A CLOSE LOOK AT THE CONVERGENCE PATTERNS IN THE EUROPEAN UNION AT THE BEGINNING OF THE 21st CENTURY

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Abstract: *Since the first initiatives of integration on the European continent, promoting economic, social and territorial cohesion has remained one of the key principles of the European Union. Over the past decades, the stability and prosperity of the European continent was threatened by diverse and turbulent events, ranging from economic and financial turmoil to sanitary and social crises, which have emphasized the need to strengthen the cohesion between Members. The aim of this paper is to study the economic landscape of the European Union by looking at the evolution of the GDP per capita between 2000 and 2022. Using β- and σ-convergence, we have tried to answer the question if the European Union has come closer to the objective of cohesion in the last two decades. By applying cross-sectional regressions in order to estimate β-convergence, we have identified a convergence speed of 2% for European Union between 2000 and 2022, with higher growth rates experienced by the new member states from Central and Eastern Europe. Complementary, σ-convergence illustrates that income divergences generally decreased both at the aggregate level and in the case of the new member states. However, the progress achieved in terms of cohesion was reversed by Covid-19 pandemic, the gaps significantly increasing mainly in the case of the old members. Considering the divergences that still persist in the European Union, being emphasized by the recent crises, this paper suggests that political decision-makers should strengthen the measures oriented towards promoting cohesion, with the purpose to avoid the division on the continent.*

Keywords: *European Union, real convergence, cohesion, β-convergence, σ-convergence, Covid-19 pandemic.*

JEL Classification: *O40, O52, O57.*

1. Introduction

Strengthening the economic convergence is becoming an important objective for European Union, given the challenges that recently occurred at the regional and global level, which ranged from financial and debt crises to sanitary and social turbulences. On the background of decreasing confidence in the European group and

its key principles, the political decision-makers have the difficult task to find the balance between increasing the competitiveness of the group and preserving the solidarity between its Members. Considering all the turbulences and crises that have changed the historical path of the European Union at the beginning of the 21st century, the additional propagation of divergent processes at the Community level would have negative repercussions, threatening the fundamental principles of the group.

On the background of the increasing challenges for the stability of the European Union, this paper tries to capture the economic landscape, with the purpose to respond the question if the Member States have become more cohesive over the last twenty years. Considering the interval 2000-2022, we have estimated (absolute) β-convergence based on cross-sectional data, by taking into consideration the evolution of GDP per capita at the aggregate and subgroup level. Our study brings additional evidence in favour of the "iron law of convergence" (Barro, 2015), identifying an average converge speed of 2% in the European Union during the interval 2000-2022. Furthermore, we have illustrated that in spite of the initial concerns that accompanied the enlargement of the European Union, the new members from Central and Eastern Europe experienced higher GDP per capita growth rates compared to the Community's average. In contrast, the countries from southern flank recorded modest performance, making more difficult to achieve the objective of convergence in the European Union. The results of the empirical study also suggest that the divergence in terms of GDP per capita have narrowed during the two decades, as reflected by σ-convergence, although the process was hampered by the Covid-19 pandemic. Moreover, while the new member states had an overall positive evolution, reducing the divergence towards the European Union's average, the old members experienced an increase of disparities, this trend being also emphasized by the sanitary crisis. The paper is structures as follows: the first chapter presents an overview on the representative empirical studies aiming the topic of economic growth and convergence, being continued by the description of the methodology and data used in the empirical study. In the third section, we have presented the results of β- and σ-convergence, continuing with the main conclusions, highlighting the policy implications, but also the limitations of the paper.

2. Literature review

The literature aiming the topic of economic convergence is vast and has become more complex with the advancement of integration process, complementing the legislative initiatives and ambitious goals established at European level. In the scope of the paper, the term of convergence refers to the process of catching-up in terms of

GDP per capita through the overall objective of achieving the cohesion. Although usually considered synonymous, in the literature has been highlighted a distinction between cohesion and convergence: the former refers to the process of achieving a goal, while cohesion is a status (Eurofound, 2018).

Nowadays, the majority of studies centred on the topic of convergence have as starting point the economic growth theories, developed in the 20th century. In the second half of the last century, Solow (1956) and Swan (1956) put the foundations of the neoclassical growth model, the empirical studies considering the hypotheses that the poorer regions, with scarce capital stocks, experienced higher growth rates compared to advanced economies. In the neoclassical framework, all economies tend towards the same state of equilibrium, based on the influence of capital, labour and exogenously determined technology. Several years later, the endogenous theories emphasized the role of human capital and productivity in generating welfare gains. Lucas (1988) explained the positive impact of investment in human capital, while Romer (1986) demonstrated that a country could increase its prosperity by allocating more resources to innovation. Moreover, by relaxing the neoclassical growth model hypothesis, Lucas (1988) and Romer (1990) highlighted the role of technological progress, as an endogenous factor, in catalysing economic growth.

The concepts of β- and σ-convergence, developed by Barro and Sala-i-Martin (1991, 1992) based on the Solow-Swan (1956) model constitute the foundation of empirical research in the field of convergence. The first indicator aims the existence of a potentially negative relationship between the initial level of income and subsequent growth rates, while σ-convergence is estimated based on standard deviation or coefficient of variation with the purpose to determine if the divergences between economies reduce over time.

Based on these fundamental theories, both researchers and practitioners have studied the European economic landscape, also taking into consideration the costs and benefits of the integration progress. The advancement of the integration process, although creates challenges related to the harmonization of the interest of all Members, brings also multiple benefits. According to Franks et al. (2018), the catching-up process in the field of real indicators is even more important, as contributes to a fair distribution of gains generated by the use of a common currency, strengthening the unity between economies, but also the social cohesion.

The researches in the field of convergence tend to reach a common ground, confirming that countries of the European Union follow a general positive trend, the average catching-up speed being around 2%. In this respect, Beugelsdijk & Eijffinger (2005) found evidence in favour of β-convergence between 1995-2002, in the case of old members. Furthermore, income convergence was identified for the

interval 1993-2010, Stanišić (2012) concluding that economies of the new member states recorded higher growth rates compared to those of the old members. The average convergence speed identified at the aggregate level was 1.7%. According to Stanišić, the global financial crisis influenced the process of income convergence, even leading to the opposite phenomenon, divergence. Similar conclusions were reached by Rapacki and Próchniak (2019), who found evidence to support the hypothesis of β-convergence, both at the aggregate level and between the EU (11) and the EU (15), reporting a convergence speed of 2.2% between 1995 and 2015. According to Rapacki and Próchniak, the leaders of the convergence process were the Baltic countries, which recorded annual growth rates of 4.5-5%, while in the group of old members, Luxembourg and Ireland experienced the highest catching-up speeds. Similarly, Gros (2018) highlighted that the new member states recorded, on average, annual growth rates that reached 6% per year, while in the European Union group (15) the speed of convergence was approximately 2% during the interval 1999-2016. In the case of the old members, Gros identified divergence processes, considering that countries such as Italy and Greece recorded negative growth rates, increasingly moving away from the developed states of the north of the continent. In the same line, Boltho (2020) studied the evolution in the Eurozone, highlighting that the new member states from Central and Eastern Europe recorded superior economic performance compared to the countries in the south of the continent.

Studying the impact of the global financial crisis on the economic performance of member states, Nagy and Siljak (2022) highlighted that income divergences, determined by σ-convergence, decreased during the interval 2004-2018. The analysts also identified evidence in favour of β-convergence, concluding that in the 2008/2009 period, growth rates were negatively affected by the financial crisis. In the interval 2004-2008, the average growth rate identified in the case of the Central and Eastern European subgroup was 6.6%, the rate reaching only 0.2% in the interval 2009-2013. In contrast, the European Union's (15) average was around 1.8% until 2008, after which there were obvious divergent trends. According to Nagy and Siljak, the advancement of the Central and Eastern European group of states was mainly determined by the liberalization of trade and capital flows, including the large flows of FDI and increasing competitiveness.

One decade after the financial crisis, the Covid-19 pandemic has disrupted, at least temporarily, the process of convergence of living standards, following the recovery phase experienced at regional and global level in the last years. According to the European Central Banks analysis (2022), all developed members except Austria experienced a decline in living standards, placing themselves close to the European

Union's average, while southern flank countries remained at the bottom of the chart. In contrast, the new member states continued their positive trend of getting closer to the community average, despite the negative effects of the Covid-19 pandemic.

In conclusion, the literature aiming the binomial economic growth-convergence is vast, the studies flourishing on the background of the advancement of the integration process. Although aiming different timespans, analysts tends generally to find evidence in favour of the "iron law of convergence" (Barro, 2015), the members states eliminating the income per capita gaps at a rate around 2% per year. Moreover, it seems to exist a consensus regarding the positive trajectory experienced by the new members, both in terms of growth rates and reducing the gaps towards the Community's average. Overall, the European Union ecosystem remains challenging, with differences in terms of performances and perspectives of convergence.

3. Data & methodology

In order to capture the economic landscape of the European Union, we have tried to study the evolution of GDP per capita by looking at the interval 2000 and 2022. The methodology is based on cross-sectional regressions aimed to determine (absolute) β-convergence and time series data used in the study of σ-convergence. β-convergence is based on the assumptions of the neoclassical growth model, developed by Solow (1956) and Swan (1956) and aims a negative relationship between the average growth rate and the initial level of income. β-convergence was complemented by σ-convergence, with the aim of identifying if income gaps reduce over time and the Members States are approaching to the Community's average. According to Barro and Sala-i-Martin (1992), "β-convergence is a necessary, but not a sufficient condition" for σ-convergence.

In order to estimate (absolute) β-convergence, we have employed cross-sectional simple regressions, where the dependent variable was the average GDP growth rate between 2000 and 2022 and the independent one the GDP per capita in the initial year (2000). σ-convergence has been estimated based on time-series data taking into consideration the interval 2000-2022. In this respect, we have studied the convergence patterns both at the aggregate and sub-group level, by structuring the countries based on the period of accession, respectively: the founders of the European Economic Community and the countries that have joined the group until 2000 - Old Member States (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, Sweden, Greece, Italy, Portugal and Spain) and the New Member States (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia). We have excluded from the computation of σ-convergence Luxembourg, given the large variation compared to

the European Union's average. Data aiming the evolution of GDP per capita in the case of European Union's countries (27) was obtained from Eurostat database.

We have employed cross-sectional regressions in order to determine β-convergence, based on the equation presented below:

$$\frac{1}{T} ln[\frac{y_{i,T}}{y_{i,0}}] = a + \alpha_1 ln(y_{i,0}) + \varepsilon_i \tag{1}$$

$y_{i,t}$ = GDP per capita of country "i" in 2022

$y_{i,0}$ = GDP per capita of country "i" in 2000

T = the length of period

ε_i = error term

The speed of convergence was computed as follows:

$$\beta = -\frac{1}{T} ln(1 + \alpha_1 T) \tag{2}$$

The number of years which are necessary in order to reach the halfway of the transition period towards equilibrium have been determined based on the formula developed by Mankiw et al. (1992):

$$t^* = \frac{ln0.5}{\beta} \tag{3}$$

σ-convergence has been calculated taking into consideration the coefficient of variation of the data set. In order to compute the variance for the subgroups of countries, we have taken into consideration the distance of each country and European Union's average in each year. The indicator has been computed based on time-series data as follows:

$$\sigma_t^2 = (\frac{1}{N}) \sum_{i=1}^{N} [(y_{i,t}) - u_t]^2 \tag{4}$$

$y_{i,t}$ = GDP per capita of economy "i" in t

u_t = average income in the EU

$$\sigma_t = \sqrt{\sigma_t^2}, \quad CV = \frac{\sigma_t}{\mu_t} \tag{5}$$

Figure 1 illustrates the results of β-convergence calculated for European Union, by taking into consideration the evolution of GDP per capita between 2000 and 2022. The average convergence rate identified in the Community was 2.3%, the paper bringing evidence in favour of the "iron law of convergence" (Barro, 2015). The negative slope of the trend line confirms the neoclassical growth model assumptions, suggesting that the initially poorer members from Central and Eastern Europe experienced higher GDP per capita growth rates compared with the developed countries (Rapacki and Próchniak, 2009; Matkowski et al., 2016; Rapacki and Próchniak, 2019). The highest growth rates were experienced by Romania (7.5%)

and Lithuania (6.6%), the top positions being occupied by the Central and Eastern European group. In the subgroup of old members, Ireland experienced the highest growth rate, reaching an average value of 5%. Other developed countries that experienced catching-up speeds above the average were Denmark (3%) and Luxembourg (3%), while modest growth rates were achieved by the Southern countries – Italy (1.8%) and Greece (1.7%). Based on estimated the convergence speed, European Union needs 30 years in order to reach the halfway towards the equilibrium period.
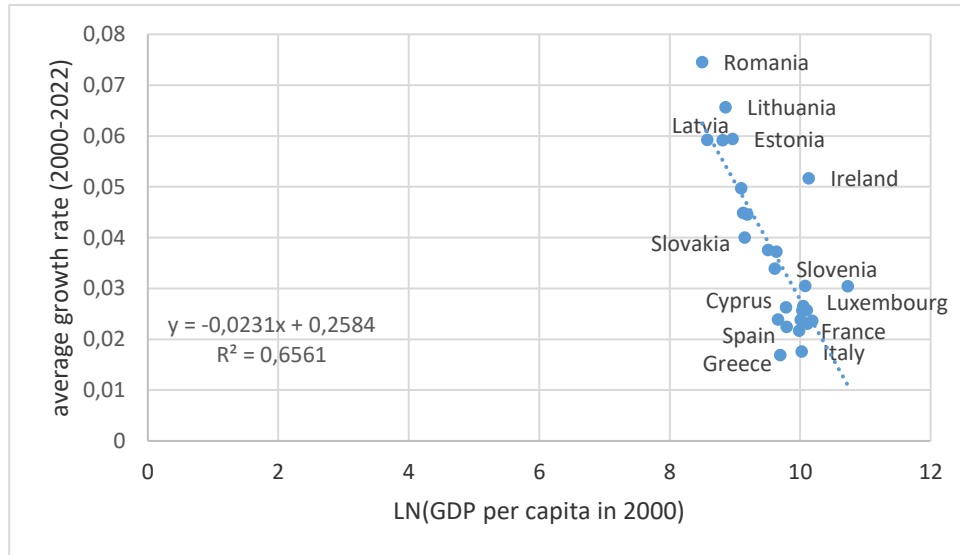

Figure 1: β-convergence in the European Union
Source: Author's computation based on data provided by Eurostat

The analysis of absolute β-convergence has been complemented by σ-convergence, in order to determine if the income divergences between countries have been narrowed. With the purpose to capture the evolution in the European Union and to conduct a comparative analysis between the new members from Central and Eastern Europe and old members, we have calculated σ-convergence based on equation 4 and 5. Our calculations suggest that at the aggregate level, the income gaps decreased with 17% between 2000 and 2022. However, the progress achieved until 2019 was reversed by the Covid-19 pandemic, the sanitary crisis conducting to an increase of income divergences among member states. As far as the evolutions in Central and Eastern Europe are concerned, figure 2 confirms that this subgroup of countries had significantly converged towards the Community's average, the income gaps gradually diminishing. Although the Covid pandemic had negative consequences also on the performance in this cluster, the member states started to recover in 2022. By contrast, the old members experienced an increase of income differentials with 9%, the gaps being significantly emphasized by the pandemic. Consequently, the

income gaps were 27% higher in 2022 compared to 2019, this increase calling into question the perspective of a fast recovery of the economies. Overall, the study confirms that β-convergence has been accompanied by a decrease of income gaps in the European Union and particularly, among the new members.
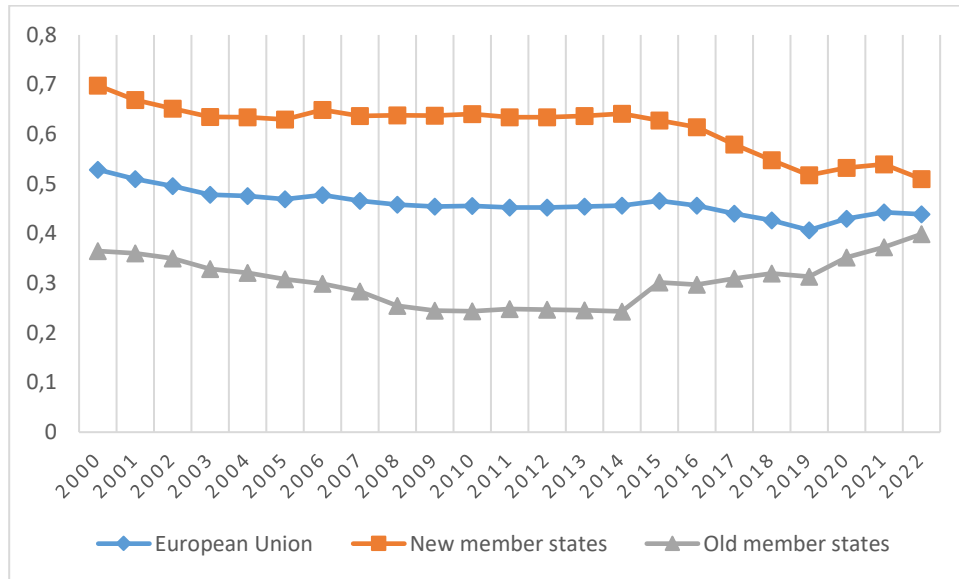

Figure 2: σ-convergence in the European Union
Source: Author's computation based on data provided by Eurostat

4. Conclusion

After seven decades since the first initiative of integration on the European continent, convergence still remains an underlying principle of the European Union. Looking at the challenges that have threaten the stability of the European continent, one may consider that maintaining cohesion between countries and regions is becoming even more important nowadays. In spite of the efforts to harmonize the interests of all the members, recent evidence suggest that European Union still has to make important efforts to achieve economic, social and territorial cohesion. The aim of this paper was to study the economic landscape of the European Union, by taking into consideration the evolution of GDP per capita among twenty-seven Member States between 2000 and 2022. In order to capture the representative trends, we have used the methodology proposed by Barro and Sala-i-Martin (1992), respectively β- and σ-convergence. Computing β-convergence on cross-sectional regressions, we have found evidence in favour of the universal speed of convergence of 2%, the countries reducing the gaps with an average catching-up speed of 2.3% per year. Another conclusion of the empirical study was that the new member states from Central and Eastern Europe experienced higher growth rates compared to the

Community's average, the paper confirming the neoclassical growth model assumptions. In contrast with the high pace of convergence experienced by the new members, the Mediterranean countries, especially Greece and Italy, recorded modest growth rates, placing below the European Union's average. As far as the degree of convergence achieved in the European Union, as shown by σ-convergence, our study illustrates that income divergences had a general downward evolution during the analysed period, this trend being reversed by the Covid-19 pandemic. However, same progress was not achieved in the case of the old members, where the divergences have significantly increased since 2019, expanding the values recorded at the beginning of the period. Overall, the conclusions of our paper are in line with previous studies which confirm the "iron law of convergence" (Barro, 2015) in the case of the European Union countries (Rapacki and Próchniak, 2009; Stanišić, 2012; Gros, 2018; Rapacki and Próchniak, 2019) considering different time horizons. At the same time, using β-convergence, we highlighted that the new Central and Eastern European member states have made remarkable progress since the 2000s, recording higher growth rates compared to the developed economies in the west of the continent and reducing the development gaps compared to the European Union's average (Rapacki and Próchniak, 2019). The limitations of the study derive from the narrow approach on convergence, given the complexity of the process and the wide variety of factor that influence the economic growth performance. Our paper has a number of policy implications. First of all, it confirms the efforts of the Central and Eastern Europe to reduce the income differentials towards Community average. Secondly, it emphasizes the need to foster the cohesion between countries and to focus the financial support and resources towards the Mediterranean group, that lags behind the other members, being also severely affected by the Covid-19 pandemic.

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