Babeș-Bolyai University

Faculty of Economics and Business Administration

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PhD Thesis Summary

ECONOMIC GROWTH AND CONVERGENCE CRITERIA ACROSS EMERGING ECONOMIES FROM CENTRAL AND EASTERN EUROPE

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Introduction

In the context of a continuous struggle for domination and international recognition, modern economies are facing not such a privileged position of capturing new techniques, instruments or methods that would enable them to obtain a considerable advantage against their main competitors. The primary objective of each economy is to ensure certain stability in what concerns the economic environment that due to the extremely high degree of interconnection with other elements of the global system leads to performance. Performance, whether we refer to the economic, financial or institutional one, is an absolute indicator of the ability to adapt to frequent macroeconomic changes, and once this indicator is fulfilled, the next natural step is towards economic growth and convergence.

Economic growth accompanied by a high degree of convergence represents one of the major challenges of the modern world architecture. The interconnections of these two processes continue to raise the interest of economists, politicians, sociologist, business people or simple citizens, being an omnipresent subject within the current economic activities.

The PhD thesis entitled:" *Economic growth and convergence criteria across emerging economies from Central and Eastern Europe*" focus on one hand, upon the analysis of the key determinants of economic growth across these economies, having as starting point theoretical aspects referring to economic growth models, and on the other hand investigate the degree of convergence within this particular group of countries taking into consideration the specific elements that characterize each economy. These two aspects should represent, in our opinion, the basic pillars of the modern economic construction, whose ignorance leads to disorganization and chaos.

The present paper concentrates upon some contemporary aspects regarding the evolution of the emerging economies of the new members of European Union, focusing upon the analysis of the main strategies adopted by these ones, considering the fulfilment of a major objective, namely becoming a member of the euro-zone. A parallel analysis is conducted regarding the process of convergence, both from nominal and real point of view, but also aspects like the speed of convergence, the level of synchronization of the monetary, financial and institutional policies across European Union are considered major topics of this research. The mixture of all these elements constitutes a strong argument in favour of highlighting the ***importance*** and the ***novelty*** of the research area.

In favour of a rigorous fundamental of the current scientific research, the doctoral research mobility periods conducted between April- July 2012 at Wirtschafts Universität from Vienna and between March-May 2013 at Kingston College from London proved to be extremely beneficial.

The ***central objective*** of this PhD thesis is considered to be the analysis of the level of convergence across new member states of the European Union that joined this structure in 2004 namely (Cyprus, Malta, Poland, Hungary, Slovakia, Slovenia, Latvia, Lithuania, Estonia and Czech Republic) and 2007 (Romania and Bulgaria) along with the investigation regarding the main factors that are responsible for the evolution of the growth rates across these economies. Furthermore, taking into consideration the high degree of complexity of this research theme, we focused on testing the hypothesis according to which the quality of a member of a supranational structure, as the European Union, constitute a stimulating factor of economic growth and sustainable convergence.

In order for a successful achievement of this central objective, a series of ***specific objectives*** constitute an integrant part of this paper namely:

- Presenting the theoretical aspects concerning the concepts of economic growth and convergence by reference to the literature in the field;
- Highlighting the key determinants of the economic growth process from different perspectives and also the economic growth models that had a major impact upon the development of the economic theories;
- Presenting the main methodologies of quantifying the degree of convergence/divergence across economies and their study with reference to the group of the new member states of European Union;
- Developing an empirical study based upon Panel GMM methodology regarding the main determinants of economic growth across European Union, focusing upon the emerging economies from Central and Eastern Europe.

The ***main argument in favour*** of choosing this topic was the attempt of trying to identify the elements that are considered to be the responsible for differences across economies and also if the strategies and policies conducted by each economy intensify the convergence process or if by contrast accentuate the gap between them.

In accordance to the compliance of a correct development of a PhD thesis, a variety of ***research methods*** were implied in order to add value to the main paths of this paper. A first category is represented by the ***induction-deduction*** analysis. This qualitative analysis permitted us to highlight the remarkable evolutions regarding the economic growth and convergence theories (Chapters 1-3). A distinctive technique of this qualitative analysis is represented by the ***comparative analysis***, which provided us the reference in formulating general considerations concerning the degree of fulfilment of the nominal convergence criteria by the new member states of euro-zone and also the real ones for the states that recently joined the European Union (Chapters 4-6). In order to add more value to our research, but also in order to support with real data the theoretical aspects detailed previously, we used the econometric modelling, using software's like Eviews 7.0 and Stata 11.0, that allowed us to draw some conclusions regarding the level of real convergence across new member states of the European Union through testing hypothesis like Sigma and Beta convergence, validating the results of Sigma convergence, using Phillips and Sul methodology, establishing the degree of interconnection between real and nominal convergence and of main channels implied by these connection and finally applying panel GMM methodology for identifying the main factors that contribute in shaping economic growth process across Central and Eastern Union (Chapters 6-7).

The structure of the PhD thesis is disseminated across seven chapters that follow a logical approach, starting from theoretical aspects that allow a framing of the current subject in the general spectrum of the research area, followed by the empirical approach that has the major role of investigating the applicability of the theoretical models in the real economy framework. If in the first part of the thesis our interest was focused in obtaining some pertinent answers to some extremely interesting questions like: *What is economic growth? What are the main models that marked the development of economic growth theories? What are the main factors included in these models? What implies convergence across economies? What are the specific elements that characterize nominal and real convergence?* in the second part, focused upon empirical testing, our main interest was in clarifying some uncertainties related to: *Does economic integration speeds up the process of convergence and economic growth across economies? Are the recent accession wave's incentive factors of economic performance of the new member's states? What is the optimal mix of factors responsible for reducing disparities between economies?*

In the following lines we will shortly present the structure of the PhD thesis:

Chapter 1 entitled ***„Economic growth - conceptualization, instruments of measures and particularities*"** aims, in the first place to temporally present the main definition attributed to this concept, as well as a comparative analysis of the economic growth and development process. This approach allows us to illustrate the complexity of this subject, but also the controversy related to the instruments of measurement, transmission channels or regarding the role of this process at micro and macro level.

The second chapter entitled ***„Determinant factors of economic growth***" approaches at theoretical level the broad spectrum of what cause an economy to record increased growth rates and on the contrary, other economies to stagnate or follow a downhill path. Establishing a dichotomy concerning this aspect represented a real challenge, taking into consideration the multitude of classifications that were mentioned by the literature in the field and of the specific characteristics of each economy, which determines that the order and the composition vary across economies. Furthermore, the recent economic crisis determined a reconfiguration of these factors whose negative effects were felt globally. We mention the fact that this classification embodies just the main factors that determines economic growth, the ones that were more often cited by economic growth models developed over time.

The third chapter entitled ***„Economic growth models***" is tributary to the same method of approach, detailed in the previous sections, focusing upon the main evolution of the basic coordinates of the economic growth theories. These models constitute a strong example of the dynamics of the economies across time, capturing the main elements of the era they were elaborated.

The forth chapter entitled " ***Convergence criteria analysis in the process of adopting euro***" concentrates in highlighting the main evolutions regarding the concept of convergence but also the main costs and benefits that the membership to a structure like the European Union embodies, and if this step has a role in intensifying the convergence across involved economies. We also insisted upon the consideration that led to the introduction of nominal convergence criteria known as the Maastricht criteria namely the need of their recast due to the recent economic evolutions.

Chapter five entitled ***„Challenges of euro – the formal framework established by the Maastricht criteria"*** analysis different strategies implemented by the new member states of the euro zone, namely Slovenia, Slovakia, Malta, Cyprus and Estonia concerning the fulfilment of the Maastricht convergence criteria. This analysis may be used as a framework

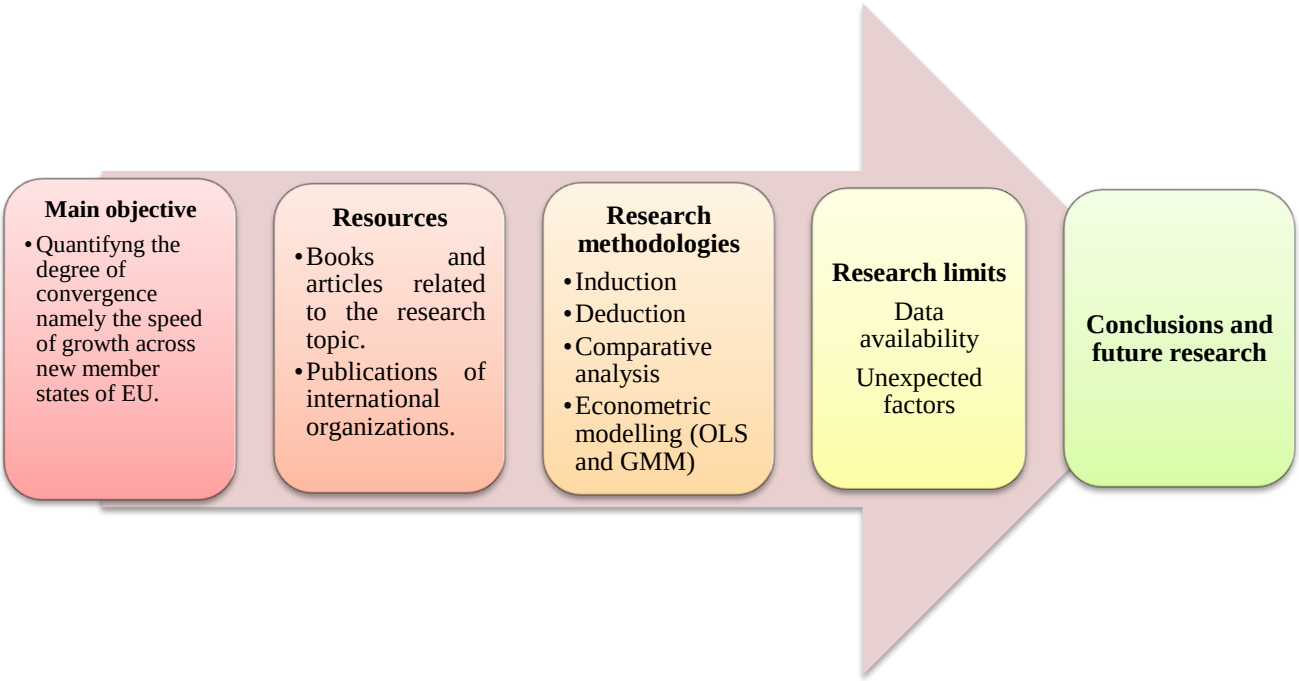
for the states that intend to a adopt euro in the short run like Romania, and may be perceived as performance economic models. At the same time we are aware of the diversity that characterize the economic structures of every economy, but the partial adjustment of these models according to the needs and objectives of each economy may represent a starting point for developing their own success models.

Chapter six entitled "***Real convergence – landmark of sustainability across new member states of European Union***" extends the topic debated in the previous chapter through investigating at empirical level the degree of real convergence across new member states using some extremely debated methodology like Sigma convergence, Beta convergence, Gini Index, Phillips and Sul methodology. We have also aimed at providing some additional data concerning the speed of convergence across this particular group of countries and testing the hypothesis of interconnection between nominal criteria, namely inflation rate and real ones.

The final chapter entitled"***Determinant factors of economic growth and convergence across new member states of European Union – a panel GMM approach***" represent in our opinion the element of novelty of this research, taking into consideration the fact that it is based upon testing all the theoretical aspects presented in the previous chapters and highlight the factors responsible for economic growth and convergence across new member states of European Union. The results of the econometric modelling supports the one obtained by other studies in the field as well as the ones provided by some recognized economic growth models. These results may be considered some major pillars of the following policies elaborated by the national governments of the states that are in the position of adopting euro in the near future, taking into consideration the fact that they capture, based upon the data provided by international institutions and organizations, the instruments that assures a smooth path towards a wealthy economy. Regardless all these aspects, we have to keep in mind the limits of our research due to some unexpected factors that may drive to a recast of the entire system, the most representative example to support this statement being the recent economic crisis.

This PhD thesis is enriched with some final conclusions that can be formulated based upon the analysis performed across the entire research, as well as future orientations, considering the fact that the present paper constitutes just the starting point in quantifying some complex aspects like economic growth and convergence.

A representation of the scientific process may be summarized as:



Also we would like to point out the fact that a large part of the ideas included in this research were validated by the participation at different national and international conference, but also being published in different articles, the most relevant being the following ones:

1. **Mihuț, Ioana Sorina** (2013),"*The connection between real and nominal convergence criteria: an empirical approach towards the case of new member states*" Review of Economic Studies and Research Virgil Madgearu, pg.89-104.
2. **Mihuț, Ioana Sorina, Luțaș Mihaela, (2013),** " *Testing convergence and divergence among EU member states*", Interdisciplinary management research IX, Josip Juraj Strossmayer University in Ossjek, pg.459-468, ISBN 978-953-253-117-6.
3. **Mihuț, Ioana Sorina**, **Luțaş Mihaela, (2012),** *"Economic Growth. Challenges, opportunities and main determinants",* în vol. Interdisciplinary Management Research VIII, Josip Juraj Strossmayer University in Ossjek, pg. 467-477, ISBN 978-953-253-105-3.
4. **Mihuț, Ioana Sorina**, **Luțaş Mihaela, (2011),** "*Factors that trigger inflation in Romania"*, Economic Review, pg.459-466.
5. **Mihuț Ioana Sorina** (2013), "*Real convergence and economic growth among new EU member states*", Economic Research Conference, Kingston University, Londra**.**
6. **Mihuț, Ioana Sorina**, **Luțaș, Mihaela (2013)**, "*Convergence and divergence in European Union:Evidence for Beta convergence among the new EU member states*", European Integration – New Challenges, Oradea, România.

7. **Mihuț, Ioana Sorina**, **Luțaș Mihaela, (2013),** ”*Testing Sigma convergence across new EU members*”, IECS Sibiu, România.
8. **Mihuț Ioana Sorina**, **Luțaş Mihaela (2012),** ”*Economic Growth. Challenges, opportunities and main determinants”, Infer Workshop,* Opportunities for Growth, Trade and Investments after the Crisis, Cluj-Napoca, Romania

Summary of chapter one - Economic growth - conceptualization, instruments of measurement and particularities

The evolution of the economic growth concept suffered over time a series of interpretations that are a strong argument in favour of the dynamics of the global economies. The interdependence between economic growth, economic development or economic progress highlights the increased level of complexity embodied by this process, complexity that may be extrapolated also in the area concerning the instruments of measurement and transmission channels that exist at regional, national or global level. This chapter aims a short introspection in the analysis of the diversity regarding economic growth concept, but also the interconnections with other fields of study.

The concept of economic growth is defined by "The New Palgrave Dictionary of Economics as a "*measure of a positive change of GDP within an economy*".[1] The production growth is associated in this case with an improvement in what concerns the living standards. Joseph Schumpeter[2] uses both the concepts of "economic growth" as well as "economic development". In his view economic development is perceived as a spontaneous and discontinues change within the existing steady state that affects the general equilibrium of the previous state. On the other hand, economic growth highlights a gradual change over the long period of time, due to a general increase of the population as well as of the economy dynamics.[3] According to Simon Kuznet, economic growth embodies in general a quantitative approach. The statement in favour of this is the following one: "*economic growth is essentially a quantitative concept*"[4] and calls in favour of a substantial progress in the field of empirical analysis and of "*considering the quantitative aspects as a basis of the economic growth process"*[5].

[1] Howitt, Peter, David N. Weil, (2008), "*The New Palgrave Dictionary of Economics*", Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, pg.231.
[2] Schumpeter, J., (1947), "*Theoretical problems of Economic Growth"* , The Journal Of Economic History, Suplement VII.
[3] Ibidem 2.
[4]Kuznets, S., (1955), "*Toward a Theory of Economic Growth*", National Po l i vf or Economic Welfare at Home and Abroad, R. Lekachman, Ed. pg. 16.
[5] Kuznets, S., (1949), "*Suggestions for an Inquiry into the Economic Growth of Nations*", Problem in the Study of Economic Growth, pg. *6.*

If we were to summarize the main characteristics concerning the evolution of the economic growth process from a historical point a view, the main categories include:[6]

1. Population and labour force registered positive trends, but in a smaller proportion than the capital stock.
2. Real rates of wages registered strong increased trends.
3. The share of wages reported to total output increased over a long period of time.
4. In exchange of reducing the return rate of capital or of interest rate, major fluctuations of profits within different business cycles may be observed.
5. Instead of a constant growth of the capital/output rate due to capital deepening, this has declined since 1900, few changes being registered during 1950s.
6. There is a massive decline of the rational savings rates characteristic to the XX century.

If we considered the literature developed in the economic field, but not only, the concept of economic growth and economic development are used as synonyms and this association is highly accepted. Despite all that, these two terms have been received different interpretations by many authors. A comparative analysis of these two concepts is represented in the table below:

Table no.1 **Economic growth vs. economic development**

	Economic Development	**Economic growth**
Purpose	Aimed at structural change within an economy.	Aimed at increasing the output within an economy.
Measurement	Qualitative indicators: poverty index, human development index, literacy index etc.	Quantitative indicators- growth rate of GDP

[6] Samuelson, Paul, Nordhaus, William (1989), *" Economics*", Thirteenth Edition, McGraw-Hill Internationl Edition, Economic Series, pg.861-862.

Implications	Implies changes within revenue structure, savings and investments structure along with progressive changes within socio-economic structures of the countries.	Implies changes in what concerns the output level of goods and services.
Uses	Economic development is generally associated with the utilization and development of unused resources from underdeveloped countries.	Economic growth is associated with the optimal use of the resources from the developed countries.
Growth	Economic development is associated with the increase of human capital and some structural changes which improved the living standards of the population.	Economic growth is associated with the gradual increase of the gross domestic product components: consumption, net exports, governmental expenditures, investments.
Effect	Quantitative and qualitative changes within an economy.	Only quantitative changes within an economy.

Source: Authors point of view based on literature in the field.

The analysis conducted in this section highlight the fact that economic growth and development involve a series of interconnections, characterizing through different channels the performance level of an economy. We considered that the economic development process represent a much broader concept that is influenced by a series of qualitative and quantitative factors, while the economic growth process is a necessary but not a sufficient conditions towards achieving economic development.

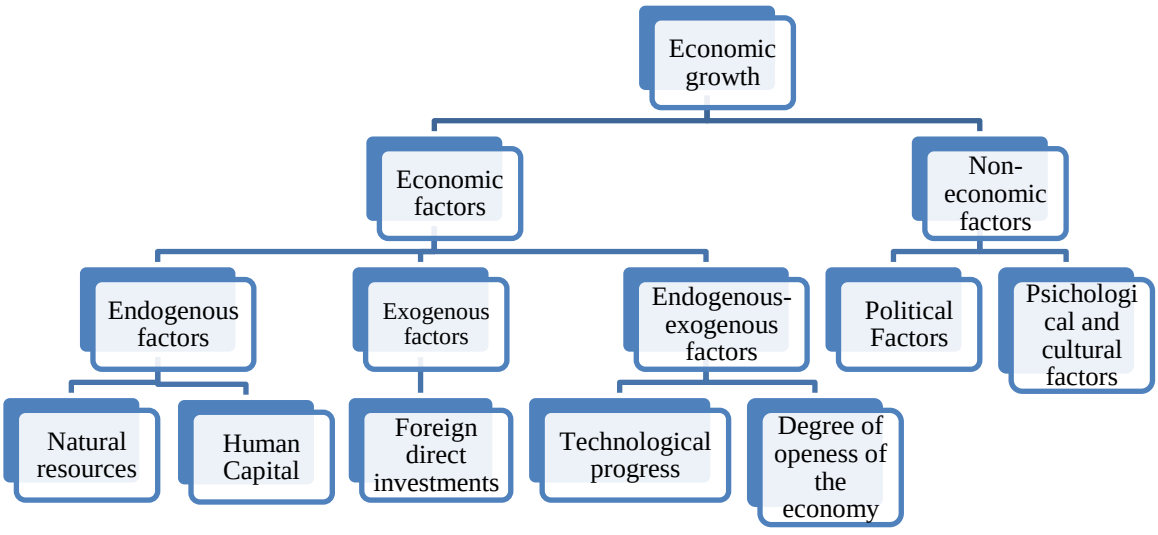
Summary of chapter 2 Determinant factors of economic growth

Highlighting the factors that have a significant impact upon the dynamics of economic growth process, constitute an extremely useful task, taking into consideration the high degree of heterogeneity that characterizes the contemporary economies. Furthermore, developing such an analysis proves to very challenging, given the multitude of factors that this process

embodies. In studying the aspects related to economic growth and its main determinants, we could identify two leading approaches. The first one is the quantitative approach, and relates to the quantitative variables like natural resources, capital, foreign direct investments or degree of openness. The second approach, namely the qualitative one, implies a series of variables interconnected with the political or the cultural field. Taking into consideration the fact that a complete classification of all the factors implied by the economic growth process requires a broader workspace, the current chapter aims at developing a hierarchy of those considered by the literature in the field to be the most relevant ones.

The economic growth process is considered to be an extremely complex one, triggered by a number of political, institutional, cultural and social ones. The literature in the field offers a wide range of classification of these factors, each contributing with strong arguments to the overall framework of economic growth.

***Fig.no.1* Determinant factors of economic growth**



Source: Authors point of view based on literature in the field

Summary of chapter 3 - Economic growth models

Economic growth models, as an integrant part of the theory concerning this concept, constitute the fundament of each analysis. The evolution of economic growth models may be used in order to capture the characteristics of the main macroeconomic indicators that determine the development of the contemporary society, and even more importantly a landmark of the economic thinking. Starting with Adam Smith theory followed by the neoclassical ones like the one elaborated by Solow or the endogenous ones elaborated by Romer, but also the recent trends concerning this subject, this chapter has as main objective the introspection upon the evolutions of the main approaches at theoretical and empirical level of what this process implies. While convergence is considered to be an illustrative element used in neoclassical models, the majority of the endogenous models argue in favour of divergence.

The literature in the field classifies in a variety of ways the economic growth theories. Some of them have been developed starting from specific domains, which enabled a separation of them in economic theories, demographic theories and sociologic theories.

In developing the classical theories of economic growth, a significant influence was the one of Adam Smith, who considered capital accumulation, technological progress and division of working force as the main generators of economic growth. Based upon these aspects, Thomas Malthus, David Ricardo and John Stuart Mill shared some of the ideas included in the famous book ”The wealth of the Nations”, mainly regarding the role and the place of property within economic growth theory and agreed the idea according to which the private benefit derivers from the pursuit of private interest that guide individuals in their decisions and activities, concept defined by Adam Smith as the *„invisible hand*”.

In Karl Marx view, the extension of markets is particularly important in supporting demand and economic development. Karl Marx interpretation captures the fact that social, political, cultural and spiritual aspects are conditioned by production. The author presented a number of ideas through which the development of the society is accomplished in well defined stages, for which he has elaborated multiple schemes of history classification in eras.

The transition from the classical to the neoclassical theory started at the end of XX century. In 1929 Maynard Keynes, in his work, ”The general theory of employment, interests and money” offers a new perspective upon the equilibrium in the economy and also upon the

monetary equilibrium managing to integrate within the monetary theory both micro and macroeconomic aspect.

The theories from 1950 and 1960 perceived the economic growth process as a series of successive steps within an evolving societal trend. They compress models based upon neoclassical hypothesis. The most well-known model is the Solow-Swan model, which determines the level of the output within an economy by using the mutual interconnection between capital, work and technology.

The 1970s brought new changes in terms of how to approach the process of economic growth, from which two main trends may be depicted. The first one focuses upon the structural changes theories using modern economic growth theory and statistic analysis. The second one considers the recession process due to the economic and institutional rigidities as well as due to the connection between internal and international factors.

The economic growth theories developed in the 80s, highlight not the interconnection between the internal and external factors and economic growth, but even more importantly this concept is viewed as a component whose role is determined by the degree of state intervention and standardisation of the economy.

The end of 1980 and the beginning of 1990, brings a new approach known as the new theory of economic growth. It aims at expending the spectrum established by the classical theories and explaining the phenomena that determine some economies to develop more rapidly and other to stagnate. The most relevant studies were elaborated by Paul M. Romer in 1986 „ *Increasing Returns and Long-Run Growth*" and Robert E. Lucas „*On the mechanism of Economic Development,,* in 1988. These two authors concentrated their research upon the measurement instrument of the capital. The second trend is highly related to introducing the concept of R&D. Within the endogenous economic growth models, investments in R&D are considered to be a determinant factor of improving productivity, aspect debated in the section concerning determinant factors of economic growth.

Summary of chapter 4 – The analysis of the convergence criteria in the process of adopting euro

One of the main goals of the new member states is finding an optimum mix of policies that would ensure high growth rates and the alignment to the general standards imposed by the European Union. The next important step is to join the Monetary and Economic Union and finally adopting euro. This embodies a series of targets that must be accomplished in

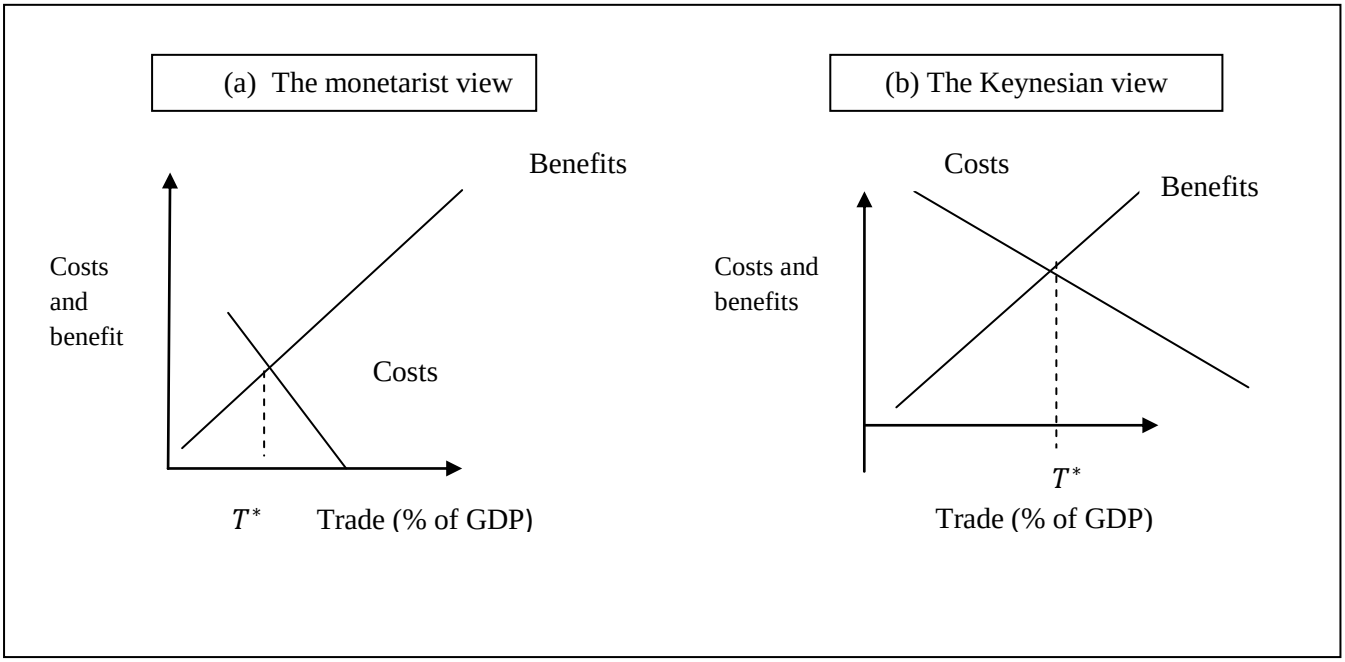
order to ensure a smooth transition towards achieving sustainable convergence. The theoretical analysis of the convergence criteria along with the cost and benefits of the euro as well as the leading theories of optimum currency area constitute the main elements of this chapter.

For a clearer understanding of the convergence process and a more objective reporting to the latest trends we state the Islam classification regarding these aspects:[7]

1. Convergence within and across economies
2. Growth rates convergence vs. income convergence
3. Beta vs. Sigma convergence
4. Conditional vs. Absolute convergence
5. Deterministic vs. Stochastic convergence
6. Regional vs. Global convergence
7. Income vs. Total productivity factors convergence

If we were to draw a qualitative conclusion about the cost and the benefits of a single currency this can be summarized in the figure below:

Fig. no. 2 **Costs and benefits of monetary union: comparative analysis**



Source: De Grauwe, P. (1996),"The Economics of Convergence: Towards Monetary Union in Europe" Weltwirtschaftliches Archiv, 123, 1-27

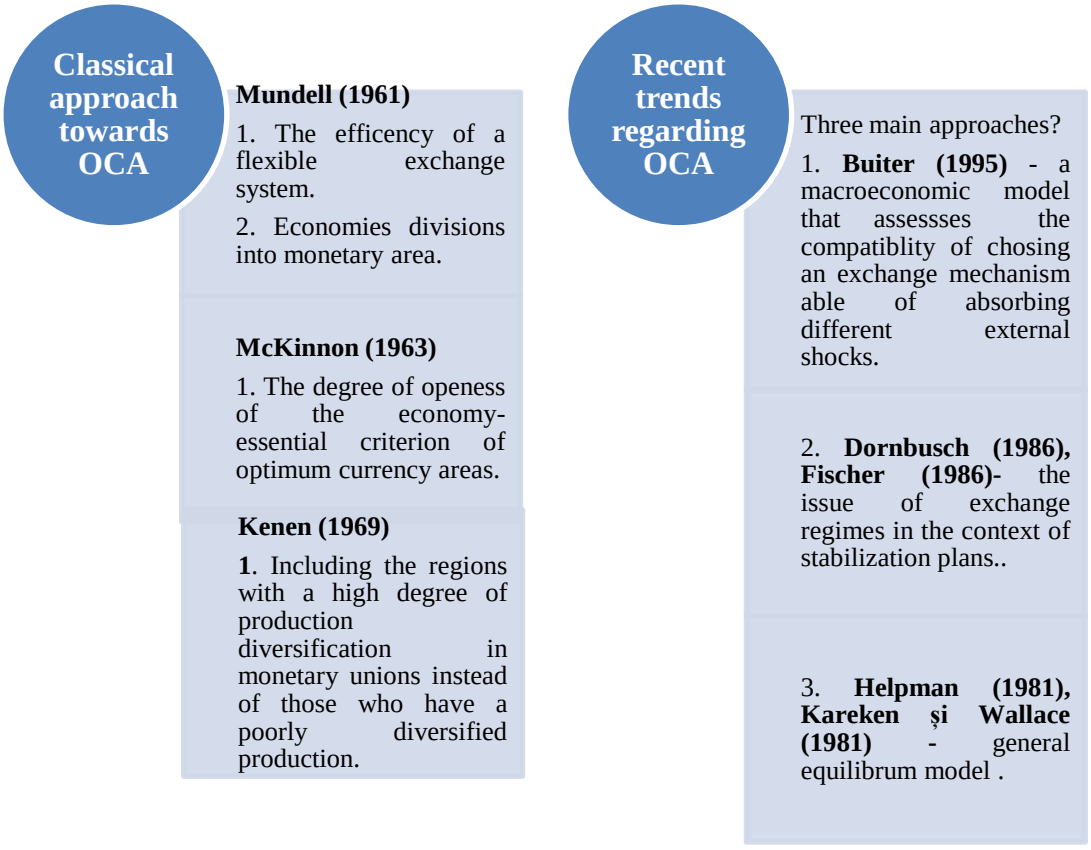
In the monetarist view many countries would obtain large benefits from entering a monetary union, claiming that the national monetary policies are unable to absorb the

[7] Islam, N., (2003), " *What have we learnt from the convergence debate*", Journal of Economic Surveys, Vol. 17, No. 3

asymmetric shocks. On the other hand, in the Keynesian view, the world is full of rigidities referring here to wages, prices and labour market, so the national monetary policies are the best instrument for absorbing the asymmetric shocks. According to this theory many of today economies that take part to the EMU would obtain greater results if they would take part to different monetary zones.

An extremely debated subject nowadays, related to the path of one country towards the euro is the one referring to the optimum currency area. The implications of the optimum currency area can be found in many domains. The main approaches towards this subject are represented in figure no.3.

***Fig.no. 3* Approaches towards optimum currency area**



Source: Authors point of view based on literature in the field

Summary of chapter 5 – Euro challenges – the formal framework of adopting the common currency established by the Maastricht Treaty

The existence of convergence across economies was tested in order to validate the modern theories of economic growth. Also the speed of convergence within different economies is considered to be a key indicator of the economic growth theories. The analysis of the stage of fulfilment of the nominal convergence criteria as well as the strategies developed by each economy related to euro adoption, constitute a major objective of this chapter, aiming at the same time the development of a basis that may be considered as a reference point by other countries that are on the path of adopting euro.

Establishing a fixed date for the accession to the euro zone, is determined exclusive by the states and their capacity of fulfilling the accession criteria. The degree of fulfilment of these criteria may be evaluated from the economic perspective and of the structural similarities that exists between that economies and the European Union. In addition to all these issues is particularly important to assess the ability of absorption of different types of shocks by these economies. The new changes of the economic and political framework of the euro zone, but also of the mechanisms of intervention of the supranational institutions on different markets may generate the introduction of new criteria for the states involved. The current situation from the euro zone was strongly influenced by the financial crisis impact and also by the sovereign debt crisis from the European markets. As a consequence, the economies from the euro zone, but not only, faced recession and recorded a significant deterioration of the fiscal government position. All restrictions imposed by the authorities slow down even more the process of economic recovery, issue that can be applied also for the euro zone but also for the other members of European Union.

In 2004, a group of ten countries decided to enter European Union. From this ones, five adopted euro until this moment (See table no.2)

Table no.2 **The schedule for entering ERM II and adopting euro**

Country	Year entering ERM II	Year of adopting euro
Slovenia	28.06.2004	01.01.2007
Cyprus	02.05.2005	01.01.2008
Malta	02.02.2005	01.01.2008

Slovakia	28.11.2005	01.01.2009
Estonia	28.06.2004	01.01.2011

Source: ec.europa.eu

The conclusions that may be drawn based upon the analysis of the stage of fulfilment of the convergence criteria by the new member states may be summarized as:

- Slovenia experience on the path of adopting euro can be characterized as being a success strategy – is the only country from the ex-Yugoslav block that is member of European Union and at the same time of euro zone.
- Estonia based its strategy of convergence on a short time horizon whose effects were felt at the moment of outbreak of the recent financial crisis.
- In the particular case of Malta, the coordination between the nominal convergence criteria, allowed a decrease of the inflation rate and budget deficit, the stability of the exchange rate mechanism once it entered ERM II and an ascending trend in what concerns the long term interest rate.
- The Slovakian experience may be characterized as being an extremely dynamic one, with a series of events that marked the evolution of the macroeconomic indicators from this country.
- The path of Cyprus in fulfilling the Maastricht criteria was the result of the interconnection of a set of criteria and targeted multiple sectors such as: efficient monetary policies along with a diverse range of structural reforms.

The reduced performances of the CEE countries during the recent crises were considered a warning sign for the need of reconfiguration of the economic growth models of these economies. Becker et all (2010)[8] identifies as generator elements for this context the extremely high degree of financial integration as well as the high dependence of net capital flows. To these ones added the fact that, in the case of small economies such as, Malta and Cyprus with high degrees of openness, any change in the behaviour of the investors from the foreign markets, is perceived more intense also due to the lack of some internal resources that would act as anchors to restore balance. The impact of the recent financial crises was a

[8] Becker et all (2010), "*Whiter growth in Central and Eastern Europe? Policy lessons for an integrated Europe*", Bruegal și WIIW, Vol. 11.

warning sign of the need to reconsider the criteria of entering euro zone. Darvas (2010)[9] propose as a manner of solving these vicissitudes a recalculation of these indicators according to the recent developments across euro zone and extending the period for the evaluation of the degree of fulfilment of these criteria by the states.

The overall conclusion is that the central element of any economy should be influenced by the quality and sustainability of the economic convergence process. Despite all that, the accomplishment of this objective seems hard to achieve, especially for the Central and Eastern economies that concentrated their strategies especially towards increasing demand in the sector of non-tradable goods.

Summary chapter 6 – Real convergence – landmark of sustainability across new member states of EU

6.1 Testing Beta convergence

Additionally to the formation of a single market and a monetary union, one of the main objectives of the European Union is constituted by the reduction of disparities between member states. One of the approaches regarding the reduction of disparities between economies implies a reduction in what concerns the GDP/capita gap or generally speaking real convergence. Testing real convergence offers a solid basis for studying convergence across new member states that was investigated in this chapter starting with some classical methodologies like Sigma and Beta convergence, but also using some new ones like the one elaborated by Phillips and Sul. For a clearer image of the degree of convergence across new member states economies, the interconnection mechanisms between real and nominal criteria was investigated both at theoretical but also at empirical level.

The literature review distinguishes three main concepts that could be associated with the concept of Beta convergence:

- *Absolute convergence* - all countries converge to the same steady state.
- *Conditional convergence* - countries converge to different steady states.
- *Club convergence* - economies with similar initial conditions will register convergence trends in what concerns their GDP/capita.

[9] Darvas, Z., (2010), "*The case for reforming euro area entry criteria*", Institute of Economics, Hungary Academy of Sciences Discussion Papers 22.

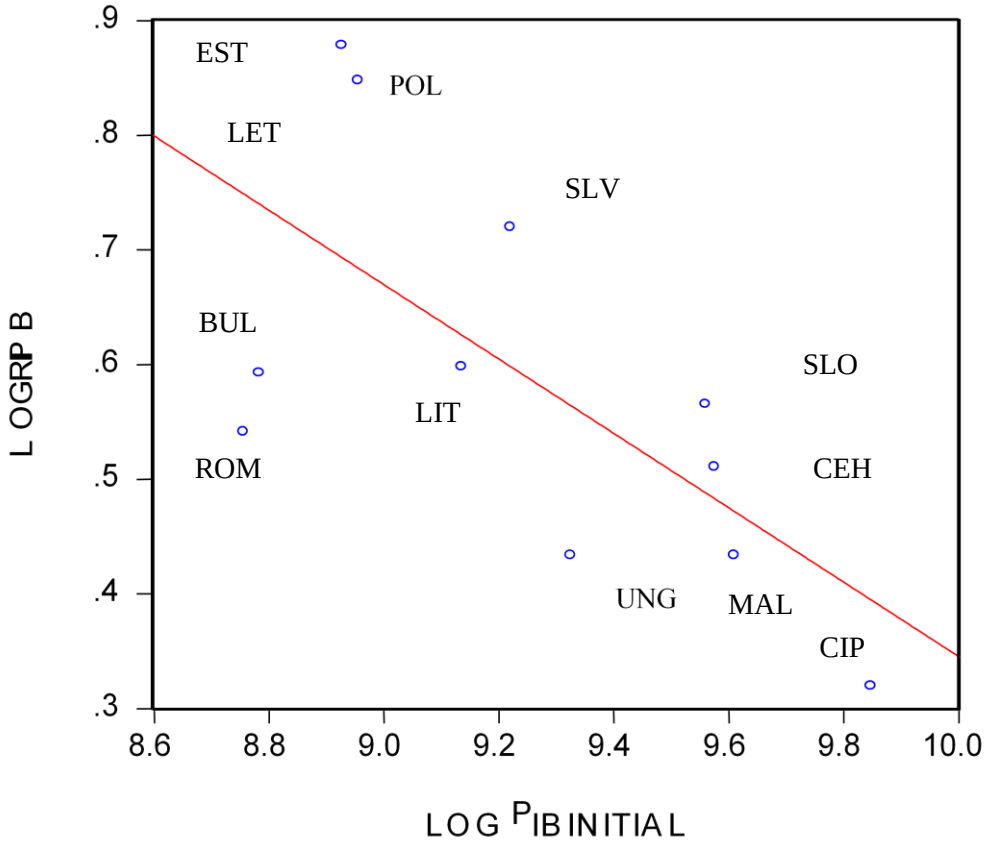
Whether this indicator is used to validate the convergence hypothesis within an individual economy or is applied to a group of countries, Beta convergence may be determined using the following formula:

$$T^{-1}ln\left(\frac{y_t}{y_0}\right)=\alpha+\beta\ln(y_0) \quad (6.1.1)$$

where the left side of the equations represents the average growth rates of GDP/capita logarithm between t=0 and t=T, α represents the constant and β is the variable that we want to estimate.

In order to test for Beta convergence we choose the group of the new member states of European Union that accede in 2004 and 2007, and are whether in the case of being adopted the single currency euro or on the path towards it. The time horizon range between 1992 and 2011, the data source being Eurostat.

Fig.no. 3 **Beta convergence across new European Union member states**



Source: Authors calculations based on Eurostat data.

The majority of the studies that concentrate upon testing Beta convergence across European Union and especially among the new member states of EU confirm de convergence

hypothesis. After testing Beta convergence across new Member States of the European Union it may be concluded that there is clear evidence to support this hypothesis corresponding to the value of Beta coefficient of -0.32. Even though the value is a little too high it certainly validates the convergence in what concerns the GDP/capita level across new member states. Beta convergence test will be applied only for all the 12 new EU member states, their division in subgroups would lead to the formation of small samples of countries whose inclusion in the model would provide irrelevant data both statistically and economic .

6.2 Testing Sigma Convergence

A series of recent empirical studies had as starting point in their research the convergence testing between different economies using as a landmark the real convergence that deals with the level of GDP/capita in order to assess the standard of living or the work productivity. The most relevant studies regarding this topic are the ones that concentrate upon sigma and beta convergence, the first one being a measure of the dispersion of the revenues/worker or of the productivity/worker between different economies that can be tested at regional or national level, and the second one being an estimator of the inverse relationship between the growth of the revenues/worker or of the productivity/worker and the initial level. The utility in testing sigma convergence denotes from the fact that it offers a clear image upon the convergence or divergence periods between different economies over a certain period of time. With all that, there are some others indicators used in order to test sigma convergence developed by Cowell (1980) namely: the coefficient of variation[10], the Gini coefficient[11], Atkinson index[12], Theil index [13] or the Mean Logarithmic Deviation[14].(See table 1). Although many of the studies in this field concentrated their work in testing beta convergence, economists draw the conclusion that this is not a sufficient condition for achieving sigma convergence. Supporting this idea Quah (1993) and Friedman (1992) states the fact that sigma

[10] The coefficient of variation is used in order to compare two or more frequency distributions from the point of view of their variation.
[11] The Gini coefficient is used to test the inequality in what concerns the revenue distribution or the welfare distribution. It varies between 0 and 1. Values close to zero indicate a more balanced distribution of revenues while the values close to 1 indicate a more unequal distribution. The coefficient is used to compare revenues distribution between different countries or regions.
[12] Atkinson index represents another instrument used in measuring income distribution. It has the ability to detect some specific changes in what concerns the distribution of different segments.
[13] Theil index answers to the sum of inequality of the average between some sub-groups of countries, property known as"decomposition".
[14] Mean logarithmic deviation is used in order to test inequality between a group or between different groups.

convergence is of greatest interest because it brought into attention the issue of revenues uniformity between economies. The authors pointed out the fact that the methodology used in order to test beta convergence may produce bias estimates of β convergence due to the Galton error; Young, Andrew; Higgins, Matthew , Levy, Daniel (2007). In response to this problem Friedman proposed an indicator to test convergence among states namely the coefficient of variation that provides unbiased estimates of beta convergence.

Whit all these the study of Beta convergence remains an extremely complex issue regarding the convergence aspect also due to the fact that represent a necessary, but not sufficient condition to test sigma convergence.

Also the literature shows evidence of some indicators that combine both sigma and beta convergence. One of these is known as Kendall index of rank concordance developed by Boyle and McCarthy (1997, 1999) that besides testing sigma and beta convergence has the ability to offer a clear image about the changes in what concerns the ranking of the economies taking into consideration the distribution of GDP/capita.

The studies developed previously that were concentrating upon testing the convergence hypothesis between different economies included in their estimation a series of indicators that would allow the validation of convergence or divergence hypothesis between different economies. Many authors admitted the fact that while studying convergence, especially sigma convergence one may use different indicators that have as a main role to highlight the differences towards the average or regarding the manner in which the reduction of the differences between different chronological series takes place; Iancu Aurel (2009):

$$\lim_{t\to\infty}(x-y)=a$$

When talking about sigma convergence, the most common indicator is the coefficient of variation of the GDP/capita, coefficient that will be marked with σ and determined using the following formula:

$$\sigma_t=\frac{\sqrt{(\sum_{i=1}^{N}(y_{it}-\overline{y_t})^2/(N-1)}}{\bar{y}_t} \qquad (6.2.1)$$

where:

- $\sqrt{(\sum_{i=1}^{N}(y_{it}-\overline{y_t})^2/(N-1)}$ represents the standard deviation, namely a measure of the dispersion where N is an indicator of the number of observations within the sample.
- $\bar{y}_t$ represents the average of that certain series.

The first utilization of this indicator in testing the degree of convergence between different economies was developed by Sala-i-Martin (1995) who defined this concept as follows:" *a group of countries converge in the sense of sigma convergence if the dispersion in what concerns the GDP/capita decreases over time.*" This may be systemized as follows:

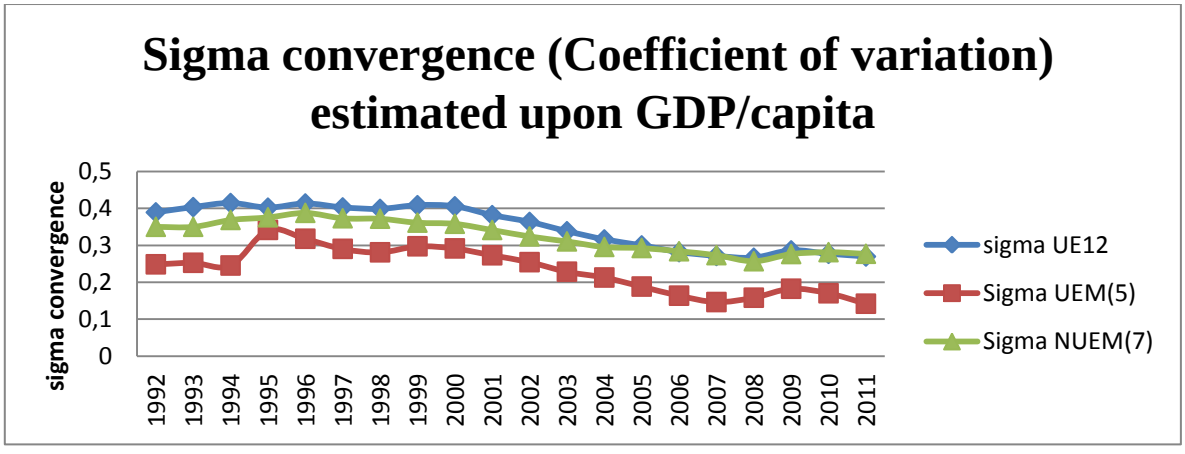
$$\sigma_{t+T} < \sigma_t$$

The formula used by the author in order to test sigma convergence is:

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left[\log\frac{y_i}{y^*}\right]^2} \text{ where } \log y^* = \frac{1}{n}\sum_{i-1}^{n}\log y_i \qquad (6.2.2)$$

In our study for testing the degree of real convergence between different emerging economies, we used sigma indicator for the EU member states, devising it into three main categories namely: EU 12 (the countries that joined EU in 2004 and 2007), EU 5 (the countries that joined EU in 2004 or 2007 and adopted euro so far) and EU 7 (the countries that joined EU in 2004 or 2007 and are in the process of adopting euro). The chronological series is based upon the estimated data for this indicator for a period between 1992-2001, annual data. This indicator used to analyze sigma convergence was estimated upon the GDP/capita in constant prices. The source of the data is World Bank.

***Fig. no. 4* - Sigma convergence (Coefficient of variation) estimated upon GDP/capita**



Source: Authors calculation based on Worldbank data.

The use of sigma convergence enables an objective evaluation of the degree of convergence or divergence between different sub-groups considered. Regarding the group of countries that joined EU in 2004 and adopted euro the data shows almost a continuous decreasing of the coefficient of variation which means an increase of the degree of convergence within that certain group. The overall tendency of decreasing the coefficient of variation expressed by the level of GDP/capita is more pronounced in the group of countries that adopted euro until now namely, Malta, Slovenia, Slovakia, Cyprus and Estonia. Even though between the level of the coefficient of variation estimated upon the level of GDP/capita between EU 12 and EU 5 is a considering difference, it should be noted the fact that overall in both cases the general tendency is of increasing the convergence between economies rather than increasing the divergence.[15] Analyzing the graphic regarding sigma convergence we may conclude that each economy less developed from an economic point of view tends to achieve superior levels of development aiming the alignment to the standards required by the countries with more increased performance. These may only lead to a dynamic of the economies that had recently joined to European Union, especially of those that adopted euro until now, with real perspectives of achieving higher rates of convergent growth.

The obtained results are similar to those provided by other specialized studies that have focused on the analysis of sigma convergence for the new member states. One of them is developed by Ingiani A., and Zdarek V. (2007)[16], who tested sigma convergence at the level of the new entrants in EU and obtained clear results in what concerns the reduction of income dispersion between economies. Also Matkowski, Próchniak (2007)[17] confirms the existence of sigma convergence among the new EU group of countries using different data sources (Groningen, UNECE or the IMF).

6.3 Testing the significance of Sigma convergence using Phillips and Sul methodology (2007, 2009)

The formula used by Phillips and Sul for testing convergence across economies is the following one:

[15] **Mihuț, Ioana Sorina**, Luțaș Mihaela, (2013), "*Testing Sigma convergence across new EU members*", IECS Sibiu, România.

[16] Ingiani A., Zdarek V (2007),"*Real convergence in the new member states: Myth or reality*" Journal of Economic Integration, 24(2), pp. 294-320.

[17] Matkowski, Z., Prochniak, M. (2004)," Real *Economic Convergence in the EU Accession Countries*" International Journal of Applied Econometrics and Quantitative Studies.

$\log(\frac{H_1}{H_t})$ - 2 log[log (t)]= a+γlog (t)+u_t, γ=2α (6.3.1)

where H_t represent the transitional relative behaviour.

Phillips and Sul argue the fact that in case of the existence of a certain degree of convergence between economies, the value of t-statistic of γ parameter will tend aimptotically towards +∞, for any given α >0 and towards a normal distribution N(0,1), for α =0. If on contrary, a divergent process between economies is confirmed (α <0), then the value of t-statistic of the estimated parameter γ will assimptotically tend towards -∞. The results obtained deterministic through the coefficient of variation are confirmed by the validation of the hypothesis of Phillips and Sul in all the investigated cases.

Table no.3 **Phillips and Sul methodology**

Country group	Variable	Coefficient	R-squared	Significance
Countries that already adopted euro (Slovenia, Slovakia, Malta, Cyprus, Estonia)	LOG (T)	151.5860	0.853932	0.0000
Countries on the path of adopting euro (Rom, Bul, Ceh, Pol, Hun, Lat, Lit)	LOG (T)	34.59912	34.59912	0.0000
All new member states (12)	LOG (T)	85.24689	85.24689	0.0000
All new member states after the exclusion of the first observations	LOG (T)	64.50311	0.905352	0.0000

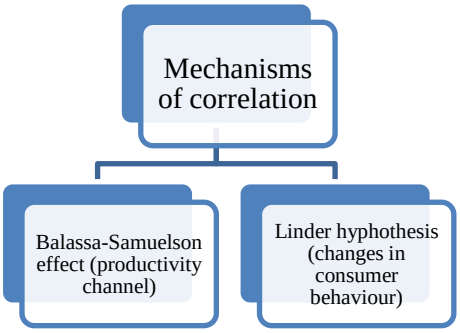
Source: Author calculation based on Worldbank data.

6.4 Interconnection between nominal an real convergence

In order to achieve an optimal level of convergence, especially concerning GDP/capita, a particular attention should be given to the mechanisms involved. Convergence, in terms of income level, often implies an increase in price level which, depending on each country's own trade regime may cause an increase in what concerns the inflation rate. (Lein et al, 2009). The process of reducing the gap between the economies is often accompanied by an increase in what concerns the price level. (Rogoff, 1996). Therefore especially at the level of new member states of European Union, the real convergence process should be regarded with great attention in relation with the future developments of the inflation rate. In the event that

price levels will continue to rise influenced by the intensification of the convergence process, it will be, at least for a short term an inflation generating source. This is especially important since some of these countries are preparing to adopt the common currency and a very important requirement in this regard, stipulated by the Maastricht convergence criteria implies maintaining price stability.

***Fig. no.5* Mechanisms of interconnection between nominal and real convergence**



Source: Authors point of view based on literature in the field.

The relationship between real and nominal convergence, respectively between the economic performance standard level measured by GDP/capita and price levels is a reciprocal one. States with low levels of GDP/capita tend to register low levels of prices and wages. With the increasing of the GDP/capita, growth will occur in terms of prices too. In theory, this relationship is influenced by a number of factors that have been previously outlined, the most relevant ones being related to the impact of tradable goods sector and the one of non-tradable goods sector. In order to empirically test this correlation, one needs to identify a relation that implies both these variables. The formula proposed to quantify this interaction is a simple one, and has been used in other studies dealing with this issue (Žďárek, 2009).

CPL_{GDP}=a+b*GDP/capita (PPS)+ε_t (6.4.1)

where $CPL_{GDP}$is the comparable level price for the variable GDP and GDP /capita (PPS) is the GDP/capita measured at the standard purchasing power parity. The variable GDP/capita is considered to be a sufficient explanatory variable in order to analyze the price dynamics across different countries. Data included in the survey are corresponding to the 12 new EU member states and the time series covers the period between 2000-2011. Both corresponding values to the GDP/capita and those referring to the comparable price level are annual, Index (EU-27 = 100), the data source being Eurostat.

Liniar regression:

NCP = 26.0727368986 + 0.613628147074*PIB_CAPITA. R^2 0,71, F-statistic 355,43.

The correlation between the comparable level of prices and the GDP/capita is quite strong in the group of analyzed countries. The regression slope of 0.61 indicates that an increase of the GDP/capita is accompanied by a generalized increase in prices. We obtained similar results with those reported by studies like the one developed by Zd'arek (2009) or Nestic, (2005). Zd'arek (2009) testing the correlation between the GDP/capita and price levels, obtained a value corresponding to the regression slope of 0.85, which indicates a high correlation between those two variable. Also a positive and highly significant relationship (a coefficient of 0,72 corresponding to the regression slope) is obtained from processing data in Nestic's research (2005) both for a group of 34 European countries and for a sample of 53 OECD and transition economies from Europe and Asia.

Summary of chapter 7 – Determinant factors of economic growth and convergence across new member states of European Union – a panel GMM approach

7.1 Used methodology

Exposing at theoretical level the determinant factors of economic growth across previous chapters constituted just the first step in developing a complex analysis related to this subject. During this chapter, the theoretical analysis will be enforced by an empirical study of the explicative variables of the convergence and economic growth across new member states, this analysis being considered a landmark in formulating some pertinent conclusion based upon real data regarding the dynamics followed by the economies of the new member states. Our model is developed starting from Mankiw, Romer and Weil model improved with a series of variables that represent in our opinion the main channels through which the information transfer takes place across new member states:

$$\Delta(lny_{i,t}) = a_0 + \beta \ln y_{i,t-1} + a_1 CF_{i,t} + a_2 CU_{i,t} + a_3 GAP_{i,t} + a_4 GDE_{i,t} + a_5 ISD_{i,t} + a_6 CHGRD1 + a_7 u_i + \varepsilon_{it}. \quad (7.1)$$

where *i* represents the country index, and *t* the time index. The variables included in the model are the following one:

- $(lny_{i,t})$ - natural logharithm of GDP/capita

- CF – a measure of physical capital (gross capital formation)
- CU – a measure of human capital (secondary education gross enrolnment)
- *GAP* - technological gap

$$Technological\ gap = \frac{GDP_{Ec.perf} - GDP_{it}}{GDP_{it}}$$

- *GDE* - degree of openess of the economy

$$GDE = \frac{\boldsymbol{I_{it+E_{it}}}}{\boldsymbol{GDP_{IT}}}$$

- *ISD* – foreign direct investments
- CHRDG1- governamental expenditures with research and developemnt
- u_i – fixed effect of time variable
- ε_{it} – random distribution

The used methodology in the estimation of the panel GMM, namely the Arellano and Bover (1995) and Blundell and Bond whose importance is recognized in the following situations:[18]

- There is a time horizon (T) not very long and a large data basis (N) very large
- There is a linear relation between variables.
- The independent variables included in the model do not fulfil the condition regarding the exogeneity, this meaning that they can be correlated with the information from the past and maybe with the current ones regarding the error term
- The included variables may include individual fixed effects.
- There is the possibility of existing heteroschedasticity between variables across individuals from that certain group but not between groups and autocorrelation.

7.2 Results panel GMM

The central elements that were considered for this research were represented by the motivation for highlighting which are the main factors that determine the intensification of the

[18] Roodman, D., (2006), " *How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata*", Center for Global Development, Working paper nr.103.

growth process across new member states. Testing different models of convergence permitted us to capture the degree of convergence across economies. Despite all that, testing the convergence hypothesis does not offers us any information regarding the factors that determine these economies to converge one another or even more importantly to register positive economic growth trends. There are at least two main arguments in favour of the validity of this model taking into consideration the theoretical consideration and also the policies adopted by these countries in order to improve the standards of performance, namely: 1) the first one refers to highlighting different aspects related to the accession experiences to European Union of the new member states; 2) the second argument consist in highlighting the main channels through which technology is assimilated within an economy.

Table no.4 **Results panel GMM**

D.pibc_log	Coef.	Std. Err	. z	P>|z|	[95% Conf.	Interval
pibc_log | LD.	-.092688	.0462395	-2.00	0.045	-.1833158	-.0020602
GDE	.0013114	.000298	-2.00	0.000	.0007274	.0018954
EDU	.002363	.0012142	4.40	0.052	-.0000168	.0047428
FBC	.0073833	.0014909	1.95	0.000	.0044612	.0103053
GAP	.1137802	.0193203	4.95	0.000	.0759131	.1516474
ISD1	5.10e-12	1.97e-12	5.89	0.009	1.25e-12	8.96e-12
CHGRD1	.0597403	.0172674	2.59	0.001	.0258968	.0935837
CONST.	-.6247845	.1339767	3.46	0.000	-.8873739	-.3621951

Source: Author calculation based upon Eurostat data.

The obtained results after performing this model are consistent with the one obtained by the neoclassical growth model, that argue in favour of absolute convergence and namely that fact that poor countries registered more rapidly growth rates, aspect quantified by the negative value associated to the coefficient of GDP/capita. Moreover, this model is an extension of the Mankiw, Romer and Weil model that includes additional variables such as human and physical capital. These results capture the fact that this group of countries register transformation and restructuration process through the assimilation of the best examples from the more developed economies. Furthermore, the value of the coefficients included in the model certify the fact that the more poor a country is, the import of the new technology will prove to be more effective on future evolutions of the economic growth rates. In the following section we will present a brief report of the main results of our research, in comparison with the ones obtained by previous studies.

The panel methodology was commonly used for testing correlations between the level of foreign direct investments and economic growth. Lee and Chang (2009)[19] concentrate their study upon the correlations between foreign direct investments, economic growth and financial development, using a sample of 37 economies and a time horizon between 1970-2002. After performing the panel causality tests, the authors obtain good results regarding the interconnections of these variables in the long term, but the influence of foreign direct investments upon economic growth is lower than the one of the financial development. The positive coefficient associated with this indicator in our case, although the recorded value is not such high is in line with others studies in the field.

If we take into consideration the influence of education upon economic growth, the recent studies that included this variable in the set of determinants were de one elaborated by Fukase (2010)[20] or Iqbal and Daly (2013)[21]. In both cases, the level of education has a positive impact upon economic growth, but the degree of significance varies, depending on the set of complementary variables, the time horizon and the group of countries included in the research. Also in our analysis, the influence of the foreign direct investments upon economic growth is a positive one, with an acceptable degree of significance. (0,052)

The degree of openness of the economy constitutes also an indicator with a positive influence upon economic growth, especially in the case of small countries that concentrates their activity upon trade. Gries and Redlin (2012)[22] taking into consideration a sample of 158 countries and a time horizon between 1970-2009 reported an extremely significant correlation over a long period of time between economic growth and degree of openness. In our analysis, the value of this coefficient is in line with the one obtained by previous studies, moreover being one of the factors with the highest degree of significance from the set of variables included in the model (0.000).

If we take into consideration the variable regarding governmental expenditures with research and development, its importance proves to be an essential one. Despite all that, there are few studies that focus upon the impact of this variable within the group of countries from Central and Eastern Europe. One possible explanation could be the fact that this group of

[19] Lee, C., Chang, C., (2009), "*FDI, financial development and economic growth: international evidence*", Journal of Applied Economics, Volume 12, Issue 2, pg.249-271.
[20] Fukase, E., (2010), "*Revisiting Linkages between Openness, Educationand Economic Growth: System GMM Approach*", Journal of Economic Integration Nr. 25(1), pg. 194-223
[21] Iqbal, N., Daly, V (2013)," *Rent seeking opportunities and economic growth in transition economies*" disponibil la www.pide.org.pk/pdf/Working%20Paper/WorkingPaper-87.pdf.
[22] Gries, T., Redlin, M. (2012), "*Trade Openness and Economic Growth: A Panel Causality Analysis*" Center for International Economics, Working Paper Series, No: 2011-06.

countries cannot afford to concentrate a high proportion of their expenditures towards supporting this sector, compared to the more developed ones, where their structure holds a significant percent. This was one of the challenges of our model. The variable regarding governmental expenditures with research and development was instrumented in relation with economic growth across the economies from Central and Eastern Europe in the study elaborated by Silaghi et al (2012)[23] whose results confirm the fact that the impact of the research development sector is very high, taking into consideration a long time horizon. In our analysis, the positive value of the coefficient along with a high degree of significance confirms the previous results, and may be used as a landmark to guide future policies of the investigated group of countries towards supporting this sector, being considered an extremely important one in relation with economic growth process.

The gross capital formation, one of the two components of the capital, according to the model developed by MRW has also a positive influence upon economic growth, aspect confirmed also by the study of Iqbal and Daly (2013).[24] Furthermore, in our model the degree of significance of coefficient of this indicator (0,000) indicates the fact that gross capital formation is a good estimator of the economic growth process.

The variable concerning the technological gap constitutes a significant determinant of economic growth. This result is in line with the neoclassical theories of economic growth that argue the fact that until they reach a common steady state, countries act as examples for each others. Despite all that, there are also few studies that reported an inverse relationship between technological gap and economic growth.[25]

Conclusions and final considerations

The harmonization of the interest of the new member states with respect the general standards imposed by the European Union constitutes a very important goal both for the national authorities but also for the supranational ones. The frequent changes that took place in the structure of the global economies constitute a good indicator for the increased dynamics of the economies. Moreover, the recession periods, although generators of imbalances, in

[23] Silaghi, M., Jude, C., Alexa, D., Litan, C., (2012), "*Do Business and public sector reasearch and development expenditures contribute to economic growth in Central and Eastern European countries? A dynamic panel estimation*", Economics Discussion paper, Nr.2, Kingston University London.
[24] Ibidem 21.
[25] Hudea, O., Stancu, S., (2012), "*Foreign direct investment, technology transfer and economic growth. A panel approach*", Romanian Journal of Economic forecasting, Vol. 2.

some cases serious ones, may be perceived as factors of progress. This aspect is argued by the need for adapting that implies the development of new policies and strategies in order to evolve. The range of efforts concentrated towards finding new solutions for restoring the balance and going behind that of achieving high levels of performance, determines in the end ***economic growth***. Taking into consideration the globalisation process, considered to be the most complex form of internalization of the economic activity, economic growth implies a high level of ***convergence*** between economies. Being the result of human progress and innovation and basing upon commercial and financial flows, economic growth implies a continuous integration of the economies. In order for this process to develop optimally, it requires a supervision and regulatory supranational system that would coordinate the activity of each state in order to establish the general policies that should be pursuit in achieving some common objectives. This role is assumed by the European Union. Over time, the impact of integration upon economic growth was highly debated.

One of the main objectives of this study was to quantify the degree of convergence between new member states of European Union. The main hypotheses were the following ones:

- Hypothesis 1: The new member states of the European Union converge one another concerning their GDP/capita level.
- Hypothesis 2: The degree of convergence between economies intensified due to the integration in the European Union and moreover to the adoption of the single currency.

The results obtained after applying different methodologies may be summarized as:

- Both Sigma and Beta convergence confirms the convergence hypothesis between economies. This convergence is more intense as is determined across the states that already adopted euro.
- Phillips and Sul methodology confirms the validity of the Sigma convergence, namely the degree of significance of the obtained values is extremely representative for the current situation of these economies.
- The overall conclusion is that the real convergence hypotheses are confirmed across this group of countries.

- Despite the fact that the results of the statistical models confirm the convergence hypotheses across new member states, we have to take into consideration that de gap between these economies and European Union or the euro zone is very high. The future strategies should be orientated towards decreasing these differences, in order for the convergence process to be a complete one.

In order to extend the analysis framework of the convergence process between the new member states of European Union, we investigated a model of quantifying the main determinants of convergence and economic growth, two complementary process whose interconnection acts in both ways. The development of this model proves to be extremely useful, in providing guidance for future policies of those countries both at theoretical but also at empirical level. Identifying those factors that contribute to intensify the degree of convergence between different economies and in the end at economic growth, allows decision actors to focus their interest upon that certain segments. Therefore, the inflow of technological progress either by increasing the research and development strategies, the degree of openness or through the channel of foreign direct investments, constitute one of the main resources of convergence and economic growth from new member states perspective. Concentrating upon the development of these sectors must be perceived as a major objective for the authorities across national economies if is considered a sustainable convergence and economic growth. This long time sustainability is also very important, due to the fact that developing some compromise solution that generate results only for a short period of time, does not constitute a success strategy, and furthermore may generate negative effects that may be felt by countries after a period of time and may trigger massive economic imbalances.

Another element of consistency of this paper, besides the parallel analysis of those two types of convergence, namely nominal and real one, is establishing some interconnections between these two concepts. For these purpose we insisted upon the main channels of interconnection, namely the Balassa - Samuelson effect and Linder hypotheses and testing at empirical level the interconnection between the comparable level of prices and the GDP/capita, the results being in favour of a significant influences of prices upon the level of GDP/capita across the new member states of EU.

The final point of this research is marked by highlighting some of the major contributions of this paper to the literature in the field but also of its limits.

Author contribution:

- Presenting the most relevant works at theoretical level regarding de determinant factors of economic growth and also regarding economic growth models;
- Establishing an evolutionary trend of the economic growth concept and highlighting the main characteristics of the convergence concept;
- Presenting the main strategies pursued by the new member states of EU in the process of adopting euro;
- Providing some interesting results regarding real convergence across these group of countries;
- Investigating the main factors generators of economic growth across new member states as well as the exposure of some measures and politics that may constitute viable sources in shaping the future development strategies by the responsible authorities.

Although the obtained results are anchored in the contemporary economies, we must state also the limits of our research namely the availability of the data concerning indicators used in modelling, for the periods previous to the reference year (1992) for that group of countries; not including some specific factors of every economy that may have an impact upon the overall evolution (social and political changes).

Taking into consideration all these aspects we highlight the fact that the current study constitutes just a starting point in developing new approaches concerning these two processes whose impact implies a wide range of areas. We mention also the extension of the current framework of analysis by including in the research sample all the states that form the European Union.

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