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**Real convergence  
of the European Union  
members states –  
evaluation attempt**

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**1. Introduction**

The European Union is an example of economic cooperation between particular states. The scope of the cooperation has broadened over time. To simplify the issue, it can be stated that the integration within the EU enables the member states to smoothly assimilate negative consequences of globalisation and simultaneously to avail of the occurring possibilities (Czyżewski, Grzelak 2006). Therefore, the group of the EU member states is still growing. In the first decade of the 21<sup>st</sup> century, 12 new states acceded to the Union. The expectations of the societies of these states concerned mainly reducing developmental disparities measured by the income level per citizen of a particular state. After eight years since the largest European Union extension, the impact of integration on convergence interpreted as the elimination of developmental disproportions between the member states is still subject to studies aimed at empirical confirmation of theoretical assumptions relating to the process. The main aim of the article is to verify the hypothesis stating that economic integration within the

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European Union diminishes differences in the level of economic development of the member states. This is studied both based on literature research as well as empirical research. The scope of the conducted analyses refers to the years 2001 – 2010 and is a cross-section of all 27 EU member states, the so-called “old” 15 EU member states and the so-called “new” 12 EU member states.

## 2. Description of the research method

To assess the convergence processes in the EU member states, the value of Gross Domestic Product (GDP) was applied as per the Purchasing Power Standard (PPS)<sup>1</sup> calculated per capita and assuming that this variable reflects the level of economic development of the analysed states best. The applied data stem from the Eurostat database.

The research covers a group of EU member states in the years 2001 – 2010, i.e. till the last year for which statistical database is available. A separate analysis covered a selected group of 15 states of the so-called old EU (EU-15), a group of 12 states (EU members since 2004) as well as Romania and Bulgaria which acceded to the Union in 2007. The breakdown results from the need to conduct the analysis of the impact of integration processes on convergence of states with various time period of their EU membership. The analysis included absolute  $\beta$ -convergence. This means that the less developed states (with lower GDP per capita) develop faster than the developed states. In order to verify it, the following estimation with the use of the regression equation has been applied (1):

$$\frac{1}{T} (\ln y(T) - h y(0)) = \alpha_0 + \alpha_1 h y(0) \quad (1)$$

where:

$y(T)$  - GDP per capita based on PPS in the final year

$y(0)$  - GDP per capita based on PPS in the initial year

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1 Purchasing Power Standard - weighed mean relative price of an identical basket of goods and services comparable and representative for each of the compared countries. It facilitates international comparisons as it considers differences in currencies' purchasing powers and eliminates differences in price levels between the countries.

$T$  – number of years in the analysed period

$\beta$ -convergence applies when coefficient  $\alpha_1$  is negative. To estimate coefficient  $\alpha_1$  in the regression equation, the least squares method is applied.

### 3. Convergence and its place in theory – selected issues

The term convergence as a scientific term refers to the process (or the process result) in which originally different phenomena gradually converge, share the same characteristics. Economic convergence is generally defined as a process of evening out differences in the economic development between the states or as a convergence of a particular economy with its sustainable growth<sup>2</sup>. It is expressed with economic variables, along with the most frequently used measure is Gross Domestic Product (GDP) per capita or GDP growth (Gierczycka-Bednarek 2007).

The key problem concerning economic convergence is the question if we live in the world where poor states are developing faster than affluent states or, whether we live in the world where affluent states are becoming more affluent and poor states are becoming poorer. In the context of the analysis of the convergence process it is also important to search for the reasons of difference in the affluence level of particular states and integration groups (Malaga 2004).

The last twenty years have seen different definitions as well as methods of verifying and interpreting convergence, starting from the absolute convergence, which became the subject of economic studies already in the mid 80s of the 20th century until the concept of  $\sigma$ -convergence. At present, the theory of the economic growth classifies  $\beta$ -convergence and  $\sigma$ -convergence as the so-called classic convergence concepts. In the course of later studies conducted with the use of the income distribution dynamics analysis, methods using panel data and time series, new convergence concepts have been developed including, inter alia, club convergence (Nowak 2007).

Along with the development of studies on the convergence process and deepening integration within the EU in relation to the common currency, the euro, researchers started to differentiate between real and nominal convergence. The latter is normative or is the target to be achieved. It is connected with the

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2 Sustainable growth – long-term equilibrium where production, capital and labour force increase at the same pace and in consequence, production volume per employee and capital volume per employee are constant.

regulations of the Maastricht Treaty specified as convergence criteria. They refer to price stability, public finance, exchange rates and long-term interest rates. The above macroeconomic indicators became the benchmarks for reaching a similar level of economic development by the EU member states as well as an attempt to specify macroeconomic conditions driving the formation and efficient functioning of the monetary union (Malaga 2004).

On the other hand, real convergence is a phenomenon which exists objectively or is perceptible. It comprises fixed structural changes in the economy, closing the gap on better developed economies or taking after the economies. So, it is closely related to the processes of economic growth and development. Convergence understood this way is closer to the theoretical and empirical analysis referring to the conditions of economic growth and development, while nominal convergence is closer to institutional and political approaches (Malaga 2009). The level of real convergence depends on the homogeneity of the analysed group of states. The closer their development level, the more economically convergent they are. The process which is the opposite of the previously defined one is the observed divergence process which manifests itself in an increased divergence between the income of the states characterised with a significantly lower affluence level and a benchmark set by the developed states (Gierczycka-Bednarek 2007).

The most common in the relevant literature is the division into beta ( $\beta$ ) convergence and sigma ( $\sigma$ ) convergence (Grzelak, Brelik 2011). The former occurs when states (regions) characterised by lower development levels have higher growth rates as compared to states (regions) which are more affluent in the analysed period. In this way, poorer states record higher return rates from each capital unit (in line with the law of diminishing returns from production factors), and in consequence a higher growth rate is recorded as compared to affluent states in the transitional period, until they reach the level represented by affluent states. The source of these phenomena may also be political and economic integration which facilitates diffusion of technologies and know-how, improvement in the quality of law or in the efficiency of actions taken by public authorities. These mechanisms allow states with lower initial GDP per capita to reduce the development shortfalls as compared to the states where the ratio was initially higher. As part of  $\beta$ -convergence, one can differentiate between conditional and absolute convergence. The former means that each of the economies approaches long-term equilibrium, which is different for different economies (Barro, Sala-I-Martin 1995). In this case, differences in the development may persist. In such a situation, a negative correlation is noted, e.g.

between GDP growth per capita and initial GDP per capita, while at the same time some parameters of the analysed group of states are similar in terms of their value. This means that economies are convergent with different steady-state economies. Absolute convergence, on the other hand, describes a faster growth pace of poorer states, which translates into a tendency consisting in approaching the same level of the analysed phenomenon. This type of convergence can be described as a relation between GDP growth rate per capita in a given time horizon and initial GDP per capita (Malaga 2004).

Conclusions deriving from the economic growth theory are particularly significant to understand the convergence process. It is important to analyse factors influencing economic growth as well as channels via which convergence may take place, understood as a process of evening out the levels of economic development and income between the analysed objects (Szopa, Dąbrowski, Kawa 2008). The neoclassical theory (see e.g. the Solow model) explained convergence processes through the prism of diminishing marginal productivity of capital. The theory clarifies the mechanism whereby poorer states approach the growth path faster than affluent states (Jabłoński 2008). The lower the initial capital values, the higher the average growth rate. States with lower capital saturation should develop faster than affluent states with high capital saturation (Wolszczak-Derlacz 2007).

A significant breakthrough in explaining the processes of economic dynamics, including convergence (divergence) was the endogenous growth theory as well as the achievements of the economic geography (Krugman 1995). Considering a broader understanding of capital, which takes into account the human capital, revenues from capital, in line with the endogenous growth theory, do not have to be of decreasing nature (Romer 1990). However, on the other hand, investments in technologies and knowledge as well as relative positive externalities can be the source of convergence. The endogenous growth theory abolished not only the neoclassical assumption concerning the same technological level in all the states, but also the assumption concerning diminishing productivity of capital replacing them with constant or increasing marginal productivity. Non-diminishing returns from capital are recorded when strong positive externalities<sup>3</sup>, related with the use of knowledge, technological progress and human capital, neutralise diminishing revenues resulting from increased capital resources. In

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3 Externalities – transferring a part of costs or benefits resulting from the operations of one entity to third parties not involved directly in the operation; positive or negative consequences of the conducted operations borne by a wider group of affected parties, regardless of their will.

consequence, the hypothesis concerning evening out GDP levels per capita was challenged, which means that initially poorer states are not able to catch up with more affluent states. According to Romer, human capital is the basic factor in the development and research sector which generates new products and ideas stimulating technical progress. States with higher initial human capital have a technological advantage which is the source of positive economies of scale. On the other hand, however, poorer states, which do not have to engage directly into ground-breaking inventions, transfer technologies from other states and thus can develop faster for some time. In this sense, diffusion of technologies can be considered a convergence mechanism. Romer also explains that economies of scale depend on the size of the internal market. Bigger states with large internal markets create better conditions for new inventions than states with smaller markets thus suggesting that bigger states develop faster than smaller ones (Wolszczak-Derlacz 2007).

The convergence level depends on the homogeneity of the analysed group (Matkowski, Próchniak 2005). Therefore, even though convergence processes can be expected in the EU(15) member states (regions) and in the EU(12) new member states, it is difficult to follow a clear scientific intuition in the case of the entire EU(27).

#### 4. Empirical evaluation of $\beta$ -convergence processes

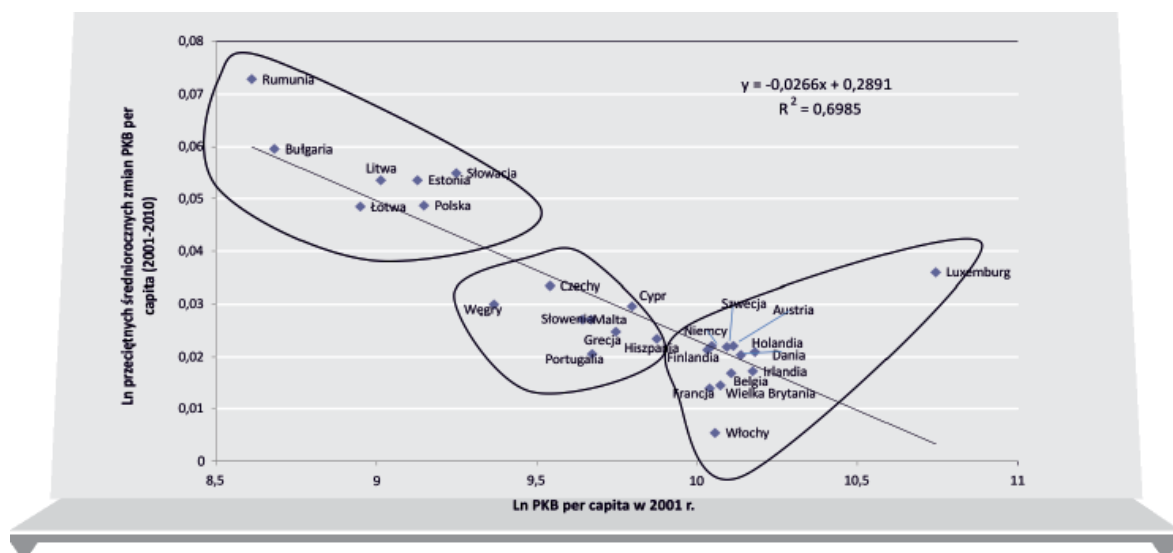
The results of studies on  $\beta$ -convergence for all EU member states are presented in Figure 1. The evaluation of GDP changes with reference to GDP in 2001, in the member states group in 2001-2010 confirms the occurrence of  $\beta$ -convergence. One can see clearly that states with initial lower GDP show a much faster pace of economic growth, whereas more affluent states are characterised by a slow pace of economic growth. On the basis of the above, it can be stated that in the analysed period the states drew closer to one another. It needs to be highlighted that in the period from 2001 to 2007 i.e. before the economic crisis, the pace of convergence (expressed by the coefficient of the regression equation) was ca. 25% higher. This is connected with significant disruptions in the economic growth, in the period 2008-2010, in some EU states (Baltic states, Greece, Ireland, Spain), whereas other states (Poland) were in a relatively more favourable situation resulting from asymmetrical reactions of particular economies to crisis phenomena.

Some states saw a significant divergence of economic growth paths from the trend set by a dominant group of states in the period 2001-2010 caused by various factors. Romania experienced an exceptionally high pace of economic



growth in 2001-2010, while Luxembourg maintained a high pace of economic growth accompanied by high GDP in the initial year. Three groups of states can be distinguished (fig. 1). The first one includes new member states with a high GDP growth per capita and simultaneously relatively low GDP in the initial period. The second group includes new member states with a slightly higher level of economic development and less developed states of the "old" EU including southern Europe (excluding Italy).

Although the coefficient of regression equation in the case of the so-called "old EU-15" does not imply the existence of  $\beta$ -convergence (0.0108), a very low coefficient of determination ( $R^2 = 0.15$ ) suggests being reticent about unambiguous interpretation of this model. Among those states, the dominant position is taken by a group characterised by high GDP in the initial year



**Figure 1.  $\beta$ -convergence in the EU states (all) in the years 2001-2010**

Source: Own study based on Eurostat data 2001-2010

and a low pace of economic growth. In 2001, poorer states such as Portugal, Greece and Spain recorded in the period until 2010 a significantly higher pace of growth as compared to more affluent states in 2001: Italy, France and United Kingdom. At the same time, states like Italy or France have a negative impact on the adjustment coefficient ( $R^2$ ) for the EU(15) group due to a relatively low GDP dynamics in the light of the other so-called "old" EU member states. In general,

it is difficult to state whether in the case of the so-called old EU member states there was convergence or divergence. Similar outcome is also presented by other authors (Kruszka, Puziak 2012), in the context of EU(15) regional studies in the years 1995-2007. It is not ruled out that lack of progress as regards convergence in this group of states results from the fact that EU regional policy concerns "old" members to a relatively lesser extent and additionally, the law of diminishing returns from capital is in this case mitigated by growth poles created by metropolitan areas in the most developed EU states. Furthermore, as long as in the "new" member states the decisive growth factors are institutional and resource-related issues, in the "old" member states, as indicated by the results of studies, education plays a significant role (Błażejowski, Gazda, Kwiatkowski 2012).

When analysing the EU-12 (new) member states, one can confirm the occurrence of  $\beta$ -convergence. Proper matching of particular points to the negative slope of the regression line ( $R^2 = 0.85$ ) evidences clear convergence of economic growth paths between the EU member states (12). These states relatively faster closed the gaps in development as compared to the so-called old EU members (Mokrosińska 2011). Yet, very often new member states experienced a relatively high/quick economic growth pace along with the polarisation of the regional development. This resulted from the fact that growth processes were strongly driven by agglomeration regions and government funding connected with R&D sector investment and public subsidies for businesses were dedicated to centres which were better developed in terms their economies (Third...2011). Poland together with Lithuania and the Czech Republic stood out from others in a way that their trend line crossed their empirical points. At the same time, it can be observed that Poland belonged to a subgroup of states (accompanied by Romania, Bulgaria, Lithuania, Latvia, Estonia and Slovakia) with a relatively high GDP growth and a relatively low GDP in the base period (2001).

The above results of studies on growth paths concerning 27 EU member states in the years 2001-2010 are diverse. The most distinct convergence paths are seen in the new EU member states and it includes both convergence as regards GDP per capita and a significantly quicker pace of growth in these states. In the case of the EU-12 group, which included states with a quite well developed market economy, a growth in trade and in international investments was observed as well as the development of the institutional environment and changes in the structure of generating GDP connected with increased importance of services. The pace of development in these states is also impacted by intensive economic cooperation with other EU member states in terms of the movement of goods,



services, capital and labour resources conducted already many years before full integration with the EU. The EU-12 member states are also beneficiaries of sizeable funding both in terms of pre-accession assistance and as part of structural funds dedicated to reduce the gaps in the level of development. These factors make the EU-12 group relatively homogenous. This is evidenced by the results of other studies (Próchniak, Rapacki 2009) which show that convergence processes can be seen in new member states in the period 2000-2005.

## 5. Summary

The conducted studies confirmed the occurrence of  $\beta$ -convergence in 27 EU member states in the years 2001-2010. This phenomenon results mainly from the fact that new member states develop faster than the old EU member states, which is associated with improved productivity of production factors, a relatively intensive investment activity as well as greater homogeneity of this group. The institutional factor plays also a significant role (Wojtyna 2009). In general, the pace at which new EU states catch up with the old member states is not quick and one can expect rather its deceleration also due to the fact that the level of prices and labour costs are evening out.

In the light of the presented results of the study, it could be initially stated that classical theories explaining convergence processes through the prism of diminishing income from capital are useful in understanding developmental processes between the EU member states, yet in the case of new member states the pace of convergence is shaped mainly by demand factors, while the actual production varies significantly from the potential one. It should also be added that it is difficult to analyse the results concerning economic growth of the EU member states resulting from the integration process bearing in mind that the global economic crisis exerted a strong impact on it.

Economic convergence of the EU member states seems not to be a homogenous process. It can be provisionally concluded that there was progress in the convergence of EU economies, in particular of the new EU members, although differences within the entire Community are still significant, also between regions in particular states (Łażniewska, Górecki, Chmielewski 2011). One of the reasons of such a situation is excessively wide economic diversification which, despite the support provided to less affluent states as part of the regional policy, cannot be eliminated in short-term period. In view of the above, a question may arise about the efficiency of the EU regional policy. It could be suggested that if such a policy was not applied, convergence processes would be weaker. On

the other hand, one has to remember that common EU budget concerns only 1% of total GDP of the EU, ca. 40% of which is related to the regional policy and thus its impact on the economic cohesion is rather minor. The impact level of economic integration effects on the real convergence remains an issue open for discussion. This, however, is an important matter in the context of the new EU budget perspective for the years 2014-2020, which could determine actions to be taken in order to intensify the processes of real convergence within the EU member states.

## Summary

### **Real convergence of EU member states - evaluation attempt**

The key aim of the article is to verify the hypothesis concerning convergence in the economic development of the EU member states, which is reflected in evening out differences in the economic development level of the EU member states. New member states develop faster than old member states. In the light of the presented results, economic convergence of the member states seems not to be homogenous. Thus, it can be provisionally stated that progress has been recorded as regards convergence of the member states economies, in particular since 2007, although it needs to be emphasised that differences between them are still significant.

*Key words:* convergence, EU, economic growth.

## Streszczenie

### **Konwergencja realna krajów UE- próba oceny**

Głównym celem artykułu jest weryfikacja hipotezy odnośnie istnienia konwergencji w rozwoju gospodarczym w ramach Unii Europejskiej, co odzwierciedlone jest w zmniejszeniu różnic w poziomie rozwoju gospodarczego krajów członkowskich. Nowe kraje członkowskie rozwijają się szybciej niż kraje należące dotychczas do UE. W świetle zaprezentowanych wyników zbliżenie gospodarcze krajów członkowskich wydaje się nie być procesem jednorodnym. Można więc wstępnie uznać, że miał miejsce postęp w zbliżaniu się do siebie gospodarek UE, zwłaszcza od roku 2007, choć zróżnicowanie między nimi w dalszym ciągu jest znaczne.

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**kluczowe:** konwergencja, UE, wzrost gospodarczy.

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