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THE EFFECTS OF THE CRISIS ON CONVERGENCE BETWEEN THE EASTERN PARTNERSHIP AND EU-15 STATES[3]

This paper aims to investigate the effects of the 2008/2009 financial crisis on the convergence process of the Eastern Partnership (EaP) countries towards the core countries of the European Union (EU-15). To do so, we econometrically test the relationship between the per capita GDP growth rate and selected macroeconomic variables in the period 2004–2018 and three sub-periods: the pre-crisis, the crisis, and the post-crisis period. We hypothesize that the financial crisis had a negative impact on the absolute and conditional convergence process in the analyzed group of countries. The convergence rates are estimated using ordinary least squares (OLS) semi-log regression based on cross-sectional data. The empirical results show that the EaP countries converge towards the EU-15 Member States and that the convergence rates range between 1.6% and 4.3%. Negative effects of the financial crisis on the convergence process are confirmed only for absolute convergence. The two groups of countries form separate clusters, which indicates a considerable heterogeneity of growth. According to the results of this research, the EaP countries should focus on opening their economies to more trade, increase macroeconomic stability and decrease corruption, because improvement in these areas should lead to a faster convergence process.
Keywords: β-convergence; Eastern Partnership; European Union; Financial crisis; Economic growth
JEL: F15; O47; O52

1. Introduction

This paper presents an analysis of the absolute and conditional convergence process of the Eastern Partnership (EaP) countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine towards the EU-15 Member States; Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.[4] The analyzed period is 2004-2018 with three sub-periods: the pre-

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[4] The United Kingdom is included in the analysis because the analyzed period is 2004-2018.

crisis sub-period 2004-2008, the crisis sub-period 2009-2013, and the post-crisis sub-period 2014-2018.

The EaP countries were part of the Union of Soviet Socialist Republics (USSR) and their economies were characterized by a centrally planned system. After the fall of the Berlin Wall in 1989, the countries gained their independence and started the transition process to the market economy, which has not finished. The countries are following the path of the Central and Eastern European (CEE) countries that joined the European Union (EU) in 2004[5], 2007[6], and 2013[7]. The transition of these countries ended once they became EU Member States. Another group of transition countries that has official relations with the European Union are the Western Balkans. These countries have a more formal relation with the EU as they signed the Stabilization and Association Agreements (SAA) and they are candidates or potential candidates for EU membership.

The EaP, which was launched in 2009, is not an association process, but a specific Eastern dimension of the European Neighbourhood Policy (ENP), which aims to reinforce the political association and economic integration of the six countries **(**European External Action Service, 2019b). The EU signed association agreements with Georgia, Moldova, and Ukraine. The agreements include the Deep and Comprehensive Free Trade Area (DCFTA), which offers the countries the free movement of goods, services and capital. The three countries have visa-free regimes with the EU. The EU has become the main trade partner for the DCFTA countries and it is also the main trade partner for Azerbaijan. Armenia and Belarus mostly trade with the Russian Federation. The EaP countries benefited from an overall of €2.8 billion of EU funds (European External Action Service 2016). In January 2019, it was announced that the European Commission, together with the World Bank had developed a new Indicative trans-European Transport Network (TEN-T) Investment Action Plan, which identifies almost 100 priority projects in the countries. These projects amount to an investment of almost €13 billion up to 2030 (European External Action Service, 2019a). In order to help the enlargement and assist the neighbourhood partners in limiting the economic consequences of the Covid-19 pandemic, the European Commission adopted a proposal for a €3 billion macro-financial assistance (MFA). Ukraine will receive €1.2 billion of the MFA funds, Georgia €150 million and Moldova €100 million (European Commission, 2020). With the financial support, the poorer countries catch up faster with the richer countries, i.e. they converge.

In the past two decades, the economic literature has mostly focused on the convergence process of the new Member States of the European Union towards the old Member States. Most studies have found that the CEE countries converge towards the EU-15 Member States (Kulhánek (2014), Matkowski et al. (2016), Grela et al. (2017), Alcidi et al. (2018), Stanišić et al. (2018), Alcidi (2019), Cieślik and Wciślik (2020)). However, the convergence process in the EU is not a homogeneous one (Cavenaile and Dubois (2010), Grzelak and Kujaczinska (2013), Benczes and Szent-Ivanyi (2015)) and it is slower at the regional level, as compared

[5] Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.
[6] Bulgaria and Romania.
[7] Croatia.

to the national level (Mikulić et al. (2013), Głodowska (2015)). Recently, the effects of the 2008/2009 financial crisis have also been investigated (Stoica et al. (2019), Marelli et al. (2019), Rapacki and Prochniak (2019), Bisciari et al. (2020)) and the results confirmed that the EU Member States did not converge or the process was slower during the crisis.

Even though the convergence process of candidates and potential candidates for EU membership has not been sufficiently investigated, some authors have included the Western Balkan and EaP countries in their analyses (Colak (2015), Benešová et al. (2017), Pipień and Roszkowska (2018), Siljak and Nagy (2018; 2019)). They confirm convergence among the analyzed countries.

The main objective of this paper is to present the analysis of the absolute (unconditional) and conditional convergence process of the EaPcountries towards the EU-15 group. Other objectives include: analyzing whether the 2008/2009 crisis had a negative effect on the convergence process and determining which policies the EaP countries should pursue in order to catch up with the EU-15 countries faster.

Two research hypotheses are tested. The first hypothesis is that the 2008/2009 crisis had a negative impact on the absolute convergence process of the EaP countries towards the old Member States of the European Union (EU-15). The second research hypothesis is that the 2008/2009 crisis had a negative impact on the conditional convergence process in the analyzed group. The sub-hypotheses are as follows: the EaP countries converge as a club and the selected macroeconomic variables are determinants of per capita growth in at least one analyzed period.

The paper is organized as follows: Section 2 analyzes the macroeconomic and political structures of the EaP countries. In Section 3, the methodology and data are presented. Section 4 discusses the empirical findings on absolute and conditional β-convergence. Section 5 concludes the paper.

2. Macroeconomic and Political Structures of the Eastern Partnership Countries

The EaP countries are former socialist countries that have been going through the transition process from a centrally planned to a market economy for the past three decades. In socialism, all decisions were made by the central government: what to produce, the quantity of production, which companies sell the products, in which markets, and at what prices. Some of the characteristics of the socialist system were the state ownership of the economy, restricted trade and investment, production according to five-year plans, low-quality products, artificially determined prices, almost non-existent unemployment, and a lack of institutions. In the early 1990s, with the dissolution of the Soviet Union, Yugoslavia, and Czechoslovakia, more than twenty countries gained their independence. All of them went through a transition recession, which was characterized by hyperinflation, due to the fact that the prices had not been determined according to the law of supply and demand. Additionally, unemployment was in double digits, as the previously state-owned companies no longer existed, and there was no market to sell their products in. The unemployment rates have stabilized in the region; the highest is in Armenia, at 17.5%, and the lowest is in Moldova, at

3%. However, the inadequately educated workforce and the poor work ethic are among the most problematic factors for doing business in the region (World Economic Forum, 2020).

Most former socialist countries decided to join the EU. Therefore, they had to fulfil the Copenhagen criteria (1993), as part of their accession process. One of the criteria is that a country has to be „a functioning market economy with the capacity to cope with competition and market forces" (European Commission, 2021). The existence of a functioning market economy requires that all prices, as well as trade, should be liberalized and that an enforceable legal system, including property rights, is in place (European Commission, 2019, p. 71). Also, the countries should be competitive and attract foreign investors, which will help them produce better-quality products and gain access to foreign markets.

Table 1

Macroeconomic indicators of the Eastern Partnership countries

Indicator	Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Real GDP growth (%)	Armenia	2.2	1.8	-0.4	0.3	1.7	2.3	2.0	2.6	2.0	7.6
	Azerbaijan	5.0	0.1	2.2	5.8	2.8	1.1	-3.1	0.2	7.5	2.2
	Belarus	7.7	5.5	1.7	1.0	1.7	-3.8	-2.5	2.5	3.0	1.2
	Georgia	6.3	7.4	6.4	3.6	4.4	3.0	2.9	4.8	4.9	5.1
	Moldova	7.1	5.8	-0.6	9.0	5.0	-0.3	4.4	4.7	4.3	3.5
	Ukraine	3.8	5.5	0.2	-0.03	-6.6	-9.8	2.2	2.5	3.4	3.2
Inflation rate (%)	Armenia	8.2	7.7	2.6	5.8	3.0	3.7	-1.4	1.0	2.5	1.4
	Azerbaijan	5.7	7.9	1.1	2.4	1.4	4.0	12.4	12.9	1.9	2.6
	Belarus	7.7	53.2	59.2	18.3	18.1	13.5	11.8	6.0	4.9	5.6
	Georgia	7.1	8.5	-0.9	-0.5	3.1	4.0	2.1	6.0	2.6	4.9
	Moldova	7.4	7.7	4.6	4.6	5.1	9.6	6.4	6.6	3.1	4.9
	Ukraine	9.4	8.0	0.6	-0.3	12.1	48.7	13.9	14.4	11.0	7.9
Unemployment rate (%)	Armenia	19.0	18.4	17.3	16.2	17.5	18.3	17.6	17.8	17.2	17.5
	Azerbaijan	5.6	5.4	5.2	5.0	4.9	5.0	5.0	5.0	5.2	4.9
	Belarus	6.1	6.1	6.0	5.9	5.9	5.9	5.8	5.7	5.7	4.8
	Georgia	17.4	17.3	17.2	16.9	14.6	14.1	14.0	13.9	12.7	11.6
	Moldova	7.4	6.7	5.6	5.1	3.9	5.0	4.2	4.1	3.0	3.0
	Ukraine	8.1	7.9	7.5	7.2	9.3	9.1	9.5	9.7	9.0	8.5
General government debt (% of GDP)	Armenia	33.8	35.7	35.6	36.3	39.4	44.1	51.9	53.7	51.3	-
	Azerbaijan	5.0	5.0	5.8	6.2	8.5	18.0	20.6	22.5	18.8	-
	Belarus	36.8	58.2	36.9	36.9	38.8	53.0	53.5	53.2	47.8	42.0
	Georgia	42.4	36.5	34.8	34.7	35.6	41.4	44.4	45.1	44.9	47.9
	Moldova	25.5	24.2	25.9	24.9	30.3	37.8	35.6	31.8	29.7	25.1
	Ukraine	40.6	36.9	37.5	40.5	70.3	79.5	81.2	71.6	60.2	50.3
Budget deficit/surplus (% of GDP)	Armenia	-5.0	-2.8	-1.5	-1.5	-1.9	-4.8	-5.5	-4.8	-1.6	-0.5
	Azerbaijan	-0.9	0.6	-0.2	0.6	-0.5	-0.5	-0.4	-1.5	-0.3	8.1
	Belarus	-1.7	2.7	0.6	0.1	1.0	1.4	1.5	3.0	4.0	2.5
	Georgia	-4.5	-0.9	-0.6	-1.1	-2.0	-1.1	-1.4	-0.9	-0.8	-1.9
	Moldova	-2.1	-2.0	-1.7	-1.4	-1.5	-1.9	-1.6	-0.6	-0.8	-1.4
	Ukraine	-6.3	-2.2	-3.7	-4.1	-4.5	-0.8	-1.9	-1.2	-1.9	-2.2

Source: World Bank, European Commission, and World Economic Outlook databases.

Macroeconomic stability and successful integration are mutually dependent on each other: stability may be a prerequisite to integration, on the one hand, and an indicator of its success, on the other hand (Palankai, 2010, p 16). Table 1 shows the most important macroeconomic

indicators, GDP growth rate, inflation rate, unemployment rate, general government debt, and budget deficit or surplus, and their development in the past 10 years in the EaP countries.

As part of the transition, less developed economies, such as the EaP countries should reach high GDP growth rates. In the period 2010-2019, the countries experienced various periods of recession (Belarus in 2015 and 2016 and Ukraine in the period 2013-2015). However, their economies started to grow again and in 2019, only Moldova's GDP growth rate (1.2%) was lower than the EU-15 average (1.9%). Armenia is the country with the highest growth rate (7.6%), followed by Georgia (5.1%).

After the collapse of socialism and the dissolution of the USSR, the newly created countries faced hyperinflation, which started to stabilize in the late 1990s or early 2000s. According to the European Bank for Reconstruction and Development (EBRD) transition indicator, except for Belarus, the EaP countries have achieved comprehensive or complete price liberalization. The EaP countries have had inflation rates higher than the EU average in the past decade. Belarus experienced hyperinflation in 2011 and 2012, while Ukraine's inflation rate in 2014 was 48.7%, due to the war with Russia. While the inflation rates in the region have a tendency to fluctuate, only Armenia and Azerbaijan had an inflation rate below 3% in 2019.

One of the characteristics of the EaP region is low general government debt rates and budget deficits. The countries did not inherit high debt from the previous system and they have maintained it below 60% of GDP (as required by the Maastricht criteria, which each country has to fulfil prior to joining Europe's Economic and Monetary Union). The only exception is Ukraine, but the country's debt increased due to the war with Russia and reached its peak in 2016, at 81.2%. However, it decreased to 50.3% in 2019. The lowest debt rate is in Azerbaijan, at 18.8%. In 2018, none of the countries had a budget deficit above 3% of the GDP (another Maastricht criterion). Belarus recorded a surplus of 4% of the GDP, while the highest deficit was in Ukraine (1.9%). Considering the economic background of the EaP countries, they have made progress and achieved a certain degree of macroeconomic stability. However, the corruption, inefficient institutions, uneducated labour force and political instability in the region hamper economic growth.

Due to a lack of institutional framework in the previous system, where all decisions were made by the central government, former socialist countries have fought against corruption, with varying degrees of success. The EaP countries are transition economies and economic transition is a process of institutional change and a process of building new institutions, as required by a capitalist economy (Redek and Sušjan, 2005: 995). A strong institutional change, which is required by the Copenhagen criteria, has had a positive effect on the economic performance of CEE countries (Aralica et al., 2019). However, history also has an effect on the quality of institutions and corruption; thus, the Soviet successor states have more corruption today because socialism lasted over 20 years longer than in CEE countries (Uberti, 2018). According to the Global Competitiveness report (2020), the least competitive country in the EaP region is Ukraine (positioned 85th out of 141 countries) and the most competitive is Azerbaijan (58th out of 141). The most competitive country in the EU is the Netherlands (4th out of 141) and the least competitive is Croatia (63rd out of 141). Ukraine has the lowest quality of institutions (104th position) and the protection of property rights (109th position), while Azerbaijan has the most protected property rights (44th position) and developed infrastructure (38th position). The highest quality of institutions is in Georgia (43rd position).

According to the Political Stability Index, Belarus is the most stable country in the region (positioned 80th out of 195 countries) and it is the only EaP country with a positive index value. Moldova's position is the second-best (130th), while Ukraine is the least politically stable country in Europe (178th position in the world).

One of the biggest challenges for the EU relations with the EaP countries is their history with and dependency on Russia, especially because Russia is one of the region's main trade partners. The countries' attitude towards the EU depends on the ruling party, i.e., whether the leading party is pro-Russia or pro-EU oriented. The EaP countries want stronger relations with the EU for a number of reasons. First, the EU provides substantial financial aid. Second, it is the main trade partner for all countries, except for Armenia and Belarus. Finally, the countries can have a visa-free regime, which facilitates travelling to and studying in the EU. Ukraine, Moldova, and Georgia signed association agreements in 2016 and 2017, but these countries are less concerned about their relations with Russia, as they were at war with Russia for a period of time since the early 2000s.

The situation with Armenia, Azerbaijan, and Belarus is more complicated. Belarus and Azerbaijan do not want to join the EU, as Belarus has very tight relations with Russia, and Azerbaijan seeks to have an independent foreign policy (Boucart, 2020b). Both countries have authoritarian regimes and their democracy indices are very low: 2.48 in Belarus and 2.75 in Azerbaijan (the index values in other countries of the region range between 5.42 in Georgia to 5.9 in Ukraine). However, one of the Copenhagen criteria for accession to the EU is „the stability of institutions guaranteeing democracy" (European Commission, 2021). Belarus' participation in the EaP is limited and the country does not take part in the Euronest Parliamentary Assembly for political reasons (European Parliament, 2021). The EU has decided to turn a blind eye to the political situation in Azerbaijan, as the country is rich in natural resources (natural gas and oil) and good relations could decrease the EU's dependence on Russia's natural resources (Boucart, 2020b).

Armenia is in a different position, as the country is in the middle between the EU and Russia. Armenia and the EU signed the Comprehensive and Enhanced Partnership Agreement (CEPA) in 2017, which entered into force in 2018 (European Commission, 2021). In 2013, the country was negotiating an association agreement with the EU, but it withdrew and joined the Eurasian Economic Union, which consists of most former Soviet republics. Armenia is in a difficult geopolitical position, as its immediate neighbours, Turkey and Azerbaijan, have closed their borders with the country. In 2020, Armenia and Azerbaijan were at war in the Nagorno-Karabagh region. Armenia is trying to find a balance between the EU and Russia, as it is military and energetically dependent on Russia (Boucart, 2020a) and the EU is its main trade partner and a significant contributor of foreign aid.

The EaP countries have to put a lot of effort into transforming their economies and achieving similar structural development levels as the EU Member States. Even though the EU has initiated some formal relations, a lack of the EU's commitment to deepen those relations can push the EaP countries towards Russia. Inconsistent policies towards Western Balkan states, where the start of the accession process was delayed (cf. the case of Albania and North Macedonia) can leave the countries discouraged. The EaP economies are not ready to start the accession negotiation. The countries should stay outside the EU as long as it takes for

them to gradually transform, to become competitive functioning market economies, which will be able to cope with the challenges of being EU Member States, without pressure from the EU.

3. Methodology and Data

The methodology for convergence analysis was developed by Barro and Sala-i-Martin (1992), who defined convergence as a tendency of poor economies to grow faster than rich economies, in per capita terms. Based on the Solow neoclassical growth model (1956), the authors tested if there was convergence in the US in the period 1840-1988 and several sub-periods. The results showed that the states converged at the rate of 2% per year, regardless of the time period. The rate of 2% is considered as a benchmark for convergence analysis. The economic literature distinguishes two types of economic convergence: sigma (δ) and beta (β) convergence. Sigma convergence measures the dispersion among the per capita GDP in the analyzed group of countries. Beta convergence occurs when there is a negative relationship between the per capita GDP growth rate and per capita GDP at the beginning of the analyzed period. There are two types of β-convergence: absolute (unconditional) and conditional β-convergence.

Absolute convergence occurs when countries of the analyzed group have similar structures in the initial period and they converge towards the same steady-state. The convergence (or β) coefficient represents the speed of convergence in the course of one year. The coefficient is obtained by estimating a simple regression model. The dependent variable in the analysis is the average per capita GDP growth rate for the analyzed period and the independent variable is the initial per capita GDP, computed in natural logarithm (Equation 1).

$$\Upsilon_{i.0,T} = \alpha_i + \beta \log(Y_{i,0}) + \varepsilon_i \quad (1)$$

Where β is the convergence coefficient; $\Upsilon_{i.0,T}$ is the average annual growth rate of per capita GDP for country *i*; $Y_{i,0}$ is per capita GDP at PPP for country *i* at the beginning of the analyzed period 0; α_i is a constant; ε_i is the stochastic error of the equation; and T is the end of the time interval.

Convergence exists only if there is a negative relationship between the variables. Therefore, the β-coefficient must be negative. If the coefficient is positive, it indicates divergence, i.e. rich countries tend to grow faster than poor countries.

If countries start with different structures, they will converge towards a different steady state. The β-coefficient is obtained by estimating a multiple regression model, which represents an absolute convergence model augmented with various macroeconomic variables. In this research, we estimate a conditional convergence model with two economic variables: economic openness and the inflation rate, and an institutional variable, the Government Integrity Index, which is a proxy for corruption (Equation 2).

$$\Upsilon_{i.0,T} = \alpha_i + \beta_1 \log(Y_{i,0}) + \beta_2 EO_{i.0,T} + \beta_3 Inf_{i.0.T} + \beta_4 GI_{i.0.T} + \varepsilon_i \quad (2)$$

Where EO is the economic openness rate; Inf is the inflation rate; and GI is the Government Integrity index.

Theoretically, it is expected that economic openness and government integrity will have a positive impact on per capita growth, while the inflation rate is expected to have a negative impact.

The classical approach to convergence analysis presented by Sala-i-Martin (1996) is followed in this research. We estimate the convergence models using ordinary least square (OLS) regression based on cross-sectional data. Cross-sectional data is used because it is free of the distortions caused by business cycles as well as various demand-side and random supply-side shocks, both internal and external, which deviate the economy from a path towards a steady state (Vojinović et al. 2009: 127). The literature on economic convergence and transition is followed (Carmeci and Mauro (2002), Yin et al. (2003), Vojinović et al. (2009), Szeles and Marinescu (2010), Dobrinsky and Havlik (2014), Rapacki and Prochniak (2019), Stoica et al. (2019), Popovic et al. (2020)) and the selected macroeconomic variables are generally used in the convergence analysis.

Eight models are estimated in this research; four absolute (Models 1-4) and four conditional convergence models (Models 5-8). The analyzed period is 2004-2018, with three sub-periods: the pre-crisis sub-period 2004-2008, the crisis sub-period 2009-2013, and the post-crisis sub-period 2014-2018. The sub-periods are included in the analysis to test the effects of the 2008/2009 crisis on the convergence process in the analyzed countries. In order to investigate relevant model diagnostics, two tests are conducted with all estimated models; the Breusch-Pagan test, which tests the null hypothesis that the variance of residuals is constant, and the Ramsey RESET test, which tests the null hypothesis that a model has no omitted variables. We test for multicollinearity in the conditional convergence models using the variance inflation factor (VIF).

The analysis is based on annual data. Table 2 presents the descriptive statistics of the variables used in the estimation of convergence models in the period 2004-2018. The data set includes twenty-one countries.

Table 2

Descriptive statistics

Variable	Description	Mean	Standard deviation	Minimum	Maximum
Per capita GDP growth	Annual percentage growth rate of GDP per capita based on constant local currency	2.09	2.18	-0.66	7.33
Log (initial per capita GDP)	Natural logarithm of per capita GDP at the beginning of the analyzed period	9.85	0.90	8.07	11.07
Economic openness	A sum of exports and imports divided by GDP	105.41	64.77	53.92	345.42
Inflation rate	Measured by the Harmonized Index of Consumer Prices	3.84	4.40	0.97	17.62
Government integrity		0.62	0.25	0.25	0.93

Source: Authors' calculations based on World Bank, World Economic Outlook, and Heritage Foundation data.

The World Bank, World Economic Outlook, and Heritage Foundation data sets are the main source of data for this research. Data for the per capita GDP growth rate, per capita GDP (in PPP) in 2004, 2009, and 2014, and economic openness are obtained from the World Bank (WB) database. Data for the inflation rate are derived from the World Economic Outlook (WEO) database and data for the Government Integrity Index from the Heritage Foundation database.

4. Results and Discussion

This paper analyzes the convergence process of EaP countries towards the EU-15 Member States in the period 2004-2018. In order to test the research hypotheses that the 2008/2009 crisis had a negative impact on the absolute and conditional convergence process in the group, three sub-periods are included in the analysis: the pre-crisis sub-period, the crisis sub-period, and the post-crisis sub-period. Eight convergence models are estimates: four absolute convergence models (Models 1-4) and four conditional convergence models (Models 5-8).

a. Absolute β-Convergence

Beta convergence implies that poor economies in the analyzed group will grow faster than rich economies. If the countries have similar structures, they will converge towards the same steady state, and the convergence will be absolute. Table 3 presents the regression results for absolute convergence in the analyzed periods.

The empirical analysis shows that the EaP countries converge towards the EU-15 Member States in every analyzed period, except the post-crisis period. The β-coefficient for the period 2004-2018 is negative, -1.93, and highly significant at the *p*-value=0.0000, which indicates that the countries converge towards the same steady state at the rate of 1.9% per year. The rate is slightly lower than the reference value from the Barro and Sala-i-Martin (1992) findings. The convergence rate in the pre-crisis period is the highest, 4.3% and it decreases to 1.6% during the crisis period. In the post-crisis period, the rate is negative, but not statistically significant, because the EaP countries achieved lower growth rates than the EU-15 member states. Their per capita GDP was only 22.7% of the EU-15 average between 2014 and 2018. The EaP countries went through a transition recession after the dissolution of the Soviet Union, which resulted in a fall of per capita GDP. The biggest fall was recorded in Georgia. The country's per capita GDP in 1994 was only 30% of the 1990 level. Other countries' per capita GDPs ranged between 44% of the 1990 level in Azerbaijan to 74% in Belarus. Per capita GDPs in the EaP countries reached the 1990 level in the late 1990s (Belarus) and early 2000s (other countries).

Based on the regression results, it can be concluded that the convergence process was slower during the 2008/2009 crisis, i.e. the crisis had a negative effect on convergence, and that the EaP countries did not start to catch up with the EU-15 average in the post-crisis sub-period. Therefore, there is no sufficient evidence to reject the first research hypothesis.

Table 3

Absolute convergence of the EaP countries towards the EU-15 Member States

	Model 1 2004-2018	Model 2 2004-2008	Model 2' 2004-2008	Model 3 2009-2013	Model 4 2014-2018
	β (t)	β (t)	β (t)	β (t)	β (t)
Log of initial per capita GDP	-1.93*** (-5.74)	-4.29*** (-5.47)	-4.29*** (-3.76)	-1.58*** (-2.95)	-0.07 (-0.10)
Number of observations	21	21	21	21	21
Number of panel observations	315	105	105	105	105
F statistics (1, 19)	33.00	29.96	14.17	8.72	0.01
Prob>F	(0.0000)	(0.0000)	(0.0013)	(0.0082)	(0.9207)
R^2	0.6346	0.6120	0.6120	0.3145	0.0005

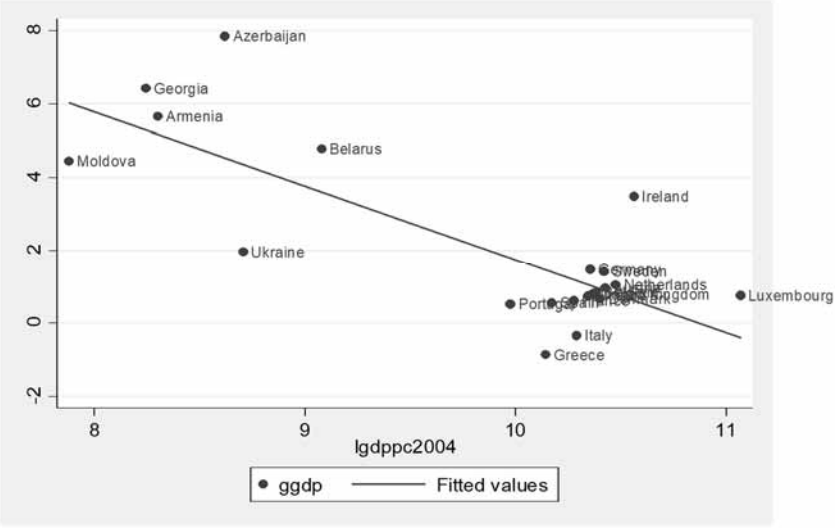
*Significance codes: ***p<0.01, **p<0.05, p*<0.1*
Source: Authors' calculations based on World Bank data.

The problem of heteroscedasticity is present in Model 2. When regression with a heteroscedasticity robust standard error (Model 2') is estimated, the issue of heteroscedasticity is corrected and the results remain unchanged.

Figure 1 plots the per capita GDP in 2004 (X-axis) with the average per capita GDP growth rate in the period 2004-2018 (Y-axis). The Figure supports the convergence hypothesis in the analyzed group as the line of fitted values shows a negative relationship between the variables, i.e., it has a downward slope.

Figure 1

Absolute convergence of the Eastern Partnership countries towards the EU-15 Member States



Source: Authors' calculations based on World Bank data.

Figure 1 shows that there are two clusters; the EaP countries and the EU-15 Member States. While the EU-15 group is mostly homogeneous, the EaP countries are heterogeneous. The EaP countries are positioned in the upper left corner in the Figure, indicating that these countries have the lowest initial per capita GDP, but they achieved the highest per capita growth rates. The average growth rate in the group is 5.2%. Azerbaijan is the country with the highest rate, 7.8%, while Ukraine has the lowest rate, 2%. However, it has to be taken into consideration that the Ukrainian economy has been affected by the war with the Russian Federation that started in 2014. The average growth rate in the EU-15 group is 0.9%, ranging from -0.9% in Greece to 3.5% in Ireland. The average per capita GDP of the EaP countries increased from 16.1% of the EU-15 average in 2004 to 23.9% in 2018.

b. Conditional β-Convergence

If countries do not have similar structures, they will converge towards a different steady state and the convergence will be conditional. We estimate four conditional convergence models (Models 5-8) and test whether economic openness, the inflation rate, and government integrity have an impact on per capita GDP growth. The empirical findings can serve as a recommendation for countries when they are deciding which policies they should pursue in order to increase per capita GDP growth rates. Table 4 presents the regression results for conditional convergence models.

Table 4

Conditional convergence in the analyzed group of countries

	Model 5 2004-2018	Model 5' 2004-2018	Model 6 2004-2008	Model 6' 2004-2008	Model 7 2009-2013	Model 8 2014-2018	Model 8' 2014-2018
	β (t)	β (t)	β (t)	β (t)	β (t)	β (t)	β (t)
Log of initial per capita GDP	-2.72*** (-4.31)	-2.72*** (-5.00)	-3.21 (-1.58)	-3.21 (-1.43)	-2.83*** (-3.32)	-2.47** (-2.30)	-2.47*** (-7.48)
Economic openness (%)	0.01* (1.99)	0.01** (2.44)	0.01 (0.63)	0.01 (0.97)	0.001 (1.11)	0.01* (1.99)	0.01 (1.31)
Inflation rate (annual %)	-0.01 (-0.07)	-0.01 (-0.06)	0.23 (0.59)	0.23 (0.48)	0.13* (1.92)	-0.26** (-2.19)	-0.26*** (-3.95)
Government Integrity Index	2.44 (1.05)	2.44 (1.44)	-1.11 (-0.17)	-1.11 (-0.27)	5.27* (1.92)	3.44* (1.03)	3.44** (2.40)
Number of observations	21	21	21	21	21	21	21
Number of panel observations	315	315	105	105	105	105	105
F statistics (4, 16)	10.70	8.77	7.45	3.66	4.44	2.33	22.77
Prob>F	(0.0002)	(0.0006)	(0.0014)	(0.0266)	(0.0132)	(0.1003)	(0.0000)
R^2	0.7280	0.7280	0.6505	0.6505	0.5263	0.3680	0.3680

*Significance codes: ***p<0.01, **p<0.05, p*<0.1*
Source: Authors' calculations based on World Bank, World Economic Outlook, and Heritage Foundation data.

The regression results for conditional convergence show that the EaP countries converge towards the EU-15 Member States in every analyzed period, except the pre-crisis sub-period. The β-coefficient for the period 2004-2008 is negative, but not statistically significant. The

countries converge at the highest rate between 2009 and 2013. Since the countries do not converge in the pre-crisis period, it cannot be concluded that the 2008/2009 crisis had a negative effect on the conditional convergence process. The EaP countries went into shorter periods of recession in the post-crisis period, therefore they recovered slower, which reflected in a lower conditional convergence rate.

The conditional convergence rates are higher than the absolute rates in the analyzed group, confirming that the countries have different structures and that improvements in trade and macroeconomic stability, and decreased corruption would help the EaP countries catch up faster with the core of the EU.

Heteroscedasticity is not only detected in the model for the crisis period. When regressions with heteroscedasticity robust standard errors are estimated (Models 5', 6' and 8'), the conditional convergence rates do not change. The change occurs in the determinants of per capita growth.

The regression results show that economic openness has a positive effect on convergence in the entire analyzed period. The positive effects of economic openness are also found by Rapacki and Prochniak (2009), Stoica et al. (2019), and Popovic et al. (2020). The EaP countries are open economies. Their average economic openness rate has decreased from 103.6% in the pre-crisis sub-period to 96.8% in the post-crisis sub-period. The average rate in the EU-15 increased from 100.9% to 117.9% between the periods. Georgia, Moldova, and Ukraine signed the Deep and Comprehensive Free Trade Agreement (DCFTA) with the EU in 2014 and trade between the two groups has increased. Total trade between the EU and Ukraine has increased by 45% in the period 2014-2019, by 39% between the EU and Moldova, and by 5% between the EU and Georgia. The EU is the main trade partner for the DCFTA countries and Azerbaijan, and the second main trade partner for Armenia and Belarus. Moldova is also a member of the Central European Free Trade Agreement, together with the Western Balkan countries, but intra-CEFTA trade is not pronounced, as the country is not a main trade partner for any of the CEFTA members.

Theoretically, inflation should have a negative effect on per capita growth, which is confirmed by Vojinović et al. (2009) and Siljak and Nagy (2019). This research has shown that the inflation rate has a negative effect on per capita growth in the post-crisis sub-period and a positive effect during the crisis period. Stable, low inflation is always good for the economy and its positive effects on economic growth are confirmed by Hasanov (2010) and Kryeziu and Durguti (2019). The average inflation rate decreased from 10.6% in the pre-crisis sub-period to 8.2% in the post-crisis sub-period. The highest rate is detected in Ukraine, which is as expected considering that the country has been at war with Russia since 2014. The average inflation rate decreased from 2.4% to 0.8% in the EU-15.

The Government Integrity Index is a statistically significant variable in the crisis and post-crisis period, and, as expected, it has a positive impact on per capita growth. The results confirm the finding of other studies (Marelli and Signorelli (2010), Masuch et al. (2016), Žuk and Savelin (2018)). The Index values range between 0 and 100 and a higher score indicates that a country is less corrupt. In the EaP countries, the average value of the Index increased from 26 in the period 2004-2008 to 35 in the period 2014-2018, and it decreased in the EU-15 countries, from 77 to 72. The most corrupt countries in the EaP region were Ukraine and

Azerbaijan (the value of the Index was 25), and the least corrupt was Georgia (38). Among the EU-15 Member States, the lowest value of the Index was in Greece (41) and the highest was in Denmark and Finland (93).

The empirical results show that the 2008/2009 crisis did not have a negative effect on the conditional convergence process in the analyzed group of countries. The countries do not converge only in the pre-crisis sub-period. Based on the results, we reject the second research hypothesis.

5. Conclusion

This paper investigates the convergence process of the Eastern Partnership (EaP) countries towards the old Member States of the European Union (EU-15). The analyzed period is 2004-2018 with three sub-periods: the pre-crisis sub-period 2004-2008, the crisis sub-period 2009-2013, and the post-crisis sub-period 2014-2018. Two types of β-convergence are analyzed: absolute and conditional convergence.

The empirical results suggest that the EaP countries converge in absolute terms towards the EU-15 Member States in every analyzed period, except the post-crisis period. The β-coefficient for the crisis period is lower than for the pre-crisis period, indicating a slower convergence process between 2009 and 2013. The countries do not converge in the post-crisis period, as their average per capita growth rate is lower than the rate of the EU-15 countries. Based on the results, we can conclude that the 2008/2009 crisis had a negative effect on the absolute convergence process, and we do not have sufficient evidence to reject the first research hypothesis.

The regression results for conditional convergence show that the countries converge in the periods 2004-2018, 2009-2013, and 2014-2018. The β-coefficient for the period 2004-2008 is negative, but it is not statistically significant. Therefore, it can be concluded that the crisis did not have a negative effect on the conditional convergence process in the analyzed group of countries and the second research hypothesis is rejected.

All selected macroeconomic variables are determinants of per capita growth in at least one analyzed period. Economic openness and the Government Integrity Index have a positive impact on per capita growth, which is as expected, while the inflation rate has both positive and negative impacts.

According to the empirical results of this study, the countries should open their economies to more trade, inflation should be stabilized, and the level of corruption should decrease. Improvements in these areas could lead to higher per capita growth rates and the EaP countries could catch up with the EU-15 group faster.

Even though the countries have achieved a certain degree of macroeconomic stability, they are not mature enough to start accession negotiations with the EU. A high degree of political instability, corruption, inefficient institutions, low competitiveness, and uneducated labour force are the factors that have hampered economic growth and will remain major issues during the transition process. In order to become full member states, the EaP countries will

have to achieve development levels similar to the EU average. However, the decision made by EU Member States is not always based on integration maturity, but on geopolitical concepts. This process should be gradual and the countries should focus on becoming functioning market economies, with help from the EU. The EaP countries should not initiate any deeper relations with the EU, as in this case they can decide on their own pace of the transition process, without external pressure.

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