STUDY ON THE CALCULATION OF REGIONAL GAPS IN ROMANIA

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Abstract: - The main purpose of this paper is to quantify and analyze the existing gap between the development level of the regions of Romania through formulas that reveal the existence or not of the types of convergence. Checking existence of gaps of Romania's development regions will be made by means of calculations of real convergence and nominal convergence and with the help of the index Williamson.
The statistics were obtained from the National Institute of Statistics (Statistical Yearbooks) but also from Rural Development Agencies, and the period under review is for the years 2000-2010.

Key-Words: - economic development, convergence, cohesion, real convergence, nominal convergence

1 Introduction

Since the beginning of this study must be made clear the distinction between the two concepts often used when talking about the reduction of regional imbalances: social-economic cohesion and economic convergence.

Thus, in terms of the concept of economic cohesion, the starting point in its analysis, it is the explanation given in the "Glossary of terms" on the official website of the European Union, which specifies the following: "The economic and social cohesion is an expression of solidarity between the Member States and the European Union regions. The aim is to develop the EU's balanced by reducing disparities between regions and promoting equal opportunities for all". This definition practically establishes the reference point of the economic and social cohesion, respectively European regions and implicit the regional policy.

On the other hand, regarding the concept of economic convergence, the specialized literature defines it as "a dynamic process on the base of which is the implementation of socio-economic policies designed to reduce disparities between regions and countries in a given space"[1]. Convergence can be achieved through the implementation of structural policies aimed at achieving economic growth indices in the outermost regions which have come during a period of economic decline or have not managed to achieve the economic performance of the area to which they belong.

Synthesizing, the convergence means to direct throught the same purpose the evolution towards achieving a "target". The central issue of the convergence has a center point "to determine the extent to which those economies with different levels of initial output recordes a level of growth which will allow, in the future, to achieve equal living levels" [2].

Through the concept of nominal convergence is established the fact that countries aspiring to Economic Union must meet certain criteria set by the Maastricht Treaty, criteria relating to a series of nominal variables aimed at fair coverage of their economic stability.

In this context, from the analysis of the treaties underlying the European Union's Constitution does not clearly and explicitly reveals which are the real convergence criteria. In the following we try to highlight the most important issues relating to this type of convergence:

- GDP/capita (purchasing power parity);
- The opening degree of the economy, highlighted by the share of imports and exports in the gross domestic product;
- The share of trade with EU Member States in the total foreign trade;

- The sectorial structure of the economy highlighted by the share of agriculture, industry and services in gross domestic product;

2 Theoretical and practical considerations regarding forms of convergence

The analysis of the relationship between the real and nominal convergence shows that the degree of relationship between the two processes is not one of interchangeability, the processes are complementary.

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[4].

In this sense they have developed a series of convergence tests to demonstrate the process used to arrive end of developed countries to least developed countries, tests that can be used in regional convergence.

Empirical testing of the two economists has led to the quantitative definition of two kinds of 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).

2.1 A short analyze about 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 relationship 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]:

$$\frac{\ln(Y_{i,T}) - \ln(Y_{i,0})}{T} = \alpha - \beta * \ln(Y_{i,0}) + \gamma X_i + \varepsilon_{i,T} \quad (1)$$

where:

YiT , - GDP per capita in the region i at time t,

T – length of the period studied,

α β - The unknown parameters to estimate econometric;

εi,T - the error random variables reflecting the level of convergence achieved.

The beta parameter value calculated in this way quantifies the intensity of convergence process. 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

2.2. Short analyze about 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[4]:

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

But the indicator most frequently used, is the coefficient of variation (equation 3):

$$Cv_T = \frac{\sigma_T}{\overline{X}_T} \quad (3)$$

where:

Cv_T - coefficient of variation between T period

σ_T - squared value of the degree of regional development in period T and calculate with equation 4:

$$\sigma_T = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(X_{i,T} - \overline{X}_T\right)^2} \quad (4)$$

2.3 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 table 1.

Table 1. - The relationship between beta and sigma convergence

Combination possible 1	Combination possible 2	Combination possible 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)
+β(divergence)	-β(convergence)	± β(divergence or convergence)
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

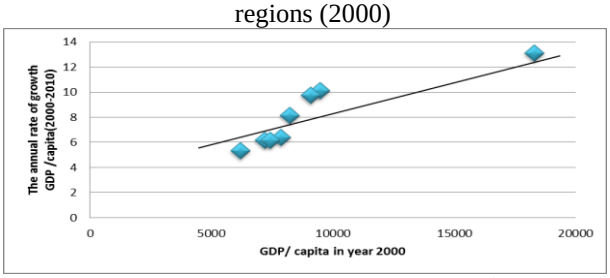
Source: Iancu A., Real Convergence , Series Working Papers, nr.1, Romanian Academy, Programe CEEX, București,2008,pg 26;

2.4. Testing the sigma and beta convergence hypothesis at the development regions level in Romania

In order to examining the proposed theories relating to beta and sigma convergence we've tested the β convergence hypothesis in the case of the eight Romanian regions of development. From the many studies published recently it 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 2000-2010). Explanatory (independent) variable is GDP per capita/year initially, and explained (dependent on) the average annual rate of growth of GDP per capita. From the regression calculations (with the help of Excell program), resulted a β coefficient of initial explanatory variable with positive sign. The positive sign indicates the lack of convergence of trend development regions, which can be seen from the graph 1.[7]

Graph 1. The annual rate of growth GDP/capita (2000- 2010) compared with the initial level of the regions (2000)



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

The present calculated result is mainly due to gaps, to the 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 2000-2010, 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. 2. [7]

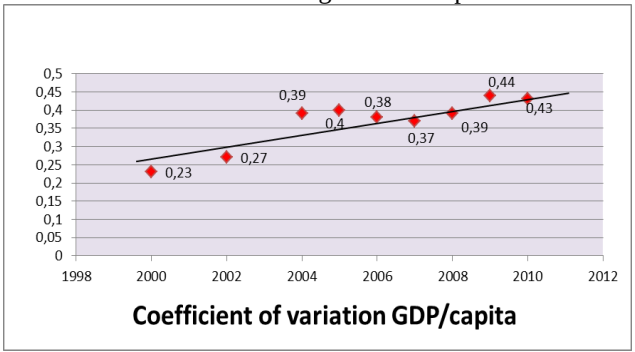
Table 2 - Quantifying variation in GDP/capita coefficient (sigma convergence) to development regions of Romania

Years	2000	2002	2004	2005	2006	2007	2008	2009	2010
σ_T	2084,2	2454,7	3564,6	4014,6	4097,0	4548,1	5105,7	6528,9	7265,4
$\overline{X_T}$	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

In order to reinforce those exposed have achieved the following graph which shows the coefficient of variation:

Graph 2. Graphical representation of sigma convergence at the level of the regions development



Source: graph based on the table 2

From the analysis of calculated data in the table and on the dynamics of the coefficient of variation of GDP/per capita (chart 2), it is notice that it records an increase in the period under review, which signifies a growing trend of divergent economies development regions of Romania. Not even this type of convergence is achieved within the regions of our country, fact revealed by the existence of this increasing trend, which only leads us to the conclusion that the differences is between the regions incomes tend to increase.

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3 The regional imbalances, measured using the index Williamson

Taking into account that significant economic growth can occur only in one region of a country, it should not surprise anyone that the difference in absolute values between rich and poor regions is likely to continue or even increase. The differences in GDP/capita will be measured in relative sizes so the GDP/inhabitant of each county is calculated as a percentage of GDP/inhabitant of the region.

To do this, we have calculated the index standard according to the following relationship Williamson:

$$V_W = \frac{\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2 \frac{P_i}{P}}}{\bar{y}} \quad (5)$$

where:
P_i - i county population
P – i region population
y_i – GDP/capita în country i
$\bar{y}$ - GDP/capita în region i

With the help of this index we can determine the regional inequalities degree that exist in each region based on the level of GDP\inhabitant.

Table 3 - The regions classification with the help of the index Wiliamson, in 2008 [7]:

REGION	Vw (2004)	Vw (2008)	ΔVw
North-East	0,17	0,17	0,00
South-East	0,21	0,22	0,00
South	0,21	0,18	-0,03
South-West Oltenia	0,19	0,15	-0,04
West	0,13	0,17	+0,04
North-West	0,22	0,21	-0,02
Center	0,09	0,11	+0,02
București-Ilfov	0,09	0,11	+0,01

Source: Own calculations

The above table presents these indexes for the years 2004 and 2008. For 2004, ranks ranged from the lowest level of regional inequalities for Bucharest-Ilfov region and Center and the highest index to Vw for the North-west region.

In 2008, the lowest rank of inequalities has also been recorded in the two regions, and the highest in the South-East. In three of eight regions (West, Center and Bucharest-Ilfov), the regional inequalities increased in size, but the increase is insignificant for the period 2004-2008.

During the same period, the Southern-Muntenia, the Southwest-Oltenia and the Northwest regions, the inequalities size has decreased, but also the decrease is insignificant. It is found in such a stagnation in the amplitude of the inequalities between regions and counties.

4 Conclusion

The analysis between the real and nominal convergence shows that the relationship degree between the two process in not one of substitutability, the two of them 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. The empirical evidence suggests that economic performance are higher within a lower inflation rate, than in the case of a moderate inflation. Meanwhile the inflation rate, diminution accelerates the wages convergence.
- 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 benefic effect because will lead to an increased rate interest, and this is how are attract foreign capitals, the currency appreciation and the 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 a faster structural adjustment of these economies to EU requirements.

At the same time, however, it must be noted 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;

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- The productivity differences between the not tradable goods sector and the tradable ones as well as 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.

From the other part, 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.

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ANEX

Anex 1.a - GROSS DOMESTIC PRODUCT

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Region / GDP	region population	2004	2005	2006	2007	2008	2009	2010
North - West	2718648	29852,5	34323,1	40806,2	50724,1	57937,1	57900,2	59292,5
Center	2524491	29095,8	33143,2	40291,2	49416,7	57586,8	51000,9	59120,1
North - East	3714050	29430,2	33265,8	38429,9	45990,1	54940,9	54408,4	55669,0
South - East	2812755	29843,3	32852,1	38508,7	44273,0	55865,9	52706	56339,5
South - Muntenia	3271207	31439,1	36855,4	44301,4	52013,5	65451,8	65141,8	66114,8
Bucharest - Ilfov	2256543	50573,1	65307,1	77710,5	95798,2	130521,7	124288,8	131579,2
South - West Oltenia	2250565	21709,7	23920,5	28589,2	34419,6	41921,9	39953	41941
West	1921700	25254,1	29081,7	35788,9	42995,7	50020,5	49200	52983,3
TOTAL	21469959	249201,8	290753,9	346432	417637,9	516254,6	501139	523693

Source: Statistical Yearbook - 2001, 2003, 2006, 2007, 2008, 2009, 2011;

Anex 1.b - CALCUL GDP/capita

Region / GDP	region population	2004	2005	2006	2007	2008
North - West	2718648	10980,64	12624,89	15009,74	18657,84	21310,99
Center	2524491	11525,41	13128,66	15960,12	19574,91	22811,25
North - East	3714050	7924,01	8596,74	10347,16	12382,73	14792,71
South - East	2812755	10609,98	11679,68	13690,74	15740,08	19861,63
South - Muntenia	3271207	9610,85	11266,60	13542,82	15900,40	20008,45
Bucharest - Ilfov	2256543	22411,75	28941,21	34437,85	42453,52	57841,44
South - West Oltenia	2250565	9646,33	10628,66	12703,12	15293,75	18627,27
West	1921700	13141,54	15133,31	18623,56	22373,78	26029,29
TOTAL	21469959					

Source: Statistical Yearbook - 2001, 2003, 2006, 2007, 2008, 2009, 2011;