1 THE QUESTION OF ECONOMIC CONVERGENCE* - FIRST PART -

Aurel IANCU**

Abstract

Real convergence is an essential objective of Romania's integration into the EU. Bridging the development gaps between Romania and the EU as soon as possible cannot be achieved exclusively through market forces, since they rather tend to cause divergence and polarization. For this purpose, special tools and mechanisms are required; e.g., cohesion. The study deals with the economic convergence of the European countries, and especially the convergence of the CEE countries, including Romania. Models are used to assess the economic growth, approximate the period of real convergence of Romania to the EU, as well as to estimate the σ- and β-convergence, and the main shortcomings of the last indicator.

The first part comprises a survey on the subject and some theoretical aspects.

Keywords: Real convergence, divergence, cohesion, club convergence, polarization, regression method, return to capital, σ-convergence, β-convergence.

Jel Classification: C42, C52, F15, F43, O19, O41, O57.

1. Introduction

The question of real economic convergence is not a recent issue. Almost all great economists dealing with long-run economic development have taken into consideration the problem of real convergence in their studies. But many of them have only approached this issue implicitly, when analysing the role of the production factors – capital, labour, natural resources, technological progress, human capital – in the long-run economic development. Also implicitly, they have dealt with the real convergence when referring, on one hand, to economic development and, on the

* *Study carried out within the project "Economic Growth, Employment and Competitiveness in the Knowledge-based Economy", CEEX 05-08 Programme No. 24/05.10.2005.*

** *Member of the Romanian Academy, and senior researcher at the National Institute of Economies - Romanian Academy - Bucharest e-mail: iancua1@yahoo.com*

other hand, to the evolution of some categories of complex economic activities or/and branches with major economic and social impact (industries based on medium and high technologies, services, IT&C), as well as to the economic institutions and mechanisms (market structure, economic outcome distribution – rent, profit, wages, etc. – considered a form of economic stimulation).

The explicit and systematic study of real convergence began with the development of the neoclassical models of economic growth and, especially, with the econometric application of such models, as well as of other improved growth models, such as the endogenous growth ones. Furthermore, the issue of the real convergence has been taken into consideration by the applied research in the European integration field, as well as by the EU decision-makers involved in the management and monitoring of the integration process. At the same time, positive results were obtained in the field of statistics. Thus, cross-country comparable data of some indicators used for the analysis of real convergence have been calculated and published. Also, various indicators used for the measurement of convergence or of some of its fields and factors have been created and/or used.

Since, at present, there is a significant diversity of approaches and studies on real convergence and a whole array of calculation methodologies, we dedicate Section 2 to some general comments on a number of approaches and categories of models concerning the issue of catching up with the developed countries. In Section 3, we present applications of some indicators and convergence models based on Romania's economy and on other less developed economies and evaluate the prospects of reducing the development gap between Romania and the EU15 average. Here, intention is to draw round: a) the calculation of the required time to fill the gap in the economic development; b) the evaluation of the general trend of convergence. Section 4 is dedicated to evidence some trends of the rate of return to capital and in section 5 we draw some short conclusions.

2. Approaches to real convergence and their shortcomings

Solow's scientific contributions (1956) were used intensively in discussing the principles and methodological issues concerning convergence. As part of the neoclassical model group, Solow's model was widely discussed, developed and criticized for half century. In spite of the relaxation of the assumptions and hypotheses on which the initial model was based and the development of new model alternatives (Lucas, Barro, Sala-i-Martin, Quah, etc.) in order to bring the new alternatives closer to the real conditions of the economy and in spite of all innovations brought about by the new scientific contributions, many of the new models could not become fully independent of the neoclassical model.

2.1. Real convergence reflected in Solow's neoclassical model

In the economic literature, especially in that dealing with globalisation and European integration, there are three ways to understand real convergence and reveal the causes and the trend of the process:

- The first way considers real convergence a natural process, based exclusively on the market forces: the larger, more functional and less distorted the market is, the safer and faster the convergence is for all categories of countries.
- The second way denies real convergence between the poor countries and the rich ones and supports increasing polarisation and deeper divergences and inequalities between centre and periphery.
- The third way considers convergence necessary and possible in a competitive market by implementing economic policies able to compensate for the negative effects of the inequalities or divergences, at least until the maturity of the economic systems, that is until reaching the so-called critical mass for a self-supporting real convergence.

The first way of understanding real convergence exclusively by the market forces pertains to the neoclassical theory of economic growth. The characteristic feature of the neoclassical model is the exclusive investment in physical capital for achieving convergent economic growth. Assuming that the economic outcome (GDP per capita) is due to the contribution of several factors of production (capital, labour, natural resources, technological progress), the neoclassical model assumes the dependence of convergence (filling the gaps) on the specific features of the rate of return to capital, on its general decreasing trend. Increases in capital will bring about smaller than proportional returns. More precisely, at the same rate of saving (investment), the marginal rate of return diminishes, so the poor countries with a low amount of capital per capita reach a rate of return to capital higher than that of the rich countries with a higher physical capital per capita. The conclusion was that poor countries could catch up with the rich ones as regards the income per capita. Solow's neoclassical model of economic growth proves this possibility.

The fundamental non-linear equation that describes the economy path to the equilibrium state in Solow's model is the following:

$$\dot{k} = sAf(k) - (\delta + n)k \qquad (1)$$

where: $\dot{k}$ - increase in the stock of capital per labour unit;

f(k) – production function[1];

s – rate of saving;

n – growth rate of the population and, implicitly, of the labour force;

δ - capital rate of depreciation;

A – effects of the technological progress, endowment with natural factors, economic policies, etc.

[1] *Denoting by:* Y – *output (e.g., GDP),* K – *capital,* L – *labour,* A – *effects of the technological progress, endowment with natural factors, etc., the production function may be expressed as follows:* Y = AF(K,L). *Dividing it by* L, *we get:* y = Af(k). *The Cobb-Douglas production function becomes* $Y=AK^{\alpha}L^{1-\alpha}$, *where* α *is the share of the effects of the physical capital in total output, and 1-*α, *the share of the effects of the labour in total output. Dividing this function by L we get:* $y = Ak^{\alpha}$.

This differential equation, that depends only on *k* and describes the dynamic behaviour of capital, shows that economies start from a k_0 capital level per capita and reach the steady state k^*_t.

To make poor and rich economies converge (towards a single steady state), it is necessary to meet the requirements concerning the following:

- diminishing returns to the physical capital;
- constant and equal rates of saving of the countries and constant and equal rates of capital depreciation and population growth.

Dividing both sides of equation (1) by *k*, we get the growth rate of the capital stock:

$$\dot{k}/k = sAf(k)/k - (\delta + n) \qquad (2\ a)$$

or

$$g_k = sAf(k)/k - (\delta + n) \qquad (2\ b)$$

Equation (2b) has three components:

- g_k – growth rate of the capital stock per effective labour unit;
- *sAf(k)/k* – saving curve;
- *(δ+n)* – depreciation curve.

The steady state k^* is reached when the growth rate of the capital per labour unit is equal to zero. In this case, the relation (2b) becomes:

$$sAf(k)/k=\delta+n. \qquad (3)$$

To achieve the convergence of all (poor and rich) countries, it is necessary that the poor economies with low levels of GDP and physical capital per capita attain a growth rate higher than that of the rich economies with higher levels of the GDP and capital per capita.

The above relations and reasoning are graphically presented in Figure 1.

The graph shows the trajectories (curves) of the two functions:

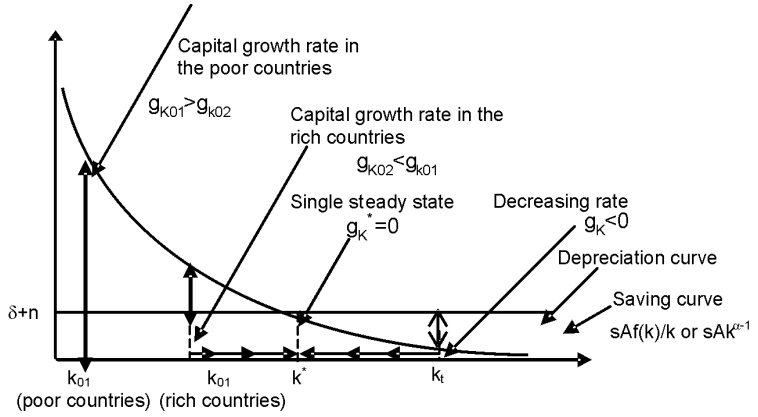
- The depreciation *(δ+n)* by the horizontal line, also called the depreciation curve;
- The saving *(sAf(k)/k* or $sAk^{\alpha-1}$) by the descending curve also called the saving curve[1].

The differences between the two curves in different points of their evolution express the growth rates, that are in a reverse ratio in relation to the level of physical capital endowment and, therefore, to the development level. Due to the higher growth rates in the poor countries against the rich ones, there is a gradual approach of the saving curve to the depreciation one until their intersection. At the point of intersection of the two curves, where the growth rate becomes zero (g_k=0), the steady state k^* is attained.

[1] *Due to the diminishing returns to capital, each additional unit of the capital stock of the less developed countries (with a lower capital stock) generates a production surplus higher than an additional unit of capital of the developed countries. As against the depreciation curve, which has constant values (horizontal line), the savings curve may take all positive values from zero to infinite, with distance variations between the two curves, including their intersecting.*

Figure 1

The neoclassical model of convergent growth

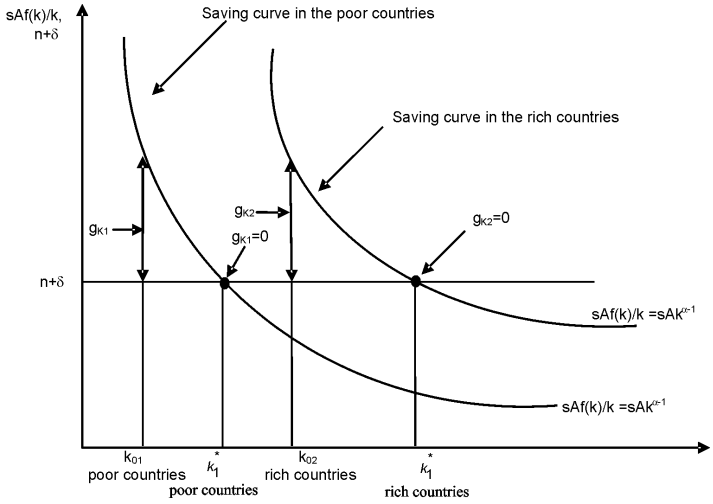


The above case covers the so-called conditional convergence, that is the alternative implying that all economies with differences in the initial stock of capital per capita have the same saving rates *(s)*, similar technologies (the same parameters *A* and δ), as well as the same population (labour) growth rates (*n*). Unless such requirements are met, the equilibrium points of the rich countries differ from those of the poor countries, and the convergence cannot take place.

Since rich countries have an investment capacity higher than that of poor countries, the saving curves of the rich countries are usually different from those of the poor countries (Figure 2).

Figure 2

The neoclassical model of divergent growth



Therefore, also the equilibrium points of the capital stocks per capita are different, and the growth rates of these stocks must not necessarily be lower in the rich countries.

Due to the significant differences between the two categories of countries in relation to the saving curves (expressing, in fact, different investment power), the real opportunity for all categories of countries to achieve economic convergence is doubtful.

2.2. Divergence and polarisation - Perenial effects of the competitive market forces

The numerous empiric research studies carried on in the last two decades to test the validity of the neoclassical growth model and of other more elaborate models have shown that in most cases the hypothesis of diminishing returns to capital and the hypothesis of equal and constant saving rates in all countries, and consequently, the real convergence of the poor and rich countries (regions) are not valid. It is impossible to explain the international gap in the present development level by the initial difference in the endowment with factors (Thirlwall, 2001). What really counts today is to reveal the possible obstacles against the poor countries' development and to see whether the mechanisms of the unequal advantages between the rich and the poor countries are perpetuated or not.

As pointed out above, what we intend by the reforms implemented during the lead-up to the accession and integration into the EU is to develop a functional market economy and improve **the capacity to cope with the competition pressure and market forces in the EU.**

By means of the concept of circular and cumulative causation of the economic processes, first used by Myrdal, one may explain the increasing international differences in the development level as compared to similar initial conditions. The movement of capital, the migration of human capital and labourforce, the exchanges of goods and services perpetuate and even increase the international and regional inequalities in the development level. By the free trade mechanisms, without tariff or non-tariff barriers, the less developed countries lacking human capital and scientific and technological capability are forced to specialize in the production of goods, especially primary ones, characterized by non-elastic demand (low elasticity) in relation to price and income.

What makes the inequalities between countries increase is the tendency of polarisation (clustering) – not only interregionally, but also internationally – especially in the context of the economic and monetary integration. Since there are no obstacles to the movement of goods, services and production factors, some countries and regions become strong attraction poles that cause disequilibria in the countries with major differences in the income per capita. The developed countries and regions, endowed properly with factors, become attraction poles that absorb increasing amounts of capital and high quality labourforce from the less developed countries and regions.

Even if during the accession process major efforts are made for the implementation of economic and institutional reforms and for the achievement of a stable economic development, in the real life there is a natural tendency with universal validity, that is the polarisation of the processes causing the deepening of the divergences in

development between countries and regions. Myrdal states that, in the context of development, the economic and the social forces alike generate tendencies towards disequilibria and the economic theory hypotheses that disequilibrium tends towards equilibrium are false (Myrdal, 1957; Thirlwall, 2001; Kornai, 1974). If it were not real, then how could explained the international differences in the standard of living? Since this question cannot be answered, Myrdal replaces the stable state (convergence) assumption with what he calls the circular and cumulative cause assumption or, briefly, the cumulative cause assumption which causes divergences. By this hypothesis one may explain why the international and interregional differences in the development level may persist and even deepen over time.

Myrdal's hypothesis is based on a multiplicator-accelerator-type mechanism, that causes the income increase at higher rates in the so-called favoured countries and regions, namely more developed, endowed with more modern infrastructure, with scientific and technological ascendancy, with inflows of physical and human capital and scientific and technological inflows, which are more and more attractive for the physical and human capital, and for the workforce from the less developed areas. Free trade in goods and services and the full freedom of movement of the production factors among countries and regions showing significant differences in the development level mean increasing polarisation: on the one hand, the countries and regions becoming richer enjoy major economic growth and significant attractiveness for the high quality production factors, on the other hand, the declining or stagnant countries and regions with a backward and unattractive basic infrastructure, with decreasing income and tax base, which cause the decrease in the demand for goods and services.

Under these circumstances, one cannot even consider economic convergence. Such approaches and analyses initiated by Myrdal, Prebisch, Seers and others created a way of thinking focused on the concept of *divergence,* which is concentrated on polarisation and the divergent relations between centre and periphery.

The influence of this approach was felt on two large levels: 1) the practical one, strongly reflected in the projects for the European construction by adopting mechanisms and tools of economic policy for supporting convergence; 2) the analytical one, strongly reflected in two directions: a) the reconsideration of the construction and interpretation of the economic growth models by returning to the economic and social relations (it refers to the development and modification of the construction of the neoclassical models and, especially, the development of endogenous models and their econometric testing); b) new approaches to the geographic economy (regional economy) by taking into account real processes, such as: regional gaps, agglomerations or development poles, role of infrastructure, transaction costs.

2.3. Cohesion – An important device to support the real convergence in the EU

When the Treaty of Rome – as the first constitution of the integration – stipulated the first two economic objectives, "the harmonious development of economic activities" and "a continuous and balanced expansion", it took into account both the structural

divergence and the widening gap between the increase in the income per capita between the backward and the advanced regions of the Common Market.

In order to achieve real convergence, initially, the Treaty was based implicitly and exclusively on the market mechanisms. Noticing some failures in the market mechanisms concerning the cathing up process, the EU gradually adopted tasks and measures for *cohesion and solidarity* in order to facilitate the real convergence of the backward countries and regions with developed by granting to the formes significant financial aids, to improve their economic performance.

The adoption of the principle of cohesion was mainly caused by the accession to the EU of the countries with major gaps in the income per capita as compared to the EU average (Greece, Portugal and the CEE countries). The principle of cohesion, applied by means of specific tools (the Cohesion Fund and the Structural Funds), is widely used inside the EU to fill the income and productivity gaps among countries and regions by increasing the investment power of the less developed countries and regions[1].

The most important step taken for adopting the principle of cohesion consisted in explicitly introducing three economic objectives focused on convergence in the Maastricht Treaty, namely: (1) harmonious and sustainable development of the economic activity; (2) high level of convergence of the economic performance; (3) economic and social cohesion and solidarity between the member countries. These objectives, focused on real convergence (by means of cohesion) of the economic performance, were included in the Amsterdam Treaty, with some rather formal amendments. To implement the above principle, the Cohesion Fond was set up only for the countries (not for the regions) with a GDP per capita below 90% of the EU average. Structural Funds were set up and used for diminishing the disparities among regions and countries. As for regions, the maximum threshold for granting the Structural Funds is 75% of the EU average and their utilisation is meant to improve the performance of the backward regions.

The Cohesion Fund and the Structural Funds (which support directly real convergence) account for 35.2%, and funds for agriculture and rural development totals 44.5% of the overall EU Budget (which represents 4% of all national budgets).

The first eligible countries that benefited from the Cohesion Fund for project financing were Greece, Spain, Portugal and Ireland. Later, the countries that joined the EU in 2004 and 2007 were added. The countries receive money from the Cohesion Fund as long as they do not exceed 90% of the European average GDP per capita.

According to some evaluations of the period between 1986-1996, the Cohesion Fund and the Structural Funds ensured real convergence (by reducing disparities) in a proportion of about 1/3.

---

[1] *The following measures were taken to achieve cohesion: in 1968 the Agricultural Structural Fund was created to promote agriculture modernisation. Later, the Fund was explicitly assigned the role to promote the economic capability of the rural areas. In 1975, the Regional Development Fund was set up for financing the infrastructure of the underdeveloped regions. The Social Fund was directed towards training in the regions undergoing restructuring, with high unemployment rates (Jacques Pelkmans, 2003, p. 299).*

2.4. New methodological approaches to convergence and its determinants

We have underlined above the limits and shortcomings of discussing convergence on the basis of the neoclassical theory as well as the need for a new approach based on indicators and models able to express the real processes, like the fact that economic growth should be the result of the economic system itself, not just the mechanical result of some independent and natural forces that act from outside the system.

Moderating the old hypothesis of the diminishing return to capital and other assumptions or constraints that cannot be proved, the new theory is focused on the types of models able to consider the effects as spillovers caused to the system by some major production factors – physical capital, human capital, RD&I, etc., as well as models for finding out the real causes and mechanisms of the long-term disparities (through cross-section analysis or long time series), by correlating the growth rate of production and income per capita at national or/and regional level with several economic, social and political variables that could be either the engine or the brake of economic growth.

The new approaches to real convergence are based on analyzing the effects caused by the intangible factors (including those concerning economic policies). The new variants or generations of convergence models take into account as distinct factors the human capital, the technological programme and the institutional state and their effects on the economic system. These effects spill over the economy in a special way, that is over other than the direct producers. The effects are greater than the inputs necessary to produce them or than the amount of their compensation.

Usually, the intangible, non-quantifiable factors (knowledge, professional abilities or skills, technological and managerial competence, information, innovation, know-how, etc.) are spread as spillovers and embodied in quantifiable tangible production factors. Such spillovers seem to be generated by investments in physical capital (Arrow, 1962) or by investments in human capital (Lucas, 1988) or by both types of investment (Romer, 1986). According to Romer, if the spillovers are strong, the marginal product of the physical and human capital could stay permanently above the discount rate (Romer, 1986; Thirwall, 2001). Economic growth could be supported by the continuous accumulation (investment) that generates positive spillovers (Grossman and Helpman, 1994), associated with the formation and development of the human capital (education and training or qualification) or of the RD&I, which prevent the decrease in the rate of return to capital or the increase in the specific capital (capital-output ratio – COR).

The new approaches to convergence have enlarged the area of research and the methods and tools of scientific investigation. First, the contribution of the human capital and technological progress, besides the physical capital, to convergence was emphasized. Second, the application of various methods for econometric testing of the hypotheses of various models (including the modified or improved neoclassical ones) was extended.

The realistic interpretation of the trends in the evolution of the economies towards the state of convergence and the rate at which the economies achieve convergence demanded the proposal and econometric testing of the new calculation tools and models, such as the β and σ indicators (Sala-i-Martin, 1996), the augmentent

dynamic neoclassical model (Mankiw, Romer, Weil, 1992; Islam, 1995; Bassanini, Scarpetta, 2001), the stochastic convergence model (Lee *et al.*; 1997), etc. The economic parameter β shows the speed of the convergence when the parameter is negative and σ shows the convergence or divergence trend, as this factor shows respectively the narrowing or the expansion of the dispersion of the sample of analysed data.

There are authors who conducted empiric research on convergence using the modified and augmented dynamic neoclassical model that involved the human capital and technological progress besides the physical capital. For example, Mankiw, Romer and Weil (1992), and Islam (1995) revealed, by the new variants of models, that the economies with an initially low level of the income tended to increase faster than those with initially high level of the income after they had introduced in the model the saving rate and the population growth rate, as control variables. Additionally, Barro, Sala-i-Martin, Blanchard and Hall (1991) considered the capital mobility, labour migration, etc.[1]

The counter-reaction to such empiric studies was an opposition literature that, on the basis of alternative econometric methods, stated that the cross-section growth model is inconsistent with convergence and consistent with the variety of endogenous growth mechanisms (Durlauf, 1996; Quah, 1996). Among the most important ideas concerning this area we find those referring to the formation, behaviour and evolution of the so-called convergence clubs. The first to mention such a process was Baunmol (1986). Later, the idea was taken on and developed theoretically and researched empirically by Quah, Bernard and Durlauf, Galor (1996), Mihăescu (2003), etc. For example, Quah states that the conventional (neoclassical) theory of convergence and the results of the empiric research based on this theory conceal the presence of the convergence clubs and the polarisation of the countries in rich and poor ones.

A spreading opinion is that convergence is not and cannot be a unitary process in all countries and regions, but a multipolar one. Placing the real convergence assumptions in a very controversial area, Galor (1996) shows that the empiric research focused on testing the validity of new competitive hypotheses, especially on that concerning the convergence clubs (polarisation, clusters, etc.). This hypothesis states that the incomes per capita of the countries which have similar structural features (preference, technology, population growth rate, government policies, etc.) converge in the long-run only if their initial conditions are similar as well.

This hypothesis can be associated with that concerning the conditional convergence, since – as Galor points out – both originate in the neoclassical model (modified and developed, I would add, A.I.) by including some significant variables in the structure and adding other elements such as spillovers, market distortions, etc.. All of them strengthen the validity of the convergence clubs hypothesis, as opposed to the conditional convergence hypothesis.

[1] *Generally speaking – as Villaverde Castro (2004) points out – the presence of convergence is considered a valid test in favour of the neoclassical growth model as opposed to the endogenous models that imply divergence in most cases. (José Villaverde Castro,* Indicators of Real Economic Convergence. A Primer*, W-2004/2, United Nations University).*

What distinguishes between the two competing hypotheses is that in one (the conditional convergence hypothesis) convergence takes place independently of the initial conditions and in the other (the convergent club hypothesis) convergence occurs if the initial conditions are similar or close from the technological, cultural and preference point of view.

The analysis of the main aspects of the real convergence reveals not only the high complexity of the topic, but also the major steps made by the economic research for the clarification of many problems in this field. It also points out the scientific and practical opportuness for Romania to achieve convergence with the EU countries.

The latest empiric research for the validation of several convergence assumptions proves that there is not and cannot be a compliance of all countries with a real convergence. What is verified and confirmed by the economic and social reality of the countries and regions, is the club convergence viewed in its dynamics, in relation to the factors of influence acting within the economic system. Under the present circumstances, the factors that decide the dynamics of the rich economies are the development of the human capital and the intensification of knowledge and its application to various fields. The two factors cause still high growth rates in these countries. Thus, the chance of some countries, like Romania, to achieve a real convergence with the EU is closely linked not only with the increase in the stock of physical capital, but also with the stimulation of the development of the two factors – knowledge and human capital -, with their increasing contribution to the achievement of higher growth rates.

Would Romania and other countries of the same group and other less developed groups succeed in eliminating the barriers from convergent growth? In the second part we will try to give partial answers that are rather conditioned than firm.

Bibliography

ABRAMOVITZ M., *Catching Up, Forging Ahead, and Falling Behind,* "The Journal of Economic History", vol. 46, No. 2, "The Tasks of Economic History" (June 1986), 385-406.

AGHION PILIPPE, EVE CAROLI, CECILIA GARCIA-PENALOSA, *Inequality and Economic Growth: The Perspective of the New Growth Theories,* "Journal of Economic Literature", vol. 37, No. 4 (Dec. 1999), 1615-1660.

ARROW, K., *The Economic Implications of Learning by Doing*, Review of Economic Studies, June, 1962.

BARRO ROBERT J., XAVIER SALA-I-MARTIN, *Convergence,* Topic 2 "Dynamics and Convergence", JPE, April 1992.

BARRO ROBERT J., *Economic Growth in a Cross-Section of Countries,* "The Quarterly Journal of Economics" vol. 106, No. 2, May 1991, 407-443.

BARRO ROBERT J., XAVIER SALA-I-MARTIN, BLANCHARD OLIVER JEAN, HALL ROBERT E., *Convergence across States and Regions*, "Brooking Papers on Economic Activity", vol. 1991, No. 1 (1991), 107-182.

BARRO ROBERT J., XAVIER SALA-I-MARTIN, *Convergence, "*The Journal of Political Economy", vol. 100, No. 2 (April 1992), 223-251.

BARRO ROBERT J., XAVIER SALA-I-MARTIN, *Economic Growth,* The MIT Press, Cambridge Mass., 1995.

BASSANINI ANDREA, STEFANO SCARPETA, *The Driving Forces of Economic Growth: Panel Data Evidence for the OECD Countries, "*OECD Economic Studies", No. 33, 2001/II.

BAUMOL, W., *Productivity Growth, Convergence and Welfare: What the Long-run Data Show*, American Economic Review December, 1986.

BENHABIB J & SPIEGEL M. M., *The Role of Financial Development in Growth and Investment, "*Journal of Economic Growth", 2000, vol. 5, 341-360.

BERNARD ANDREW B., CHARLES I. JONES, *Productivity across Industries and Countries: Time Series Theory and Evidence, "*The Review of Economics and Statistics", vol. 78, No. 1 (February 1996), 135-146.

BRYAN CAPLAN, *The Idea Trap: The Political Economy of Growth Divergence,* "European Journal of Political Economy", vol. 19 (2003), 183-203.

CASTRO VILLAVERDE JOSÉ, *Indicators of Real Economic Convergence. A Primer,* United Nations University, UNU-CRIS E-WORKING PAPERS, w-2004/2

COLLINS M. SUSAN, BARRY BOSWORTH P., *Economic Growth in East Asia: Accumulation versus Assimilation,* in vol. "Economic Development and Growth Papers, Brooking Papers Economic Activity", No. 1/1996.

DALGAARD CARL-JOHAN, JACOB VASTRUP, *On the Measurement of σ-Convergence*, "Economics Letters", 70 (2001), 283-287.

DĂIANU DAN, *Convergența economică. Cerințe şi posibilități,* în Aurel Iancu (coorodonator)*,* "Dezvoltarea economică a României. Competitivitatea şi integrarea în Uniunea Europeană", Editura Academiei Române, Bucureşti, 2003.

DOWRICK STEVE, NGUYEN DUC-THO, *OECD Comparative Economic Growth 1950-85: Catch-up and Convergence, "*The American Economic Review", vol. 79, No. 5, (December 1989), 1010-1030.

DURLAUF ST. N, *On the Convergence and Divergence of Growth Rates, "*The Economic Journal", vol. 106, No. 437 (June 1996), 1016-1018.

FAGERBERG JAN, *Technology and International Differences in Growth Rates, "*Journal of Economic Literature", vol. XXXII (September 1994), 1147-1175.

FRIEDMAN MILTON, *Do Old Fallacies Ever Die?, "*Journal of Economic Literature", vol. 30, No. 4 (December 1992), 2129-2132.

GALOR ODED, *Convergence? Inferences from Theoretical Models, "*The Economic Journal", vol. 106, No. 437 (July 1996), 1056-1069.

GROSSMAN GENE M, HELPMAN ELHANAN, *Endogenous Innovation in the Theory of Growth, "*Journal of Economic Perspectives", vol. 8, No. 1, Winter 1994, 23-24.

HALL ROBERT E., JONES CHARLES I., *Why Do Some Countries Produce So Much More Output per Worker than Others?, "*The Quarterly Journal of Economics", vol. 114, No. 1 (February 1999), 83-116.

HAUSMANN RICARDO, PRITCHETT LANT, RODRIK DANI, *Growth Accelerations,* National Bureau of Economic Research, June 2004.

HAVRYLYSHYN OLEH, *Recovery and Growth in Transition: A Decade of Evidence, "*IMF Staff Papers", 2001.

ISLAM NAZRUL, *Growth Empiries: A Panel Data Approach,* Quarterly Journal of Economics, CX, 1955.

KORNAI JANOS, *Anti-equilibrium,* Editura Ştiințifică, Bucureşti, 1974.

KUTAN ALI M., TANER M. YIGIT, *Convergence of Candidate Countries to the European Union,* 2003.

LEE KEVIN, HASHEM PESARAN, RON SMITH, *Growth and Convergence in a Multi-Country Empirical Stochastic Solow Model, "*Journal of Applied Econometrics", vol. 12, No. 4 (June-August 1997), 357-392.

LUCAS ROBERT E. Jr., *On the Mechanics of Economic Development*, (în vol. "Economic Development and Growth Papers"), "Journal of Monetary Economics", 22/1988, 3-42.

LUCAS ROBERT E. Jr., *Why Doesn't Capital Flow from Rich to Poor Countries, "*American Economic Review", vol. 8/1990.

MANKIW GREGORY, DAVID ROMER, DAVID N. WEIL, *A Contribution to the Empirics of Economic Growth, "*The Quaterly Journal of Economics", vol. 107, No. 2, May 1992, 407-437.

MATKOWSKI ZBIGNIEW, MARIUSZ PROCHNIAK, *Economic Convergence in the EU Accession Countries,* Warsaw School of Economics.

MEEUSEN WIM, JOSÉ VILLAVERDE (Ed.), Convergence Issues in the European Union, Edward Elgar, UK, 2002.

MIHĂESCU FLAVIUS, *Convergența între economiile central şi est-europene,* în Daniel Dăianu şi Mugur Isărescu (coordinators), "Noii economişti despre tranziția în România", colecția Bibliotecii Băncii Naționale, Bucureşti, 2003.

Myrdal GUNNAR, *Economic Theory and Under Developed Regions,* London, Duck worth, 1957.

O'CONNOR JULIA S., *Dimensions of Socio-Economic Convergence in the European Union: Convergence of What?,* May 9, 2005.

OECD, *OECD Economic Studies,* No. 33, 2001/II.

PELKMANS JACQUES, *Integrare europeană. Metode şi analiză economică* (ed. a II-a) (translation from English), Institutul European din România, Bucureşti, 2003.

QUAH DANNY T., *Twin Peaks: Growth and Convergence in Models of Distribution Dynamics, "*The Economic Journal", vol. 106, No. 437 (July 1996), 1045-1055.

QUAH DANNY, *Empirical Cross-Section Dynamics in the Economic Growth, "*European Economic Review", 37 (1993), 426-434.

ROMER PAUL M., *Increasing Returns and Long-Run Growth, "*The Journal of Political Economy", vol. 94, No. 5, (October 1986), 1002-1039.

ROMER PAUL M., *Endogenous Technological Change, "*The Journal of Political Economy", October 1990, 98,5, AB1/Inform Global.

ROMER P., *Theories of Economic Growth (Endogenous Technical Change) Economics of Growth and Innovation, "*Journal of Political Economy", 98(5), S71-S102, February 6, 2004.

SALA-I-MARTIN XAVIER, Regional Cohesion: Evidence and Theories of Regional Growth and Convergence, "European Economic Review", 40 (1996), 1325-1352.

SALA-I-MARTIN, XAVIER, *A Classical Approach to Convergence Analysis, "*The Economic Journal", vol. 106, No. 437 (July 1996), 1019-1036.

SOLOW ROBERT M., *A Contribution to the Theory of Economic Growth, "*The Quarterly Journal of Economics", vol. 70, No. 1 (February 1956), 65-94.

SOLOW ROBERT M., *Perspectives on Growth Theory, "*Journal of Economic Perspectives", vol. 8, No. 1, Winter 1994, 45-54.

TEMPLE JONATHAN, *The New Growth Evidence, "*Journal of Economic Literature" vol. 37, No. 1 (May 1999), 112-156.

THIRLWALL A.P., *Growth and Development with Special Reference to Developing Economies* (sixth ed.), 2001.

TOMLINSON MARK, *The Learning Economy and Embodied Knowledge Flows in Great Britain, "*Journal of Economics", vol. "Economy" (1999) 9, 431-451.

TORSTEN PERSSON, GUIDO TABELLINI, *Is Inequality Harmful for Growth?,* The American Economic Review, vol. 84, No. 3, (June 1994), 600-621.

WARWICK J Mc KIBBIN, *Forecasting the World Economy Using Dynamic Intertemporal General Equilibrium Multi-Country Models,* 22 September 1998.