Real Convergence in the European Union: An Empirical Approach

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Abstract

One of the fundamental pillar of the European integration architecture aims the convergence of economic performance between Members. This objective has proved to be increasingly difficult to achieve nowadays, given the economic, social and sanitary challenges that occurred both at regional and global level. The aim of this paper is to study conditional β-convergence between 2000 and 2019, trying to identify the factors that enhanced economic growth. By applying panel regressions, we have found evidence in favor of the convergence process at Community's level, taking into consideration the inverse relationship between the initial level of income and the subsequent growth rates. Moreover, the results of the empirical study suggest that factors such as gross savings, imports, real labor productivity, business freedom and citizens' voice and accountability had a favorable impact on the economic growth rates in the European Union between 2000 and 2019.

1. Introduction

Looking back to the history of almost seven decades, one can say that the European Union has proved its ability to promote "unity in diversity", capturing under same common values the identities of twenty-seven European states. One of the fundamental pillar of the European structure even since its establishment was to promote economic convergence between its Members. However, this goal proved to be difficult to reach given the subsequent challenges that took place at regional level, which varied from economic and financial to migrations and sanitary crisis. Moreover, the last waves of enlargement has redefined the landscape of the European continent, brining closer than ever countries with heterogeneous economic performance and different political and social backgrounds. Given the turmoil that take place nowadays inside and outside the borders of the European Union, maintaining political stability and prosperity is essential in order to preserve the unity between its Members. The main purpose of this paper is to study the economic growth determinants in the European Union between 2000 and 2019, taking into consideration the conditional convergence framework. By employing panel regressions based on cross-sectional weights and fixed effects, we have illustrated that factors such gross savings, imports, real labor productivity, business freedom and citizens' voice and accountability had a favorable impact on the economic growth rates in the European Union between 2000 and 2019. In contrast, the growth rates were hampered by high level of tax rates and by the economic and financial crisis. The results also illustrate that the rate of convergence exceeds the value of 2% when taking into consideration economic and social variables, besides the initial level of GDP per capita. The negative sign of the α_1 coefficient confirms the convergence process in the European Union, suggesting that the poorer Members experienced higher GDP per capita growth rates than the developed economies. The paper is structured as follows. The second section presents the findings of the previous studies in the field of convergence, outlining the trends that took place in the European Union. The following section incorporates a description of the data and methodology and continues with the presentation of the results of the econometric study, explaining the main findings of the conditional convergence model. The last section summarizes the main findings, also highlighting the limitations and future directions of study.

2. Literature review

Empirical studies in the field of economic growth were developed in the 20th century and expanded in the last decades, with the subsequent waves of enlargement of the European Union. In the second half of the last century, exponents of the neoclassical growth model (Solow, 1956) considered that economies with low incomes and capital stocks experienced higher growth rates than advanced economies due to the decreasing returns on capital. In the neoclassical framework proposed by Solow, all economies were considered to reach the same state of equilibrium, the technological factor being exogenously given. However, at the end of the last century, as more and more developing economies found impossible to follow a positive path towards long-term economic growth, the applicability of the neoclassical theory began to be questioned. Consequently, new (endogenous) theories were developed by analysts such as Romer (1986, 1990) and Lucas (1988). The endogenous theories outline the possibility that developed economies continue to grow, exceeding the equilibrium state defined by the neoclassical model, and low-income states to lag behind. In the endogenous model, the capital no longer includes only the physical capacities, but also the intellectual abilities of the labor force. Barro and Sala-i-Martin (1991, 1992) expanded the methodology in the field of economic growth, based on the neoclassical growth models, developing two key concepts: β- and σ-convergence. For a better understanding of the two concepts, Barro and Sala-i-Martin (1991|) note that β-convergence highlights how fast an economy will reach the average level of income of countries or regions. In contrast, σ-convergence is used to study of past trends and potential future developments of income differentials between economies.

The trends that took place in the European Union have been widely studied in the last decades, analysts focusing on absolute and conditional convergence models. Duro (2012) noted that the exponents of the neoclassical growth model have popularized the concept of absolute convergence, which refers to the process in which less developed economies experience higher growth rates than rich ones. From this perspective, economies with similar initial incomes and macroeconomic determinants will reach the same equilibrium level. In contrast, conditional convergence assumes that the growth rates wills depend on the particular conditions of each economy. From this perspective, less developed economies will not necessarily have higher growth rates than developed ones, and the speed of convergence will depend on the distance of each economy from its own equilibrium.

Taking into consideration that there are robust evidence that the European Union's Member States differ in their economic, social and structural conditions, conditional convergence has been recently increasingly studied. In this respect, analysts such as Stanišić (2012), Dobrinsky (2013), Dobrinsky and Havlik (2014), Rapacki and Próchniak (2019), Marelli et al. (2019) conducted in-depth studies of conditional convergence at aggregate or sub-group level. Marelli et al. (2019) were interested in studying the absolute and conditional convergence in both the European Union and Eurozone, conducting a comparative analysis of the performance of the two groups between 1995 and 2016. In order to test conditional convergence, analysts used cross-section and panel regressions, including as explanatory variables, which characterize the heterogeneity between states the following factors: trade openness, technological progress, investments in physical capital, human capital and the rate of net migration. Applying the equation based on cross-sectional regressions, analysts concluded that the convergence rate at the aggregate level increased with the expansion of the group. In this respect, the conditional model indicates divergences among the Old Member States (15) between 1995 and 2016. Extending the sample by taking into consideration the European group (27), Marelli et al. identified a convergence rate of around 4%, which mainly reflects the high performance of the New Member States.

Similarly, Dobrinsky (2013) examined conditional convergence at Community's level, including in the regression equation the following variables: labor cost, domestic savings, domestic and foreign savings and the share of global exports. According to the result of the econometric model, GDP growth rates were mainly influenced by the labor costs and export performance. The convergence rate was around 2% between 2000 and 2011. Dobrinsky pointed out that the European Union's economic advance was mainly based on over-indebtedness, so that while aggregate GDP increased by 17%, public and private debt raised by 50%. However, trends have not been homogeneous at

Community level, so that the new Member States have largely avoided public finance gaps.

Rapacki and Próchniak (2019) investigated the factors that contributed to the catching-up process, taking into consideration variables linked to the European Union membership (economic freedom, governance, European funds, international trade, foreign investment and economic reforms) and other indicators targeting the economic and social framework. At the same time, the control variables also include a dummy variable, in order to highlight the impact of the economic crisis. By applying multiple regressions, analysts pointed out that the accession to the European Union contributed to the income convergence in the Central and Eastern European countries, all seven variables taken into account being statistically significant. At the same time, analysts found evidence to support the hypothesis that the structural funds had a beneficial influence on convergence within the Central and Eastern European region. Moreover, the process of economic growth was favored by the improvement of the institutional quality and trade and financial integration. Rapacki and Próchniak pointed out that the convergence process is not automatic, requiring concrete steps from public authorities, especially in the field of strengthening the institutional framework. At the same time, analysts noted that the structural funds had a defined role in the economic emancipation of the New Member States, so that a possible reduction in their amount could have a negative effect on the economic recovery process.

Próchniak (2011) studied the main determinants economic growth in the Central and Eastern Europe between 1993 and 2009, taking into consideration both demand and supply side determinants. According to the analyst, demand-side determinants mainly influence short-term economic growth, while supply-side factors have a long-term effect. The analyst pointed out that FDI and gross fixed capital formation played a major role in economic growth in the CEE region. At the same time, Próchniak highlighted the defining role that human capital played in the economic emancipation of ex-communist states, illustrating that a higher proportion of employees with tertiary education will positively influence the GDP rate. The analyst highlighted the existence of a negative relationship between the deficit and public debt and economic growth, concluding at the same time that the structure of the economy did not influence the GDP dynamics. In terms of population structure, Próchniak pointed out that a higher share of the active population determined higher growth rates.

3. Research methodology

The aim of this paper is to study conditional β-convergence in the European Union, trying to identify the determinants of economic growth between 2000 and 2019. In this respect, we have employed panel regressions using cross-sectional weights and fixed effects. We have initially computed the equation taking into consideration three variables related to the level of savings (gross savings as % of GDP), trade (imports of goods and services % of GDP), level of taxation (tax burden) also including the lagged value of GDP per capita. Subsequently, we have expanded the equation with other determinants regarding the labor market (real labor productivity per person) and governance (business freedom and voice and accountability). All three equations include a dummy variable related to the economic and financial crisis (1 for 2008 and 2009 and 0 for the rest of the years included in the analysis).

The decision to compute the regressions with fixed effects was taken based on the results of Hausman Test, where in all the cases the p-values were below 5%, so we rejected the null hypothesis of random effects. All the equations included as explanatory variable the lagged value of GDP per capita and were performed with robust standard errors. We have initially studied the impact of economic and governance related variables, based on the following equation:

$$lny_{i,t} - lny_{i,t-1}$$
$$= a + \alpha_1 \ln(y_{i,t-1}) + \alpha_2(Savings) + \alpha_3(Imports) + \alpha_4(Tax\ burden)$$
$$+ \alpha_5(dummy) + \varepsilon_{i,t}$$

Then, we have expanded the equation 1 by including an indicator related to the labor productivity:

$$lny_{i,t} - lny_{i,t-1}$$
$$= a + \alpha_1 \ln(y_{i,t-1}) + \alpha_2(Savings) + \alpha_3(Imports) + \alpha_4(Tax\ burden)$$
$$+ \alpha_5(RLP) + \alpha_6(dummy) + \varepsilon_{i,t}$$

Finally, the model was expanded with two other factors that aim the governance framework:

$$lny_{i,t} - lny_{i,t-1}$$
$$= a + \alpha_1 \ln(y_{i,t-1}) + \alpha_2(Savings) + \alpha_3(Imports) + \alpha_4(Tax\ burden)$$
$$+ \alpha_5(RLP) + \alpha_6(Business\ freedom) + \alpha_7(Voice)$$
$$+ \alpha_8(dummy)_{i,t} + \varepsilon_{i,t}$$

The variables, sources and the expected influence are presented in Table 1:

Table no. 1. Variables, definitions and sources

Variable	Definition	Source	Expected sign
GDP per capita (y)	GDP per capita at market prices (PPS per capita)	Eurostat	The lagged value - Negative
Gross savings	Gross savings (% of GDP)	World Bank	Positive
Imports	Imports (% of GDP)	World Bank	Positive
Tax burden	Composite indicator, part of Index of Economic Freedom	The Heritage Foundation	Negative
RLP	Real labor productivity per person employed (index, 2010=100)	Eurostat	Positive
Business freedom	Overall indicator which reflects the efficiency of business environment – part of Index of Economic Freedom	The Heritage Foundation	Positive
Voice and accountability	Indicator which encompasses the perceptions related to the participation of citizens in selecting the government and different forms of freedom – part of Worldwide Governance Indicators	World Bank	Positive

Source: Author's presentation

Table 2 presents the statistical description of the variables. The descriptive statistics confirm that the European Union is not homogenous in terms of economic and social performance. We excluded from our analysis Luxemburg, Malta and Cyrus, taking into consideration that the values of the indicators might be distorted by the activity of the offshore companies. However, as data shows, there are still large differences between the mean and median values of the selected indicators and the maximum and minimum. Although important progress has been made in recent years, convergence in terms of GDP per capita has not been achieved so far. Ireland recorded the highest value, reaching 60,500 PPS in 2019, while Romania had a modest performance in the field of this indicator in 2000 – 5,100 PPS. At the same time, Ireland had the highest percentage of savings in the last years of the analysis (2016-2019), while low values were recorded by Greece and the United Kingdom. The average value of imports at Community's level was at 50.6% between 2000 and 2019, with significant differences between countries such as Ireland and Italy or Greece. Regarding the tax burden, high values indicating a trend of surcharge were recorded by Bulgaria and Lithuania, especially in 2012 and 2013. At the same time, Romania appears in the top of the ranking, with a score of 90 points in 2019. In the opposite part, there are states such as Sweden and Denmark, with values ranging from 30 to 40. Regarding labor productivity, high values were recorded in 2019 by Ireland and Romania. Despite the performance in the last years of analysis, Romania, together with other Central and Eastern European countries lagged behind in the ranking at the beginning of the analyzed period. In the field of business freedom, values close to or equal to 100 were recorded by Denmark, Sweden and Finland. At the bottom of the rankings were Central and Eastern European countries such as Poland, Croatia, Romania and Bulgaria. Referring to the involvement of citizens in society, superior performance were experienced by Denmark, Finland, Sweden, the Netherlands, while at the opposite pole were the Central and Eastern European countries.

Table no. 2. Descriptive statistics

Variable/ Indicator	Mean	Median	Maximum	Minimum	Std. Dev.
GDP per capita	23630.60	23650.00	60500.00	5100.00	8802.71
Gross savings	22.04984	22.48754	34.48096	4.870078	5.165728
Imports	50.64980	46.25000	113.8000	22.80000	18.51117
Tax burden	63.15440	62.30000	94.00000	29.80000	15.57135
RLP	98.92020	100.0000	146.2000	53.60000	10.52277
Business freedom	77.01820	76.10000	100.0000	53.70000	10.63572
Voice and accountability	1.105431	1.107324	1.800992	0.299219	0.345313

Source: Author's computation

4. Findings

Table 3 illustrates the results of the panel regressions using cross-sectional weights and fixed effects. First of all, the negative sign of the α_1 coefficient confirms the convergence process in the European Union, suggesting that the initially poorer Members experienced higher growth rates than the developed ones between 2000 and 2019. Moreover, the coefficient is statistically significant (p-value < 1%) in all the regressions. As reflected by earlier studies, the average convergence rate under the absolute framework, where the growth rates are explained by the initial level of GDP per capita is around 2% per year (Dobrinsky, 2013; Dobrinsky and Havlik, 2014, Rapacki and Próchniak, 2019). However, when including other explanatory variables, the coefficient tends to have higher values (Stanišić, 2012; Marelli, 2019). This conclusion can be drawn also from our study as the convergence speed, determined based on α_1 coefficient varies from 4.5% (equation 1) and 8.8%

(equation 3). As shown by the results of the panel regressions with cross-sectional weights, the coefficient is higher when adding more explanatory variables. Consequently, these findings suggest that the growth rates in the European Union are determined not only by the initial level of GDP per capita, but also by the economic and social performance. When computing the regressions with fixed effects, the values of coefficient is significant higher compared to cross-section weight, still maintaining its statistically significance and the negative sign. Regarding the explanatory variables included in the model to control the differences between economies, they have the expected influence on the dependent variable, except for the tax burden indicator, which in the first (cross-sectional weights) and last equation (fixed effects) has a positive sign. The outline model confirms the beneficial influence that gross savings, imports and labor productivity had on economic growth rates at Community's level. At the same time, the estimated model shows that a stable business environment, as well as the involvement of citizens in the government selection had a favorable effect on prosperity of the Member States. In contrast, the tax burden and the economic and financial crisis, measured by a dummy variable (1 for 2008 and 2009 and 0 for the other years) had a negative impact on the income per capita growth rates. The values of the coefficient of variation suggest that the model explains in a proportion of 50% the variation GDP per capita in the European Union.

Table no. 3. Conditional β-convergence results

Dependent variable: Annual GDP per capita growth rate						
Method: Panel Least Squares						
Effects	EGLS (Cross-section weights)	Fixed	EGLS (Cross-section weights)	Fixed	EGLS (Cross-section weights)	Fixed
Total panel observations Variable	466	466	466	466	419	419
C	0.3544* (0.1065) (3.3267)	0.5137* (0.0788) (-5.6613)	0.2674** (0.1203) (2.2213)	0.5973* (0.0732) (5.2181)	0.1957 (0.1730) (1.1308)	0.6513* (0.1029) (5.1946)
GDP per capita (-1)	-0.0449* (0.0072) (-6.1890)	-0.1403* (0.0108) (-5.6613)	-0.0535* (0.0069) (-7.7036)	-0.2809* (0.0187) (-6.3471)	-0.0878* (0.0111) (-0.0878)	-0.3121* (0.0211) (-7.2164)
Gross savings	0.0325* (0.0081) (3.9714)	0.0676 (0.0105) (4.7349)	0.0343* (0.0080) (4.2399)	0.0584* (0.0097) (4.6626)	0.0358* (0.0080) (4.4422)	0.0679* (0.0106) (5.3347)
Imports	0.0068*** (0.0041) (1.6553)	0.2000* (0.0195) (4.3794)	0.0057 (0.0038) (1.4828)	0.1659* 0.0184 (4.5829)	0.0032 0.0041 (0.7933)	0.1860* 0.0200 (5.1975)
Tax burden	0.0018 (0.0100) (0.1801)	-0.0131 (0.0232) (-0.5824)	-0.0056 (0.0100) (-0.5596)	-0.0012 (0.0214) (-0.0550)	-0.0005 (0.0104) (-0.0520)	0.0145 (0.0258) (0.5652)
RLP			0.0438** (0.0217) (2.0119)	0.3106* (0.0349) (4.7468)	0.1135* (0.0360) (3.1521)	0.3324* (0.0414) (4.5022)
Business freedom					0.0173 (0.0152 (1.1360)	0.0190 (0.0205) (0.7733)
Voice and accountability					0.0367* (0.0079) (4.6241)	0.0280** (0.0118) (2.1687)
Crisis dummy	-0.0577** (0.0240) (-2.0240)	-0.4785** (0.0048) (-2.4481)	-0.0565** (0.0236) (-2.3957)	-0.0382** (0.0046) (-2.1472)	-0.0553** (0.0226) (-2.4443)	-0.0345** (0.0047) (-2.1873)
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.4801	0.5896	0.4840	0.6526	0.5161	0.6792
Adjusted R-squared	0.4744	0.5623	0.47773	0.6286	0.5066	0.6530
Durbin Watson	1.7883	1.8078	1.7533	1.5885	1.7759	1.6271

Source: Author's computation

Note: * - p-value < 1%; ** - p-value < 5%; *** - p-value < 10%; robust standard errors and t-statistics in parentheses

5. Conclusions

Economic convergence has always been one of the principle of the European integration architecture. Nowadays, the capacity of the European Union to achieve this objective has been called into question, taking into consideration the economic, social and sanitary turmoil that threatens the regional and global stability and prosperity. The main purpose of this paper was to study conditional β-convergence, by taking into consideration several economic and social variables. In contrast with absolute convergence framework, which takes into consideration the relationship between the initial level of capita and subsequent growth rates, the conditional allows the incorporation or other factors that might explain the growth rates differentials between countries. The main determinant of economic growth proved to be the real labor productivity between 2000 and 2019. Consequently, European decision makers should design measures aiming to improve the skills of the labor factor. At the same time, political actors should focus on increasing the level of gross savings, an important determinant of prosperity. On trade side, our empirical study suggests that imports have a beneficial influence on economic growth. Consequently, the European Union's trade policy should have as central pillar the free trade perspective. Last but not least, the estimated models show that the involvement of public authorities by creating an appropriate environment for businesses, as well as to grant freedom of expression to citizens bring economic benefits. By contrast, our study suggests that a high level of taxation hampered the economic growth potential in the European Union. The main limitation of this study is the limited number of explanatory variables, which are taken into consideration. Although the research encompasses both social and economic variables, it provides a limited explanation of the economic growth process. Consequently, the study may be continued by studying the influence of other variables on economic growth.

6. References

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