



INCOME PER CAPITA CONVERGENCE OF SELECTED CENTRAL AND EASTERN EUROPEAN COUNTRIES WITH THE EURO AREA

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Introduction

Interest in the issue of convergence in the scientific literature has grown significantly in recent years due to the growing discussions related to the optimal functioning of the euro area. Convergence has traditionally been seen as involving multiple dimensions. In this regard, a distinction can be made between real convergence, nominal convergence, structural convergence, social convergence and others (see Palan, 2010; Velichkov, 2019, 2020; Velichkov, Damyanov, 2021; Stefanova, 2020; Damyanov, 2019; Raleva, 2020, 2021; Raleva, Marikina, 2019; del Hoyo, 2017; Marelli, 2019; Barro, Sala-i-Martin, 1991, etc.). With respect to the accession of the EU CEE countries to the euro area, attention is usually placed on nominal convergence, which is directly related to the Maastricht criteria. In reality, however, the other dimensions of convergence are also important in assessing a country's readiness to join the euro area. This is because achieving more similarities in the economies of individual countries is an important condition for the effective functioning of such a highly integrated economic and monetary union as the euro area. Furthermore, EU membership itself and the resulting benefits of a Single Market and the improvement of macroeconomic conditions are generally seen as a prerequisite for growing similarity in real variables and deepening of the

convergence processes. Joining the euro area could reinforce these positive effects associated with stronger economic integration. Therefore, the achievement of real convergence can be considered on the one hand a necessary conditions for the successful functioning of highly integrated economies, but on the other hand a consequence of economic integration.

This paper examines the income per capita convergence of six EU countries from Central and Eastern Europe (CEE) with the euro area for the period 2000-2019. Within this time period, certain features of the convergence processes are identified, which are clearly distinguished from the crisis 2009. The article draws conclusions about the presence or absence of both a beta convergence (β -convergence) and a sigma convergence (σ -convergence).

Methodology

The study in this paper covers the time interval of 2000-2019. This is characterized by certain features that are directly related to the manifestation of the crisis of 2009. Therefore, the study identifies separate periods that are different from the crisis year. The study includes six CEE countries - Bulgaria, Czechia, Croatia, Hungary, Poland and Romania. Data on GDP at purchasing power standard per capita are used. The data are of annual frequency, and their source is Eurostat. The data available for this indicator for Romania are from 2002, so the initial year for all calculations relating to Romania starts from this year instead of 2000.

The study uses the sigma convergence method to determine the heterogeneity in GDP per capita in CEE countries compared to that in the euro area. In this respect, the coefficient of variation is used. In addition, the beta convergence method is used to assess convergence, with an emphasis on changes in GDP per capita over time compared to the initial level of per capita income. The latter allows the confirmation or rejection of the existence of a catching up process.

Empirical analysis

The dynamics of per capita income in the six studied CEE countries during the studied time interval is characterized by certain peculiarities. Until the crisis year of 2009, all countries reported positive growth rates of GDP per capita. (see Table 1). On average for this period, per capita income increased the most in Romania and Bulgaria, with the lowest increase observed in Poland.

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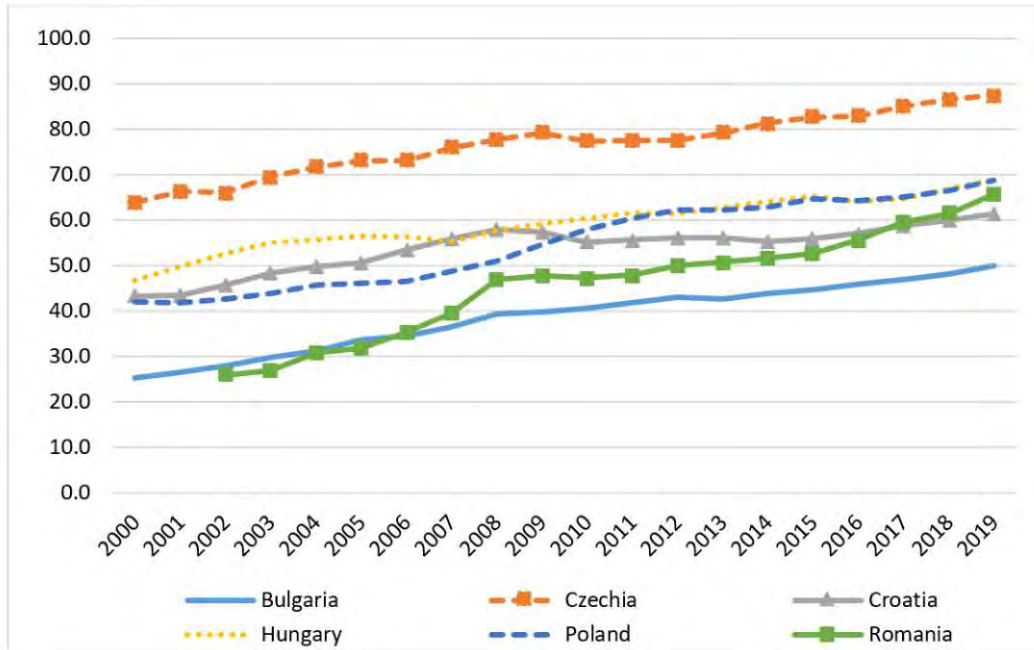
Table 1. GDP growth rate per capita in PPS (%)

Year	Euro area	Bulgaria	Czechia	Croatia	Hungary	Poland	Romania
2000	5.6	9.9	4.6	10.9	8.4	4.6	-
2001	4.4	9.3	8.3	4.4	11.0	3.8	-
2002	2.9	9.0	2.6	8.5	8.9	5.1	-
2003	1.8	8.0	7.2	7.5	6.7	4.3	5.5
2004	3.4	8.6	6.6	6.7	4.4	8.1	18.3
2005	3.7	11.9	5.7	5.5	5.4	4.3	7.1
2006	5.0	7.3	5.0	10.7	4.4	5.8	16.8
2007	5.1	11.3	9.2	10.1	3.1	10.1	17.8
2008	1.9	9.7	4.4	5.6	6.7	7.1	20.4
2009	-5.2	-3.9	-3.5	-6.3	-2.8	1.4	-3.6
2010	3.1	5.1	0.7	-0.7	5.2	9.4	2.3
2011	2.6	5.7	2.9	3.5	4.4	6.7	3.8
2012	0.0	2.8	0.0	0.9	0.0	3.1	4.5
2013	0.8	-0.3	2.9	0.7	3.1	1.1	2.4
2014	1.9	5.1	4.7	0.4	4.0	3.0	3.7
2015	3.1	4.8	4.7	4.5	4.8	5.8	4.9
2016	2.5	5.4	2.8	4.6	0.7	1.9	8.5
2017	3.6	5.7	6.4	6.4	4.4	5.0	10.6
2018	2.9	5.8	4.6	5.3	6.7	5.0	6.4
2019	2.5	6.3	3.6	5.0	5.7	6.1	9.4

Source: author's calculations based on Eurostat data.

It should be noted that in all CEE countries the average GDP growth rate per capita for the period 2000-2008 exceeds that of the euro area. This is also the reason for the increase in income in the six countries in 2008 compared to the first year of the period, measured as a percentage of income for the euro area (see Figure 1). Romania and Bulgaria have the lowest starting position on this indicator - about ¼ of GDP per capita in the euro area. The situation in Czechia is the opposite, where in 2000 the per capita income of the euro area was about 63.8%. In 2008, Czechia maintained its leading position compared to the other five CEE countries and per capita income was already at 77.8% of that in the euro area. At the same time, Bulgaria and

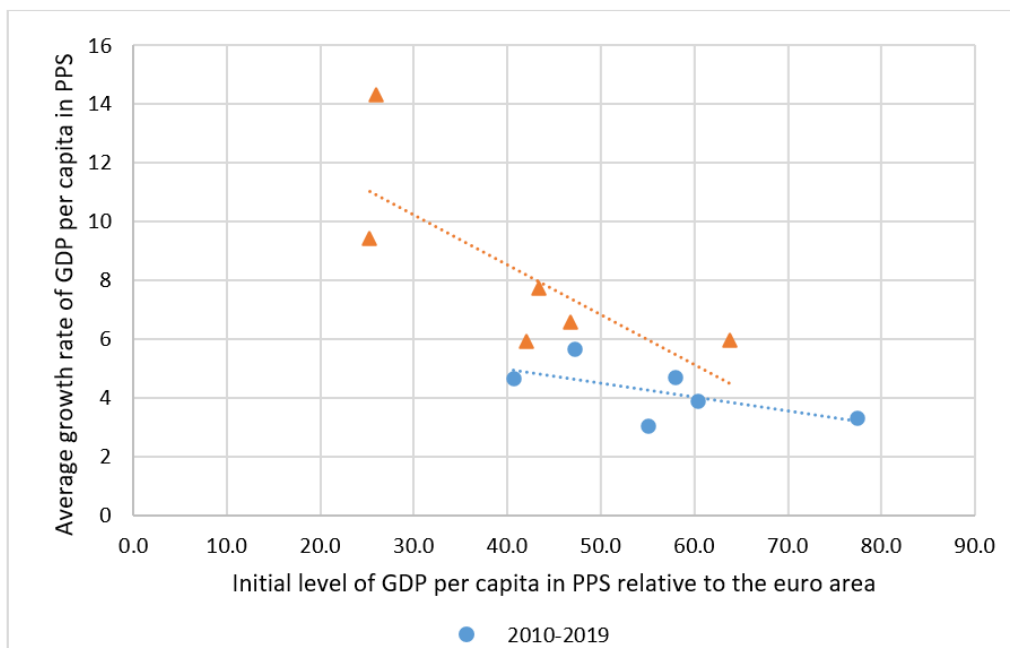
Romania in 2008 are again in the last two positions of the analyzed six CEE countries with regard to that indicator. In addition, the gap between Bulgaria and Romania is widening, with GDP per capita relative to the euro area in 2008 amounting to 46.9% in Romania and 39.3% in Bulgaria. In Croatia and Hungary, similar values were reported in 2008, namely around 58%. For Poland in 2008, per capita income was around 51.1 per cent of that in the euro area. When presenting the relationship between the initial level of per capita income and the average growth rate for the interval 2000-2008, it becomes clear that it is negative (see Figure 2). This indicates that lower income economies grow faster, i.e. they experience a process of catching up.



Source: author's calculations based on Eurostat data.

Figure 1. GDP per capita in PPS relative to the euro area (%)

These features in the dynamics of GDP per capita in the CEE countries and in the euro area for the period up to the crisis year 2009 project their impact on the coefficients of variation (see Figure 3). They are indicative that among all studied countries, Bulgaria and Romania have the strongest difference in GDP per capita compared to that in the euro area, as the coefficient of variation on average for the interval 2000-2008 for these two countries is over 70%. They are followed by Poland, where the coefficient of variation averages 53.2%. The strongest similarity with the euro area is reported in Czechia, where the coefficient of variation averages about 24.3%.

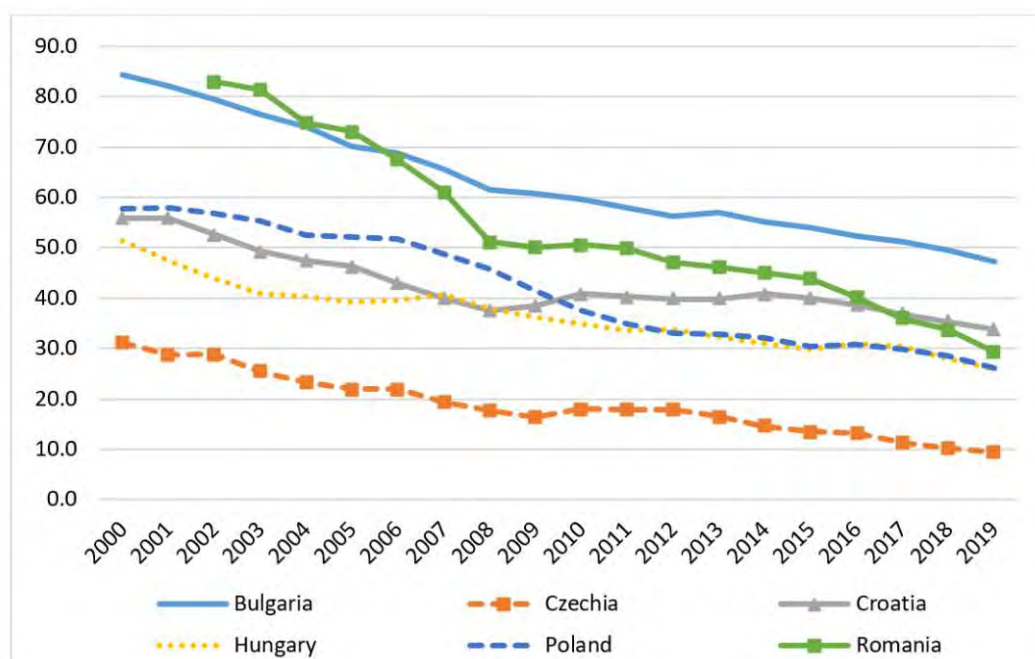


Source: author's calculations based on Eurostat data.

Figure 2. Initial level of GDP per capita in PPS relative to the euro area (%) versus average growth rate of GDP per capita in PPS (%)

At the same time, it should be noted that for the period 2000-2008 there is typically a very clear trend of convergence of per capita income in all six countries to that in the euro area. This trend is most pronounced in Romania and Bulgaria. In Romania the coefficient of variation in 2008 was 31.9 percentage points lower than in the first year of the period, and in Bulgaria - by 22.7 percentage points. In Croatia, the reported decrease in the coefficient of variation is about 18.3 percentage points. In

Czechia and Hungary this decrease was by 13.5 percentage points, and in Poland - by about 12 percentage points. In 2008, the highest degree of sigma convergence towards the euro area among the six CEE countries was observed in Czechia. The situation in Bulgaria is the opposite, where the coefficient of variation in 2008 is the highest and amounts to 61.6%, despite its relatively strong decrease compared to 2000.



Source: author's calculations based on Eurostat data.

Figure 3. Coefficients of variation between GDP per capita in PPS in CEE countries and the euro area (%)

During the crisis year of 2009, the coefficient of variation decreased in the CEE countries studied, with the exception of Croatia. The increase in sigma convergence in Croatia in 2009 can be explained by the fact that this year the decline in GDP per capita in was stronger than the reported decline in the euro area. In the other five countries, the growth rate of per capita income in 2009 was higher than that of the euro area. Only in Poland this year a positive rate of GDP growth per capita was registered, while in all other CEE countries there was a negative rate of change. The latter may also explain why in Poland the coefficient of variation in per capita income marked the strongest decrease in 2009 - by about 4.3 percentage points.

The interval 2010-2019 is characterized by the

convergence of GDP per capita in the CEE countries to that of the euro area. However, this positive tendency to reduce the differences is relatively less pronounced compared to the period before the crisis of 2009. Therefore, the fact that the reduction of the coefficient of variation in 2019 compared to 2010 is less in absolute value compared to the reported reduction for the interval 2000-2008. The strongest discrepancy between the two separate time periods is observed in Croatia, where the decrease during the second interval amounts to only 39% of the reported decrease for the first time interval. This discrepancy is also relatively high for Bulgaria, as the reduction of the coefficient of variation for the period after the crisis year of 2009 was about 55% of the reduction for the previous period. Only in



Poland is the analyzed discrepancy negligible. In the last year of the period (2019), the highest degree of sigma convergence to the euro area, similarly to the interval 2000-2008, was reported in Czechia, where the coefficient of variation was 9.5%. Bulgaria ranks last in terms of the degree of convergence to the euro area in 2019, with a coefficient of variation of 47.2%.

These features in the convergence processes are in direct line with the dynamics of GDP per capita in the CEE countries and in the euro area. For the six CEE countries, the average GDP growth per capita for the period 2010-2019 was 4.2%, while that in the euro area was about 1.8 times lower. This discrepancy with the euro area is most pronounced in Romania. Although on average for the period 2010-2019 the growth rate of per capita income in the six CEE countries was higher than in the euro area, the difference between them is lower compared to the corresponding difference for the interval 2000-2008. This is the reason why the negative relationship between the initial level of per capita income and the average growth rate for the interval 2010-2019 is less pronounced compared to the interval before the crisis of 2009 (see Figure 2), which is indicative of a less intense process of catching up.

Therefore, it can be stated that convergence of the CEE countries with the euro area takes place, but this convergence weakens over time. The reason for this can be found in the factorization of GDP dynamics. In this context, it should be emphasized that in the period 2010-2019 the role of investment in GDP growth decreased significantly in most CEE countries. This can be seen as a reason for the weaker GDP growth in these countries and the slowdown in convergence in per capita income to the euro area.

Conclusion

From the performed empirical analysis it can be concluded that until the crisis year of 2009 in Czechia the per capita income showed the highest degree of convergence to the euro area. In addition, during this period there is a strong trend of convergence to the euro area in all six countries, and this trend is most pronounced in Bulgaria and Romania. The existence of a process of catching up is also confirmed, as lower income economies grow faster.

The interval 2010-2019 is also characterized by

a convergence in GDP per capita in the CEE countries to that in the euro area. However, in contrast to the period before 2009, this convergence is significantly less pronounced. The leading position in terms of convergence is again occupied by Czechia, while in Bulgaria the lowest sigma convergence is observed. This time period is also characterized by a less intense process of catching up. The leading reason for these differences in the course of the convergence processes before and after 2009 is the change in the determinants of economic growth in the CEE countries. Reducing the role of investment in GDP growth, which has been inherent in most of these countries since 2009, has a restraining effect on economic growth and reduces the intensity of the real convergence process.

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