

## ECONOMIC GROWTH AND DEVELOPMENT OF THE CONCEPT OF CONVERGENCE – THEORETICAL BASIS

*The aim of the study is to outline the theoretical foundations of the concept of convergence related to economic growth, as well as to systematise the different types of convergence. The development of the concept of convergence, which is a result of many applied researches worldwide on the connection between growth and convergence, has been theoretically traced. The specifics of neoclassical and endogenous theories of economic growth are briefly presented as the basis of the concept of convergence, including its types – alpha (absolute), beta (relative), “club” and sigma convergence. The types of convergence that appeared in these studies are critically analysed – structural, based on labour productivity, regional, price, monetary, business cycle, and others. For EU countries, the interaction between nominal and real convergence has been studied.*

*JEL: E13; F63; N10; O11*

### Introduction

The interest in the issues of convergence of economies stems from the neoclassical theory of economic growth. According to the neoclassical model, the growth of per capita income tends to grow inversely with the initial level of this income. In practice, however, there is no convergence in the standard of living between developed and underdeveloped countries, which does not meet this theoretical assumption. The later endogenous theory of growth offers possible explanations for the observed lack of convergence. It also provides a better explanation of long-term growth factors and opportunities for real convergence.

The theoretical foundations were laid mainly in the second half of the 80s and in the 90s of the twentieth century, and then, especially in the last twenty years, there is the emergence of numerous and diverse empirical studies, including in Bulgaria, which contribute to the development of the concept of convergence. Therefore, an attempt was made in the study to analyse and systematise the applied ideas and topics for convergence (called in this case approaches or types of convergence – structural, regional, price etc.). The aim is to make a critical review of what has been done so far in the international scientific literature and to summarise in which direction it is going and to what extent the development of the concept of convergence has been scientifically explained. These issues are addressed on a universal

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<sup>1</sup> Rossitsa Rangelova is Professor, Doctor of Economics Sciences at the Economic Research Institute at the Bulgarian Academy of Sciences, e-mail: r.rasngelova@iki.bas.bg.

(global) scale, but the aim is to focus on practice within the EU and, above all, the specificities of nominal and real convergence.<sup>2</sup>

## 1. Convergence in the Neoclassical Model of Economic Growth

According to Solow's neoclassical model of growth, countries with lower GDP per capita (laggers) are expected to grow faster than developed countries (advanced) and thus to move closer to them. This follows from the difference in the capital-labour ratio and the difference it is created in the productivity of capital. In the context of an open economy and with sufficiently high mobility in international capital markets, a capital flow would be created from 'rich' countries (with low marginal productivity), directed to 'poor' countries (with high marginal productivity). Thus, the initial difference in capital intensity will tend to decrease and even disappear. At the same time, existing differences in technology (and therefore in the type of production function) would tend to disappear as well through the (assumed) intensity of consciously and unconsciously knowledge transfers.<sup>3</sup>

According to the neoclassical model, if the level of the physical capital  $K$  is low, i.e. under the steady-state condition  $K^*$ , the growth rate will be high.<sup>4</sup> The explanation of the differences in the growth rates among the considered countries could be found in their initial level of development and potential to develop in a long-term perspective. If a given country has a scarce capital  $K$ , and its ratio with the labour  $L$ , i.e.  $K/L$  is low, it is expected that this country could realise a higher rate of profit in comparison with another country with a higher rate of capital accumulation and respectively a higher growth rate. As far as capital is mobile on a world scale, it will try to move to countries where the perspectives for returns are the best and the described tendency will get higher and higher. Thus it is expected that the gap between the income level of the rich and the poor countries will decrease and gradually will disappear.<sup>5</sup>

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<sup>2</sup> The study is part of the research project at the Economics Research Institute at the Bulgarian Academy of Sciences titled "Economic Growth and Convergence in the EU", adopted by the Scientific Council. Project participants: Prof. D.Ec.Sc. Rossitsa Rangelova (Project leader), Prof. Dr. Daniela Bobeva and Associate Professor Dr. Dimitar Zlatinov.

<sup>3</sup> These questions are considered by the author Rositsa Rangelova in the dissertation for defending of the scientific degree "Doctor of Economic Sciences". The dissertation is titled "Contemporary Dimensions of Economic Growth", Higher Attestation Commission, 2008. Here these questions are presented very briefly and further developed according to the theme of the study. For details, see Rangelova, 2008, pp. 48-63.

<sup>4</sup> Interestingly, Solow had not realize that he was creating a model that explained the differences in economic growth rates by country, but that this was just a way to study the dynamics of growth in a country.

<sup>5</sup> It is assumed that the change in population number and the share of savings in GDP, or in other words the factors influencing savings, are identical for all countries. If these factors do not affect equally, each country will form a different steady state, but GDP growth per capita in individual countries will continue to converge because new technologies are embodied in new capital goods and the importance of capital accumulation is growing.

If a number of conditions are met, the neo-classical model of economic growth implies *economic convergence*<sup>6</sup> between a number of countries or groups of countries, at least in terms of rates of growth.

The main assumptions and conclusions from Solow's model in the context of the considered issue of economic convergence are as follows (Solow, 1956, pp. 65-94):

- labour supply grows at a constant rate  $n$ :  $L^S(t) = L_0 e^{nt}$ ;
- labour market continuously clears:  $L^S(t) = L^D(t) = L(t)$ ;
- technological progress is 'labour augmenting'; this means that the effective input of labour  $E$  (Emloyed) can be written as  $E(t) = L(t) e^{\varphi t}$ ;  $\varphi$  is the rate of labour-augmenting, so-called Harrod-neutral, technological progress;
- savings are a constant fraction of income:  $S(t) = sy(t)$ ;
- the production function is neo-classical and is characterised by constant returns to scale:  $y(t) = F(K(t), E(t))$ , with  $F(\mu K, \mu E) = \mu F(K, E)$  ( $\mu > 0$ ).

The hypothesis of constant returns to scale means that the production function can be written as follows, without loss of generality:

$$q \equiv y / E = f(K/E) = f(k), \quad (1)$$

where  $q$  is income as a result of a unit of productive capital;  $k = K/E$  is the capital/labour ratio. After analysing and transforming (1),<sup>7</sup> it is concluded that the immediate consequence of this is that the growth rate of the capital/labour ratio (and therefore per capita income) is higher in countries with a lower initial value of  $k$ . *This means that with the same production technology, the capital/labour ratio in less developed countries will grow faster than in developed countries.* This property of the neoclassical model of growth is known as the hypothesis of **absolute (unconditional)** convergence and leads to the conclusion that all countries will follow the same model (trajectory) of growth.

#### *Measurement issues: $\beta$ - and $\sigma$ -convergence*

In order to test the hypotheses mentioned above empirically, it is necessary to use a specific form for the production function. It is usual in this context to opt for a simple Cobb-Douglas specification:

$$q = f(k) = Bk^\alpha, \text{ with } 0 < \alpha < 1 \quad (2)$$

After a series of transformations, it takes the form:

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<sup>6</sup> In the modern economic literature and analyses, two concepts are used – catching-up and convergence, to which we adhere in the theoretical consideration of these processes.

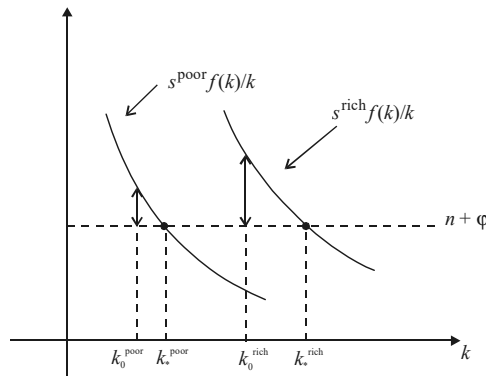
<sup>7</sup> For details, see Rangelova, 2008, pp. 48-66.

$$\frac{d \log q}{dt} = \frac{d \log(q/q^*)}{dt} \cong - (1-\alpha)(n+\varphi) \log(q/q^*) \quad (3)$$

The parameter  $\beta \equiv (1-\alpha)(n+\varphi)$  shows how fast a person's income (measured in units of efficiency) will approach its equilibrium value (Figure 1). Equation (3) is the basis of the concept of  $\beta$ -convergence, as an alternative choice for convergence of economic growth rates. If  $\beta$  is equal to 0.03 (suppose, for example, that  $n = 0.01$ ,  $\varphi = 0.03$  and  $\alpha = 0.25$ ), then each year 3% of the relative difference between  $q$  (income as a unit of efficiency capital) and its equilibrium value will decrease.

Figure 1

$\beta$ -convergence in the neo-classical model of economic growth



It is proved, however, that  $\beta$ -convergence is not valid for all the countries. It can only be confirmed for countries from a more or less homogeneous groups (EU or OECD member-states), but not for more heterogeneous groups, and even more so on a global scale. This circumstance denies the theoretical concept of absolute convergence, according to which convergence should be valid in all cases and even more so in the typical case of income disparities between rich and poor countries. Therefore, without changing the neoclassical model of growth, it was necessary to redefine convergence in a conditional form. Most likely, the countries are characterised by different coefficients in front of the variables for them in the model and therefore have different long-term equilibrium values  $k^*$  and different growth trajectories. In this situation, growth in a rich country will be higher than in a poor country if the capital/labour ratio for it is relatively far from its equilibrium value. In such a case, we are talking about conditional  $\beta$ -convergence, according to which the lower initial value of a person's income corresponds to a higher growth rate, if the variables that determine the value of long-term equilibrium are controlled as well as possible.<sup>8</sup>

<sup>8</sup> The theory defines three hypotheses for convergence: a) *absolute (unconditional)*, when the income per capita in different countries approaches each other in the long run, regardless of their initial state; b) *conditional*, when per capita incomes in countries with similar structural characteristics (e.g.

Convergence, as defined so far, relates to  $\beta$ -convergence in growth rates of per capita income. In other words, there is  $\beta$ -convergence if poor economies tend to grow faster than rich ones. Whether such (absolute or conditional) convergence exists in specific cases is always an open question, but one that most of the time can be empirically answered. An altogether different question, however, is whether this type of convergence also implies that income inequality between countries diminishes as time goes by. The answer is ‘not automatically’, even in the case of absolute  $\beta$ -convergence. In other words, the convergence of growth paths does not necessarily lead to a lower variance in the group, to so-called  $\sigma$ -convergence. This could be shown as a measure for inequality of per capita income and we take the sample variance of the logarithm of  $q_{it}$ :

$$D_t = \frac{1}{N} \sum_{i=1}^N (\log(q_{it}) - \mu_t)^2 \quad (4)$$

where  $\mu_t$  is the sample mean over the units considered (countries, regions, etc.). If  $N$  is sufficiently large, then we can consider  $D_t$  to be a good estimate for the variance of the population. Under the assumption that the disturbances  $u_{it}$  are independently distributed in time and between ‘countries’ with a constant variance  $\sigma_u^2$ , we get the following first-order difference equation for  $D_t$  describing the dynamics of income inequality in the group under study:

$$D_t = b^2 D_{t-1} + \sigma_u^2 \quad (5)$$

The two concepts express different phenomena:  $\beta$ -convergence studies *the dynamics of income in a sample of studied countries*, and  $\sigma$  convergence studies how *the distribution of income between the individual countries* in the sample changes over time (Figure 2).

Although the two concepts are different, they have a connection to each other. It can be proved that  $\beta$ -convergence is a necessary but not sufficient condition for  $\sigma$ -convergence (Sala-i-Martin, 1996, pp. 1325-1352). From Figure 2 it follows that even with absolute  $\beta$ -convergence, the deviations in the income levels remain positive values. The deviations may even increase at the time when the initial dispersing is lower than the equilibrium value  $D^*$ . The existence of  $\beta$ -convergence (i.e.  $b < 1$ ) does not necessarily lead to a reduction in inequality between countries ( $\sigma$ -convergence).

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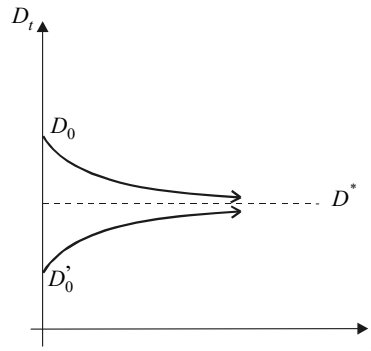
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technology development, population growth rate, government policy, etc.) approach each other in the long run, as countries with lower initial income levels achieve higher economic growth and are closer to those of richer countries; c) *club convergence*, when countries in a group that have a similar initial level of income and similar structural characteristics approach each other in the long run.

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Figure 2

Sigma ( $\sigma$ ) convergence starting from two different initial positions



For the purpose of empirical studies, *the speed of convergence* could be estimated using the following non-linear equation (Barro, Sala-i-Martin, 1992, pp. 230):

$$1/T \ln (y_{i, t_0+T}/y_{i, t_0}) = \alpha - (1 - e^{-\beta T})/T \cdot \ln (y_{i, t_0}) + u_{it_0, t_0+T}, \quad (6)$$

where  $\ln y_{i, t_0+T}$  and  $\ln y_{i, t_0}$  mean log of the growth rates of the income per capita in the initial and respectively final year;  $i$  is the country index;  $T$  – duration of the observed period in years;  $\alpha$  – constant;  $u_{it_0, t_0+T}$  – average error  $u_{it}$  in the time interval between  $t_0$  и  $t_0+T$ . After estimation by the Least Squares method and transformations, it is obtained that the speed of  $\beta$ -convergence rate can be calculated using the equation:

$$(1 - b_T) = (1 - e^{-\beta T})/T \quad (7)$$

It is proved that *conditional  $\beta$ -convergence* could observe if the partial correlation between the income per capita growth and its initial level is negative. In case the regression coefficient of the variable of the initial level is negative, we can speak about *absolute  $\beta$ -convergence*. Absolute  $\beta$ -convergence is limited to relatively homogeneous groups of countries, conditional  $\beta$ -convergence is an empirically well-established fact, and  $\sigma$ -convergence is not warranted, even in the case of absolute  $\beta$ -convergence.

## 2. The Role of Endogenous Models for the Development of the Concept of Convergence

The emergence of endogenous economic growth models is associated with the research interest in the theory of convergence (or catching up), embedded but undeveloped in the neoclassical model. The neoclassical model of economic growth includes the technological progress as an exogenous factor. Because of this weakness, the model cannot actually offer

insight into why some countries are growing faster than others are. This prompted scientists to work further, and since the mid-1980s, models of endogenous growth have emerged to seek a solution. The mechanism of their creation is to reject the assumption of a declining return on capital accumulation and to replace it with the assumption of a constant return. These models aim to explain why convergence did not take place, and the answer is because there are positive externalities of capital accumulation that outweigh the effects of increasing the capital/labour ratio (K/L). Therefore, the marginal productivity of capital does not decrease with increasing GDP per capita. As a result, the rich remain rich and the poor remain poor.

The assumption of increasing returns on capital opens up opportunities for policy changes or preferences that affect the rate of economic growth in the long term. It allows the inclusion in the growth models of indicators from a number of other aspects of the financial, demographic and social systems, including reducing income inequalities between the population and between countries and improving the quality of life, environment, role of institutions, non-economic factors, etc.

Over the last three or four decades, there has been a debate on what are the determinants of economic growth and the reasons for the growing income gap between people in different countries. One of the main questions is whether economic growth and the difference in per capita income should be included in the processes of accumulation of physical and human capital or in total factor productivity (TFP). However, looking at the impact of these two factors alone (accumulation and productivity) is an oversimplification of reality. The process of economic growth is the result of a complex and interconnected combination of factors. Therefore, it is crucial to study the system of relationships that connects the factors of production, including the quality of institutions, investment in new technologies and others. For example, the CEE countries were on relatively comparable levels of development at the beginning of the transition to a market economy after 1989. However, 30 years later, some of them are in the group of developed countries, while others such as Bulgaria have reached only a little over half of the average level of development (GDP per capita) in the EU.<sup>9</sup> These effects on long-term growth rates are accounted for by the endogenous theory of growth, which is a further development of neoclassical theory.

The beginning of endogenous ideas could be found in the publications of Paul Romer (1986) and Robert Lucas (1988), who defend the view that in the model of economic growth, the ratio of capital and labour should be a key endogenous variable and the technological change cannot be treated as an exogenous factor. However, if technological change is included as an endogenous factor, perfect competition cannot be the main theoretical basis for modelling growth. In his defence against the exogenous nature of technological progress embedded in his model, Solow acknowledges, “no one can deny that technological progress is at least partially endogenous to the economy”. To overcome this limitation is “the most promising

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<sup>9</sup> E. Spasova (2016) gives her reading of the possibilities for real convergence through the prism of modern economic theories.

aspect of the third wave of growth theory and the inclusion of monopoly competition in growth theory is undoubtedly a good thing” (Solow, 2000).<sup>10</sup>

The first works of P. Romer (Romer, 1986, pp. 1002-1037), R. Lucas (Lucas, 1988, pp. 3-42) and others, laying the foundations of the theory of endogenous growth, do not treat the issue of technological progress. They emphasise a reassessment of the theory of declining returns on factors of production. Most new models take Solow’s model as a starting point and try to endogenise it using one or another mechanism.

The transition from exogenous to endogenous theory takes place via three channels: 1) Reflection of the spill-over effects of knowledge as a consequence of the accumulation of physical capital; 2) A way is sought for increasing the labour productivity through the accumulation of human capital, relying on the fact that there is a strong dynamic connection from education to the produced product; 3) An expression of achieving more productive projects through R&D is sought.

*In summary:*

- There is a rising level trend of GDP worldwide, but this cannot be reconciled with the idea of the declining return of the factors of production in the neoclassical theory of growth. The lack of explanatory power of neoclassical theory was particularly evident in the constant and even widening gap in the level of economic development (GDP per capita) between the developed and poor countries of the world for many years. The statistics for increasing the differences between developed and developing countries confirm the unsuitability of the model, which cannot explain the sustainable existence of these differences, nor does it give recommendations for their elimination (Spasova, 2015).
- Although Adam Smith was the first to proclaim the role of free trade, after him up to the neoclassical model of Solow, the economy is seen as a closed system in perfect markets, which is a strong violation of today’s conditions of international economic and trade cooperation. Endogenous models look at economic growth in open economies, including under the influence of ongoing globalisation in the world, which suggests the inclusion of another wide range of variables.
- A strong shortcoming of Solow’s neoclassical model is the assumption that changes in the growth rate of per capita output in a long-term sustainable equilibrium come from changes in the growth rate of exogenously set technological progress. The endogenous theory is the first to attempt to explicitly decipher technological progress. The idea of the poorer countries catching up with the richer ones is to reduce the gap in technological

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<sup>10</sup> From the end of the first half of the twentieth century until today, there have been three successive waves of growth patterns. *The first wave* relates to the emergence of the theory of economic dynamics with the main representatives R. Harod (and his works from 1939 and 1948) from Great Britain and E. Domar (1947) from the USA and the development of the neo-Keynesian models of economic growth. *The second wave* concerns the emergence of the so-called neoclassical models, the beginning of which is considered to be the work of R. Solow (1956). *The third wave* has been observed since the mid-1980s. It has become an expression of efforts to overcome the limitations and contradictions in neoclassical models and is associated with the emergence of endogenous growth patterns.



development between them. It can be accelerated through the import of capital goods and through foreign direct investment (FDI), but the effectiveness of this process depends on the absorption capacity, i.e. “social capacity” and “technological similarity”. It includes a wide range of variables reflecting the state of human capital, political stability and institutional development.

- As noted by N. Nenovski, the idea of convergence (as a process of general motion of certain variables) is borrowed in economics from classical physics and mathematics and generally remains within the neoclassical equilibrium model. According to the latter, without the presence of state intervention, there are internal forces that lead to convergence between different economic units (be it individuals, groups, classes, enterprises, nations, etc.). Convergence is the result of price movements and the profitability of factors of production, following the principles of marginal utility. It is believed that balancing takes place in an ideal world without restrictions, transaction costs are zero, information is free and freely available, knowledge is complete (Nenovski, 2007).
- A question would be curious hypothetically about what would happen if full convergence was achieved.<sup>11</sup> For example, if GDP per capita get equal in all countries, what will follow? Will the countries and regions develop equally? Will there be an opposite phase of divergence, who will cause it, etc.?
- In the process of accumulating theoretical knowledge in science, some assumptions and statements remain more persistent over time and convincing in the minds of those who defend or criticise them, others less, and others who are simply rejected. Very often, certain assumptions and mantras take such deep roots in thinking that almost no one realises that they are created only under certain theoretical assumptions. One of the many examples is that most often, the justifications for certain economic decisions are based on the postulates of perfect markets and perfect competition. Other important conditions are missed, which change the meaning, even make the acceptance of the used ideas meaningless, and thus affect the correctness of the proposed solutions and policies. An example of such discrepancies is the attitude towards neoclassical theory. It has been widely criticised for the last 5-6 decades. However, it continues to be prevalent among the models taught in most faculties of economics in the world, and the vast majority of research is based on it. On this occasion, Thirlwall notes that after so much criticism, it is “a mystery how the neoclassical model based on Solow’s continues to dominate the training of economists in growth theory, and social psychologists probably need to explain this” (Thirlwall, 2013, p. 34).

### **3. Empirical Studies of the Relationship between Economic Growth and Convergence**

Empirical research on convergence includes historical analyses. They consider GDP per capita as a dependent variable (and proxy) for the degree of catching up. Most empirical

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<sup>11</sup> Likely the author N. Nenovski (2007) was the first to ask this question. In addition, he finds similarities with the Marxist model, where there is a tendency to equalize the rate of profit within and between industries.

research relates to growth in industrialised OECD countries. This is mainly because of the available reliable estimates and data for long periods, mainly due to the assessments of A. Madison, A. Heston and R. Summers, the World Bank and others. Research in this area is primarily on the nature of  $\beta$ -convergence and  $\sigma$ -convergence, as well as the relationship between the two, proving that  $\beta$ -convergence is a necessary but not a sufficient condition for  $\sigma$ -convergence. According to the authors Barro and Sala-i-Martin (1992), the rate at which regions in different countries approach in terms of the level of development in different periods is surprisingly close – about 2% per year. These estimates are stable and always statistically significant. The authors reject the possibility that this unified assessment for all countries is the result of measurement errors or due to a small sample (Sala-i-Martin, 1996, pp. 1325-1352).

The following comments could be made on these empirical assessments. *Firstly*, the rate of 2% per year is very slow. This means that it takes about 35 years to shorten 50% of the distance between an economy with a certain initial level and its sustainable state and that 75% of this difference disappears after a full 70 years. In other words, after a long period of 70 years, a quarter of this distance will remain. *Secondly*, this constancy of a coefficient of 2%, obtained in numerous inspections and cases, is doubtful. It could reflect some mechanical, mathematical dependencies, or the economic structure of growth is independent of the variables in question. Another author, examining the results of a previous article by Sala-i-Martin (in the same journal and the same issue in 1996), argued that a convergence rate of about 2% could be due to measurement errors or the presence of endogenous relationships between the variables (Quah, 1996, pp. 1353-1375). Reasons could also be some statistical artefacts – measurement errors, small sample and so on. It should also be noted that the studied dependencies are much more complex and the results are not always statistically significant and reliable. Even Romer, in a study of increasing returns, argues that, in fact, the rate of economic growth does not show a correlation with the initial level of income per capita (Romer, 1986, pp. 1002-1037). Many studies and by statistics confirm the lack of convergence. The only optimist about convergence is Lucas. Based on data for a very long historical period (1800-2000), the author shows that the indicator of income inequality between countries tends to increase since 1800 onwards, reaching its peak in 1970. This convergence is intensifying and according to him, it will be one of the main economic events in the 21<sup>st</sup> century (Lucas, 2000, pp. 159-168).<sup>12</sup>

Because of the criticism regarding the unrealistic nature of the neoclassical model, a number of authors (Mankiw, Romer, Weil, 1992, p. 407-437) modify the model by adding human capital (using the variable for the number of high school graduates) to the determinants of growth. They prove that the expanded indicator of physical capital with the variable measuring human capital is more effective in quantifying growth. According to Baumol, the inclusion of education as a variable in regression analysis changes the results – countries with a close level of education approach each other very consistently (Baumol, 1986, pp. 1072-1085). Other authors rely on the role of institutions (Knack, 1996, pp. 207-228), etc. It has

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<sup>12</sup> There are a large number of studies that deserve attention. Here are presented only ones of the most known publication on the subject concernend. For further information in Bulgarian literature, see Rangelova, 2008, p. 48-66; Spasova, 2016; and others.

been shown, however, that *extended versions of Solow's model do not change the basic presumptions of the neoclassical theory of growth.*

A number of authors examine the issues of convergence through the prism of the development of technological progress. For example, James proves that technological change mainly affects developed economies, but not the developing world, which leads to a widening gap between them. This fact is not explained in neoclassical theory, as it states that technological changes occur at comparable, exogenously determined rates throughout the world. It is important to note that the low degree of technological diffusion in these countries is due to their inability to absorb capital-intensive, large-scale technologies due to their outdated technological systems (James, 2003, pp. 312-323). Others do not deny the presumption that only technology can change long-term growth rates, while all other factors (savings, investment, employment, and increase in human capital) can only change the levels of aggregate per capita output (Mankiw, Romer and Weil, 1992, pp. 407-437). This fact is confirmed by the study of three authors of  $\beta$ -convergence between 12 countries in Western Europe over a 55-year period (1937-1992). According to them, the  $\beta$ -coefficient is 0.029 at a significance level of 5%, which means that during this period, the countries have been approaching each other at an average rate of nearly 3% (Fischer, Sahay, Vegh, 1998).

A summary assessment of Solow's model is given by Temple (Temple, 1999), which model is an ideal tool to show divergence, and in particular that anything unrelated to the rate of investment in rich and poor countries leads to an increase in income dispersion. The main reason for the different growth rates between the countries is the different macroeconomic stability in them. This is partly due to capital investment, with equipment investment perhaps playing a special role. Solow himself examines the issues theoretically and notes that the use of convergence criteria makes sense only if the countries in question have a significant number of common features: level of savings, demographic parameters, available technological knowledge, and so on (Solow, 2000).

A more recent study uses the availability of data for many countries, in the long run, to make it possible to trace the convergence of today's EU Member States in the 20th century on the basis of  $\beta$ - and  $\sigma$ -convergence (Rangelova, 2008, pp. 48-66).<sup>13</sup> A. Madison's estimates of GDP per capita based on PPPs, in particular from 1913 to 2006, were used. The convergence calculations for the period under review for all 42 countries gave a  $\beta$ -coefficient of 0.021 with a significance level of 5%, which means that during this period the income gap between richer and poorer countries decreased by almost 2%. The results for the two subperiods 1913-1939 and 1939-2006 confirm the observed phenomenon of more intensive convergence in the second than in the first subperiod.

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<sup>13</sup> The sample consists of a total of 42 countries. The thirty countries include 15 countries of the "old" EU, 7 newcomers to the EU (Cyprus, Malta, Bulgaria, Czechoslovakia, Hungary, Poland and Romania), 4 other European countries – Iceland, Switzerland, Norway and Turkey as well as 4 countries outside Europe – USA, Canada, Australia, and New Zealand. Poorly developed are 12 countries from Africa, selected by us to obtain a more diverse sample, which is closer to the world average – Algeria, Congo, Ivory Coast, Egypt, Ethiopia, Ghana, Kenya, Morocco, Nigeria, South Africa, Sudan, Tanzania.

#### **4. Integration, Cohesion, Nominal and Real Economic Convergence in the EU**

EU terminology uses several terms related to the convergence processes of the Member States in economic and social policy. The most frequently used terms in EU policy, as well as in separate publications, are integration, cohesion and convergence (Hristova-Balkanska, 2017, pp. 84-102). Most of the available publications mix the use of these concepts and often create ambiguity in the results and messages. This happens because the authors do not feel a desire or need to differentiate the concepts, or because of the logical one-way connection between them – as a rule, greater convergence implies greater cohesion and then – greater integration between the countries considered. Before considering the issues of nominal and real convergence in the EU, an attempt is made to basically define and distinguish the three concepts – integration, cohesion and convergence.

##### *4.1. Economic Integration*

The concept of integration has the broadest meaning compared to the other concepts considered. Generally speaking, it expresses growing economic interaction between countries. Economic integration is based on accepted economic agreements between different countries, including common monetary, fiscal, social and economic policies managed by supranational institutions. The main goals of economic integration are to achieve higher efficiency in the use of the factors of production and a fairer distribution of income between people and countries given the existing inequalities between them (Marinov, 2017). The same author distinguishes the following types of integration: a) according to the object of integration – market integration (removal of obstacles to the free movement of factors of production) and policy integration (creation of a common framework for the functioning of individual sectors or economies); b) according to the means (direction) for implementation – positive (creation of means, measures and institutions) and negative (removal of barriers and obstacles); c) according to the form of implementation – informal (practical actions, interaction between the markets) and formal (institutionalisation, political decisions). Institutional integration within the EU is organised in accordance with certain bilateral or multilateral treaties, which express the interests and expectations of individual Member States. These documents must comply not only with specific internationally established economic norms, but also with the relevant rules in the field of international cooperation, defined by international organisations such as the UN, WTO, IMF, and others in a wide range of human relations such as democracy, world security, environment, protection of human rights, etc. The EU Treaty sets out the conditions (Article 49) and principles (Article 6) that every country wishing to join and integrate into the EU must meet. The Copenhagen European Council in 1993 (known with the Copenhagen Criteria) has set out further criteria at the Madrid meeting in 1995. They could be divided into three groups – political, economic and administrative capacity – and are as follows:

- Stability of institutions guaranteeing democracy, the rule of law, human rights and the protection of minorities;
- Existence of a functioning market economy and the ability to withstand competitive pressure and market forces within the EU;

- Ability to fulfill the obligations of membership, including a willingness to adhere to the goal of Economic and Monetary Union, known as the Euro area.

In addition, the membership criteria require candidate countries to establish conditions for integration into the EU by adapting its administrative structures. This requirement was introduced by the Madrid European Council in December 1995. It concerns the ability of candidate countries not only to adopt but also to effectively implement harmonised European legislation through the relevant administrative and judicial structures. All these criteria got mandatory by the 1997 Amsterdam Treaty.<sup>14</sup>

In order to start EU accession negotiations, the candidate countries had to meet the political (first group above) criteria, assuming that they would continue their efforts to meet the other criteria until full integration.

The wording of the criteria shows that they are interpretive in nature and not set by parameters, as in the case of the nominal convergence policy (which will be discussed below). The evaluation of their implementation is carried out on the basis of many indicators for each country, but there is a possibility also for subjective consideration and evaluation.<sup>15</sup>

Even today, 15 years for ones countries and 12 for others after accession, the EU Member States of CEE do not fully meet the Copenhagen criteria and conditions listed above. The newly acceded countries were accepted into the EU benevolently and encouragingly, but also for strategic and geopolitical reasons (Table 1).

Table 1

Indices of GDP per capita in SPP, 2008 and 2019, EU=100%

Regions, countries	Index		Regions, countries	Index		Regions, countries	Index	
	2008	2019		2008	2019		2008	2019
EU-28*	102*	101*	Malta	80	99	Romania	52	69
Eurozone-19	110	106	Italy	108	95	Greece	95	68
Ireland	136	191	Czech Republic	85	92	Chroatia	64	65
Luxemburg	266	261	Spain	102	91	Latvia	60	69
Danmark	127	129	Cyprus	107	89	Bulgaria	43	53
The Netherlands	143	128	Slovenia	91	88			
Austria	127	127	Estonia	70	84	Turkey	49	61
Germany	118	121	Lituinia	64	82	Montenegro	42	50
Sweden	129	120	Portugal	82	79	Northern Macedonia	32	38
Belgium	116	117	Slovakia	73	74	Surbia	39	41
Finland	123	111	Poland	56	73	Bosnia and Herzegovina	29	32
France	108	106	Hungary	64	73	Albania	25	31
United Kingdom	113	105						

\* Based on EU-27 for 2020.

Source: National Statistical Institute, available at: <https://www.nsi.bg/bg/content/11470/>.

<sup>14</sup> See: Accession criteria (Copenhagen criteria), available at: [https://eur-lex.europa.eu/summary/glossary/accession\\_criteria\\_copenhagen.html?locale=bg](https://eur-lex.europa.eu/summary/glossary/accession_criteria_copenhagen.html?locale=bg), Portal Europe <http://old.europe.bg/htmls/page.php?category=198>.

<sup>15</sup> The EC assesses the progress of reforms in the candidate countries through annual reports to the Council. Negotiations take the form of an intergovernmental conference of the Member States with the candidate countries.

The accession to the EU of candidate countries from the so-called Western Balkans and probably Turkey is forthcoming. However, the level of economic development of these countries is lower than the starting point of the already accepted CEE Member States (Table 1). With the accession of these countries, the EU will become even more heterogeneous, more unstable and full of internal contradictions, which would undoubtedly affect the integration into this community.

#### 4.2. Cohesion – economic and social

The concept of cohesion<sup>16</sup> in the EU is considered in the scientific literature as economic and mostly as social cohesion. Some authors consider the concept of economic cohesion as an element of economic integration. According to D. Hadjinikolov, economic cohesion means achieving a homogeneous structure of the economy of individual member states and regions, which allows the EU economy to act as a single organism. Defined in this way, the level of economic cohesion can be determined by the structures of: the economy (GDP and/or GVA); services sector, manufacturing, exports, etc. (Hadjinikolov, 2014). The cohesion is based on the fact that the greater the similarity of these indicators between the different national economies, the greater the cohesion between them in the European Economic Area. Economic cohesion defined in this way, however, is very similar and mixed with economic convergence. The same author distinguishes between cohesion and convergence, as the former reflects the similarity in structures (economic, social, ethnic, etc.), but the latter, convergence reflects the similarity of processes (the cycle of GDP development, etc.).

**Social cohesion** is defined as “an approach and process of cohesion and inclusion in society based on overcoming inequality, injustice, marginalisation and social exclusion of certain individuals and groups... Social cohesion cannot solve and eliminate social problems, but could mitigate social contrasts and reduce the economic burden on the socially disadvantaged”.<sup>17</sup>

The EU, via Eurostat, monitors the situation and changes in the social sphere and on this basis, certain policies are adopted.<sup>18</sup> The main financial instrument for cohesion between the individual EU Member States is the Cohesion Fund. It is established in 1993 and provides financial assistance for projects in the field of trans-European networks, transport infrastructure and the environment for the EU Member States with a GDP of less than 90% of the EU average. The aim is for these countries to reduce their economic and social backwardness, as well as to stabilise their economies. This fund is subject to the same

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<sup>16</sup> The word cohesion (from Latin language “stick together”) literally means the force of attraction, the adhesion between the molecules of a substance. That is why it appears firstly in physics and chemistry.

<sup>17</sup> See Dictionary, available at: <http://rechnik.info/%D1%81%D0%BE%D1%86%D0%B8%D0%B0%D0%BB%D0%BD%D0%B0+%D0%BA%D0%BE%D1%85%D0%B5%D0%B7%D0%B8%D1%8F>

<sup>18</sup> The main indicators related to measuring social cohesion could be found on the Eurostat website under the heading “Income and Living Conditions”. These are as follows: relative share of the poor by sex and age groups, relative share of the poor by economic activity and by sex (for persons aged 18 and over), percentage of the population living with material deprivation by age and sex, etc. Available at: <https://ec.europa.eu/eurostat/data/database>.

programming, management and control rules as the European Social Fund (ESF) and the European Regional Development Fund (ERDF).

Social cohesion can be seen as a function of economic cohesion. It is logical to assume that the greater the economic cohesion and the more similar the structure of the economies of the countries concerned, the more similar the structure of incomes. In our opinion, however, this is a crude assumption, insofar as it is necessary to specify what structures are in question and insofar as in this case, different and divergent factors play a role.

The concept of cohesion is most closely linked to the concept of policies and catch-up. The bulk of cohesion policy funding goes to less developed countries and regions in the EU (including co-financing from the national budget) in order to help them catch up and reduce the economic, social and territorial disparities that exist. The cohesion policy of the EU's targets all regions and cities to support job creation, business competitiveness, economic growth, sustainable development and improve the quality of life of citizens. That is why cohesion policy is at the heart of European solidarity. Investment helps to achieve many other EU policy objectives, such as education, employment, energy, the environment, the single market, research and innovation. In particular, cohesion policy provides the necessary investment framework and strategy to achieve the agreed growth targets.<sup>19</sup>

#### *4.3. Nominal and real convergence in the EU*

This section examines the most typical and most frequently considered for the EU types of convergence – nominal and real, as well as the relationship between them.

In addition to having the political will, an acceding country needs to meet certain formal criteria for its accession and integration, in particular with regard to its macroeconomic and financial stability. Nominal convergence is expressed in the implementation of the so-called Maastricht criteria. Initially introduced as a mechanism for imposing budgetary discipline in the EU, they later became the main criteria for joining the single currency.

The criteria include five basic requirements:

1. *Inflation*, according to the harmonised index of consumer prices, should not be higher than 1.5 percentage points above the average value between the three Member States with the lowest inflation.
2. *Budget deficit*, measured as a percentage of GDP, shall not exceed 3%. The rule allows a deficit that exceeds the threshold only under exceptional conditions.

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<sup>19</sup> By 2020, the EU targets to five specific objectives: employment, innovation, education, social policy and social inclusion, and climate/energy. Each Member State has adopted its own national targets in these areas. To achieve these goals and to meet the development needs of all EU regions, 351.8 billion EUR has been set aside for cohesion policy for the period 2014-2020 – almost a third of the total EU budget. See: Europe Strategy 2020 – [ec.europa.eu/eu2020](http://ec.europa.eu/eu2020); EU Cohesion Policy 2014-2020, date accessed 20 July 2015, available at: [http://ec.europa.eu/regional\\_policy/sources/docgener/informat/basic/basic\\_2014\\_en.pdf](http://ec.europa.eu/regional_policy/sources/docgener/informat/basic/basic_2014_en.pdf).

3. *Government debt* as a percentage of GDP should not exceed 60%. In the event of a downtrend, the rule allows debt above 60%, as long as it is expected to fall below the limit in the near future.
4. *Long-term interest rates* (average yield on ten-year government bonds) shall not exceed by more than 2 percentage points the average value between the three Member States with the lowest inflation.
5. *Stability of the exchange rate against the euro*. Stability of the exchange rate against the euro. The currency of the candidate country should not devalue significantly in the last two years against the European currency. The deviation may vary by +/- 15% from the threshold set by which the currency of the Member State concerned has entered Economic and Monetary Union (EMU) II.

EMU is set as a tool to achieve the Member States integration into the EU and the objectives “economic and social progress, high employment, balanced and sustainable development” (as referred to in Article 2 of EU Treaty). Such goals implicitly include “real” convergence, which enables the achievement of results in which the lagging countries and regions catch up with the more developed ones.

Nearly 20 years have passed since the adoption of the euro in the EU. During the first years (2002-2008), EMU was characterised by general macroeconomic stability, low inflation and calm in the financial markets. The global financial and economic crisis of 2008 and the ensuing debt crisis, caused stagnation, which raised doubts about the validity of the EMU content. The EU has proved vulnerable to financial and economic shocks, but there has been a lack of research and a vision for long-term economic convergence according to EMU principles (Marelli, Parisi, Signorelli, 2017, pp. 2-7).<sup>20</sup>

Nominal stability and convergence were satisfactory in the run-up to the 2008 crisis. In most countries, inflation was very close to the ECB’s 2% target. Slightly higher inflation was registered in the then faster-developing countries such as Ireland, Spain, Greece and others. A reflection of the different inflation dynamics was that the short-term interest rate set by the ECB caused lower real interest rates in the inflation-prone countries. This stimulated investment in non-tradable activities and the creation of asset and bubbles in the housing sector. The result was *structural divergence* as the “periphery” specialised still from the time before the crises of 2008 in non-tradable activities and construction, while the centre, relied on exports and tradable activities – manufacturing and services (Buti, Turrini, 2015).

At that time, there was calm in the financial markets and interest rates were almost the same everywhere. This environment encouraged huge capital flows from the “centre” to the “periphery”, fostered by the disappearance of currency risk and private capital flows in the euro area, which replaced the missing centralised public budget and contributed to rapid economic growth. However, this environment masks the growing (trade and debt) imbalances, while the increase in peripheral debt was mainly related to private debt, not public debt.

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<sup>20</sup> See: Institutional, Nominal and Real Convergence, available at: [https://ebrary.net/39903/political\\_science/institutional\\_nominal\\_real\\_convergence](https://ebrary.net/39903/political_science/institutional_nominal_real_convergence).



In the reports, which monitor compliance with the criteria in individual economies, the European Central Bank (ECB) said that in the years after the crisis, only Bulgaria and Estonia managed to comply with all Maastricht conditions. However, according to the ECB, in none of the countries, including Bulgaria, the legal framework is yet in full compliance with all the requirements for adopting the euro. Therefore, the criteria for stability, accession, cohesion, convergence, integration, etc., intertwine and most often are one-way in their action, which hampers in many cases clearly distinguish. This raises the question of whether convergence is a natural consequence of the “catching up” effect of less developed countries to more developed ones. Is there and what is the relationship between nominal and real convergence given the policy and the observed trends within the EU?

The logic assumes that the Maastricht Treaty sets out the criteria for nominal convergence as a necessary condition for candidate countries to join EMU. Meeting these criteria leads to the stability of economies and preparation for the inclusion of some of them in the euro area. Convergence issues were not yet on the agenda at the time (Andreff, 1998, pp. 111-138). In this sense, *nominal convergence could be seen as a necessary condition for real economic convergence*, which, however, is not enough to lead to real economic convergence. Real convergence requires higher economic growth to ensure that catching-up countries grow faster in terms of GDP per capita.

The concept of “economic convergence” has different meanings. In the literature on economic growth, convergence refers to the expected trend of countries to grow faster the lower the GDP per capita of the population. The *real economic convergence* is considered as the decreasing differences in GDP per capita, which the neoclassical theory of growth predicts. The concept of real convergence includes the possibility of sustainable GDP growth over a relatively long period at a sufficiently high rate to bring the level of development of an economy closer to that of the developed world.

Since 1992, the EU’s economic policy has focused on achieving a higher degree of nominal and real convergence between its members. It could be said that nominal convergence has been achieved, but this is not happening with the real one.

To compensate for the underestimation of the problems of economic growth in the 1990s, the EU adopted the Lisbon Strategy (2000-2010) and its subsequent revisions, where one of the main objectives of economic and social development is to build a knowledge society. In the Europe 2020 economic strategy adopted on 13<sup>th</sup> July 2010, the European Commission (EC) outlines its vision for the development of the EU over the next 10 years. The immediate objectives of the new strategy are to identify the causes of the crisis in the EU and to find ways to prevent its recurrence. Part of the cause of the global crisis is believed to be the lack of a long-term vision and development agenda, including economic growth, which is why creating a new strategy is essential. It is recognised that no country can tackle global challenges on its own through isolated action.

Through the Europe 2020 economic strategy, the EU sets itself the task of preparing the conditions and achieving smart, sustainable and inclusive growth in a dynamically changing world. These three mutually reinforcing priorities had to help individual countries and the community as a whole to achieve a high level of employment, productivity and social cohesion (homogeneity).

The aim of the strategy Europe 2020 was to avoid the mistakes in the implementation of the Lisbon Strategy by making it more concrete, stricter and better integrated with other EU strategies – that of sustainable development, cohesion and social policy, policies in the field of energy and climate, etc. In both basic strategies, the main priority is to build a new economic model based on knowledge, a low-carbon (green) economy and high employment (Rangelova, 2011, pp. 3-29).

The concept of *convergence* between countries and/or regions is opposed in a dichotomy to the concept of *divergence*. The latter means an increase in the gap between economic developments in the countries concerned (Nell, Signorelli, 2015). One of the reasons for the discrepancy is the lack of infrastructure and the simultaneous effects of the network, which is why lagging countries cannot take advantage of new technologies. The divergence between countries could also be the result of badly functioned institutions (such as corrupt or dictatory); discrepancies in the demographic, social and economic processes between rich and poor nations, etc. Globally, social disparities can be caused by social barriers to knowledge sharing due to language and cultural constraints, as well as differences in income, ethnicity or other social dimensions.

Another used concept, related to the considered topic, are the *macroeconomic imbalances*, setting the differences in the growth rates, the dynamics of productivity and competitiveness, the current account positions, the public budgets, etc. They show constant asymmetries in the EU, especially in the euro area. However, there are no studies on whether and to what extent these differences mean an economic divergence, lack of convergence or simply weak convergence.

## 5. Approaches to Convergence Research

In recent decades, ideas have been developed and implemented about what additional conditions can lead to real convergence between the EU Member States. This section analyses different approaches to convergence research proposed and used in various scientific publications. Different authors call them kinds, types, etc., but we prefer the term approach, because in fact, the research approaches to the convergence, considering individual economic sector or economic parameters. Various indicators and methods are used in the studies to test or prove an accepted hypothesis. Along with the presentation of selected approaches by different authors, a critique of characteristic moments is made.<sup>21</sup>

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<sup>21</sup> On the topic of convergence between the EU member states, the serious work of a circle of experts from Italy is impressive. It is presented here as an illustration of the issues under consideration, as well as research by Bulgarian scientists is presented.

### *Structural convergence*

The concept of structural convergence was introduced by M. Buti and A. Torini.<sup>22</sup> They argue, “Real cohesion was implicitly intended to work towards greater similarity of the economies involved in a monetary union in terms of economic structures, thus approaching EMU with the requirements of the OCA and easing the Maastricht nominal criteria”. According to the two authors, what has already changed, is the type of convergence, as today’s convergence is neither nominal nor real, it is structural. They see structural convergence as a basis for renewing real convergence. For this to happen, however, the right institutions and policies need to be put in place at both the European and national level (Buti, Turrini, 2015). However, the concept of structural convergence or divergence is theoretically still unclear.

### *Convergence by major economic sectors*

The topic of structural convergence is first and foremost associated with the convergence of the productive structures of the countries’ economies, which in turn is often seen as an important contribution to the synchronisation of business cycles and the effectiveness of the ECB’s monetary policy. The global crisis of 2008 further raised the question of the similarity in the production structures of individual economies and their influence in the single monetary union. These considerations show the intertwined relationship between individual indicators and areas in the economy. For example, Bulgarian authors S. Raleva and D. Damyanov show the progress made by several of the new EU member states from CEE in terms of the convergence of the three main economic sectors – agriculture and forestry, industry and services – to the euro area level (Raleva, Damyanov, 2019, pp. 29-41).

In my view, the structural convergence based on economic sectors, industries and activities put logically the question to what extent of disaggregation it is assumed that there could be convergence, taking into account the comparative advantages and respectively the industry specialisation? The question of efficiency and competitiveness is an integral part of this. Does it mean that if the relative shares (structure) of the individual economic sectors and productions equalise, full convergence will be achieved? And if at the highest level of aggregation (by economic sectors) it may sound acceptable, then at a lower level, it is not logical. Research should be directed to these issues.

### *Monetary convergence*

Among the Maastricht criteria, the monetary sphere includes the following indicators: inflation, partly interest rates and exchange rates. They can be seen as part of monetary convergence. N. Nenovski (2007) suggests to expand the set of variables related to monetary

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<sup>22</sup> Marco Buti serves as Chief of Staff to EU Commissioner Paolo Gentiloni and Alessandro Turini as Head of Unit at the EC’s Directorate-General for Economy and Finance. Available at: <https://voxeu.org/article/types-ez-convergence-nominal-real-and-structural>. This explains the style of these authors – they offer expert and affirmative work, but are a little away from academic research and critical analysis.

convergence by including different types of monetary and credit aggregates, interest rates, price indices and others. Institutional and organisational requirements regarding the independence of central banks and their administrative capacity may also be considered necessary for monetary convergence. The author pays attention to the fact that convergence is analysed and measured primarily through quantitative and aggregated indicators. But this type of convergence disregards the institutional characteristics and differences of Eastern European countries, including Bulgaria. Under this condition, it is even possible to see an increase in divergence in an enlarged Europe.

#### *Institutional convergence*

In order to achieve structural convergence, Buti and Turrini suggest that the right institutions and policies need to be put in place at both the European and national level (Buti, Turrini, 2015). The topic of the role of institutional convergence (cohesion, integration) is especially popular (Marelli, Signorelli, 2005, pp. 140-155).

There is a growing idea that institutions are important factors that can determine the development of nations, economic growth or decline, as the institutional factor stimulates or blocks economic and social mechanisms. Therefore, institutional cohesion must become not only an object of in-depth study, but also a starting point and a basis for compliance with the structure and requirements of the EU institutions. The main reason for not solving the problems of institutional cohesion comes from the difficulty of measuring processes and quantifying them, and hence the reduced ability to summarise indicators as reliable, significant, rigorous and synthetic.

So far, some experience has been gained in collecting data on the quality of institutions, but these data and results should be treated with caution. It is well known, for example, that institutions are context-specific because they evolve into a longer-term historical and cultural context. It is also questionable whether the legal characteristics and systems are sufficient to describe the actual impact of institutions. Moreover, most of the empirical data on the quality of institutions and the measures taken from there are usually based on public opinion polls and expert data surveys, which introduces a great deal of subjectivity and conditionality (Voigt, 2013, pp. 1-26).

#### *Convergence of business cycles*

The classical theory of OCA assumes preliminary synchronisation of economic cycles and the main macroeconomic indicators. When the common monetary policy is considered as a basic precondition, the existence of a sufficiently strong convergence between the individual economic cycles and the existence of similarity in the transmission mechanisms is assumed. It is also assumed that this similarity allows the impulses of ECB policy to have a symmetrical effect on the euro area. Otherwise, when there are differences in cycles and transmission mechanisms, it is expected the probability of asymmetric shocks to increase, as well as their harmfulness. This is because a common monetary policy could not dampen the various individual shocks.

The EU countries participation in EMU means enhanced trade integration and a greater degree of joint movement of economic cycles. It is assumed that homogeneity in structures makes economic shocks more symmetrical, so that real indicators can respond more adequately. In addition, the post-shock adjustment would be easier to deal with, provided there is an adequate degree of flexibility in prices and wages, high labour mobility and a sufficiently centralised public budget.

The degree of symmetry of shocks is also assessed in terms of per capita income, labour productivity, labour market indicators, trade relations and others. The impact of the business cycle is also measured by the openness of the economy, the ratio between tradable and non-tradable industries, income elasticity and market-weighted differences in the production of the economies of the EU member states.

#### *Price convergence*

Accession to the EU and the subsequent free movement of goods and capital, together with the EU's common customs policy, lead to price convergence in the participating countries.

Price convergence in the EU and euro area countries is the subject of research in the works of many authors, who regard either a group of countries or a single country. It is understandable that the first type of research for a group of countries has a higher degree of aggregation and often, the analysis is limited to the general convergence and price dynamics, but is not considered product groups or individual products. Also, the former lack an in-depth analysis of the factors behind the observed price processes (Bilyanski, Bozev, 2021, pp. 75-95).<sup>23</sup>

Individual authors consider price convergence to be one of the EU's main objectives (Cavallo, Neiman, Rigobon, 2013). According to them, during the recent turmoil in the Eurozone around the 2008 global crisis, little attention was paid to this issue. But this is important because the price structure has implications for the theory of optimal currency areas (OCA) and for correction as a result of external factors. The results of such studies suggest a greater role for consumer psychology or corporate organisational structure in macro-models for pricing.

#### *Regional convergence*

It is rightly believed that the crisis in the euro area is at the root of the crisis of failed regional cohesion and a lack of structural reforms. These reforms can be essential to promote the

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<sup>23</sup> The theoretical basis of the study of the two cited authors is the Balasa-Samuelson model. The empirical study of the relationship between economic growth and price levels is carried out through regression analysis and panel regressions, the latter analyzing the change in the strength of the relationship over time and the peculiarities of its manifestation in EU member states. The results clearly show the significantly greater importance of economic growth rates for price levels of non-tradable products compared to tradable goods. The role of governments in the CEE countries and in particular in Bulgaria in keeping the prices of products, where these governments can directly set prices or influence indirectly, but to a large extent through indirect taxes, also stands out.

development of lagging regions in a country, and thus accelerate the degree of convergence between countries within the EU. Usually, poorer countries have higher regional disparities in per capita output. In addition, the going on technological change through a revolution in product and labour markets slows down the current model of convergence. Digital technologies, artificial intelligence and 3D printing, offer more and more opportunities for highly skilled workers, while low-skilled workers and less productive companies risk falling behind. Convergence can be observed both in countries that use different currencies and in countries and regions in a country where the use of the same currency is expected to speed up the process, as capital and technology can move more easily within the area. It seems, however, that the rate of convergence in Europe has not increased (does not correlate) with the introduction of a single currency. Two authors examine whether slow (or slower than expected) convergence is due to the lack of structural reforms that should accompany monetary union and which are the structural reforms that promote regional cohesion (Che, Spilimbergo, 2012). Using a large set of data, including regional panel data for 32 (advanced and emerging) countries over a period of 3-4 decades, they find out that structural reforms in terms of financial development, trade development, good institutional infrastructure (rule of law, bureaucracy, low corruption) contribute to the faster convergence of poorer areas and in particular border areas.

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What does show the diversity of researched topics on convergence among countries, called by us approaches? It is logical to assume the EU as a single economic system that includes a wide variety of elements, sectors and subsystems. Some of them were presented above, others – omitted due to the impossibility to cover all. Such approaches are directed to as follows: structure of GDP by elements of end-use, labour productivity, TFP, technological progress, foreign trade, labour market, including unemployment, demographic processes, including geographical mobility of the population, wages and incomes, poverty and inequality, fiscal policy, distribution and control of European funds, ecology, etc. However, the question is whether, in such cases, we can always talk about convergence, or is it a matter of tracking and analysing trends in individual economic areas, which still do not give a total picture of real macroeconomic convergence.

## **Conclusion**

The interest in the question of the convergence of economies stems from the neoclassical theory of economic growth. However, the observed economic growth could not be reconciled with the theory of the declining return on the factors of production. The basic shortcomings of Solow's neoclassical model are the consideration of the economy as a closed system in the conditions of perfect competition (markets) and the assumption that changes in the rate of growth do not come from exogenously set technological progress. The endogenous theory tries to overcome the lack of explanatory power of neoclassical theory by trying to explicitly decipher technological progress. The idea of the poorer countries catching up with the richer ones is to reduce the gap in technological development between them. In connection with this, a large number of publications and studies have emerged on the empirical link between

long-term growth and their role as determinants of growth includes various economic, social, political and institutional indicators that may influence it.

In a large number of studies on the processes of convergence and/or the other similar concepts defined above – cohesion and integration, are observed imprecision and even mixing of concepts, not taking into account the specifics of the concept of convergence. The three processes are generally one-way and research cannot be openly contradictory, but their differentiation would enrich the analysis. In addition to the mentioned, other concepts are similar in meaning, expressing the ongoing and desired processes in the EU – accession, stability, (im)balances, competitiveness, cohesion, nominal and real convergence and, more broadly, integration. The criteria for their implementation are intertwined and mutually conditioned.

The process of aligning growth rates with convergence and hence on living standards in the individual countries is complex and highly vulnerable. Perhaps nowadays, it is more useful and more important to consider the processes of divergence and how they could be overcome. And when it comes to converging institutions and policy responses to vulnerabilities, things get even more complicated. In addition, the emergence of major economic shocks – such as those caused by the economic crises and the lack of adequate adjustment mechanisms dramatically increase socio-economic disparities within EMU.

## References

- Andreff, W. (1998). Nominal and real convergence – at what speed?. – In: van Brabant, J. (ed.). *The European Union, the transition economies, and the re-making of Europe*. Boulder, CO: Rowen and Littlefield, pp. 111-138.
- Barro, R. J., Sala-i-Martin, X. (1992). Convergence. – *Journal of Political Economy*, Vol. 100, N 2, April.
- Baumol, W. J. (1986). Productivity Growth, Convergence and Welfare: What the Long-Run Data Show. – *The American Economic Review*, December, Vol. 76, N 5, pp. 1072-1085.
- Bilyanski, V., Bozev, V. (2021). Economic Growth as a Factor for Price Convergence in the EU Countries. – *Economic and Social Alternatives, UNWE*, Vol. 27, N 1, pp. 75-95. Available at: <https://www.unwe.bg/alternativi/bg/journalissues/article/19693>.
- Buti, M., Turrini, A. (2015). Three waves of convergence. Can Eurozone countries Start growing together? *Voxeu.org*. 17 April. Available at: <https://voxeu.org/article/types-cz-convergence-nominal-real-and-structural>.
- Cavallo, A., Neiman, B., Rigobon, R. (2013). The euro and price convergence: You wanted it... you got it! *VOX<sup>EU</sup> CEPR Policy Research*. Available at: <https://voxeu.org/article/euro-and-price-convergence>.
- Che, N., Spilimbergo, A. (2012). Structural reforms and regional convergence. *VOX<sup>EU</sup> CEPR Policy Research*, 11 July 2012. Available at: <https://voxeu.org/article/structural-reforms-and-regional-convergence-pointers-eurozone>.
- Fischer, S., Sahay, R., Vegh, C. A. (1998). How Far Is Eastern Europe from Brussels?. – Washington, D.C.: International Monetary Fund, IMF Working Paper, April, WP/98/53.
- Hadjinikolov, D. (2014). Cohesion and Convergence. 12. EU cohesion and cohesion policy. UNWE. Available at: <http://hadjinikolov.pro/wp-content/uploads/2010/02/%D0%95%D0%98%D0%9A-13-2018.pdf>.
- Hristova-Balkanska, I. (2017). Economic convergence in the EU and Bulgaria. – In: “The Consequences of the European Debt Crisis on the Processes of Economic Integration in the European Union”. Bulgarian Academy of Sciences and Macedonian Academy of Sciences and Arts, GorexPress, Sofia / Skopje, pp. 84-102.
- Institutional, nominal and real convergence in the EU. Available at: [https://ebrary.net/39903/political\\_science/institutional\\_nominal\\_real\\_convergence](https://ebrary.net/39903/political_science/institutional_nominal_real_convergence).
- James, J. (2003). Convergence and divergence in the global economy from a technological perspective. – *International Journal of Information Technology and Management*, Vol. 2, N 4, September, pp. 312-323.

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- Knack, S. (1996), Institutions and the Convergence Hypothesis: The Cross-national Evidence. – *Public Choice*, Vol. 87, N 3-4, pp. 207-228.
- Lucas, R. E. (1988). On the Mechanics of Economic Development. – *Journal of Monetary Economics*, Vol. 22, pp. 3-42.
- Lucas, R. E. (2000). Some Macroeconomics for the 21<sup>st</sup> century. – *Journal of Economic Perspectives*, Winter, Vol. 14, № 1, pp. 159-168.
- Mankiw, N. G., Romer, P. M., Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. – *Quarterly Journal of Economics*. Vol. 107, N(Month) 2(May), pp. 407-437.
- Marelli, E., Signorelli, M. (2005). Institutional, nominal, and real convergence in Europe. – *Banks and Bank Systems*, 5, pp. 140-155.
- Marelli, E., Parisi, M. L., Signorelli, M. (2017). Economic Convergence in the EU and in the Eurozone. Preliminary version, 15 May 2017. Available at: <https://www.siecon.org/sites/siecon.org/files/oldfiles/uploads/2017/04/Signorelli.pdf>.
- Marinov, E. (2017). *European economic integration*. Sofia: Published by EVM.
- Nell, G., Signorelli, M. (2015). Convergence and Divergence. – In: Hölscher, J. et al. (eds.). *Palgrave Dictionary of Emerging Markets and Transition Economics*.
- Nenovski, N. (2007). Monetary Convergence on the Road to the Eurozone: Theoretical Problems, UNWE Yearbook.
- Quah, D. T. (1996). Empirics for Economic Growth and Convergence. – *European Economic Review*, Vol. 40, N 6, June, pp. 1353-1375.
- Raleva, S., Damyanov, D. (2019). Sustainable Development Goals 2030: Challenges for South and Eastern European Countries and the Black Sea Region. Proceedings of the 15<sup>th</sup> International Conference of ASECU, organised on the occasion of 100<sup>th</sup> anniversary of the University of National and World Economy, 26-27 September 2019, Sofia, Bulgaria, pp. 29-41.
- Rangelova, R. (2008). Convergence in the neoclassical model of economic growth. – *Economic Thought*, N 6, pp. 48-66.
- Rangelova, R. (2011). Europe 2020 Strategy and Bulgaria's Economic Growth. – *Economic Thought*, N 3, pp. 3-29.
- Romer, P. M. (1986). Increasing Returns and Long-Run Growth. – *Journal of Political Economy*, Vol. 94, pp. 1002-1037.
- Sala-i-Martin, X. (1996), Regional Cohesion: Evidence and Theories of Regional Growth and Convergence. – *European Economic Review*, Vol. 40, N 6, June, pp. 1325-1352.
- Solow, R. M. (1956), A Contribution to the Theory of Economic Growth. – *Quarterly Journal of Economics*, February, Vol. 70, N 1, pp. 65-94.
- Solow, R. M. (2000). *Growth Theory. An Exposition*, Second edition. Oxford: Oxford University Press.
- Spasova, E. (2016). Analysis of the possibilities for real convergence through the prism of modern economic theories. Yearbook "Economics and Business". Department of Economics, NBU. Available at: [http://ebox.nbu.bg/ico16/view\\_lesson.php?id=2](http://ebox.nbu.bg/ico16/view_lesson.php?id=2).
- Temple, J. (1999). The New Growth Evidence. – *Journal of Economic Literature*, Vol. 37, March, pp. 112-156.
- Thirlwall, A. P. (2013), *Economic Growth in an Open Developing Economy. The Role of Structure and Demand*. Edward Elgar, Cheltenham, UK – Northampton
- Voigt, S. (2013). How (Not) to Measure Institutions. – *Journal of Institutional Economics*, Vol. 9, N 1, March 2013, pp. 1-26.