

REAL CONVERGENCE VERSUS NOMINAL CONVERGENCE - - A COMPARATIVE ANALYSIS

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Abstract

The main purpose of this study is to quantify and analyze the gap between the development regions of Romania through formulas that reveal the existence or not of the convergence types. The statistical data were obtained from the National Institute of Statistics (Statistical Yearbook) but also from Rural Development Agencies and the analyzed period is from 2000 to 2009.

Keywords: economic development, cohesion, convergence, real convergence, nominal convergence

1. Introduction

A first aspect that we propose since the beginning of the study is to make clear the binding distinction between the concepts of economic convergence and economic cohesion, so the specialized literature can easily see that they are somehow confused and this because their purpose is to reduce disparities between macroeconomic indicators of various countries.

In the specialized literature the convergence is defined as "a dynamic process which is based on the application of social and economic policies aimed at reducing disparities between regions and countries in a given space" [1]. The convergence can be achieved by applying some structural policies to achieve strong growth economic indices in peripheral regions that had undergone a period of economic decline or failed to attain economic performance of the region they belong to.

Therefore, the concept of convergence is seen somehow as a precondition for integration as long as the structures that create and implement policies converge, the integrative process, its strategies and the creation of common functional institutions are more easily reached.

To summarize, the convergence is therefore targeting on the same goal, the evolution towards the achievement of "targets". The central issue of convergence has as a central point central "determining the extent to which those economies with different initial levels of output records a growth level that allow them, in the future, to achieve equal living standards" [2].

Through the concept of nominal convergence is established that the countries aspiring to The Economic Union must meet certain criteria set out in the Maastricht Treaty criteria on a set of nominal variables that aim a faithful reflection of economic stability namely: the long rate interest [average yield of long-term government securities calculated on the last 12 months must not exceed by more than 2 percentage points the yield on government securities in the three states with the lowest inflation rates], the inflation [the average rate of inflation in the last two months must not exceed by more than 1.5 percentage points from the first three states with the lowest levels of inflation], the deficit and debt [the consolidated state budget deficit should not exceed 3% of GDP and the public debt 60% of GDP, the relationship between budget deficit and public debt can be expressed by the equation at the governmental budget constraint, given the forecasts of the Treaty of Maastricht on the actual rate of growth of 3% (g) and constant inflation rate of 2% (r): $(\text{budget deficit} / \text{GDP}) = (\text{public Debt} / \text{GDP}) * (1 - 1 / (1 + g) (1 + r))$ replacing we will obtain the budget deficit of 3%: $3\% = 60\% * (1 - 1 / (1 + 3\%))$ and the exchange rate stability.

The analysis underlying the setting up or treaties of the European Union are not clearly and explicitly shown that real convergence criteria. In the following lines we try to highlight the most important aspects of this type of convergence:

- ✓ GDP / capita (at the purchasing power parity)
- ✓ The degree of openness
- ✓ The opening degree of economy is evidenced by the share of imports and exports in GDP;
- ✓ The share of trade with EU Member States in foreign trade;
- ✓ The sectoral structure of the economy is evidenced by the share of agriculture, industry and services in the GDP;

2. The analysis of the relationship between the real and the nominal convergence

The analysis of the relationship between the real and the nominal convergence shows that the degree of relationship between the two processes is not one of substitutability, the processes being complementary. From the nominal convergence analysis we can see that it affects both favorable and unfavorable real convergence process as follows:

- ✓ A reduction in the interest rate and the inflation rate will eventually cause an increase in investment and therefore of GDP. Empirical evidence suggests that economic performance are higher with a lower inflation rate than in the case of moderate inflation. Meanwhile inflation rate diminution accelerates convergence of wages.
- ✓ National currency stability is another factor that causes an increase in foreign direct investment and exports with positive implications on the real convergence process.
- ✓ If inflation is reduced it will have a beneficial effect because the interest rate will increase, and this is how are attract foreign capitals, the currency appreciation and reducing of net exports.
- ✓ The analysis and incorrect sizing budget deficit and public debt can affect the convergence of the economies in which the level of investments is reduced, the existence of some sustainable deficits, although more than 3% may contribute to faster structural adjustment of these economies to EU requirements.

At the same time, however, stressed that the real convergence process affect nominal variables as follows:

- The structural reforms have the effect of stimulating the convergence of GDP / capita, leading to a non-inflationary wage growth, while revenue increases, and an increase in budget revenues, which will reduce the budget deficit and public debt;
- The productivity differences between the not tradable goods sector and the tradable goods and the wage growth in the two sectors will lead to persistently higher inflation level.

The opposite of the convergence process is the economic divergence process which occurs when the growth gap is widening.

The indicator with which can be quantified using real convergence is the GDP per capita expressed in purchasing power parity.

Finally, we can make clear that the main objective of convergence near the levels envisaged economic indicators, social, monetary, financial, performance of the regions and countries, ensuring reduction of the development gap, monetary and financial stability in all countries as well as the institutional and administrative compatibility of structures and mechanisms of the various regions. We can speak of a real economic convergence process if the rate of growth of poorer countries is higher than in rich countries, resulting in reduction of income differences between them.

3. The analysis of the types of the real convergence

According to specialized literature the first attempts to establish the real convergence types are assigned to the economist Xavier Sala-i-Martin [professor of economics at Columbia University] and Robert Joseph Barro [professor of economics at Harvard University], and their analysis is based on the economic growth model of Solow. To this end they developed a series of tests to demonstrate the convergence catching of developed countries by the LDCs, tests that can be used on regional convergence.

The empirical testing conducted by two economists led to the quantitative defining of the real convergence of two types namely convergence beta (β) and sigma convergence (σ).

The econometric parameter β indicates the speed of the convergence and σ shows the divergence convergence trend (the restriction or increasing dispersion of analyzed data sample).

A. Beta convergence (β)

In the context of absolute convergence hypothesis the convergence beta [β] indicates that on long term, the poor economies tend to grow faster than the richer ones, and in the context of conditional convergence hypothesis, the same phenomenon depending on certain factors. Knowing the issues raised in this case of neoclassical theories that poor economies grow faster than rich ones, which means, on the one hand, reducing the coefficient of dispersion of GDP per capita, on the other hand, the existence of an inverse, negative between the growth rate of GDP per capita in a given time and the initial level of GDP per capita.

Usually the beta absolute convergence hypothesis is treated using the formula [3]:

$$\frac{\ln(Y_{i,T}) - \ln(Y_{i,0})}{T} = \alpha - \beta * \ln(Y_{i,0}) + \varepsilon_{i,T}$$

where: $Y_{i,T}$ - GDP per capita in the region i at time t , T – length of the period studied,

α β - The unknown parameters to estimate econometric; $\varepsilon_{i,T}$ - the error random variables reflecting the level of convergence achieved.

The indicator beta (β) shows the same dispersion of income mobility that sigma convergence study in terms of their evolution over time [4].

The convergence hypothesis (β) conditioned is usually checked using the relationship:

$$\frac{\ln(Y_{i,T}) - \ln(Y_{i,0})}{T} = \alpha - \beta * \ln(Y_{i,0}) + \gamma X_i + \varepsilon_{i,T}$$

- the estimates of the present model should be isolated and kept constant variables for regional differences;

X_i - Is called the vector of variables that allows keeping constant steady state economy (maintaining a constant level of equilibrium of an economy).

The beta parameter value calculated in this way quantifies the intensity of convergence. This may allow different values depending on the distance that separates economy concerned by the state of long-run equilibrium. As the economy approaches its equilibrium state, the coefficient decreases.

B.Sigma convergence (σ)

This type of convergence indicates a decreasing variation of income per capita in a region or group of countries, namely income distribution tends to reduce. The sigma convergence is used to characterize the convergence level and reduce it by studying the dispersion measured by the standard deviation of the logarithm of per capita income or output (Barro and Sala-i-Martin). The two authors used to measure the sigma convergence the following relationship:

$$\sigma = \sqrt{\frac{1}{n} \sum_{i=1}^n \left[\log\left(\frac{y_i}{y^*}\right) \right]^2}$$

But the indicator most frequently used is the coefficient of variation::

$$Cv_T = \frac{\sigma_T}{X_T},$$

Where: Cv_T - coefficient of variation between T period

σ_T - squared value of the degree of regional development in period T and calculate :

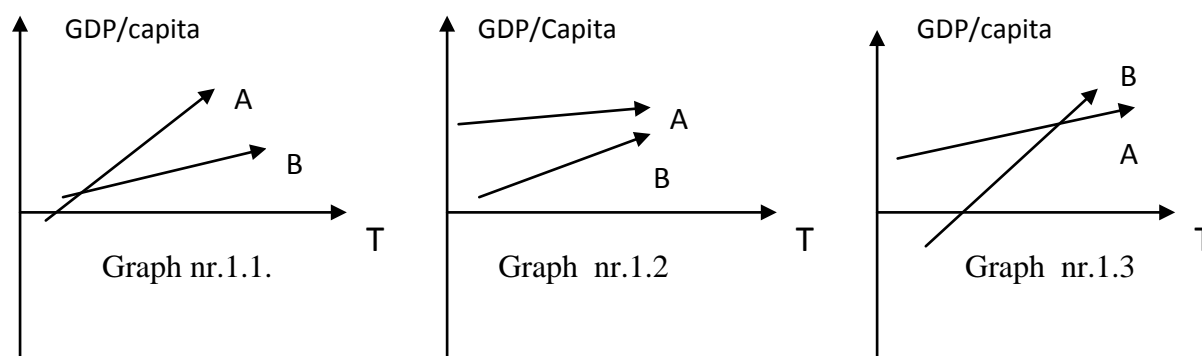
$$\sigma_T = \sqrt{\frac{1}{n} \sum_{i=1}^n (X_{i,T} - \overline{X_T})^2},$$

where: $\overline{X_T}$ - the average level of development in period T.

4. The relationship between beta and sigma convergence

To be able to calculate σ convergence must first be calculated β convergence, as a necessary condition but not sufficient, since disparities from the inside may diminish if poorer countries grow faster than rich ones, but there is also the possibility for a country to grow much faster than another without the development of these disparities to be reduced.

The relations between sigma and beta convergence can be seen in the graph and table below:



Source: Marinaș M., - Convergența Economică, Editura Economică, București,2008,pg. 93;

Table 1.1.

The relationship between beta and sigma convergence

Combination possible 1 (Graph 1)	Combination possible 2 (Graph 2)	Combination possible 3 (Graph 3)
$\sigma_{t0+T} > \sigma_{t0}$ (divergence)	$\sigma_{t0+T} < \sigma_{t0}$ (convergence)	$\sigma_{t0+T} > \sigma_{t0}$ $\sigma_{t0+T} < \sigma_{t0}$ (divergence, stationary, convergence)
$+\beta$ (divergence)	$-\beta$ (convergence)	$\pm \beta$ (divergență sau convergență)
Increase the distance between the levels of development of economies in period T	Decrease the distance between the levels of development of economies in period T	Within the analysis period can take place successively both decrease and increase the distance between the levels of development of economies

Source: Iancu A., *Real Convergence*, Series Working Papers, nr.1, Romanian Academy, Programe CEEX, București,2008,pag 26;

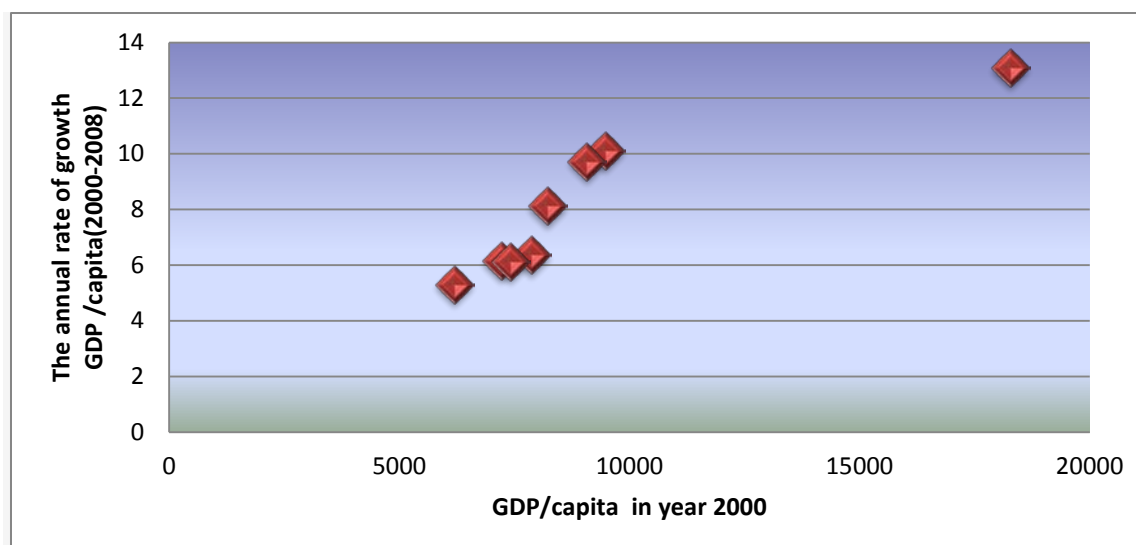
Analyzing table 1.1., we notice with ease, that the first column corresponds to the graph 1.1, which indicates the lack of both types of convergence (sigma and beta) between the countries A and B.

The second column corresponds to the graph 1.2, where we notice the existence of both types of convergence sigma and the beta. In this situation there will be a reduction in the gap of income (GDP per capita) between the two countries, but also a reduction in the dispersion of income.

The third column corresponds to the graph 1.3 that indicate that, within the period of time it can produce a series of oscillations in terms of GDP per capita. In a first phase less developed country (B) carry out the process of "reach back" to the country, which is again an increase in the dispersion of incomes between the two countries.

5. The hypothesis testing beta and sigma convergence at the level of regions in Romania

In order to examination proposed theories relating to beta and sigma convergence we've tested hypothesis convergence β in the case of the eight regions for the development of Romania. Of the very many studies published recently shows that, finally reaching the rich States, or so called beta convergence is rare. In view of the achievement of a more exact analysis data, GDP per capita has been expressed in comparable prices. In the calculation of the equation of regression have been used the data in Annex 1b(GDP/inhabitant of development regions in the first year of the analysis of the 2000 and average annual rates of growth of GDP/per capita in the period 2000-2008). Explanatory (independent) variable is GDP per capita/year initially, and explained (dependent on) the average annual rate of growth of GDP per capita. In regression calculations (with the help of Excell program), resulting in a β coefficient of initial explanatory variable with positive sign (annex 1). The positive sign indicates the lack of convergence of trend development regions, which can be seen from the chart and 1.4



Graph 1.4. The annual rate of growth GDP/capita (2000-2008) compared with the initial level of the regions (2000)

Source: Graph made using Excell on the basis of Annex 1b

This calculated result is mainly due to gaps, very large differences between the developed regions (Bucharest-Ilfov, West) and the poorly developed (Northeast, Southeast, South-West Oltenia), as regards the presence and ability of economic growth factors (physical and human capital, technological progress) to generate higher economic growth rates, and the ability of the regions developed to attract foreign direct investment, to generate and assimilate new technologies.

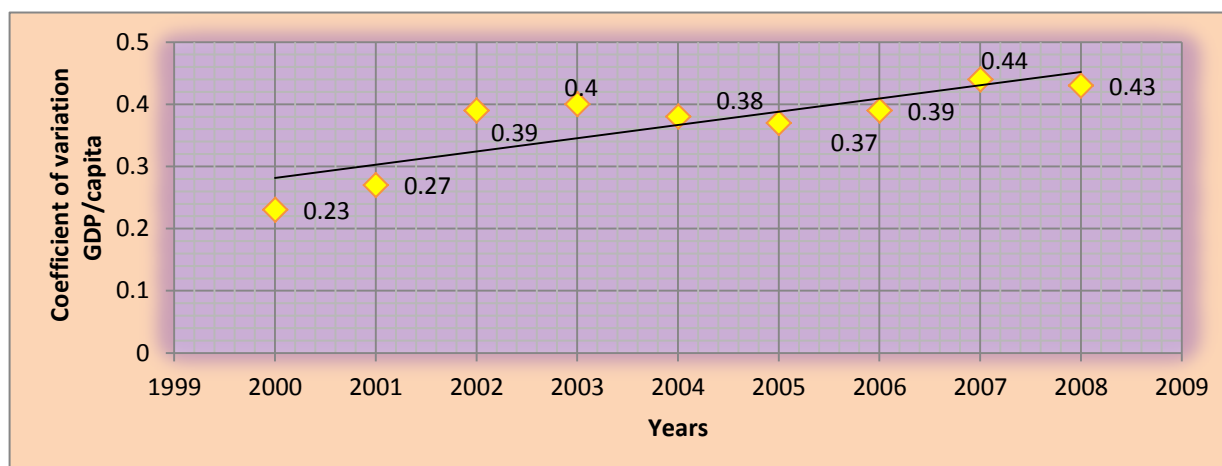
As regards the convergence sigma hypothesis testing, for the development regions of Romania, was chosen the period 2000-2008, precisely in order to determine if the regions were able to shrink the gap existing between them. The indicator used to calculate sigma convergence is GDP/capita. Calculated results can be seen in table no. 1.2.

Table 1.2.

Quantifying variation in GDP/capita coefficient (sigma convergence) to development regions of Romania

Ani	2000	2001	2002	2003	2004	2005	2006	2007	2008
σ_T	2084,2	2454,7	3564,6	4014,6	4097,0	4548,1	5105,7	6528,9	7265,4
X_T	8899,1	9119,4	9174,9	9950,1	10840,6	12273,6	13782,6	14857,9	16680,0
Cv_T	0,23	0,27	0,39	0,40	0,38	0,37	0,39	0,44	0,43

Source: own calculations based on data from Annex 1a



Graph 1.5. Graphical representation of sigma convergence at the level of the regions development

Source: graph based on the table 2

6. Conclusions

From the analysis of calculated data in the table and on the dynamics of the coefficient of variation of GDP/per capita (chart 1.5), we will notice that it records an increase in the period under review, which signifies a growing trend of divergent economies development regions of Romania. No this type of convergence is not achieved within the regions of our country, the fact that the existence of this increasing trend, trend increasing not only lead us to conclude that the differences between the incomes of the regions tend to increase.

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