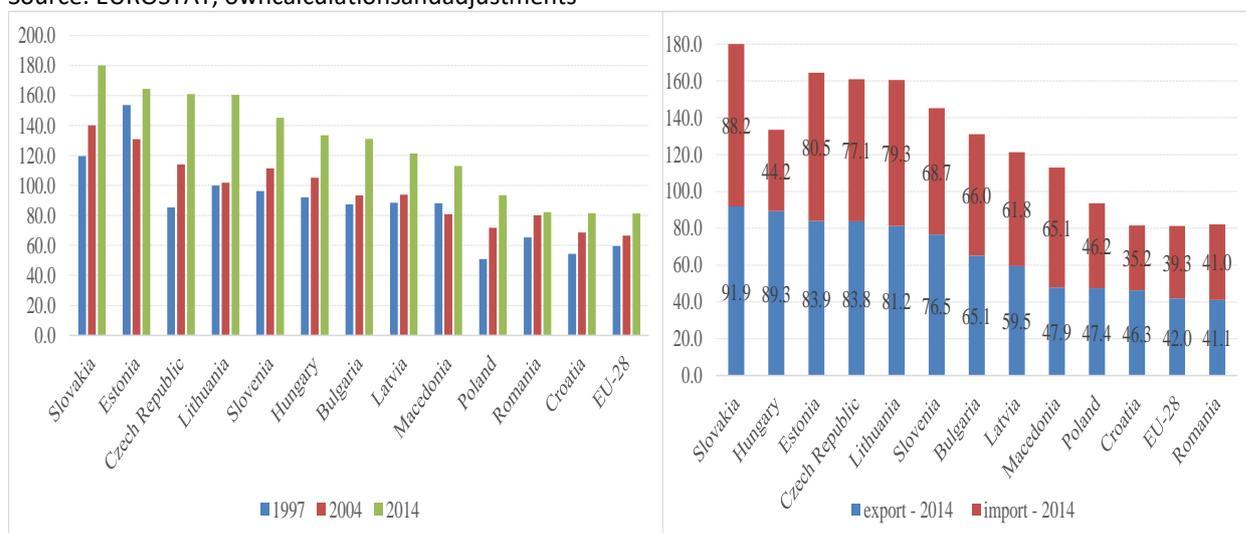


Figure 2. Trade openness in CEE countries, 1997-2014

Note: Export and import of goods and services as % of GDP.

Source: EUROSTAT, World Bank, IMF, own calculations

### 3.2. Openness and Market Integration with The EU

Openness of the economy and its trade integration with the EU are important preconditions for successful accession within the EU. Basically, the theoretical debate on this indicator, which largely arises from the theory of optimal currency area, suggests that greater openness and trade integration lead to better adjustment between business cycles between the countries. This is necessary in order to minimize the appearance of asymmetric shocks which, if not neutralized by functional alternative adjustment mechanisms (flexible wages and prices), would result in lower economic performance. In what follows, we will analyze the

openness and market integration of the CEE economies with the EU.

Figure 2 clearly shows that most of the new member states (Croatia and Romania are the only outliers) have above the average trade openness with Slovakia, the Czech Republic and the Baltic countries being the leaders. In addition, it can be seen that the degree of openness has increased in most of the countries during the analyzed period. Finally, it seems that these countries are open on both the exports and imports side. As for the trade integration with the EU, one can observe that the new EU member states had achieved a relatively high level of trade integration at the moment of their EU accession. From that point on, the degree of trade integration has been stagnant while in many countries it has been

declining over the analyzed period. Macedonia is a striking exception from this general trend since it has almost doubled its trade with the EU.

### 3.3. Unemployment and Poverty

Labour market and poverty are two areas with pretty large differences between the old and the new member states. Figure 4 shows the rates of unemployment in the EU for the period 2005 to 2014. As can be seen, although unemployment has risen throughout the EU following the Global economic crisis, it is evident that the new member states struggle with generally higher unemployment rates. For instance, some countries, such as Cyprus and Croatia have unemployment rates above 15%, while some

other countries have occasionally approached the level of 20%. Macedonia is an obvious outlier in this area with almost three times higher unemployment compared to the EU average. In addition, Figure 4 depicts the cyclical nature of the unemployment in the new member states, except for Macedonia. Specifically, during the period of the global economic expansion from 2006 to 2008, the unemployment rate in EU-28 was reduced, reaching the minimum of 7% in 2008. However, later there is a sharp increase in unemployment in the EU due to the recession related to the global financial crisis and the European debtor crisis. As a consequence of this, in 2013 the rate of unemployment reaches the peak at 10.9%.

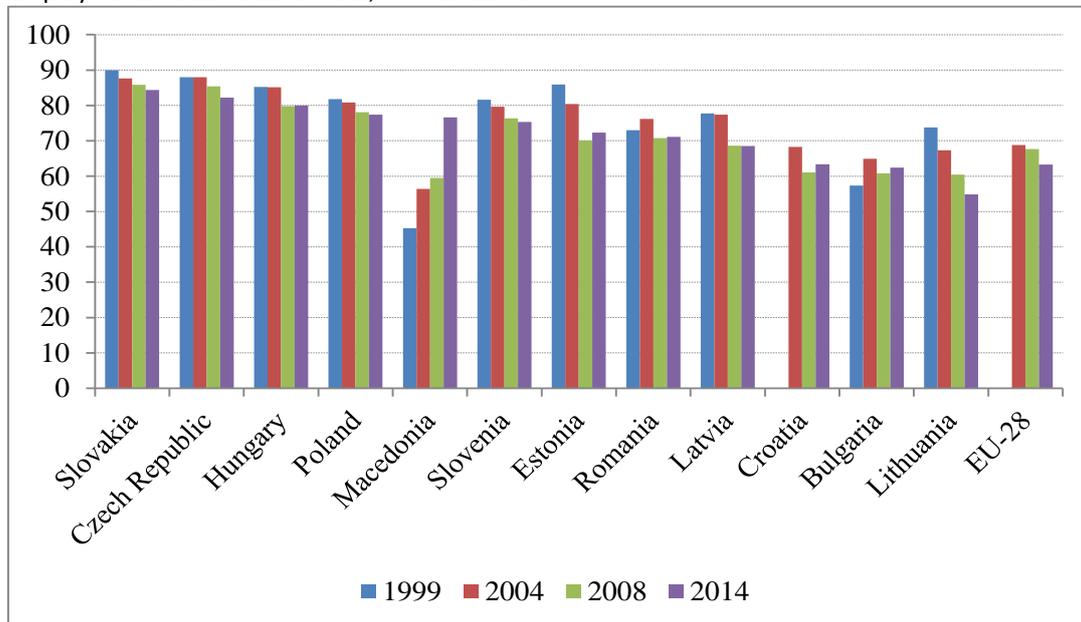


Figure 3. Trade integration of CEE countries, 1999-2014

Note: The percentage share of exports to EU in total exports, Source: EUROSTAT, World Bank, IMF, own calculations

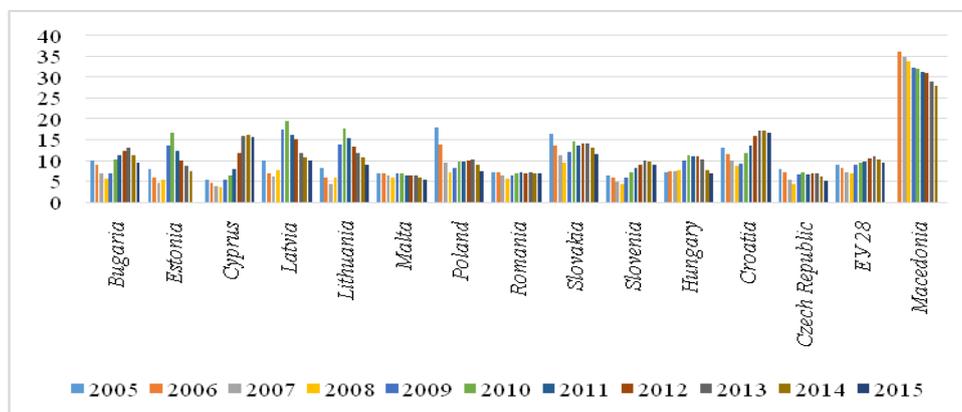


Figure 4. Unemployment in CEE countries, 2005-2015

Note: Participation of unemployed persons in the overall workforce according to ILO., Source: EUROSTAT.

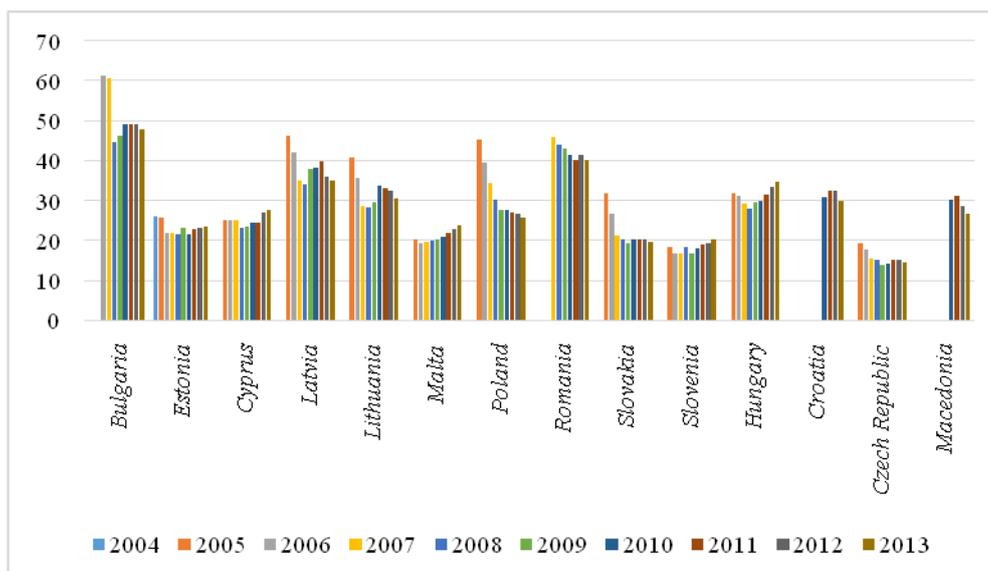


Figure 5. Poverty rates in CEE countries, 2004-2013.

Note: Rate of poverty risk before social transfers.

Source: EUROSTAT.

Figure 5 provides an overview of the poverty rates in new EU member states. What is immediately evident is that there are no big differences between the former transition countries in regards to poverty. For instance, in 2013, 12 out of 14 analyzed countries had poverty rates above 20%. What is even more important is the fact that, notwithstanding the cyclical nature of unemployment, poverty does not show a declining trend in these economies throughout the analyzed period.

### 3.4. Wages and Productivity

In this subsection we analyze another indicator that is related to unemployment and poverty – the level of wages. In this regard, Figure 6 shows the comparison of the level of wages (expressed in Euros) in the new EU member states. As can be noticed, there is an upward trend in the wages in all the analyzed countries. For example, during 1999-2011 the wages have increased by 60% in Slovenia and Cyprus; more than doubled in Hungary, Bulgaria and Lithuania; almost tripled in the Czech Republic, Estonia and Latvia; and have increased almost 3.5 times in Romania. As expected, the wage growth was lowest in the

countries with a higher initial level of wages (Cyprus and Slovenia), and highest in the countries with the lower initial level of wages (Romania).

Certainly, the dynamics of wages can be connected to the growth of labor productivity. Figure 6 (the right panel) provides an overview of labor productivity in the new EU member states for the period 2003-2014. Here we can see that almost all countries are rather far away from the average productivity of EU-28: productivity in Cyprus and Malta is 87% of the European average, after which come Slovenia and Slovakia with productivity of 83% and 81.5%, respectively; all other countries are under the level of 80%. In fact, the countries with highest productivity have not achieved any progress in relation to their level of productivity in 2003 (with the exception of Slovakia); quite the opposite, in Cyprus and Malta there is a reduction of the relative productivity. All this indicates that the process of convergence of productivity in these countries has stopped, although it is unclear at this time whether it is a temporary or permanent phenomenon.

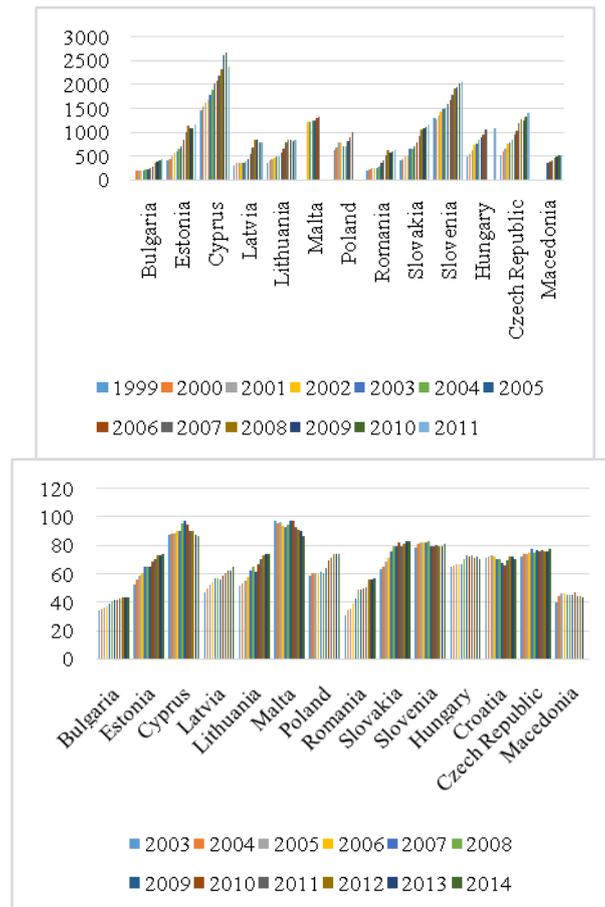


Figure 6. Laborcosts (left) and productivity (right) CEE, 1999-2014.

Note: Nominallaborproductivityperemployedperson (ESA2010), EU-28 = 100.

Source: EUROSTAT.

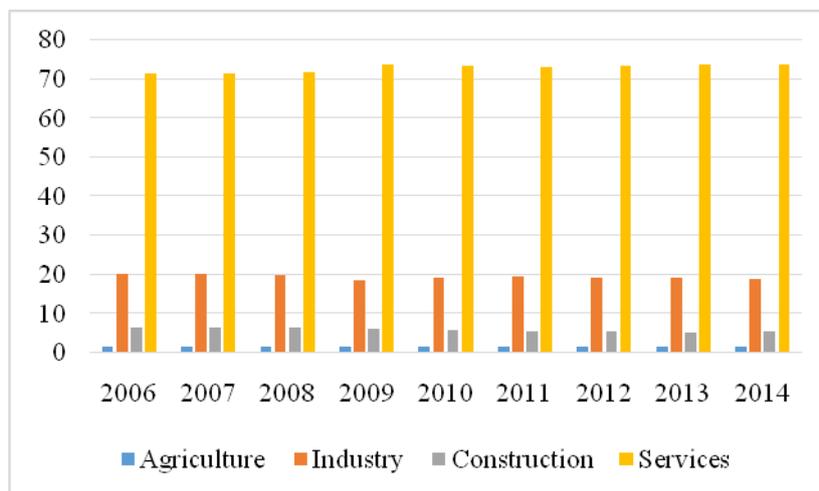


Figure 7. Economic structure in EU-28

Note: Percentage share of the main economic sectors in the gross added value.

Source: EUROSTAT.

### 3.5. Economic structure in the EU

Finally, the convergence process can be monitored through the economic structure, represented by the share of individual sectors in the creation of gross value added. In this regard, Figure 7 shows the average economic structure in EU-28, emphasizing the predominance of services in the value added as well as the negligible role of agriculture. Also, it can be seen that the economic structure in EU-28 has remained very stable throughout the analyzed period. Though not showed here, the detailed inspection of the data confirms the aforementioned conclusion: the share of agriculture accounts between two and six percent across the individual countries, while services account for between 65 and 70 percent in the gross value added.

## 4. Empirical evidence on the real convergence of CEE countries

### 4.1. Data description

Understandably, the previous descriptive analysis serves only for illustrative purposes and ought to be accompanied by formal empirical evidence. Therefore, in this section we provide the findings of the econometric investigation of the main determinants of real convergence in the CEE countries. In these regards, we regress the relative level of income, i.e. the level of GDP as a percentage of the average EU-28 GDP level (*gdp*) to several macroeconomic, structural and institutional variables for a panel of 10 CEE countries during the period between 2000 and 2015. Specifically, our sample includes the following countries: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. We work with annual data obtained from the EUROSTAT Database, the World Development Indicators Database, as well as World Economic Outlook (April 2016). Although the sample period ranges from 2000 to 2015 there are many gaps in the data for the individual countries included in the sample. As a consequence we end up with 103 observations available for estimation of the regression model.

The initial specification of the empirical model includes the following regressors: the savings/GDP ratio (*save*), the investment/GDP ratio (*invest*), trade openness as expressed by the share of total foreign trade in GDP (*trade*), trade integration within EU expressed as a percentage of the country's trade with the EU in total trade (*trade*), the share of foreign direct investment in GDP (*fdi*), fiscal decentralization expressed as the share of subnational expenditure in GDP (*decen*), unemployment rate (*unem*), inflation rate (*infl*), budget deficits as a percent of GDP (*budget*), the share of old population in total population (*old*), the level of wages expressed in Euros (*wage*), the EBRD index of banking sector reforms (*bank*), the EBRD index of the capital market reforms (*sec*), the size of the public sector measured by the share of general government expenditure in GDP (*govern*), and the economic structure as expressed by the percentage share of agriculture, industry and services in the gross value added, respectively (*agri*, *ind*, *serv*).

### 4.2. Methodology

We analyse the relationship between government size and fiscal decentralization by means of a fixed-effects panel data model, which seems to be more appropriate when working with macro panels, especially when the cross-sections are not sampled randomly and when the research focuses on the behaviour of the specific sample without drawing inferences about the whole population. In addition, the fixed-effects estimator is consistent even when individual effects are correlated with the regressors (Baltagi 2008). In these regards, the assumption that the regressors are not correlated with the disturbance term, which is critical for employing the random effects model, seems to be a priori unrealistic (Wooldridge 2002) as many of the regressors included in the model may be correlated with the unobserved country-specific effects. For instance, the economic structure may be associated with the country's geography and history; the level of economic development depends on various country-specific cultural and institutional factors; the dependent population is affected by the demographic trends in a country; inflation may reflect the society's aversion etc.

Formally, we base our choice of the fixed-effects vis-à-vis the random-effects model on the Hausman-test (Hausman 1978), which in each case rejects the null-hypothesis that the regressors and the disturbances are not correlated.<sup>1</sup> In addition, our preference for the fixed-effects model is supported by the results of the F-test for the joint significance of the fixed effects, which are statistically significant in all the variants of the regression model (the results are shown at the bottom of Tables 2 and 3).

The empirical model has the following general specification:

$$y_{it} = \alpha_i + x_{it}\beta' + u_{it} \quad (1)$$

where:

- $y$  is the dependent variable;
- $x$  is a  $k$ -dimensional vector of explanatory variables;
- $\alpha$  and  $\beta$  are the constant and the  $k$ -dimensional vector of parameters of the control variables, respectively;
- $u$  are the residuals;
- $i$  and  $t$  are the country and time subscripts, respectively.

### 4.3. Discussion of the main findings

Table 2 shows the estimates obtained from the general specification empirical model. The first three regressions are virtually the same and they differ only by the variable showing fiscal discipline in the sample countries, i.e. budget surplus appears in the first regression, which has been replaced with the public debt and public expenditure, respectively. Similarly, the last two regressions are virtually the same as the first one as they retain the budget surplus as a regressor, differing only with respect to the economic structure variable (the share of manufacturing in GDP, which is included in the first regression, has subsequently been replaced with the share of agriculture and services).

Table 3 confirms that the process of real convergence is indeed associated with the variables included in the regression model as the coefficient of determination is pretty high in all cases. Also, the results of F-test show that the

fixed effects are highly significant, which can be taken as an additional support for the fixed-effects model. Since the sec and old variables have appeared to be statistically insignificant in the first regression, they have been excluded from the rest of the model specifications.

In accordance with the traditional empirical growth literature, we find that both the savings and investment ratios are statistically significant and economically important determinants of economic growth in the CEE countries. Their coefficients have the expected positive signs with magnitudes that range from 0.2 to 0.3, thus implying a non-negligible effects on the process of real convergence. In addition, the banking sector reforms variable turns out to be highly statistically significant in all the specification. The regression coefficient has a positive sign and its magnitude ranges from 6 to almost 9, thus, implying very strong effects on convergence process. Also, we have obtained the expected results for the two labour market variables (unemployment wage) whose coefficients are highly significant and economically important. This set of results suggest that higher labour market flexibility and efficiency (translated to lower unemployment) accompanied by high labour productivity (as proxied by the wage level) have favourable effects on the real convergence of CEE economies. Further on, the two macroeconomic variables (inflation and budget) provide support to the view that macroeconomic stability (low inflation and low budget deficits) provide a favourable environment to the convergence process. In these respect, it seems that nominal convergence goes hand in hand with real convergence. Finally, we provide a brief comment on the only odd result from the regression – the negative coefficient of trade integration. Although this is a complex issue calling for a detailed analysis, the negative association between trade integration with the EU and real convergence may suggest that the countries that are more integrated within the EU market are more heavily exposed to the EU-wide symmetric shocks. As a result, they suffer more from the recent stagnation in economic activity following the Global financial and economic crisis. On the contrary, the countries that are less integrated within the EU, i.e. those with more diversified trade have been able to grow faster than the EU-average.

<sup>1</sup>The results of the Hausman-test are available from the authors upon request.

Table 2. Regression results from the general specification

Variables	(1)	(2)	(3)	(4)	(5)
constant	13.1040 (20.9614)	14.0204 (21.5716)	1.8628 (22.4120)	32.3063* (17.1964)	24.6671 (17.7471)
save	0.1440 (0.1349)	0.1507 (0.1375)	0.1613 (0.1363)	0.1880 (0.1287)	0.1821 (0.1346)
invest	0.2294* (0.1272)	0.1877 (0.1335)	0.2265* (0.1288)	0.1324 (0.1457)	0.2183 (0.1384)
open	-0.0118 (0.0335)	-0.0434 (0.0314)	-0.0222 (0.0332)	-0.0056 (0.0314)	-0.0005 (0.0323)
trade	-0.3031*** (0.1108)	-0.2930** (0.1139)	-0.2702** (0.1113)	-0.3230*** (0.1071)	-0.3285*** (0.1097)
fdi	-0.03884 (0.0536)	-0.0489 (0.0543)	-0.0513 (0.0539)	-0.0403 (0.0534)	-0.0360 (0.0538)
decent	0.0831** (0.1630)	-0.0395*** (0.1519)	0.0258 (0.1593)	0.1035 (0.1628)	0.0882 (0.1642)
bank	6.2557*** (2.1510)	6.1220*** (2.1909)	5.6186 (2.2038)	5.1566** (2.2812)	6.0969*** (2.2454)
sec	2.3047 (1.6673)	2.4889 (1.7203)	3.1891* (1.6982)	1.9809 (1.6878)	2.3569 (1.6812)
unem	-0.3852** (0.1732)	-0.2971 (0.1841)	-0.4054** (0.1802)	-0.4673*** (0.1590)	-0.4526*** (0.1725)
wage	0.0085** (0.0031)	0.0102*** (0.0032)	0.0084** (0.0032)	0.0076** (0.0031)	0.0079** (0.0032)
infl	-0.0589 (0.0642)	-0.0616 (0.0659)	-0.0574 (0.0653)	-0.0308 (0.0692)	-0.0636 (0.0655)
budget	-0.3262* (0.1705)			-0.2261 (0.1852)	-0.3144* (0.1799)
ind	0.2425 (0.2659)	0.2258 (0.2709)	0.2861 (0.2735)		
old	1.2206 (0.8442)	1.5660* (0.8455)	1.3063 (0.8546)	1.1387 (0.8156)	1.0036 (0.8250)
debt		-0.0339 (0.0449)			
govern			0.2287 (0.1705)		
agri				-0.4026	
serv					0.0151 (0.2120)
F-test	16.31 (0.0000)	17.13 (0.0000)	16.94 (0.0000)	22.97 (0.0000)	25.09 (0.0000)
R <sup>2</sup>	0.8859	0.8815	0.8833	0.8869	0.8847

Notes:

1. Standard errors are given in parentheses.

2. \*\*\*/\*\*/\* denotes significance at 1%, 5% and 10% level of significance, respectively.

Table 3. Regression results from the parsimonious model

Variables	(1)	(2)	(3)	(4)
constant	27.6965* (15.1289)	37.4927*** (12.0757)	26.0795** (13.1065)	40.7507*** (11.9853)
save	0.1835 (0.1145)	0.1900* (0.1148)	0.2374** (0.1167)	
invest	0.2104* (0.1170)	0.2877*** (0.1093)	0.2861** (0.1126)	0.3064*** (0.1043)
trade	-0.3214*** (0.1033)	-0.3443*** (0.0951)	-0.3039*** (0.0984)	-0.3650*** (0.0946)
bank	6.2730*** (2.1075)	8.3981*** (1.7433)	8.1620*** (1.8092)	8.9182*** (1.7045)
sec	2.3059 (1.6304)			
unem	-0.4558*** (0.1543)	-0.4085*** (0.1524)	-0.4142** (0.1650)	-0.3842** (0.1501)
wage	0.0082*** (0.0029)	0.0117*** (0.0022)	0.0123*** (0.0022)	0.0112*** (0.0022)
infl	-0.0770 (0.0576)	-0.0950* (0.0570)	-0.0971* (0.0587)	-0.1090* (0.0565)
budget	-0.3124** (0.1310)	-0.3619*** (0.1289)		-0.3921*** (0.1268)
old	0.9003 (0.7579)			
govern			0.2294* (0.1346)	
F-test	31.62 (0.0000)	39.08 (0.0000)	36.72 (0.0000)	43.01 (0.0000)
R <sup>2</sup>	0.8830	0.8785	0.8716	0.8781

Notes:

1. Standard errors are given in parentheses.
2. \*\*\*/\*\*/\* denotes significance at 1%, 5% and 10% level of significance, respectively.

## 5. Conclusion

The main research task in this paper is to evaluate the progress of CEE economies towards meeting the criteria for nominal and real convergence by employing various economic variables. In these regards, we provide some basic descriptive statistics, which shows the developments in several areas during the period between 1997 and 2014. In addition, we offer a formal econometric evidence on the main determinants of the real convergence process. Based on a panel data for 10 countries during 2000-2015, estimated by the fixed-effects estimator, we find the following main results: the standard variables in the growth literature (domestic savings and investment

ratios), higher labour productivity and banking sector reforms are positively associated with real convergence. On the other hand, we find a negative association between unemployment, inflation, and budget deficits. All these findings are in line with our *a priori* expectations about the signs of the regression coefficients. In addition, we obtain one puzzling result – the negative association between real convergence and the trade integration with the EU, which calls for further research in order to be rationalized.

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