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**THE ROMANIAN ACADEMY  
THE “COSTIN C. KIRIȚESCU” NATIONAL  
INSTITUTE FOR ECONOMIC RESEARCH**

**WORKING PAPERS**

*Real Convergence and Integration*

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# REAL CONVERGENCE AND INTEGRATION\*

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*The study is based on the critical observations that competitive market forces alone are not able to assure convergence with the developed countries. These observations are grounded on the results of the computation of the marginal rate of return to capital (which contradict the neoclassical model hypotheses), as well as on the real process of polarisation of the economic activities, taking place worldwide and in accordance with the law of competition. Unlike those who trust the perfect competitive market virtues, the EU's economic policy is realistic as it is based on the harmonisation of the market forces with an economic policy based on the principle of cohesion, which supports, by means of economic levers, the less developed regions and member countries. Our paper deals with the evolution of the EU cohesion funds, as well as with the results of convergence.*

*Keywords: Neoclassical model, marginal rate of return to capital, polarisation, convergence, divergence, cohesion, cohesion among countries, cohesion funds, structural funds, variation coefficient.*

*JEL: C21; E22; O41; O47.*

The two domains – institutions and nominal sector – the convergence of which we analyse, represent the environment of the real economic processes. The environment may be favourable for or hostile to real economic development, and also it may be harmonized and compatible or differentiated and incompatible among countries, just as it may stimulate or hinder the real process. In other words, if the monetary system and the institutions of the member countries undergo the necessary changes so that they may work jointly on the European Single Market and in compliance with the need for narrowing the economic gap between the poor and the rich countries, it means that the environment acts to achieve real economic convergence.

It is worth mentioning that the institutional and nominal convergence is designed and managed so that a competitive market across the EU may be created

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to help economic agents to function under equal conditions and achieve real convergence by bridging the development gap among countries and regions. Economists wonder if real economy convergence can actually be achieved only in a competitive market. In this respect, extensive studies and models have been completed. Considering the way the determinants and trends of real convergence are approached, the studies and models may be divided into three categories:

- The first one views real convergence as a natural process, based exclusively on the market forces, in accordance with which the convergence process is surer and faster as the market is larger, more functional, less distorted.

- The second one denies that, in the present competitive market, there is an actual real convergence between the poor and the rich countries, but accepts the existence of the tendency of polarisation or deepening of the divergences and inequalities between the center and the periphery.

- The third one considers that real convergence is necessary and possible in a competitive market, provided that economic policies are implemented to compensate for the negative effects of the inequalities or divergences, until the economic systems reach maturity or the so-called critical mass to support the self-sufficiency of the real convergence process.

Further, we make some critical comments and present some arguments in support of one of the alternatives that are closer to the real needs and opportunities of the Romanian economy.

### **1. Convergence through the functional competitive market forces**

The first way to perceive real convergence exclusively by the market forces is the neoclassical growth theory. Assuming that the economic outcome (GDP per capita) is ensured by the contribution of several production factors (capital, labour, natural resources, technological progress), the neoclassical model advances the fundamental hypothesis that growth depends on the features of the rate of return to capital, which generally tends to decrease in relation to the economic growth. For a certain increase in capital, the outcome increase is less than proportional. More exactly, at the same saving (investment) rate, the marginal rate of return to capital decreases, so that poor countries, with a low amount of capital per capita, attain higher rates of return capital than those of rich countries, with a considerably higher amount of capital per capita.

According to the neoclassical model, the higher rate of return to capital achieved by the poor countries/regions as against the rich countries/regions (if the other conditions are comparable) ensure the long-term convergent economic growth. This postulate is explained by the author (Aurel Iancu) in *Oeconomica* No. 4/2006 (“The question of the economic convergence”), by the presentation of the fundamental relation of Solow’s model and the graphic representation of the model, taking into account the conditions *ceteris paribus* that might ensure the

general convergence of all categories of countries (poor, medium, rich). For example, these conditions refer to equal rates of saving (accumulation), population/employed population growth, capital depreciation, technological progress, etc. This is the only way that all countries, on different initial development levels, may reach the convergence or equilibrium state by economic growth rates higher in the poor countries than in the rich ones.

Several studies on the real convergence in the context of the European integration, as well as the theoretical and practical actions taken by the fathers of the European construction have taken into consideration the capability of other factors to achieve real convergence within the enlarged and competitive European Single Market. According to the neoclassical school, many economists consider that the competition intensification by the establishment and enlargement of the European internal market and integration would have a positive impact and offer opportunities to the countries and regions for diminishing the development and per capita income disparities in order to achieve real convergence. Only action on a larger scale of the competitive internal market forces in the EU, free of any interventionist (protectionist) policy, could guarantee the real convergence of the EU countries and regions.

The free movement of the production factors among the European countries and regions, especially through capital market integration and FDI, is an important way to achieve real convergence.

The less developed countries and regions are characterized by capital scarcity and low saving capability, due to the low income per capita. This means that those territorial entities offer opportunities for development and attract available capital from the countries rich in capital, whose companies are eager to penetrate a large safe and profitable market. After the accession, the capital inflows as investments increased. Among them, the foreign direct investments became the most important means of attracting various intangible resources, such as technology, know-how, expertise, managerial experience, etc. Foreign direct investments have clearer advantages, if compared with financial investments. But their presence in a country or region is dependent on the following requirements: a) sufficient infrastructure of high quality; b) low transaction costs (similar to those in agglomerated areas); c) abundant and cheap local resources (their low cost may compensate for the additional transaction cost, due to the scarce infrastructure); d) possibility to make horizontal investments based on scale economies, showing a significant dispersion of the production units among countries and regions, as close to the potential clients as possible.

To make the markets of the new EU countries perfectly compatible and competitive, the European Commission implements a systematic policy for the elimination of the non-competitive elements from the market by banning state aid, protectionist actions and other elements that may cause distortions of the single market and national markets.

Moreover, it is quite obvious that many economic reform measures taken by the CEE countries as well as the implementation of the Community acquis and the institutional improvement are aimed at creating a functional competitive market within every national economy and the Community market.

Some economists and international financial institutions still believe that an enlarged and functional market as well as the profound economic integration require the existence of strong mechanisms that automatically lead to real convergence, without any policy in support of such convergence. The implementation of such policies means, in their opinion, many other distortions of the market.

It is quite obvious that such opinions are expressed by the supporters of the neoclassical model, as they think that only the market forces free of any intervention may set in motion efficiently the mechanisms that enable the poor countries to recover the delays by higher growth rates than those of developed countries.

Although the reasoning based on the hypothesis of decreasing rate of return and the hypothesis of perfect competition is logically correct, facts contradict such opinions. On the one hand, poor countries lack the necessary economic, scientific, technological and financial power to cope with competition, which explains, to some extent, the reverse trend, that is widening the gap (divergence) between the poor and the rich countries, and not diminishing it. On the other hand, one should not ignore the overall natural trend of clustering or polarisation of the economic activities at different (national, regional or sub-regional) levels, which might become a major obstacle to convergence.

## **2. The neoclassical model shortcomings and new approaches**

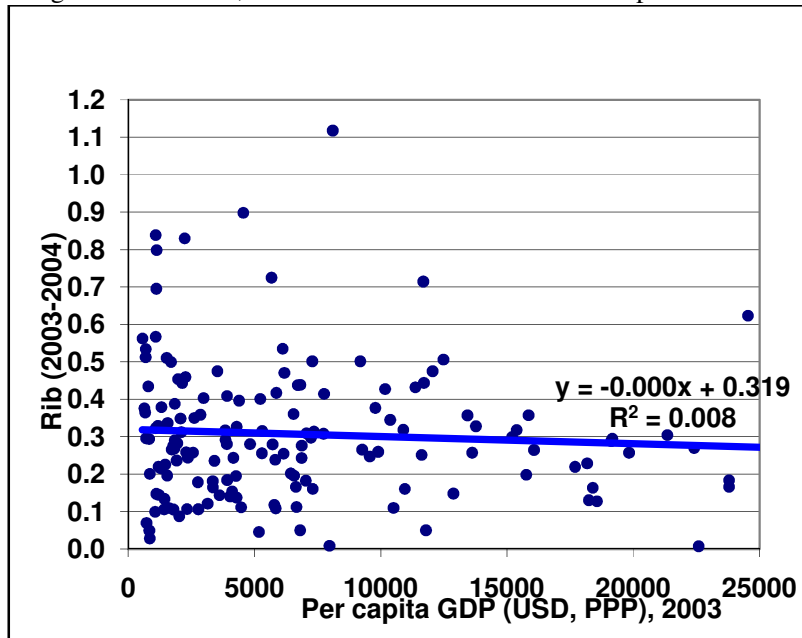
The empirical research done in the last two decades to check the validity of the neoclassical model of convergent growth has not been as relevant as expected. To clarify this crucial problem, we intend to check the veracity of the assumption concerning the existence of decreasing rate of return to capital, illustrated by the existence or non-existence of the correlation between the marginal rate of return of the physical capital (the rate of return of investment in physical capital) and the country's development level (GDP per capita). Consequently we consider the following two indicators:

(i) *Rate of return of gross investment in fixed capital (Rib)* based on the ratio:

$$Rib = \frac{\Delta \text{GDP per capita, representing the GDP per capita growth in 2004, as against the previous year (2003) expressed in PPP - USD}}{\text{The amount of gross investment in per capita physical capital in 2003}}$$

(ii) *Per capita Gross Domestic Product expressed in PPP-USD in 2003.*

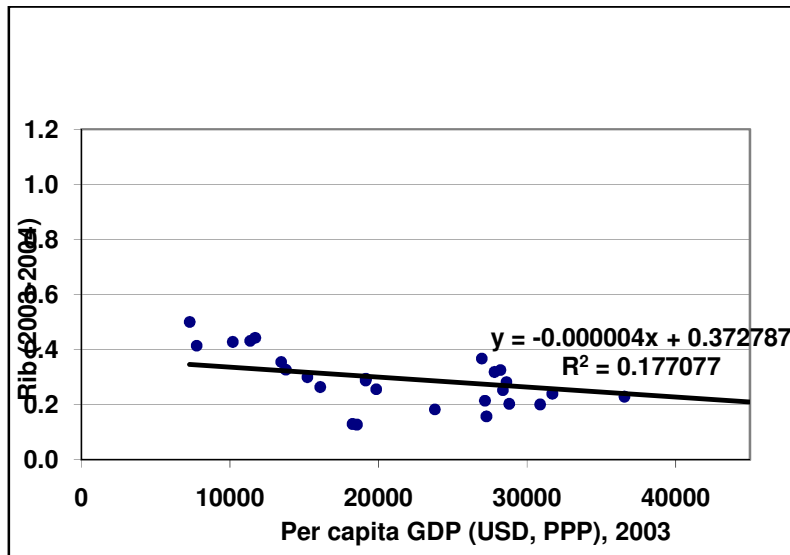
Computed in two ways, on a total number of 180 countries and a number of 24 EU member countries; either alternative of the rate of return is correlated with the GDP per capita. Results are presented in the graphs in Figures 1 and 2, in which we noted: on the horizontal, the GDP/capita in 2003 and on the vertical, the rate of return of gross investment, for each of the two alternative computations.



Source: Based on data from *UNCTAD Handbook of Statistics, 2005*; *2006 World Development Indicators*, The World Bank.

Figure 1. Rate of return of the gross capital investment (Rib), in relation to the development level of the economies





Source: Based on data from *UNCTAD Handbook of Statistics, 2005; 2006 World Development Indicators*, The World Bank.

Figure 2. Rate of return of the gross capital investment (Rib), EU member countries

The graphic presentation does not clearly show an upward trend of the marginal rate of return to capital in all 180 countries. On the contrary, the analysis of groups of countries at different development levels reveals that the groups of countries with the GDP per capita of 2501-7000 USD (PPP) and 15001-40000 USD (PPP) show some upward trend in the rate of return increase. The downward trend in the EU countries is too insignificant to draw a clear conclusion.

The existence of the increasing rate of return means, according to the neoclassical model, a tendency towards the divergence or the widening of the development gaps among countries. Some additional clarifications and analyses (beyond the restrictive postulates required by this type of too simplified a model) concerning the definition of the production factors and the interpretation manner lead to new interpretations closer to reality and to a clearer definition of the real convergence or divergence sources.

Dividing the capital factor into the three components – physical capital, human capital and stock of knowledge – and considering that these components do not come from outside, but represent accumulations after the input within the system, we may identify which factors have additional effects in relation to the input, in what proportion and, finally, which category of countries stimulate the factors through the allocated inputs and which factors produce the greatest results.

Rejecting the old hypothesis concerning the decreasing rate of return to capital and other unverifiable constraints, the new theory concentrates on types of models able to include the effects caused within the system by major production factors – human capital, productive knowledge stock, etc. – as well as types of

models able to determine the real causes and mechanisms of the long-term disparities (using the cross-section analysis or long time series), by correlating the growth rate of the production and the per capita income on the national or/and regional level with economic, social and political variables which become either the engine or the brake of growth.

The new theory of convergence is based on the operational character of the effects of the intangible factors (including the economic policy factors). These effects (called “spillovers”) spill over the economy in a special way, that is, over other entities, than their direct producers. The effects exceed the input necessary for their production or their remuneration amount.

Usually, the intangible factors (knowledge, professional abilities or skills, information, innovation, know-how, etc.) are included in tangible production factors, and their outputs are spilled over. Spillovers may occur during the investment in physical capital (Arrow, 1962), in human capital (Lucas, 1988) or in both types of investment (Romer, 1986). According to Romer, if the spillovers are strong, the private marginal product of the physical and human capital may stay permanently above the discount rate (Romer, 1986; Thirlwall, 2001). Growth may be supported by continuous accumulation (investment), which generates positive spillovers (Grossman and Helpman, 1994), associated with the formation of the human capital (education and training or qualification) and with the RDI, thus preventing the diminution of the rate of return to capital or the increase in the specific capital (capital-output ratio).

### **3. Divergence and polarisation – Lasting effects of the competitive market forces**

The empirical research for checking the validity of the neoclassical model has demonstrated that, in most cases, neither the hypothesis concerning the decreasing rate of return to capital, nor the real convergence between the poor and the rich countries (regions) is confirmed. It is impossible to explain the international discrepancy in the present development level only by making reference to the initial difference in factor endowment (Thirlwall, 2001). What actually counts is stimulating the development of the new factors (human capital and knowledge stock) and their increasing contribution to economic growth, detecting possible obstacles to growth in the poor countries and, finally, checking whether the mechanisms causing the inequality between the developed countries and the poor ones may last or not.

The theoretical contribution made by Perroux, Myrdal, Prebisch, etc. has changed the way of explaining real convergence and decisively influenced the direction of the economic policy for the European construction, beginning with the

drafting of the Rome Treaty<sup>1</sup>. Although not always analytically rigorous, the new economic notions included in the scientific circuit, such as attraction poles, clusters, centre-periphery, flows of complementary factors, positive spillovers, etc., have broadened the horizon of the debates and the understanding of the processes taking place in the real economy, and the research area concerning the economic policy.

The above notions and the concept of *circular cumulative cause* of the economic processes help us explain the increasing international difference in the development level as against the similar initial conditions<sup>2</sup>. The movement of capital, the human capital and labour migration, the goods and services exchange perpetuate and even worsen international and regional development inequalities. By means of the free trade mechanisms (*i.e.*, free of tariff and non-tariff barriers), the less developed countries, which lack the human capital and the scientific and technological capability, have to specialize in the production of mostly primary goods characterized by an inelastic or almost inelastic demand in relation to price and income.

What causes the increasing inequality between countries is the tendency of interregional and international polarisation (agglomeration), especially in the context of the economic and monetary integration. As there are no barriers to the movement of goods, services and production factors, some countries and regions form strong poles of attraction and cause imbalances between countries showing important differences in the income per capita. The developed countries and regions endowed with factors become poles of attraction that absorb increasing amounts of high quality labour and capital from the less developed countries.

Even if during the accession process the countries make major efforts to support the economic and institutional reforms and attempts to achieve a stable development equilibrium, in real life there is a natural trend with an universal character towards the polarisation of the processes, which in turn causes the broadening of the gap between the development levels of the countries and regions. Myrdal claims that the economic and social forces alike tend towards equilibrium and that the economic theory hypotheses according to which disequilibrium situations tend towards equilibrium are false (Myrdal, 1957; Thirlwall, 2001). If it were not true, then how could one explain the international differences in the standard of living? Unable to answer this question, Myrdal replaces the stable equilibrium hypothesis with what he calls the circular cumulative causation hypothesis or, briefly speaking, the cumulative causation hypothesis. This hypothesis helps us explain why the international and interregional differences in the development level may persist and increase in time.

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<sup>1</sup> Jacques Pelkmans, *Integrare europeană. Metode și analiză economică*, Institutul European din România, București, 2003 (translation).

<sup>2</sup> M.G. Myrdal, *Economic Theory and Underdeveloped Regions*, Duckworth, London, 1956.

Myrdal's hypothesis is based on a multiplier-accelerator mechanism, which causes the income to rise at higher rates in the so-called favoured - more developed - countries and regions, which are endowed with modern infrastructure, gain scientific and technological ascendancy and enjoy physical and human capital inflows, as well as scientific and technological inflows; consequently, they become more attractive for their capital and labour than the less developed areas. The free trade in goods and services and the full freedom of movement of the production factors among countries and regions showing great differences in the development level causes increasing polarisation: on the one hand, countries and regions that become richer, enjoy a significant economic growth and show attractiveness to the high-skilled production factors and, on the other hand, countries and regions characterized by stagnation and economic decline, obsolete and non-attractive infrastructure, decreasing income and taxation levels, that is, limited demand for goods and services.

Under these circumstances, there cannot be any economic convergence. The approaches and analyses initiated by Myrdal, Prebisch, Seers, etc. have led to an influent trend, based on the concept of divergence, which points out the process of polarisation and the divergence between the centre and the periphery.

This trend of thought brings influence to bear upon the following levels: 1) the practical one, reflected in the European construction projects by the adoption of some tools of the European economic policy; 2) the analytical one, strongly reflected in two directions: a) re-thinking the construction and interpretation of economic growth, by returning to the economic and social realities (it concerns the development of endogenous models and the econometric testing); b) new approaches to the geographic (regional) economy, taking into account real processes, such as: regional disparities, development agglomerations or poles, role of infrastructure, transaction costs.

#### **4. Cohesion – An important tool in support of the real convergence within the EU**

The chance that the poor national economies advance towards convergence within an enlarged and highly competitive single market is illusory. There are some mechanisms that rather stimulate divergence. But there are some other ones that may produce positive effects on the long-term convergence processes, although their success is rather uncertain in the absence of economic policies to support them and to prevent the negative effects. Among the most important mechanisms mentioned by Pelkmans and pointed out by us, one may find the following: 1) the intraindustrial specialisation of the less developed countries on parts of products and operations, in accordance with the comparative advantage principle, for the capitalisation of the available national (local) resources at small costs; 2) the integration of the less developed countries into the EU makes them more attractive to foreign capital, and, first, to foreign direct investments, initially within the

existing economic clusters and then extended gradually to the periphery territories, along with the infrastructure extension; 3) the strengthening of the competition to which the products, services, factors and companies from the less developed countries are exposed as the countries accede to the EU, which eliminates the non-competitive local activities and causes dramatic social problems, while such activities are taken over by viable competitive companies; 4) the integration into a large single market in accordance with the Community *acquis* eliminates the distortions and the obstacles to development, but does not always stimulate the development of the poor countries and regions.

The impact of the integration on economic growth, in the absence of cohesion policies, does not ensure that the poor countries will reach higher GDP per capita growth rates than the more developed countries, to enable convergence. Unlocking convergence mechanisms by cohesion policies has become one of the EU's major objectives.

When the Rome Treaty (the first constitution of the integration) stipulated that "the harmonious development of the economic activities" and "the continuous and balanced expansion" are the first two economic objectives, both the structural divergence and the difference in income per capita between the backward and the advanced members of the Common Market were taken into consideration. To achieve the real convergence in both cases, the Treaty was based implicitly and exclusively on the market mechanisms.

Considering the scarcity of market mechanisms for the recovery of the poor countries and regions, the EU has gradually gained tasks concerning cohesion and solidarity in order to facilitate real convergence by improving the economic performance. The adoption of the cohesion principle was mostly determined by the accession of the countries with a GDP per capita much below the EU average (Greece, Portugal and the CEE countries). The cohesion principle, applied by means of specific tools, is largely used to diminish the disparities in the GDP per capita between countries and regions by improving their performance.

The most important step taken to adopt the principles of cohesion and harmonious development was the explicit inclusion of three economic objectives concerning convergence in the Maastricht Treaty: (1) harmonious and sustainable development of the economic activities; (2) high level of convergence of the economic performance; (3) economic and social cohesion and solidarity of the member states. The objectives (concerning the real convergence of the economic performance through cohesion) were included in the Amsterdam Treaty, with some formal modifications. To apply the above-mentioned principle, two important categories of EU funds were created: structural funds and cohesion funds.

*The structural funds* are mostly directed to the EU regions with a GDP per capita below 75% of the EU average. The funds are provided: to support the development of the infrastructure in the backward regions; to develop human resources, mainly by training; to enable the private sector development.

*The cohesion fund* provides support for the EU member countries (with a GDP per capita under 90% of the EU-15 average) to meet the requirements for the European Single Market and the transition to the EMU. Until 2006, cohesion funds were granted to Greece, Ireland, Portugal and Spain. Afterwards, between 2004

and 2006 the countries which joined the EU in 2004 received the total amount of 8.495 billion euros, out of which Poland received almost half<sup>3</sup>. In 2007, Romania and Bulgaria will join the countries receiving the cohesion fund for the fiscal years 2007-2013. This fund is used to finance directly individual projects on transport infrastructure and environment, provided that they are clearly identified<sup>4</sup>.

The amount provided for the Cohesion Fund increased at a fast pace, as per Table 1.

Table 1

Evolution of the Cohesion Fund, 1975-2013

Year	Mil. ECU/euro	Share in EU budget, %
1975	257 (ECU)	4.8
1981	1 540 (ECU)	7.3
1987	3 311 (ECU)	9.1
1992	18 557 (ECU)	25.0
1998	33 461 (ECU)	37.0
2002 (incl. pre-accession assistance)	34 615 (euros)	35.0
2006 UE-25 <sup>*)</sup>	38 791 (euros)	32.0
2013 UE-27 <sup>*)</sup>	50 960 (euros)	32.0

\*) Excluding the European Agricultural Guidance and Guarantee Fund and Financial Instrument for Fisheries Guidance, but including the Solidarity Fund.

Source: Helen Wallace, William Wallace and Mark A. Pollack, *Elaborarea politicilor în Uniunea Europeană* (translation), Ediția a cincea, Institutul European din România, 2005, p. 205.

The most important transfers to the cohesion countries (in 1989-1999) were the following: Greece received an amount equivalent to 3.5% of the GDP, Portugal 3.3%, Ireland 2.4% and Spain 1.5%<sup>5</sup>.

In 2007-2013, the resources allocated to the cohesion policy (received by the countries with a GDP per capita below 90% of the EU-27 average) will amount to 336.1 billion euros, that is, one-third of the EU total budget and about 4% of the EU GDP. To these resources one should add the structural funds (competitiveness for growth and employment) of 132.77 billion euros, as well as the funds for the preservation and management of the natural resources of 404.77 billion euros, of which: 301.06 billion euros for agriculture (market expenditure and direct payment).

Since the main objective is the promotion of the development projects in the backward countries and regions, the structural and cohesion funds are essential operational tools that spread the new poles of attraction in order to extend viable businesses to new areas of the recipient cohesion countries by the development of both the physical (tangible) infrastructure and the intangible one, pertaining to the information, training (qualification), knowledge and innovation fields.

<sup>3</sup> In 2000-2006, until the accession to the EU, the applicant countries benefited by special lead-up programmes, such as: PHARE – assistance for the economic restructuring (lead-up to the participation in the Structural Funds); ISPA – a tool for the structural pre-accession policy (lead-up to the Cohesion Fund); SAPARD – the special pre-accession programme for agriculture and rural development (lead-up to the European Agricultural Orientation and Guarantee Fund. The ten countries which acceded to the EU in 2004 benefited by the Structural Fund and Cohesion Fund in 2004, and Romania and Bulgaria, which acceded to the EU in 2007, joined the assistance programmes in 2007.

<sup>4</sup> The decision on the financing of each project is taken by the European Commission in agreement with the beneficiary member state. The project management is ensured by the national authority, and the supervision by a monitoring committee.

<sup>5</sup> European Commission, *Second Report on Economic and Social Cohesion*, 2001.

### **5. Evidences concerning the need for cohesion policies and some assessments of the real convergence**

Although the development level of the country's real economy is not a condition for the accession to the EU or a negotiation issue for the accession, the question of recovering the delays or bridging the gaps between the EU member countries and regions is an important and urgent topic for the economic, scientific and technological strategy of the EU. The issue is important because there are major disparities in the economic development levels of the EU countries and regions. The disparities widened after the accession of the two waves of CEE countries. For example, while in 2000 the ratio of the lowest GDP per capita of a EU-15 member country to the average GDP per capita of the EU-15 was 66%, in 2005, after the accession of the ten countries, the ratio of the lowest GDP per capita to the average GDP per capita of the EU-25 reached 46.6%. After the accession of Romania and Bulgaria, the lowest GDP per capita as against the EU-25 average reached 32%.

The persistence of the disparities and underdevelopment of some EU countries and regions would mean the inconsistency with the very meaning of the European Communities and with the EU strategy, according to which the EU is supposed to become the most important economic and technological power in the world in a predictable period of time, to become the global leader in the economic, scientific, technological and living standard areas. Of course, such a strategy prevents the persistence of disparities and the existence of underdeveloped and poor regions and, also, requires the implementation of policies fully aimed at capitalising the resources of all component countries and regions to achieve their economic and social development. That is why, the EU adopted a firm policy on economic and social cohesion, in order to achieve the real economic convergence of all member countries and regions. From this perspective, it is worth mentioning that all twelve countries of the two accession waves have become cohesion countries, since their GDP per capita has been far below the threshold of 90% of the EU average. Therefore, all these countries satisfy the basic criterion for becoming beneficiaries of the Cohesion Fund for the infrastructure and environment projects. Also, most regions of these countries are eligible for financing from the Structural Funds, since their GDP per capita is below the threshold of 75% of the EU-25 average.

The new member countries have received economic support from the EU since the pre-accession period through special lead-up programmes (PHARE, ISPA, SAPARD, etc.). In the post-accession period, the financial support offered through the new programmes is more consistent as regards the objectives and implementation mechanisms, as well as the size of the funds allocated from the EU multiannual budget (2007-2013). The question "To what extent did these policies influence the real economy convergence?" is difficult to answer by analytical

impact assessments, since these policies have not yet produced effects, due to the relatively short time of application.

The clarifying elements in this matter are the overall results of the influence of all factors of convergent growth in each country, determined by means of different factors (usually, computed on long term), which show either the diminution in the inequalities between the set of analysed economies (the evolution of the index concerning the ratio between the level indicators of the economies, dispersion, Gini index, Theil index, etc.), or the cross-section convergence ( $\beta$ -convergence), or, finally, the convergence of the time series, dynamic distribution, etc.<sup>6</sup>. We confine ourselves in this study to the results of the computation of two of the above indicators, which are equally simple and suggestive

(i) *The index concerning the ratio between the level indicators (GDP per capita).* Relating the level of the GDP per capita of the countries to the average level of the EU for a certain period, one may find general trend of approximation of the development levels of these countries as against the EU average level in the analysed period. Table 2 contains data on the cohesion countries pertaining to the EU-15 Group (Greece, Spain, Portugal) and the countries that joined the EU in 2004 and 2007.

Table 2

The evolution of the index concerning the ratio of the GDP per capita of the cohesion countries and to the EU-25 average, based on PPP\* (1998-2005), percent

	1998	1999	2000	2001	2002	2003	2004	2005
Greece	70.4	70.7	72.6	73.5	77.2	81.1	81.9	83.0
Spain	88.8	92.5	92.5	93.2	95.3	97.7	97.3	98.3
Portugal	78.2	80.3	80.6	79.8	79.53	72.8	72.2	70.9
Czech R.	65.3	64.9	63.7	64.9	66.5	67.7	70.04	73.07
Estonia	39.1	38.8	40.7	42.3	45.1	48.4	51.1	55.5
Cyprus	79.3	80.3	81.1	83.1	82.3	80.2	82.3	82.5
Latvia	32.9	34.0	35.3	37.0	38.6	41.0	42.7	46.6
Lithuania	38.5	37.2	38.3	40.3	41.9	45.1	47.6	50.9
Hungary	50.8	51.6	52.7	55.7	58.1	59.4	59.9	61.2
Malta	76.5	77.1	77.6	74.0	74.4	72.8	69.1	69.2
Poland	44.7	45.7	46.7	46.2	46.5	47.0	48.9	49.5
Slovakia	46.9	46.8	47.2	48.6	51.1	52	52.9	55.1
Slovenia	71.5	73.9	72.6	74.0	74.4	76	78.9	80.7
Bulgaria	26.2	26.3	26.7	28.3	28.6	29.6	30.4	32.0
Romania	26.5	25.6	25.1	26.5	28.5	28.5	32.1	32.9

\* Purchasing Power Parity.

Source: Based on Eurostat data.

We have related the GDP per capita of each country to the average GDP per capita, computed for 25 countries, although the official computation for the previous financial years was based on the GDP per capita of the cohesion countries related to the average GDP per capita of the EU-15.

<sup>6</sup> Castro, José Villaverde, "Indicators of Real Economic Convergence. A Primer", United Nations University – Cris E-Working Papers, W-2004/2.



The evolution described by the data presented in Table 2 reveals a general trend of approximation to the average index (denoted by 100%) in all cohesion countries. Of course, the evolution of the indices computed for each country reveals the convergence of the real national economies during the pre-accession and post-accession to the EU.

(ii) *The variation coefficient of the GDP per capita or the  $\sigma$ -convergence.* Frequently used in the economic analysis, the indicator expresses the convergence level as a result of the measurement of the dispersion of the per capita GDP in a group of countries, according to the following formula:

$$\sigma_t = \sqrt{\frac{1}{n} \sum_{i=1}^n (X_{it} - \bar{X}_t)^2 / \bar{X}_t}$$

The indicator computation is based on cross-section statistical series (countries), when comparisons in a time sequence are made, and time series (discrete time interval,  $t$  and  $t + T$ ), in order to characterize the evolution (trend) of convergence. When the dispersion decreases in a certain period of time (when the value of the variation coefficient diminishes), convergence  $\sigma_{t+T} < \sigma_t$  takes place.

To characterize the level and evolution of the real convergence process of the EU national economies, we computed the variation coefficient separately, for two groups of countries, EU-25 and EU-10 (the countries which joined the EU in 2004) and for the two alternatives of the GDP per capita expressed in euros: the purchasing power parity (euros-PPP) and market exchange rate (euros). The series cover the period between 1995-2006.

The results of the computation concerning the evolution of the variation coefficient ( $\sigma$ -convergence) are presented in a numerical form in Table 3, in accordance with above alternatives.

Table 3

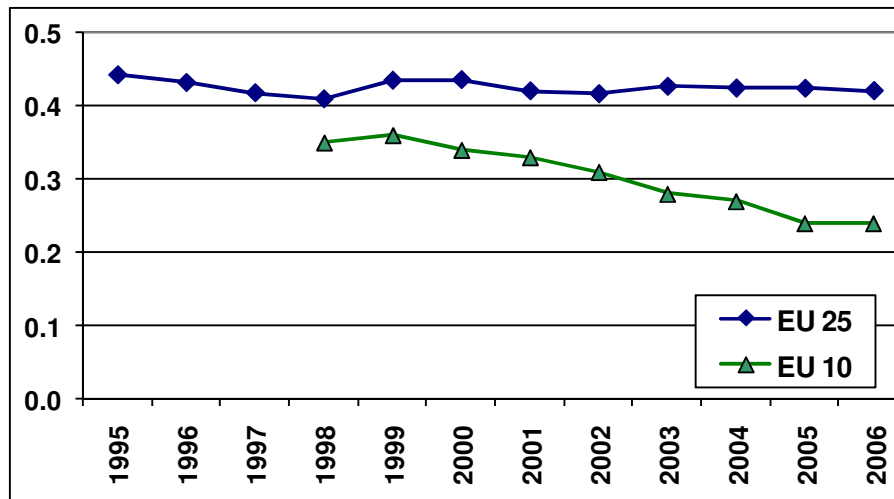
The numerical evolution of the  $\sigma$ -convergence (the per capita GDP variation coefficient), EU-25 and EU-10

Years	Calculation based on PPP		Calculation based on exchange rate	
	EU 25	EU 10	EU 25	EU 10
1995	0.44	....	0.71	....
1996	0.43	....	0.68	....
1997	0.42	....	0.65	....
1998	0.41	0.35	0.64	0.81
1999	0.44	0.36	0.66	0.86
2000	0.44	0.34	0.65	0.77
2001	0.42	0.33	0.63	0.67
2002	0.42	0.31	0.63	0.66
2003	0.43	0.28	0.63	0.69
2004	0.43	0.27	0.63	0.64
2005	0.42	0.24	0.62	0.55
2006*	0.42	0.24	0.62	0.51

\*Estimated data.

Source: Based on Eurostat data.

The evolution of the variation coefficients ( $\sigma$ -convergence) computed for the two groups of countries – EU-25 and EU-10 – and on the basis of the PPP is shown in Figure 3.



Source: Based on Eurostat data.

Figure 3.  $\sigma$ -convergence (variation coefficient) computed on the basis of the per capita GDP (PPP, euro)

From the analysis of the level and tendency of the variation coefficients computed for the above alternatives, we draw the following conclusions:

- a) In the case of the ten countries that joined the EU in 2004, the lower level of the variation coefficient means a higher convergence level in relation to the whole of the EU member countries.
- b) The downward trend of the variation coefficient for both alternatives (PPP and exchange rate), more discernible with the 10 countries as against all countries, shows a higher rate of real convergence in this group of countries.
- c) The variation coefficients based on the market exchange rate in the group of ten countries are higher – over two times – than those based on the PPP, which means that the difference among the countries of this group in the standard of living is relatively low and, consequently, the convergence level of these countries expressed in real terms is much higher than that expressed in nominal terms.

### Conclusions

Due to the wide gap between Romania and the developed countries and the complexity of the problem as such, the issue of real convergence should be paid special attention. Moreover, it is worth mentioning that, within the theoretical and empirical research in the field, real convergence is the crucial point of the economic growth and enables the researcher to set the objectives, resources and mechanisms; also, it signals the transition of the countries from the periphery (poor) group to the rich one.

To examine the question of the real convergence from different angles, two classes of models have been designed and used: neoclassical and endogenous. In our study we tried to show the limitations of the neoclassical model and, especially, the failure of the assumption concerning the decreasing rate of return to capital.

Finding ourselves in opposition to this kind of model, in this study we present the most important features of the endogenous growth model (and derived models) and its capability to include and/or consider the real convergence (divergence) factors.

The latest empirical research aimed at the validation of various convergence hypotheses proves that there is not neither can be an alignment of all countries with an absolute convergence. What the economic and social reality of the countries and regions confirms is rather the group convergence, viewed in its dynamics and in relation to the factors of influence acting within the system. Under the present circumstances, the factor that determines the dynamics of the developed countries is knowledge, in its multiple forms. The knowledge factor determines the higher growth rates of the developed countries, if compared to the poor ones.

As pointed out above, market mechanisms are not able to support the convergence process, especially when there is a wider gap in the development level of the countries and regions. On the contrary, the mechanism stimulates, first, the economic clustering, the formation of development poles, which rather cause wider gaps. Considering these natural processes, the European Union tries to correct the shortcomings of the free market laws by the cohesion policy, besides the sectoral policies.

In spite of the importance of the real convergence and its special role in the economic research, the definition, analysis and understanding of the other types - namely, institutional and nominal, closely linked with the real convergence - enable new theoretical approaches and practical action for economic reform, for transposing and implementing the Community acquis, and for integration. Also, they help formulate clearly the strategic objectives of economic growth and, equally, reveal and assess the contribution of the driving factors to the acceleration of the real convergence in a balanced and effective way.

All three types of convergence are important to Romania. That is why they should be carefully studied in close interdependence.

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