EUROPEAN CONVERGENCE AND THE IMPACT OF THE CURRENT ECONOMIC CRISIS

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Abstract: *Real convergence study began with the development of neoclassical models of growth and especially with the passage of econometric applications of these models. In this paper we present applications of indicators and patterns of convergence on the example of European Union member countries and some current economic impact assessments on the European convergence process. The study deals with the economic convergence of the European countries and especially the convergence of the EU countries, including Romania. The impact of the economic crisis in Romania is studied using the "St.Louis" model. At the end, the study presents several economic scenarios for a faster and easier recovery from the current crisis in Romania.*

Key words: *real convergence, σ-convergence, β-convergence, Markov chains, "St.Louis" model.*

1. Introduction

Convergence is an essential objective of Romania's integration process in the European Union, minimizing gaps that arise between Romania and the average of the European Union at the level of development. There are two types of convergences: the Beta (β) and Sigma (σ) Convergence.

'Sigma' convergence measures the dispersion of real GDP per capita (in constant prices) between regions or countries based the on standard deviation of the cross-section series. When the standard deviation is falling (rising) over time, the differences of GDP per capita between regions or countries in absolute terms gradually decrease (increase) and convergence (divergence) is approached. If

standard deviation does not show any clear tendency but instead, increases or decreases successively, then a mixed process of convergence and divergence is realized. A different way of measuring the 'sigma' convergence is to use the coefficient of variation which results by dividing the standard deviation with the mean of the sample. The coefficient of variation is a measure of relative variability and is expressed usually, as percentage and not via the units of data in which it is referred. If the coefficient of variation decreases over time, we have convergence; otherwise we have divergence.

The 'beta' convergence of the neo-classical approach is obtained by a regression analysis estimating the growth of GDP per capita over a certain period of

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time in relation to its initial level. If the regression coefficient 'beta' has negative sign, it means that the GDP per capita of countries with lower initial GDP per capita grow more rapidly than that of the countries with higher initial GDP per capita. The neo-classical theory presents two types of convergence: unconditional and conditional (Sala-i-Martin 1994). When all regions (or countries) converge to the same terminal point (steady-state point) the convergence is called unconditional. In such a case, having considered that economies do not differ significantly in terms of variables like the investment level, coefficient β is estimated without introducing structural variables. On the contrary, when economies have different structures, it is assumed that they converge to a different steady state point. In this case, convergence is called conditional and both the coefficient β and the structural variables (influencing the level of growth of GDP per capita) are introduced in the model. According to the neo-classical model, the query of why poor regions (or countries) grow faster than rich regions (or countries) can be answered by the diminishing returns to capital explanation.

In early 1960, Federal Deposit Bank of St. Louis developed an economic analysis model, which stressed the role of monetary aggregates. Initial analysis of economic data was performed using diagrams; after 1960, regression techniques will be used as a tool of analysis. Some of the quantitative research efforts were consolidated in 1970, with the publication of what was to be known as *"The St. Louis".*

2. The St. Louis Model

The first theoretical consideration that underlies the development model was the modern quantitative theory of money. The emphasis of the modern quantity theory is the behaviour of economic units in response to changes in the stock of money. Moreover, the existing stock of money must be held by someone. As a result, a change in the stock of money will induce a discrepancy between the current owner and the interested possession of money that will change because of the alternate portfolio of assets. Included in this adjustment is a change in spending on goods and services. The second theoretical issue that has been implicit in the construction of the model, although not explicitly recognized by those who developed the model at the time, was the search and information costs on economic behaviour. Information on the equilibrium price is not to gather cost and thus economic units should seek balance in market prices. As a result, prices do not necessarily have been adjusted instantaneously to the new equilibrium level in response to a step change in total spending. As a result of these theoretical considerations, the relative impact of fiscal and monetary measures requires careful assessment. This assessment includes the differentiation between short and long term, and granting special focus methods are to finance government expenditure. The "*St. Louis"* Revised Model allows the analysis and forecasting of economic fundamentals following developments: nominal national income; level of prices; real national income; rate of employment.

All these issues are raised as a result of certain changes in monetary policy and a certain variation of expenditure, given the potential of production, related full employment. The starting point for this quantitative analysis is a reformulated theory, whose main thesis is that the evolution of national income and prices depend on monetary developments.

The main assumption in developing the model equations is that the evolution of the nominal national income depends on the evolution of monetary and budgetary

policy. In other words, changes in national income depend on monetary and fiscal policy. Thus, the merit of this model is that it provides information on developments in the basic macroeconomic variables in different ways of combining measures of monetary and financial policy, which allows the design of monetary policy in line with the overall objectives of economic policy in terms of income, national employment and prices.

The equation of nominal national income:

$$\Delta Y_t = f_1\left(\Delta M_t \ldots \ldots \Delta M_{t-n}, \Delta E_t \ldots \ldots \Delta E_{t-n} \right) \quad [1]$$

Equation of price level:

$$\Delta P_t = f_2\left(D_t \ldots \ldots D_{t-n}, \Delta P_t^A \right) \quad [2]$$

The identity equation:

$$D_t = \Delta Y_t - \left(X_t^F - X_{t-1} \right) \quad [3]$$

The identity equation of total expenditure (nominal national income):

$$\Delta Y_t = \Delta P_t + \Delta X_t \quad [4]$$

The equation of interest rate:

$$R_t = f_3\left(\Delta M_t, \Delta X_t \ldots \Delta X_{t-n}, \Delta P_t, \Delta P_t^A \right) \quad [5]$$

The equation predicted prices:

$$\Delta P_t^A = f_4\left(\Delta P_{t-1} \ldots P_{t-n} \right) \quad [6]$$

The equation of unemployment rate:

$$U_t = f_5\left(G_t, G_{t-1} \right) \quad [7]$$

The deviation of actual GDP from potential GDP:

$$G_t = \frac{X_t^F - X_t}{X_t^F} \quad [8]$$

To describe the model, its characteristics are summarized in relation to four key assumptions, as follows:
1. Monetary actions are the dominant factor contributing to economic fluctuations.
2. Monetary actions have little, if any, lasting effect on real variables, with effects lasting only for nominal variables.
3. Fiscal actions, defined as changes in government spending with a given stock of money, have only a transitory impact on the economic activity.
4. The economy is in a private stable inertia.

3. Effects of Crisis in Romania

Under the model assumptions, we can build the national income equation in the form of a linear econometric multi-factorial model:

$$I^{PIB} = 0,16 + 0,84\, I_{t/1}^{ChGuver} + 0,2\, I_{t/1}^{M} \quad [9]$$

where the indicators used are: real GDP index, index of real monetary, government spending index.

Therefore, we interpret the estimated parameters as to an increase of 1% of government expenditure, the national income has increased in the review, on average, 0.84211%, respectively an increase of 1% of average monetary income of national increased in the range examined, on average, 0.20644%, which confirm the theoretical results of the influence of fiscal and budgetary policy.

The linear correlation coefficient is defined in the interval [-1, 1], that the value 0.964 obtained indicates a stronger linear correlation between the two variables. The Fisher - Snedecor test shows that the results are significant, with a significance threshold of 5%.

Therefore, the model correctly describes the dependence of the three variables, the independence in explaining the proportion of 93% of the total variation in the dependent variable.

The interest Rate equation is:

$$R = 46,4 + 1,7 \cdot IPC - 0,07 \cdot I^{PIB} - 10,7 \cdot I^{M} \quad [10]$$

where the indicators used are: interest rate, index of consumer prices, monetary mass average GDP dynamics.

The interest rate is influenced by positive and negative pricing dynamics of GDP and the monetary policy. All influences are

analyzed in accordance with economic theory. Romanian economy to the equilibrium interest rate is 10.12%. Influences factors are analyzed as follows: for each percentage increase in the CPI rate increases by 1.73% for a percentage of GDP growth rate falls to 0.0771% for each percentage increase in monetary leads to lower interest rates with 10.73%. The lowest influence has therefore GDP.

Coefficient of linear correlation shows that there is a strong linear correlation between variables (0,9147). Test Fisher - Snedecor shows that the results are significant, with a significance threshold of 5%.

Therefore, the model correctly describes the dependence of the four variables in explaining the independent proportion of 83% of total variation in the dependent variable.

A commonly used indicator for measuring convergence is the variation coefficient on the level of GDP/capita, denoted by σ. This indicator is used to measure Sigma convergence. It can be used to evaluate the real convergence level by measuring the dispersion of GDP/capita over a one year period, using for this purpose cross series (countries and regions). In this case, the relevance of the convergence indicator appears only when making comparisons.

In our study, we have used this indicator to measure and predict the real convergence level for some EU countries, specifically the group of EU 12. Data series refers to the 1998-2007 period. They will be symbolized with UE12 and are: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia.

Sigma convergence values for this period are: 0,6656; 0,6774; 0,6427; 0,6098; 0,5817; 0,5692; 0,5398; 0,4918; 0,4512; 0,3841.

By analyzing the level and trend of the variation coefficient, we can conclude the following:
- The considered indicator concerning the GDP/capita variation coefficient of the EU countries shows an increase during 1998-1999. This increasing process reveals a divergent growth of the economies inside this group of countries, with the real possibility that every less developed country will strive for higher levels of development;
- During 2000-2007 the evolution of the variation coefficient of GDP / capita is a decreasing one, which indicates the tendency of increasing convergence of the economies of the mentioned countries.

Besides Sigma indicator, expressed by the variation coefficient or standard deviation, there were numerous concerns within econometric research, a significant place being occupied by the Beta parameter estimation and interpretation of growth regression equation.

The Beta indicator, estimated by using the regression equation, expresses the speed (rate) at which different countries achieve convergence to a steady state. This indicator studies sigma convergence in terms of evolution over time.

Beta indicator's values are increasing throughout the period 1999-2007, compared to 1998: they range from 0.06889 to 0.2866. This means that if in 1998 the indicator's GDP / capita would have increased by 1 unit, in 2007 it would have reached values of 0.2866 or higher.

Conclusions

Current economic crisis, burst into the U.S. to quickly propagated globally affecting international economic system.

Put on the irresponsible policies of financial institutions, the crisis raises

worrying questions about the security. Transmission of the crisis was not only geographically but also in society, the financial plan in the real economy, both social and gradually installed and psychological level. The latter seems to be the most dangerous contaminants, whereas the frozen actions practically blocking economic growth for fear and mistrust.

The effects of the crisis are felt in Romania. This is seen primarily at economic indicators, which after a period of growth began to come together with this crisis on a downward trend. Regarding short-term evolution of economy and living standards in Romania, according to evolutionary scenarios outlined in the model St. Louis reviewed the pessimistic scenario (which is most likely in the current context) GDP will decrease by 2.5% and interest rate (real) will be an average of 12.27%.

This paper has reviewed a number of methods and instruments developed for the analysis of economic and/or social inequalities and that can be used for examining disparities among EU12 countries.

One objective of the paper was to produce an update analysis of the convergence process among EU countries. Another was to show that instruments vary significantly in terms of their specificities and qualities and that it is therefore important to be aware of their limits when measuring the extent and evolution of countries disparities within the EU.

These results also underline that the analysis of convergence is in fact complex.

Finally, even if the analysis of countries disparities is conducted thoroughly, it says little about the effectiveness of EU Cohesion Policy. Keeping track of countries disparities and monitoring their evolution is definitely of key importance for the design and management of Cohesion Policy. However, it must be kept in mind that the analysis of disparities, whether pointing to the presence or absence of convergence, generally cannot be used to infer firm conclusions concerning the success or failure of the policy. For this, it is necessary to proceed to further analysis, notably by controlling other variables likely to affect the convergence process, as a proper econometric analysis would do.

References

1. Abramowitz, M.: *Catching Up, Forging Ahead, and Falling Behind.* The Journal of Economic History, vol. 46, nr. 2 "The Tasks of Economic History", Jun. 1986, pp. 385-406.
2. Aghion, P., Caroli, E., Garcia-Penalosa, C.: *Inequality and Economic Growth: The Perspective of the New Growth Theories.* Journal of Economic Literature, vol. 37, nr. 4, dec. 1999, pp. 1615-1660.
3. Barro, R. J., Sala-I-Martin, X.: *Convergence.* Topic 2, Dynamics and Convergence. JPE, April 1992.
4. Barro, R. J.: *Economic Growth in a Cross Section of Countries.* The Quarterly Journal of Economics, vol. 106, nr. 2, May 1991, pp. 407-443.
5. Barro, R. J., Sala-I-Martin, X., Blanchard O. J., Hall R. E.: *Convergence across States and Regions.* Brooking Papers on Economic Activity, vol. 1991, nr. 1, 1991, pp. 107-182.
6. Barro, R. J., Sala-I-Martin, X.: *Convergence.* The Journal of Political Economy, vol. 100, nr. 2, April 1992, pp. 223-251.
7. Iancu, A.: *Problema convergenţei economice.* Oeconomica, nr. 4, 2006.
8. Lee, K., Pesaran, H., Smith, R.: *Growth and Convergence in a Multi-Country Empirical Stochastic Solow*

Model. Journal of Applied Econometrics, vol. 12, nr. 4, June-August 1997, pp. 357-392.

9. Matkowski, Z., Prochniak, M.: *Economic Convergence in the EU Accession Countries*. Warsaw School of Economics.

10. Quah, D. T.: *Twin Peaks: Growth and Convergence in Models of Distribution Dynamics.* The Economic Journal, vol. 106, nr. 437, July 1996, pp. 1045-1055.

11. Sala-I-Martin, X.: *Regional Cohesion: Evidence and Theories of Regional Growth and Convergence*. European Economic Review, vol. 40, 1996, pp. 1325-1352.

12. Sala-I-Martin, X.: *A Classical Approach to Convergence Analysis.* The Economic Journal, vol. 106, nr. 437, July 1996, pp. 1019-1036.

13. UNCTAD: *Handbook of Statistics*. 2005.

14. World Bank: *World Development Indicators*. 2006.