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Sustainability of convergence in the context of macro-prudential policies in the European Union

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**THE ROMANIAN ACADEMY
THE NATIONAL INSTITUTE OF
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WORKING PAPERS

***Sustainability of convergence in the context of
macro-prudential policies in the European Union***

Cristina Maria Triandafil

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SUSTAINABILITY OF CONVERGENCE IN THE CONTEXT OF MACRO-PRUDENTIAL POLICIES IN THE EUROPEAN UNION

CRISTINA MARIA TRIANDAFIL*

Abstract: *This postdoctoral research aimed to highlight sustainability convergence criteria in the context of financialisation, with impact on the prudential regulator. Based on complex analysis, the research work has revealed that countries in Central and Eastern Europe still face significant macroeconomic risks caused by fragile macroeconomic structures. These countries have been undergoing a catching up process that contributes to the amplification of divergence across the European Union. Being heavily dependent on external financial flows, these countries involve a high macro-prudential risk, affecting the pace of real convergence.*

Keywords: convergence, macro-prudential, sustainability, nominal and real economy

JEL: E20, E60, E51, E52

Introduction

The financial crisis revealed the paradox regarding the financial system amplitude and the financial stability. As for the extensive financial flows, which led to abundant liquidity and hence the development of sophisticated products, the *too big to fail* principle gained consistency, leading to a new philosophy regarding financial stability. According to this philosophy, a financial institution having a significant volume of assets and multiple connections at jurisdictional and system level, was perceived as strong enough in size to withstand any shocks and jeopardize financial stability.

The collapse of the Lehman Brothers highlighted the limitations of this philosophy which revealed the nature and even the paradoxical discrepancy between the two sides of the coin - amplitude versus stability. In essence, it was the unprecedented amplitude of financial system that created favorable conditions for banks to circumvent prudential regulatory framework, unveiling important weaknesses of the supervisory process which was unable to capture the weaknesses in the risk management system based mainly on internal models. Unfortunately internal models have shown a significant potential for regulatory arbitrage.

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In fact, a special emphasis was placed on the quantitative dimension of the models that led to the creation and development of innovative, but extremely complex, financial instruments that caused supervisors' failure to monitor them more strictly, and especially, to become aware of the risks involved therein at the global level.

On the other hand, the prudential regulatory framework focused mainly on the individual size of banking and financial institutions, based on the principle that institutions with a sufficient capital adequacy position at the individual level have the potential to sustain financial stability at the system level .

The objective of this research is to highlight the actual state of the financial system in correlation with the convergence process in the European Union (EU), laying special emphasis on the differences existing in the nominal and real convergence at regional level. Based on extensive studies that permitted a technical and theoretical foundation, the research has revealed the complex relationship between the financial system dynamics and the developments in the economic convergence process. Thus, Chapter 1 presents the characteristics of economic convergence in line with developments in economic theories. In this respect, the neoclassical theory of economic growth is revealed, based on the hypothetical foundations of real convergence, absolute (unconditional) convergence, conditional convergence and " club convergence " .

Based on these fundamentals, the research has revealed the economic convergence typology based on different elements, such as determining structural factors (according to which relative convergence may be classified as monetary, fiscal or institutional).

The link between convergence and the financial system was shown particularly through real convergence which encompasses the objective of the financialisation process; in essence, financialization involved the development of the banking system in order to support real economy. The essential contribution of this research was to reveal the paradox implied by the modern financial theory, which placed a special focus on the importance of the financial system evolution. Chapters 3 and 6 focused on the mutations in the economic convergence, under the impact of the financial turmoil and, consequently, of the new prudential regulations; in essence, the research has shown the migration of convergence indicators to a wide opposite referential that is firmly anchored in the concept of divergence criteria.

The project addressed the dynamics of economic convergence in terms of causes and implications of economic, financial, social and regulatory nature. The fourth chapter highlights the relationship between financialization and economic convergence in the European Union. The

financial system has been analyzed on this basis of the growth recorded over the last ten years and the specific components involved. The research approach was complex, focused both on the financial system as a whole and on its dimensions - banking, equity market, bond market, money market. A special emphasis was put on real convergence, reflected in the real GDP growth, in order to reveal how the GDP reacts to the impulse of the financial system components.

In essence, as regards the convergence process, the research has shown the balance between the nominal and the real economy, with a special focus on macroeconomic stability implications. The recent financial turmoil revealed that financial flows are of disparate magnitude in comparison with the real economy; even if the real economy shows a contraction, the nominal economy can develop in the context of extensive development of a financial system component. For example, bond issues supported significantly the need for funding in the context of the financial imbalances, thereby increasing financial system share in the GDP.

Operationally, the research included a strong empirical side, reflected in the construction of a complex set of indicators to reveal the mix of the two types of convergence, as well as the mix between financial and real economy. Chapter 2 has shows the high level of discrepancies between the monetary and financial system and the real economy in these countries, which divergence ultimately affects the benefits foreshadowed by the economic and monetary union. The dynamic analysis of these indicators has highlighted the importance of appropriate economic policies at EU level in order to strengthen their macroeconomic stability and to stimulate the macro-prudential risk reduction.

Chapter 6, in order to deepen the relationship between convergence and macro-prudential policies, reveals how the financial system development might explain the differences in nominal convergence at regional level. In this respect, based on previous research, we constructed different groups of countries, given the similarity degree of nominal convergence. In order to assess the level of financial stability in the EU, three indices were constructed by aggregating several indicators reflecting the characteristics of the financial system as well as the characteristics of the nominal and the real convergence. The financial stability index of the Euro Area captured less extensive dynamics, since changes were smaller.

An interesting aspect was the fact that in Central and Eastern Europe the index recorded an upward dynamics, in opposition to the Euro Area, where the dynamics was totally opposite. In the CEE countries, the

dynamics of the financial stability index is heterogenous; except for Poland and Romania, which showed a similar trajectory, the other countries showed various dynamics.

As regards the other two indices, the analysis has revealed some peculiarities of the correlation between the nominal and the real convergence. As for the indices computed for the two regions – Euro Area versus non-euro CEE countries, the research has shown that the two processes exhibited a similar trend.

As for solutions, Chapters 2 and 3 reveal the necessity to create some composite economic convergence indicators and to restructure the prudential regulatory framework in order to ensure financial stability as well as real economic growth.

From the perspective of the multi-disciplinary implications, the results of this research are important both in economic and financial terms since they shed light on the management of potential risks spread by subsequent developments in the convergence process at the EU level; apart from that, the research is relevant for identifying macro-prudential policies that aim to enhance real convergence. In this respect, the project reveals the need to ensure a balanced regulatory framework, enabling both the lending of real economy as well as the construction of premises for sound financial system dynamic.

1. General convergence. Definitions, classification systems, reflections in literature

1.1. Theories of economic convergence

In literature, economic convergence is defined as a process that facilitates closing the gaps between countries at different development levels. In this regard, two types of convergence have been revealed: nominal and real. Nominal convergence encompasses the dynamics of several indicators (inflation, interest rate, exchange rate, budget deficit, public debt) within the limits imposed by the Maastricht Treaty¹ considered as optimal for the euro adoption. Real convergence is a process oriented towards the standardization of the living standard in emerging and developed countries, reflected in the similarity of the output, income, employment rate or productivity. In general, the degree of real convergence is reflected in the GDP per capita expressed in terms of purchasing power parity, as well as in other indicators correlated with the level of economic development, competitiveness and labor market.

The neoclassical growth theory points out that economies characterized by the same production function will reach the same level of development, regardless of their initial position. From this perspective, three hypotheses on real convergence have been considered:

- Absolute convergence hypothesis (unconditional) - income per capita in various countries converges in the long run regardless of their the initial conditions;
- Conditional convergence hypothesis - income per capita in countries that have the same fundamental structure converges irrespective of initial conditions. This type of convergence occurs in the context of a negative correlation between GDP growth and initial GDP;

¹ Reference values provided by the Maastricht Treaty signed in 1992 and enforced in 1993:

- Average inflation rate during one year should not exceed by more than 1.5% the average of the inflation rate in the three most performing Member States which have had the best results in the price stability;
- The share of the budget deficit in GDP should not exceed 3% at the end of the previous fiscal year;
- The share of the public debt in GDP should not exceed 60% at the end of the previous fiscal year;
- Participation in the ERM, i.e. an MS is obliged to comply with the fluctuation margins (+/-15% in comparison with the single currency);
- The average long-term interest rate should not exceed by more than 2% the interest rate in the three most performing Member States.

- Convergence club hypothesis - income per capita in countries that have similar basic structures converges in the long run, if initial conditions are similar.

Based on these assumptions, two types of real convergence were defined:

- β - convergence shows that on long term, on the context of absolute convergence hypothesis, poor economies tend to grow faster than the rich economies, and in the context of conditional convergence hypothesis, the same phenomenon is dependent on its determinants;

- σ - convergence shows a decreasing variation in income per capita in a group of countries.

Several researches have revealed that real convergence process is impacted by an assembly of determinant factors such as saving rate or population growth that determine a reduction in structural disparities between different countries or regions, favoring catching-up. Recent researches (Cavallero, 2010) have revealed that not only the international convergence is particularly important, but also the inter-regional convergence, especially in the new Member States. In this respect, literature (Mink et al., 2007) revealed that between the 50s and 70s, there was a mitigation of regional disparities, while during the 70s and 80s there was a regional divergence and, thereafter, in the 90s there was an increasing economic convergence, with the exception of the early period, marked by the unification of the two parts of Germany.

Researches in the '90s (Valdes, 1999) have frequently pointed out that in time nominal convergence generates real convergence owing to macroeconomic stability achieved through price stability, fiscal discipline or stimulation of investment and international trade, all these vectors favoring economic growth.

Empirical tests in literature revealed a high degree of heterogeneity of results; consequently, it was not possible to draw clear conclusions regarding the progress of convergence in the emerging and developed countries. Thus, it was noted that during different periods of time, emerging countries have made important progress in catching up with developed countries (Angeloni and Ehrmann, 2004); in other cases, there was a notable trend in real convergence, emerging countries exhibiting a more accelerated convergence than initially expected (Aguiar and Soares, 2009). From this perspective, some countries that have seen major developments in real convergence continue to progress, while in other countries there are widening disparities in relation to developed countries.

Empirical tests conducted in numerous studies (Melitz and Ottaviano, 2005) have shown that it is necessary to take into account other factors (institutional, educational ones) to explain the process of convergence. From this perspective, several research approaches have brought in a typology of economic convergence (Hanusch and Balz, (2004)):

- Monetary convergence reflected in the dynamics of inflation, interest rate or exchange rate.
- Fiscal convergence reflected in the evolution of fiscal deficit, public debt or external debt.
- Real (absolute) convergence reflected in the evolution of GDP per capita, unemployment or international trade.
- Institutional convergence reflected in the evolution of some special indicators developed in this respect², and in the stage of the *acquis communautaire* implementation.

Barro and Sala-i-Martin (1995) have shown the existence, alongside with absolute convergence, of conditional convergence that, once achieving similar levels of development in structural terms, triggers a certain similarity of the variables reflecting the real economy, i.e. GDP per capita. Convergence in the European Union was achieved in a process of integration, characterized by a gradual expansion from the initial core of six countries in 1958 to twenty-seven countries currently. This integration process was originally developed around a single market and a customs union, and later it was completed within an economic and monetary union. Moreover, the EMU is perceived as a mechanism that encourages real convergence, which, in optimum currency areas, help mitigate the effects of the economic shocks.

1.2. Models of economic convergence

Literature has often revealed differences between real and nominal convergence (De Grauwe P., 2007). According to the theory of purchasing power parity, the price of tradable goods in different countries should be the same in the long run; any differences are generated by non-tradable goods prices, labor productivity or transaction costs. Marelli (2007) revealed that these differences can be attributed to the discrepancy between the nominal and the real convergence, as well as to different economic structures and adjustment mechanisms.

² The European Bank for Reconstruction and Development has elaborated an index by which institutional convergence is assessed. This index is based on the legal framework, the banking system, trade liberalization and openness to the external market.

1.2.1. Neo-classical model

The neoclassical model, developed by Solow (1956, 1967), was an essential step in building a formal model of economic growth. This model dates back to the mid-1950s, and was founded by Robert Solow. Using a set of basic assumptions, Solow showed that long-term economy tends to a steady state characterized by continuous growth in production. The Solow model is based on several of simplifying assumptions:

- a) saving rate and growth rate of labor force are exogenous and constant;
- b) economy is in a steady state (characterized by full employment of labor);
- c) production is based on two fundamental factors - labor and capital; the way they might be combined is determined by a neoclassical production function.

Implications of the neoclassical model

A fundamental implication of the Solow model is the phenomenon of economic convergence, defined in the literature as a process of catching-up occurred in economies with low levels of income per capita relative to economies with high levels. The neoclassical model assumes that poor countries will close the gaps with rich countries, and per capita output as well as the economic growth rate will reach the same level at the end of a certain period of time. This prediction is conditioned on the assumption that economies are identical in all respects except for their initial level of output per capita. The model assumes that economies have identical production technologies, similar saving rates and institutional frameworks (e.g. similar legal systems).

According to the neoclassical model, the production per capita converges because of decreasing marginal returns on capital. The model assumes that an economy with a lower level of capital per capita will have a higher return on capital. Therefore, a poor country should have a higher marginal efficiency of capital than a rich country because, by definition, it has lower levels of output and capital per capita. Thus, if two countries have the same saving rate, the poorer country will grow faster than the richer country because each monetary unit of additional investment will produce more goods and services. The model also predicts that investment in a poor

country will exceed the savings, because the high rate of return on physical capital will attract investment flows from rich countries, speeding up convergence. Relaxing the hypothesis that economies at different levels of development have identical production structures produces another source of convergence. The technology transfer from industrialized countries to developing countries may determine the latter to grow faster. The neoclassical growth model relates this to technological progress.

Limitations of the neoclassical model

Analysts consider that the first limitation of the neoclassical model consists in designing technological progress as a single factor in stimulating the production per capita, ignoring the dynamics of other determining variables. Second, the neoclassical model provides only a rudimentary framework for analyzing the effects of government policy on economic growth, ignoring how these policies can influence the growth rate of output per capita (except for policies covering technological progress).

Third, the model is limitative in terms of variables that can capture the effect of international flows on economic growth. Numerous studies have shown that countries oriented towards export tend to grow faster than those that adopt a more protectionist system.

Further developments of the neoclassical model

To overcome the limiting aspects of the neoclassical model, followers of the New Growth Theories have improved the Solow model, revamping some of the assumptions, particularly the migration from constant returns to increasing scale returns and assimilation of technological progress as an endogenous factor. Thus, the '80s marked a new paradigm in building models addressing economic growth, characterized by the following steps:

- endogenization of variables (mainly technological progress);
- extension of the basic models to multi-sector models;
- integration of a more complex set of production factors in developed models;
- accounting for externalities, economies of scale and monopolistic market structure. Subsequently, endogenous growth models (Romer, 1986; Grossman and Helpman, 1994; Lucas, 1998) have shown that technology has a key role in increasing productivity, emphasizing the importance of cross-border dispersion of technological progress and policies for research and development expenditures (see Table 1.1).

Table 1.1

Characteristics of economic growth

ECONOMIC GROWTH MODEL	ESSENTIAL DETERMINANT FACTOR FOR ECONOMIC GROWTH	ENDOGENOUS DIMENSION OF GROWTH	CONVERGENCE/DIVERGENCE	
			Growth rate	Income level
Harrod-Domar	Investment in physical capital	Yes	Conditional neutrality	Conditional divergence
Solow	Investment in physical capital	No	Unconditional convergence	Conditional divergence
Endogenous technological progress	Allocation of human capital among sectors, investment in physical capital	Yes	Conditional divergence	Conditional divergence
Human capital model	Investment in physical and human capital	Yes	Conditional neutrality	Conditional divergence
Technological externalities model	Investment in physical capital and <i>learning by doing</i>	Yes	Conditional divergence	Conditional divergence

Source: Staicu, G. and L. C. Moraru. (2006), Endogenous growth paradigm. Implications concerning economic and political theories, *Theoretical and Applied Economics*, vol.10 (6).

Baumol (1986) found that poorer economies record a stronger economic growth than developed countries, and therefore, differences in income per capita will disappear. In the 70's, there were disparities in economic growth, which were particularly accelerated in Asia in comparison with other regions. Fidrmuc and Korhonen (2006) showed that growth was particularly high in China, Malaysia and Thailand in the 90's, unlike the Middle East countries that have experienced low economic growth.

These disparities were explained as follows:

- lack of a homogeneous framework of government policies, legal system and democratic principles;
- significant differences observed in the external factors. A number of countries were affected by significant restructuring of international trade policies, macroeconomic policies and political regimes;
- varying degrees of natural resource endowment;

- diversity of economic structures characterized by different production structures, varying levels of productivity, labor employment and competitiveness;
- significant differences in the labor market structure.

Recent developments in the macroeconomic situation of the Central and Eastern Europe countries have highlighted the limited nature of nominal convergence criteria. From this perspective, a series of contradictions between these criteria were observed. On the one hand, a rigorous control on inflation often involves an increase in the interest rate and a subsequent exchange rate appreciation, which may lead to violation of the nominal convergence criteria.

On the other hand, the lower interest rate results in increasing inflationary pressures. In 1997, Lewis and Staehr pointed some problematic issues concerning the convergence criteria. Setting the reference value for the inflation rate causes significant problems to the EU enlargement; the integration of other countries led to decrease in the reference value. Thus the compliance with the reference value becomes increasingly difficult for Member States.

Dobrinsky (2006) and Lewis (2007) showed that the last two enlargements led to lower reference values. According to Jonas (2006), a unique reference value for the whole EU27 is not appropriate and it is more relevant to establish two benchmarks, tailored to the stage of the economic cycle, i.e. a benchmark for countries that experience periods of overheating economy and a benchmark for other countries in the descending phase of the economic cycle. Busetti et al. (2006) emphasized that establishing a baseline inflation with reference to the three best performing countries in this area may lead to a situation where a country is included in the assembly containing the most advanced countries in the field, but at the same time may not meet the convergence criteria.

Current literature on the relationship between the nominal and the real convergence in the newly integrated European Union countries includes a series of investigations which revealed major disparities both at inter-regional and intra-regional level. Răileanu-Szeles and Marinescu (2010) showed the eclectic nature of the researches conducted on this topic, many of them standing out by conflicting value judgments. In essence, most of the countries that joined the EU within the recent waves have exhibited a common substratum in the path they followed; over a long period, they faced a communist regime with a centralized economy in which free enterprise was virtually nonexistent. After the collapse of the regime,

countries experienced the transition to a market economy after the accession to the European Union, completed in different stages.

Beginning in 2000, various studies have been prepared regarding the stage of the nominal and the real convergence in the Central and Eastern European countries. Initially, the findings confirmed a positive relationship between the two types of convergence, namely Bergs (2000), Bjorksten (2001) revealed that the compliance with nominal convergence criteria lead in time to real convergence.

Barrientos (2007) illustrated the relationship between the two processes of convergence under the impact of the temporal dimension:

- On long term, real convergence leads to lower structural differences between countries, mitigating disparities.
- On short term, real convergence determines more symmetrical shocks, reflected in the similarity of reactions to shocks given by variables representing the real economy.

Egert et al, (2006) show that in the monetary union shock effects depend on their degree of asymmetry, while asymmetry is explained in the light of different economic structures. A fundamental aspect of the research was the identification of the timing for the euro adoption; some authors believe that integration in the Euro Area should be done only if the real and nominal convergence criteria are observed, even if the period is longer, affecting the speed of the convergence process; other authors consider that the earliest possible integration generates a reduction in disparities between developed and emerging markets.

Kocenda (2005) reveals a similar GDP per capita in terms of dynamic, which reflects an effective convergence of the real economy; as for the nominal economy, the author showed a sustained convergence process having a foreground fiscal and monetary dimension, as revealed by the interest rate. Lein-Ruprecht et al, (2007) revealed that real convergence generates multiple structural changes while leading to enhanced productivity, higher level of labour qualification and international trade flows. Lee et al, (2004) emphasized, moreover, important contribution of the economy openness to GDP per capita.

Pecican (2009) found a high degree of divergence in the European Union, especially from the perspective of less developed countries; GDP per capita in the last 10 years reflected a very poor convergence at the EU level. Dobrescu (2004), Iancu (2009) emphasized the counteraction of two trends: the convergence of old Member States' economies, as opposed to the divergence caused by the integration of new Member States, which is

characterized by levels of development located mainly at the lower level of the classification hierarchy and less to the median one.

Pecican (2009) found a significant departure of Romania from the average level of development in the European Union for the period 1999-2007; only if Romania is to maintain an economic growth rate around 10 %, it would reach the EU average in the next 15-20 years. Unfortunately, the recent financial crisis jeopardizes the change to produce or to maintain this growth rate, creating real obstacles to the acceleration of convergence.

Iancu (2009) found that the group of 10 countries that joined the EU in 2004 reached a higher level of convergence in comparison to the other EU countries; in addition, differences between these countries in the living standard proved to be relatively low and therefore the degree of convergence between these countries in real terms is much higher than the convergence expressed in nominal terms.

Literature on convergence in the Central and Eastern European countries showed the Balassa-Samuelson (BS) effect, reflected in the correlation between productivity growth and inflation; according to the BS theory, an emerging country with a fast-productivity growth is likely to experience a more rapid convergence of productivity levels in the tradable goods sector than in the non-tradable goods sector. While high productivity stimulates wage increase in the sector and ensures workforce mobility, wage growth occurs gradually in other sectors as well, determining the propagation of this phenomenon in the general price level.

Altăr et al. (2009) highlighted the impact of the Balassa-Samuelson effect on the appreciation of the real exchange rate in Romania for the period 1995-2004; this finding is similar to the research conducted by Halpern and Wyplosz (2001), who measured, based on panel data, an average appreciation of the real "equilibrium" exchange rate of 3% per year.

In general, research revealed a BS effect in the CEE countries; Lein-Ruprecht et al. (2007) showed that this effect mitigates under the impact of the economy openness.

Most of the research conducted so far in the economic convergence area was quite complex; the focus was placed mainly on various phenomena, such as the Balassa-Samuelson effect, considered to support the convergence process. Many studies have focused on the rate at which convergence occurred at various regional levels, as well as on structural factors that caused global disparities (Rinaldi-Larribe (2008), Marelli and Signorelli (2010b), Foster and Stehrer (2007)). However, current analysis of the reference literature does not provide any perspective on the impact

exerted by the financial component on the convergence process, especially in case of the CEE countries. The relationship between convergence and financialisation was poorly treated in the recent research, being confined mainly to an individual-level approach to the two processes; in addition, numerous studies have mostly focused on the process of financialisation, especially on its effect on macroeconomic stability (Gerdesmeier, 2009; Holly and Raissa, 2009; Goodhart and Persaud, 2008).

The methodological framework has no operational dimension designed to support the close relationship between the dynamics of convergence and financialisation. In order to overcome these limiting issues, the current research aims to highlight the link between economic convergence and financialisation; the emphasis is placed on macro-prudential policies, perceived as an element of connection between the two processes. Sustainability of the convergence process is analyzed in terms of characteristics of convergence and later, the stress is placed on the characterization of the macro-financial system in parallel with the two sides of convergence - nominal and real.

2. Analysis of convergence in the European Union

2.1. Assessment of convergence indicators at the EU level

In order to create an economic and monetary union, the Maastricht Treaty introduced an assembly of criteria to assess the ability of countries to join the euro area as fundamental parts of the nominal convergence. Nominal convergence criteria are related to a set of policies - financial, monetary, currency, fiscal and macro-financial architecture - for the nations becoming members of the Euro Area.

In essence, the convergence criteria consist of a series of macroeconomic indicators calibrated to specific reference levels considered to be sustainable for a stable macroeconomic environment.

Reference values for the analyzed indicators:

- 1.5% above the average of the three best performing states recorded over the last two years as regards the inflation rate;
- 2% above the average of the three best performing states recorded over the last two years as regards the interest rate;
- 3% share of GDP as regards budget deficit;
- 60% share of GDP as regards public debt.

Nominal convergence indicators are analyzed for the 2000-2010 period at the EU level. The analysis focuses on a comparative perspective on the actual values of the macroeconomic indicators recorded in EU countries in relation to the reference values of these indicators.

As for the inflation rate, we notice that it involves a dynamics of reference values divided into two sub-periods:

- 2000-2006, when the reference value fluctuates, reaching a 3.1% peak in 2001 and a minimum of 2.2 % in 2004. During this period, the reference value varied from one year to another.
- Since 2006, the inflation reference rate constantly decreased from 2.9% to 1.1% in 2010. Prior to 2006, the inflation reference value increased from 2.5% in 2005 to 2.9% in 2006. This dynamic path of inflation reflects the positive macroeconomic developments in the EU before 2006, while the financial crisis caused deflation.

Once a gradual lowering of the reference values corresponding to the inflation rate occurred, the capacity of the Member States to join the defined limits of this indicator is reduced. Thus, if during the 2000-2006 period, Austria, Finland, Luxembourg, Denmark, Sweden recorded values of the inflation rate lower than the reference levels, since 2007 the actual amounts recorded for this indicator have been above the threshold.

However, in the Euro Area, we see a stronger convergence of the inflation rates; average inflation in the euro area is below the reference value, which reflects the performance in this respect of the states to mitigate regional disparities caused by other countries, which had an inflation rate above the reference value.

This is remarkable in the EU 27 as well, highlighting the ability to absorb negative effects caused by important differing values recorded by this indicator in some countries due to the power of convergence of other important countries. A higher degree of convergence is reflected in the rate of interest. Reference values have declined almost constantly from 2000 to 2010.

Indicators that show the highest degree of divergence derive from the fiscal area. The actual share of the budget deficit and public debt to GDP is moving away from the reference value as the time of financial crisis is approaching, i.e. 2006-2007. Of the two indicators specific to the fiscal convergence, the budget deficit is the most divergent.

As for the **inflationary pressures**, Belgium and Denmark have failed to observe the reference values during the recent years (4.5%, 3.6% and 2.4% and 2%, as compared to 2% and 1%). Germany boasts a high degree of discipline in terms of convergence rate of inflation during the analyzed period, only in 2008 and 2010, respectively, it exceeded the reference value by an extremely low value (2.8% and 1.1% compared with 2.5% and 1.1%). Another country with a high degree of alignment to the reference values of inflation is France. In 2000-2007, the actual values of inflation stood always below the reference; because of the imbalances triggered by the financial crisis, the values of this indicator are above the reference level (3.1% and 1.7% compared to 2.5% and 1%). In 2009, inflation was 0%, showing a deflationary process.

As regards Ireland, during 2000-2003, inflation exceeded the reference value permanently, while during 2004-2007, we note a tendency of indicators to attain levels below the reference value. The outbreak of the financial turmoil caused reappearance of inflation values above or just below the reference level in 2008-2010 (3%, -2.3% and -1.5% compared to 2.5%, 1.6% and 1%). Negative values reflect a real process with deflationary effects on the macroeconomic environment. The same trajectory of inflation is noticed in Italy, Austria, Luxembourg, Sweden and the Great Britain, meaning that there is a high process of convergence until 2006, while subsequently a significant slippage - reflected in the departure from the baseline - intervened.

Greece and Spain distinguished by the highest level of indiscipline in the rate of inflation over ten years (2000-2010), since the countries were unable to control the inflationary process in order to keep values below the reference ones; during the last two years, the indicators have been close to the reference values due to deflation.

Table 2.1

Dynamic of the inflation rate in the EU, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	2.3	2.8	2.5	2.0	2.1	2.2	2.3	2.3	3.6	0.8	1.9
Euro 17	2.2	2.4	2.2	2.0	2.0	2.1	2.2	2.1	3.3	0.1	1.5
Belgium	2.7	2.4	1.5	1.4	1.8	2.5	2.4	1.7	4.5	-0.1	2.4
Bulgaria	10.7	7.7	4.9	2.3	5.2	6.0	5.3	8.0	12.1	1.8	1.9
Czech R.	4.30	4.7	1.4	-0.2	2.5	1.6	2.2	2.2	5.9	0.0	0.9
Denmark	2.8	2.3	2.5	2.2	1.2	1.7	1.9	1.7	3.6	1.0	2.0
Germany	1.4	1.9	1.2	0.9	1.5	1.6	1.7	2.2	2.8	0.1	1.1
Estonia	3.1	5.5	3.8	1.2	3.1	4.1	4.5	7.0	10.1	-0.8	2.6
Ireland	4.6	4.1	4.6	3.5	2.2	2.3	2.8	2.6	3.0	-2.3	-1.5
Greece	2.9	3.5	3.8	3.4	2.9	3.6	3.2	2.8	4.3	1.2	4.2
Spain	3.5	2.8	3.5	3.1	3.0	3.3	3.6	2.7	4.1	-0.5	1.8
France	1.8	1.7	1.8	1.9	1.8	2.0	2.0	1.6	3.1	0.0	1.7
Italy	2.6	2.4	2.6	2.7	2.1	2.0	2.1	2.0	3.5	0.7	1.6
Cyprus	4.8	1.9	2.5	3.4	1.6	2.1	2.3	2.2	4.5	0.1	2.6
Latvia	2.4	2.5	1.9	3.0	6.2	7.1	6.5	9.8	13.7	2.0	-1.6
Lithuania	2.0	1.7	0.2	-1.5	1.0	2.9	4.1	5.8	10.8	3.2	0.2
Luxembourg	3.8	2.2	1.6	2.0	2.7	3.3	2.9	2.4	3.8	-0.6	2.7
Hungary	5.50	5.30	5.0	4.2	6.4	3.5	4.0	8.0	6.1	3.7	4.4
Malta	2.7	2.4	2.3	1.9	2.2	2.6	2.7	0.7	4.8	1.8	1.9
Netherlands	2.3	5.0	3.8	2.2	1.2	1.4	1.6	1.6	2.1	0.7	0.8
Austria	2.0	2.3	1.6	1.2	2.0	2.0	1.7	2.2	3.2	0.4	1.7
Poland	10.2	5.4	1.9	0.9	3.7	2.1	1.2	2.6	3.9	3.4	2.3
Portugal	2.9	4.4	3.7	3.2	2.5	2.1	2.8	2.3	2.5	-1.0	1.3
Romania	45,7	34,5	22,7	14,9	11,6	8,9	5,9	4,3	7,8	4,5	5,5
Slovenia	8.3	8.6	7.1	5.3	3.6	2.4	2.5	3.6	5.7	0.6	1.8
Slovakia	12.3	7.4	3.1	8.2	7.4	3.0	4.3	1.7	3.9	0.5	0.4
Finland	2.9	2.7	2.1	1.3	0.9	0.9	1.2	1.6	3.8	1.2	1.5
Sweden	1.3	2.8	2.0	2.4	1.0	0.9	1.5	1.4	3.1	1.9	1.9
UK	0.5	1.1	1.2	1.3	1.2	1.9	2.3	2.2	3.5	2.0	3.0

Source: Own computations based on the data extracted from www.eurostat.org.

Table 2.2

Dynamic of the budget deficit share in GDP in the EU, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	0.6	-1.4	-2.5	-3.1	-2.9	-2.5	-1.5	-0.9	-2.4	-6.8	-6.4
Euro 17	0.0	-1.9	-2.6	-3.1	-2.9	-2.5	-1.4	-0.7	-2.0	-6.3	-6.0
Belgium	0.0	0.4	-0.1	-0.1	-0.3	-2.7	0.1	-0.3	-1.3	-5.9	-4.1
Bulgaria	-0.5	1.1	-1.2	-0.4	1.8	1.0	1.9	1.1	1.7	-4.7	-3.2
Czech R.	-3.7	-5.6	-6.8	-6.6	-3.0	-3.6	-2.6	-0.7	-2.7	-5.9	-4.7
Denmark	2.3	1.5	0.4	0.1	2.1	5.2	5.2	4.8	3.2	-2.7	-2.7
Germany	1.3	-2.8	-3.7	-4.0	-3.8	-3.3	-1.6	0.3	0.1	-3.0	-3.3
Estonia	-0.2	-0.1	0.3	1.7	1.6	1.6	2.4	2.5	-2.8	-1.7	0.1
Ireland	4.7	0.9	-0.4	0.4	1.4	1.6	2.9	0.1	-7.3	-14.3	-32.4
Greece	-3.7	-4.5	-4.8	-5.6	-7.5	-5.2	-5.7	-6.4	-9.8	-15.4	-10.5
Spain	-1.0	-0.6	-0.5	-0.2	-0.3	1.0	2.0	1.9	-4.2	-11.1	-9.2
France	-1.5	-1.5	-3.1	-4.1	-3.6	-2.9	-2.3	-2.7	-3.3	-7.5	-7.0
Italy	-0.8	-3.1	-2.9	-3.5	-3.5	-4.3	-3.4	-1.5	-2.7	-5.4	-4.6
Cyprus	-2.3	-2.2	-4.4	-6.5	-4.1	-2.4	-1.2	3.4	0.9	-6.0	-5.3
Latvia	-2.8	-1.9	-2.3	-1.6	-1.0	-0.4	-0.5	-0.3	-4.2	-9.7	-7.7
Lithuania	-3.2	-3.6	-1.9	-1.3	-1.5	-0.5	-0.4	-1.0	-3.3	-9.5	-7.1
Luxembourg	6.0	6.1	2.1	0.5	-1.1	0.0	1.4	3.7	3.0	-0.9	-1.7
Hungary	-3.0	-4.0	-8.9	-7.2	-6.4	-7.9	-9.3	-5.0	-3.7	-4.5	-4.2
Malta	-6.2	-6.4	-5.5	-9.9	-4.7	-2.9	-2.8	-2.4	-4.5	-3.7	-3.6
Netherlands	2.0	-0.2	-2.1	-3.1	-1.7	-0.3	0.5	0.2	0.6	-5.5	-5.4
Austria	-1.7	0.0	-0.7	-1.5	-4.5	-1.7	-1.6	-0.9	-0.9	-4.1	-4.6
Poland	-3.0	-5.3	-5.0	-6.2	-5.4	-4.1	-3.6	-1.9	-3.7	-7.3	-7.9
Portugal	-2.9	-4.3	-2.9	-3.0	-3.4	-5.9	-4.1	-3.1	-3.5	-10.1	-9.1
Romania	-4.7	-3.5	-2.0	-1.5	-1.2	-1.2	-2.2	-2.6	-5.7	-8.5	-6.4
Slovenia	-3.7	-4.0	-2.5	-2.7	-2.3	-1.5	-1.4	-0.1	-1.8	-6.0	-5.6
Slovakia	-12.3	-6.5	-8.2	-2.8	-2.4	-2.8	-3.2	-1.8	-2.1	-8.0	-7.9
Finland	6.8	5.0	4.0	2.4	2.3	2.7	4.0	5.2	4.2	-2.6	-2.5
Sweden	3.6	1.5	-1.3	-1.0	0.6	2.2	2.3	3.6	2.2	-0.7	0.0
UK	3.6	0.5	-2.1	-3.4	-3.4	-3.4	-2.7	-2.7	-5.0	-11.4	-10.4

Source: Own computations based on the data from www.eurostat.org.com.

Portugal is characterized by a different path of inflation; if during the 2000-2004 period, the actual value of the indicator was below the benchmark, 2005 marked the beginning of an imbalance in the capacity of the Member State to fulfill the convergence criteria related to inflation.

With regard to **budgetary discipline**, Germany has evolved to balance the budget deficits within the limits imposed by the convergence criterion, except the years of 2002, 2003 and 2010 when the share of the budget deficit in GDP reached values of 3.7%, 4% and 3.3%; during the other years the effective deficit was below 3% of GDP. However, as regards the fiscal rigour, Denmark is ranked first for the period under review, as the budget balance was predominantly positive, except the last two years (2009, 2010), when the deficit was below the threshold (2.7%).

Table 2.3

Dynamics of the public debt share in GDP in the EU, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	61.9	61.0	60.4	61.8	62.2	62.8	61.5	59.0	62.3	74.4	80.0
Euro 17	69.1	68.1	67.9	69.0	69.5	70.0	68.4	66.2	69.9	79.3	85.1
Belgium	107.9	106.6	103.5	98.5	94.2	92.1	88.1	84.2	89.6	96.2	96.8
Bulgaria	72.5	66.0	52.4	44.4	37.0	27.5	21.6	17.2	13.7	14.6	16.2
Czech R.	18.5	24.9	28.2	29.8	30.1	29.7	29.4	29.0	30.0	35.3	38.5
Denmark	52.4	49.6	49.5	47.2	45.1	37.8	32.1	27.5	34.5	41.8	43.6
Germany	59.7	58.8	60.4	63.9	65.8	68.0	67.6	64.9	66.3	73.5	83.2
Estonia	5.1	4.8	5.7	5.6	5.0	4.6	4.4	3.7	4.6	7.2	6.6
Ireland	37.8	35.5	32.1	30.9	29.6	27.4	24.8	25.0	44.4	65.6	96.2
Greece	103.4	103.7	101.7	97.4	98.6	100.0	106.1	105.4	110.7	127.1	142.8
Spain	59.3	55.5	52.5	48.7	46.2	43.0	39.6	36.1	39.8	53.3	60.1
France	57.3	56.9	58.8	62.9	64.9	66.4	63.7	63.9	67.7	78.3	81.7
Italy	109.2	108.8	105.7	104.4	103.9	105.9	106.6	103.6	106.3	116.1	119.0
Cyprus	58.8	60.7	64.6	68.9	70.2	69.1	64.6	58.3	48.3	58.0	60.8
Latvia	12.3	14.0	13.5	14.6	14.9	12.4	10.7	9.0	19.7	36.7	44.7
Lithuania	23.7	23.1	22.3	21.1	19.4	18.4	18.0	16.9	15.6	29.5	38.2
Luxembourg	6.2	6.3	6.3	6.1	6.3	6.1	6.7	6.7	13.6	14.6	18.4
Hungary	54.9	52.0	55.6	58.3	59.1	61.8	65.7	66.1	72.3	78.4	80.2
Malta	55.9	62.1	60.1	69.3	72.4	69.6	64.2	62.0	61.5	67.6	68.0
Netherlands	53.8	50.7	50.5	52.0	52.4	51.8	47.4	45.3	58.2	60.8	62.7

Austria	66.5	67.3	66.7	65.8	65.2	64.6	62.8	60.7	63.8	69.6	72.3
Poland	36.8	37.6	42.2	47.1	45.7	47.1	47.7	45.0	47.1	50.9	55.0
Portugal	48.5	51.2	53.8	55.9	57.6	62.8	63.9	68.3	71.6	83.0	93.0
Romania	22.5	25.7	24.9	21.5	18.7	15.8	12.4	12.6	13.4	23.6	30.8
Slovenia	:	26.7	27.9	27.3	27.4	26.7	26.4	23.1	21.9	35.2	38.0
Slovakia	50.3	48.9	43.4	42.4	41.5	34.2	30.5	29.6	27.8	35.4	41.0
Finland	43.8	42.5	41.5	44.5	44.4	41.7	39.7	35.2	34.1	43.8	48.4
Sweden	53.9	54.7	52.5	51.7	50.3	50.4	45.0	40.2	38.8	42.8	39.8
UK	41.0	37.7	37.5	39.0	40.9	42.5	43.4	44.5	54.4	69.6	80.0

Source: Own computations based on the data from www.eurostat.org.com.

The financial crisis generated a swelling budget deficit to GDP ratio; while during the 2000-2007 period, France, Italy, Luxembourg, the Netherlands, the UK and even Portugal effectively managed public finance, being able to maintain a positive budget balance or slightly negative - below the limit imposed by the convergence criteria, with the financial crisis, budget deficit to GDP ratio increased significantly, reaching alarming levels above 7% of GDP for France (7%), Spain (9.2 %), Portugal (9.1%) or the UK (10.4%).

Nevertheless, in terms of leverage, Spain managed to keep its own control by 2009, with any breach of the reference level. A galloping growth occurred in 2009-2010, with a share of GDP ranging between 60.1% and 53.3%.

Luxembourg has the lowest indebtedness degree during the analyzed period, with an average of about 6% by 2007, while later on the public debt in GDP increased to 14.6% in 2009 and to 18.4% in 2010. Other countries with rigorous management of public debt in GDP are the Netherlands, Finland and Sweden, where the financial turmoil increased the debt over the limit required by the convergence criteria, leading only a to an increase of 10%, which continued to maintain the public debt in GDP in the 60% limit.

Greece is in a position to face the highest deficit recorded over the period analyzed, and before the financial crisis, the share of GDP budget deficit was not managed effectively, being almost permanently above the reference values (4.5% in 2001, 5.2% in 2005, 6.4% in 2007). The financial turmoil triggered an unprecedented budget deficit, which in 2008 reached 9.8%, while in 2009 its value amounted to 15.4%, and 10.5% in 2010. The same situation is found at the level of the public debt in GDP, Greece recording an average of this indicator superior to 100% over the period.

Another country with a high degree of fiscal indiscipline is Italy, which even in the period before the outbreak of the financial turmoil saw a GDP share of public debt exceeding 100%. This is contrary to the deficit that, with certain exceptions, was maintained within the convergence criteria, with some slippages not even under the impact of the financial crisis.

At the opposite pole lies Ireland which until the outbreak of the financial imbalances failed to have adequate control over public finance, thus having over almost the entire analyzed period a positive budget balance; once the financial crisis broke out, in 2007, suddenly the budget balance became negative, reaching alarming levels: 7.3% in 2008, 14.3% in 2009 and 32.4% in 2010. Moreover, the same consideration can be given to the debt to GDP ratio; by 2008, Ireland met this convergence criterion, with a leverage of approximately half the reference value, while in 2009 and 2010 the values of these indicators rose alarmingly to 65.6% and 96.2%.

France and the United Kingdom resorted to a more relaxed management of public finance, maintaining a share of public debt in GDP close to the baseline throughout the analyzed period. Under the impact of the financial crisis, the public debt in GDP increased, reaching 81.7% and 80% in 2010 in France and in the UK.

The average share of the budget deficit in GDP in the EU 27 and the Euro Area increased from 3.1% in 2003 to 6.4% and 6% in 2010. One should note that even in the Euro Area the share of budget deficit in GDP is much lower than the value within EU 27, which shows poor management of public finance, also in Euro Area countries.

A particularly interesting aspect is that public debt in GDP in the Euro Area average is higher than the EU 27 average, reflecting significant levels of debt for countries in this area. From this perspective, we consider that *Euro Area* countries had a negative effect on the EU 27, essentially causing a spiraling financial crisis, anchored initially in the sub-prime loans, subsequently extending to public finance. This paper endorses the innovative idea of disparities in the EU through the gaps created not only by significant differences between the economic development of emerging countries compared with developed countries but also in terms of imbalances caused by the degree of excessive indebtedness of Euro Area countries. Practically, lack of budgetary discipline in Portugal, Italy, Greece and Spain led to a significant accumulation of deficits over time that caused significant turbulences, with negative effects on the macroeconomic stability.

2.2. The situation of the convergence indicators of the NMS 12. The dynamics of indicators in the light of the real convergence process

Considering the Central and Eastern European countries, the Baltic States - Latvia and Lithuania - are characterized by a convergence nearly at the level of all nominal convergence indicators. Except for inflation which implies a degree of divergence for the four sub-periods in both countries, all other indicators showed a sustained convergence. The exchange rate stability is explained in the terms of the Monetary Council as a strategy for monetary policy.

Table 2.4

Dynamics of the interest rate in the EU, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	5.50	5.00	4.92	4.23	4.38	3.71	4.03	4.56	4.55	4.13	3.83
Euro 17	5.44	5.00	4.91	4.14	4.12	3.42	3.84	4.32	4.31	3.82	3.62
Belgium	5.59	5.13	4.99	4.18	4.15	3.43	3.81	4.33	4.42	3.90	3.46
Bulgaria	7.20	6.70	6.60	6.45	5.36	3.87	4.18	4.54	5.38	7.22	6.01
Czech R.	6.50	6.31	4.88	4.12	4.82	3.54	3.80	4.30	4.63	4.84	3.88
Denmark	5.64	5.08	5.06	4.31	4.30	3.40	3.81	4.29	4.28	3.59	2.93
Germany	5.26	4.80	4.78	4.07	4.04	3.35	3.76	4.22	3.98	3.22	2.74
Estonia	5.51	5.01	5.01	4.13	4.08	3.33	3.76	4.31	4.53	5.23	5.74
Ireland	6.10	5.30	5.12	4.27	4.26	3.59	4.07	4.50	4.80	5.17	9.09
Greece	5.53	5.12	4.96	4.12	4.10	3.39	3.78	4.31	4.37	3.98	4.25
Spain	5.39	4.94	4.86	4.13	4.10	3.41	3.80	4.30	4.23	3.65	3.12
France	5.58	5.19	5.03	4.25	4.26	3.56	4.05	4.49	4.68	4.31	4.04
Italy	8.00	7.62	5.70	4.74	5.80	5.16	4.13	4.48	4.60	4.60	4.60
Cyprus	7.90	7.57	5.41	4.90	4.86	3.88	4.13	5.28	6.43	12.36	10.34
Latvia	8.00	8.15	6.06	5.32	4.50	3.70	4.08	4.55	5.61	14.00	5.57
Lithuania	5.52	4.86	4.70	3.32	2.84	2.41	3.30	4.46	4.61	4.23	3.17
Luxembourg	8.00	7.95	7.09	6.82	8.19	6.60	7.12	6.74	8.24	9.12	7.28
Hungary	6.50	6.19	5.82	5.04	4.69	4.56	4.32	4.72	4.81	4.54	4.19
Malta	5.40	4.96	4.89	4.12	4.10	3.37	3.78	4.29	4.23	3.69	2.99
Netherlands	5.56	5.08	4.96	4.14	4.13	3.39	3.80	4.30	4.36	3.94	3.23
Austria	11.00	10.68	7.36	5.78	6.90	5.22	5.23	5.48	6.07	6.12	5.78
Poland	5.59	5.16	5.01	4.18	4.14	3.44	3.91	4.42	4.52	4.21	5.40
Portugal	:	:	:	:	:	6.75	7.23	7.13	7.70	9.69	7.34

Romania	:	:	8.72	6.40	4.68	3.81	3.85	4.53	4.61	4.38	3.83
Slovenia	:	8.04	6.94	4.99	5.03	3.52	4.41	4.49	4.72	4.71	3.87
Slovakia	5.48	5.04	4.98	4.13	4.11	3.35	3.78	4.29	4.29	3.74	3.01
Finland	5.37	5.11	5.30	4.64	4.42	3.38	3.70	4.17	3.89	3.25	2.89
Sweden	5.33	5.01	4.91	4.58	4.93	4.46	4.37	5.06	4.50	3.36	3.36

Source: Own computations based on the data from www.eurostat.org.com.

Prior to the crisis outbreak (2005-2007) a convergence process is obvious for all indicators; afterwards, the situation is different. The interest rate is the leading convergence indicator in the context of financial disturbances. This applies to all other countries except for Poland, fully characterized by a convergence state during the post-crisis period, even at the level of the interest rate. As regards the entire sample of countries, inflation and budget deficits have generated critical situations, breaching the reference values in the post-crisis period.

This is explained in terms of decreasing tax revenues generated by macroeconomic imbalances and financial disturbances. Concerning the inflation rate, the existence of differences is notable even before the financial crisis, reflecting the period of consumption-led growth and generating inflation. Inflation rate convergence occurs only for Latvia and Lithuania in the short run, i.e. 1999-2001 and 2002-2004, explained by the effects of immediate shock therapy due to the monetary anchor adoption.

In Bulgaria, although the monetary policy strategy was similar, beneficial effects were not felt in the inflation rate, the country presenting a high divergence in inflation. Conversely, positive effects were felt in the budget deficit that constantly was in a state of convergence in relation to benchmarks. Also, Bulgaria is a country with a well-managed fiscal policy in terms of converging values recorded in the public debt. Even after the emergence of the financial disturbance, Bulgaria shows convergence as regards the benchmarks in the public debt.

As for the budget deficit, the situation is characterized by diversity. There are a number of countries - Bulgaria, Latvia and Lithuania, where budgetary policies have been managed effectively, highlighting a convergence of budget deficit towards the reference value; in opposition, there are countries such as Romania, Poland and Hungary which are characterized by differences.

Except for Hungary, all countries present convergence for the debt indicator, both previously to the crisis outbreak, as well as afterwards. This

is in opposition to developed countries - Greece, Ireland, Portugal, Spain - where the values reflect an extremely high leverage.

As regards Romania, the interest rate is the only indicator showing a high degree of divergence in all sub-periods; other indicators that are quite far from the reference value are inflation and budget deficit.

Moving to the area of real convergence analysis, we note that the GDP per capita took on the highest values in EU15, followed by the Euro Area and EU25. NMS10 is positioned at approximately half of the GDP per capita corresponding to the Euro Area while NMS10 is placed at a significant distance.

Table 2.5

Dynamics of GDP per capita in the EU, 2000-2011 (EUR)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	17,800	19,100	19,800	20,500	20,800	21,700	22,500	23,700	25,000	25,100	25,000	23,600
EU25	19,000	20,300	21,000	21,700	22,000	22,900	23,700	24,900	26,200	26,200	26,300	24,700
EU15	21,800	23,200	24,000	24,700	25,000	26,000	26,800	28,000	29,300	29,100	29,400	27,500
Euro Area	21,400	22,400	22,900	23,600	24,100	24,900	25,700	26,800	28,000	28,500	29,200	27,200
NMS 12	9,446	9,846	10,328	10,982	11,521	12,320	13,505	14,717	14,832	15,662	15,780	15,311
NMS 10	5,035	5,687	6,397	6,822	6,810	7,419	8,560	9,433	10,275	11,444	10,240	10,413
Bulgaria	1,500	1,700	2,000	2,200	2,400	2,600	3,000	3,400	4,000	4,700	4,550	4,700
Czech Republic	5,500	6,000	6,800	7,800	7,900	8,600	9,800	11,100	12,300	14,200	13,600	13,100
Hungary	4,500	5,000	5,900	7,000	7,300	8,200	8,800	8,900	10,000	10,600	9,300	9,800
Latvia	2,900	3,600	4,000	4,200	4,300	4,800	5,700	7,000	9,300	10,200	8,300	8,000
Lithuania	2,900	3,500	3,900	4,300	4,800	5,300	6,100	7,100	8,500	9,600	7,900	8,300
Poland	4,100	4,900	5,600	5,500	5,000	5,300	6,400	7,100	8,200	9,500	8,400	8,100
Romania	1,500	1,800	2,000	2,200	2,400	2,800	3,700	4,500	5,800	6,500	5,500	5,700

Source: Own computations based on the data from www.eurostat.org.com.

In the new Member States which are not yet in the Euro Area, in 2011, Romania and Bulgaria had the lowest values of this indicator (5,700 EUR and 4,700 EUR respectively), and the highest values in case of the Czech Republic and Hungary. The group of recently integrated Member States (in 2004) is remarkable, in fact, for the lowest values of this indicator.

Table 2. 6

The dynamic of labor productivity (expressed in EUR/work hour) in the EU, 2001-2011

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	25.5	26.0	26.4	26.8	27.2	27.5	28.0	28.3	28.3	28.0	28.4
Euro 17	30.1	30.4	30.7	31.0	31.3	31.6	32.2	32.5	32.5	32.2	32.7
Belgium	39.7	38.7	39.2	39.6	41.2	40.9	41.5	42.2	41.7	41.2	41.00
Bulgaria	2.6	2.8	2.9	3.0	3.0	3.2	3.3	3.4	3.5	3.4	3.6
Czech R.	6.1	6.5	6.6	6.9	7.2	7.5	7.9	8.2	8.3	8.3	8.3
Denmark	40.4	40.2	40.5	41.2	42.3	42.9	43.3	43.2	42.0	41.3	43.0
Germany	35.8	36.4	37.0	37.4	37.6	38.1	39.3	39.7	39.6	38.7	39.1
Estonia	5.4	5.8	6.2	6.5	7.0	7.4	7.8	8.3	8.0	8.2	8.7
Ireland	31.7	32.9	34.9	36.1	36.6	36.9	37.4	38.4	38.2	39.3	40.2
Greece	15.3	15.9	16.2	17.0	17.5	17.7	17.5	18.2	18.4	18.9	17.7
Spain	22.2	22.3	22.5	22.7	22.8	23.0	23.2	23.6	23.8	24.4	24.4
France	37.2	37.5	38.6	39.0	39.3	39.9	41.0	40.8	40.4	39.9	39.9
Italy	27.9	28.1	28.0	27.6	27.9	28.1	28.1	28.2	27.9	27.4	27.9
Cyprus	16.6	16.7	17.0	16.7	17.1	17.5	17.7	18.1	18.3	18.3	18.5
Latvia	4.1	4.4	4.6	4.9	5.3	5.7	6.2	6.6	6.6	6.4	6.7
Lithuania	4.8	5.4	5.6	6.1	6.5	6.6	7.0	7.4	7.6	7.1	7.5
Luxembourg	:	:	50.9	51.5	52.7	54.7	55.5	56.3	54.7	54.6	54.6
Hungary	5.9	6.3	6.6	6.9	7.3	7.5	7.8	7.9	8.0	7.8	7.9
Malta	14.7	16.9	14.9	15.3	15.0	15.6	15.9	15.9	16.3	16.3	16.3
Netherlands	35.9	36.1	36.4	36.9	38.1	38.8	39.4	40.1	40.6	39.5	40.4
Austria	31.8	31.8	32.4	32.5	33.1	33.7	34.6	35.5	35.8	35.5	35.8
Poland	6.1	6.4	6.7	7.0	7.3	7.4	7.6	7.8	7.9	8.2	8.3
Portugal	12.8	13.0	13.1	13.1	13.2	13.4	13.6	13.8	13.8	13.8	14.0
Romania	2.0	2.2	2.5	2.7	3.0	3.1	3.3	3.5	3.8	3.5	3.6
Slovenia	13.8	14.3	14.4	14.9	15.3	16.4	17.4	18.2	18.1	16.9	16.9
Slovakia	6.0	6.3	6.7	7.2	7.4	7.6	8.2	8.6	9.0	9.1	9.3
Finland	32.9	33.5	34.0	34.8	36.0	36.7	37.8	39.0	38.8	37.3	38.0
Sweden	38.0	38.2	39.7	41.2	42.6	43.9	45.2	45.1	44.4	43.3	44.6
UK	34.1	34.5	35.4	36.5	37.2	37.6	38.4	39.1	39.3	38.1	:

Source: Own computations based on the data from www.eurostat.org.com.

In terms of productivity, the Euro Area has a productivity far below the EU27 level; also the productivity of the member states integrated in 2004 is well below that of the Euro Area. Considering the group of new Member States outside the Euro Area, the highest value of productivity is recorded by

the Czech Republic, followed by Lithuania and Poland. Bulgaria and Romania remain on last position, with the lowest levels of productivity. Similar to differences for productivity, export ratio reflects important disparities in the Member States in comparison with the euro area (see Table 7).

Table 2.7

Evolution of the export ratio in the EU, 2003-2011 (%)

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Belgium	101.0	101.7	102.1	103.2	100.2	99.8	99.4	99.6	100.8
Bulgaria	95.7	96.7	92.2	96.4	104.1	99.6	78.4	66.2	76.0
Czech R.	99.2	100.1	99.0	101.3	105.1	107.2	108.8	110.5	112.5
Denmark	100.2	100.8	102.1	102.3	99.3	96.1	92.0	92.5	98.7
Germany	105.7	111.0	109.2	113.4	114.7	115.4	118.0	117.8	109.3
Estonia	99.1	97.3	96.7	99.0	108.1	105.0	101.9	116.5	127.5
Ireland	107.3	111.5	115.8	116.4	106.3	101.5	100.9	104.8	121.0
Greece	100.7	94.4	92.5	89.9	105.0	108.3	100.9	97.1	119.3
Spain	102.4	102.7	101.3	96.8	93.4	91.8	91.6	97.1	105.2
France	101.2	104.0	102.2	100.6	99.6	98.6	95.6	94.8	92.7
Italy	100.8	98.2	94.8	94.8	94.1	94.5	96.2	98.1	95.4
Cyprus	100.8	93.1	97.3	145.7	201.3	165.5	139.6	127.1	145.7
Latvia	97.7	94.9	94.0	94.0	102.4	93.2	89.7	108.5	136.3
Lithuania	105.4	103.5	103.0	104.8	109.3	108.3	102.7	115.0	135.4
Luxembourg	107.6	107.9	116.7	121.5	138.6	142.5	137.3	142.0	149.0
Hungary	104.2	105.4	103.2	106.1	110.4	116.9	121.7	121.3	127.0
Malta	98.9	100.9	96.0	97.3	96.4	96.6	95.4	95.9	84.1
Netherlands	102.0	104.0	104.4	104.9	107.8	109.3	108.7	108.5	111.7
Austria	102.2	108.3	105.9	108.4	109.8	112.5	112.6	113.3	107.8
Poland	108.2	110.2	118.0	122.6	131.8	132.2	127.6	125.5	136.8
Portugal	100.1	104.8	111.4	108.6	107.1	112.8	114.6	112.0	109.7
Romania	92.1	95.7	89.8	85.3	81.4	73.6	67.3	68.6	86.3
Slovenia	104.3	106.7	103.5	104.2	111.2	111.6	111.6	109.6	113.5
Slovakia	94.7	95.7	104.2	98.3	97.1	100.8	105.6	109.3	110.1
Finland	99.8	96.3	94.2	94.0	87.6	88.9	85.5	85.4	82.0
Sweden	100.2	102.0	102.7	104.4	101.1	101.4	96.2	96.2	95.4
UK	96.2	93.5	91.9	88.4	87.7	88.3	83.7	85.7	86.7

Source: Own computations based on the data from www.eurostat.org.com.

For an economy to be considered powerful in terms of openness, the ratio of exports to imports must be higher than unit, i.e. the productivity surplus can be capitalized through exports.

At the individual level, disparities are evident in the group of countries integrated in the latest wave. In 2011, in Czech Republic and Hungary, the indicator stands at 112.5% and respectively 127%, while in case of Lithuania and Latvia, it stands at 135% and 136%. The highest value is recorded in case of Poland (136%), and a rather important level stands for Hungary (127%). Romania and Bulgaria have similar values of this indicator (86.3% and, respectively, 76%) (see Table 2.7).

Table 2.8

Evolution of the credit share in GDP in the EU, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro 17	0.84	0.87	0.87	0.88	0.89	0.92	1.00	1.13	1.17	1.14	1.13
Belgium	0.75	0.74	0.71	0.70	0.69	0.72	0.79	0.93	0.89	0.81	0.77
Bulgaria	0.42	0.38	0.35	0.30	0.27	0.30	0.33	0.54	0.70	0.72	0.73
Czech R.	0.29	0.28	0.26	0.24	0.26	0.29	0.32	0.45	0.48	0.46	0.47
Denmark	1.23	1.32	1.33	1.34	1.38	1.52	1.70	2.02	2.13	2.01	1.95
Germany	1.04	1.06	1.04	1.03	0.98	0.94	0.94	1.01	1.01	0.97	0.94
Estonia	0.72	0.64	0.58	0.50	0.42	0.48	0.68	1.05	1.07	0.95	0.85
Ireland	0.92	1.01	1.01	1.03	1.20	1.42	1.83	2.46	2.48	2.24	1.74
Greece	0.38	0.43	0.47	0.52	0.55	0.60	0.66	0.78	0.87	0.86	1.12
Spain	0.78	0.81	0.84	0.89	0.97	1.15	1.40	1.69	1.79	1.73	1.69
France	0.69	0.71	0.70	0.70	0.72	0.75	0.82	0.95	1.00	0.96	0.98
Italy	0.68	0.70	0.71	0.74	0.75	0.78	0.86	0.98	1.01	1.00	1.05
Cyprus	2.19	2.08	1.93	1.79	1.67	1.54	1.58	1.99	2.53	2.62	2.67
Latvia	0.38	0.38	0.34	0.29	0.33	0.42	0.61	1.01	1.15	1.01	0.88
Lithuania	0.34	0.31	0.28	0.25	0.21	0.30	0.37	0.64	0.74	0.64	0.57
Luxembourg	3.14	3.21	2.83	2.44	2.24	2.37	2.48	3.35	3.53	3.16	3.09
Hungary	0.42	0.40	0.36	0.33	0.42	0.43	0.48	0.64	0.69	0.61	0.58
Malta	1.28	1.30	1.28	1.20	1.14	1.05	1.14	1.30	1.50	1.43	1.42
Netherlands	1.17	1.23	1.28	1.34	1.40	1.44	1.46	1.62	1.63	1.67	1.57
Austria	0.91	0.94	0.92	0.89	0.89	0.96	0.98	1.08	1.16	1.11	1.11
Poland	0.29	0.32	0.30	0.25	0.23	0.23	0.25	0.41	0.42	0.42	0.44
Portugal	1.05	1.13	1.17	1.15	1.16	1.19	1.29	1.48	1.57	1.61	1.60
Romania	0.21	0.20	0.17	0.13	0.11	0.13	0.20	0.35	0.40	0.37	0.35
Slovenia	0.51	0.49	0.46	0.44	0.41	0.45	0.53	0.74	0.86	0.86	0.84
Slovakia	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.48	0.46	0.43	0.43
Finland	0.46	0.51	0.53	0.56	0.59	0.62	0.67	0.81	0.86	0.82	0.83

Source: Own computations based on the data from www.eurostat.org.com.

Shifting to the analysis of specific indicators of monetary and financial convergence in 2011, the share of credit in GDP reveals a very high level for EU15 and Euro Area (1.79 and 1.13, respectively) and EU27 (1.59). As for the New Member States, the share of credit in GDP shows a high level of heterogeneity (see Table 2.8). While Romania and the Czech Republic record the lowest values (0.35 and 0.47 respectively), the highest values are recorded in Hungary (0.58), Latvia (0.88) and Lithuania (0.57).

Table 2.9

Evolution of the deposit share in GDP in the EU, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro 17	0.75	0.79	0.78	0.80	0.81	0.83	0.88	1.02	1.09	1.09	1.10
Belgium	0.90	0.95	0.95	0.99	1.04	1.08	1.13	1.26	1.29	1.26	1.23
Bulgaria	0.29	0.32	0.33	0.35	0.39	0.41	0.19	0.26	0.30	0.36	0.40
Czech R.	0.18	0.19	0.18	0.14	0.13	0.12	0.11	0.15	0.14	0.12	0.09
Germany	0.96	0.99	0.98	0.99	0.98	0.97	0.99	1.11	1.14	1.16	1.13
Estonia	0.11	0.10	0.09	0.08	0.08	0.10	0.13	0.19	0.23	0.20	0.16
Ireland	0.71	0.73	0.76	0.78	0.80	0.90	1.11	1.37	1.41	1.40	1.36
Greece	0.73	0.76	0.70	0.67	0.68	0.73	0.77	0.88	1.03	0.99	0.97
Spain	0.71	0.75	0.76	0.77	0.81	0.95	1.14	1.36	1.59	1.60	1.59
France	0.60	0.62	0.61	0.66	0.67	0.67	0.67	0.76	0.79	0.81	0.85
Italy	0.47	0.49	0.51	0.50	0.50	0.52	0.55	0.70	0.75	0.77	0.88
Cyprus	0.45	0.52	0.53	0.36	0.34	0.32	0.30	0.31	0.31	0.33	0.32
Latvia	0.07	0.07	0.07	0.07	0.07	0.06	0.08	0.15	0.19	0.19	0.17
Lithuania	0.09	0.08	0.08	0.09	0.08	0.08	0.10	0.17	0.21	0.22	0.19
Luxembourg	6.78	6.34	5.59	5.31	5.13	4.96	5.32	5.95	5.21	4.80	4.55
Hungary	0.23	0.22	0.20	0.20	0.24	0.21	0.23	0.28	0.31	0.29	0.25
Malta	0.24	0.29	0.32	0.27	0.25	0.26	0.26	0.27	0.27	0.24	0.23
Netherlands	0.87	0.94	0.94	0.98	0.97	1.06	1.13	1.31	1.42	1.36	1.31
Austria	0.82	0.87	0.84	0.85	0.84	0.87	0.89	1.03	1.06	1.04	1.01
Poland	0.22	0.24	0.22	0.19	0.17	0.16	0.15	0.19	0.21	0.21	0.20
Portugal	0.89	0.91	0.87	0.86	0.87	0.92	0.96	1.07	1.16	1.23	1.30
Romania	0.17	0.16	0.14	0.11	0.10	0.11	0.13	0.16	0.17	0.20	0.20
Slovenia	52.04	63.37	62.68	58.63	57.63	51.77	47.98	50.58	49.63	48.11	48.11
Slovakia	0.28	0.25	0.22	0.19	0.18	0.14	0.16	0.18	0.24	0.23	0.23
Finland	0.46	0.45	0.46	0.47	0.47	0.46	0.46	0.57	0.60	0.63	0.63
United Kingdom	0.11	0.13	0.11	0.11	0.11	0.12	0.16	0.20	0.17	0.17	0.17

Source: Own computations based on the data from www.eurostat.org.com.

Countries that have recorded maximum values involve a commensurate volatility, reflecting the variation of the indicator from one period to another.

The comparative analysis of the deposit share in GDP shows that the new Member States reflects significant differences in comparison with the Euro Area. In 2011, the share of deposits in GDP amounts to 11% in the Euro Area while in the new Member States, the level varies from 9% in the Czech Republic to 20% in Poland and Romania. The highest values are recorded in Hungary (25%) and Bulgaria (40%) (see Table 2.9).

2.3. Critical aspects of the convergence criteria

Recent developments in the macroeconomic situation of the Central and Eastern European countries have highlighted the limitative dimension of nominal convergence criteria. The assessment of the EU Member States' ability to meet the Euro Area requirements taking into account a series of nominal indicators, totally disparate with respect to the area of real convergence, is poor because of the fact that recent financial disturbance came within a massive de-correlation between nominal economy, reflected in the financial flows, and real economy, as revealed, among other things, by the volume of goods and services produced, as well as by the level of the living standards (Iancu, 2011). Thus, it is necessary to correlate real and nominal convergence criteria by the composition of an integrated system based on indicators anchored in both types of convergence.

From this perspective, there are several contradictions between these criteria. On the one hand, a rigorous control of inflation often involves an upsurge in interest rate and exchange rate appreciation, which may lead to a violation of the nominal convergence criteria. On the other hand, interest rate downtrend results in rising inflationary pressures.

Lewis and Staehr highlighted, as far back as 1997, some problems related to the convergence criteria. Setting benchmark inflation rate implies real difficulties for EU enlargement; integration of other countries has generated a downtrend of the reference value. In this way, the compliance with the reference value is becoming increasingly difficult for Member States.

In line with the literature and recent macroeconomic developments, a number of weaknesses of nominal convergence criteria have been revealed. Thus, the convergence criterion of price stability was defined in terms of average inflation rate reflected in the harmonized index of consumer prices that should not exceed by more than 1.5% p.p. the level corresponding to

the best performing countries in this regard. This evolution should prove to be sustainable at the same time.

In essence, the best states are those in which the lowest inflation rate is recorded, which can be in contradiction with the main objective of the ECB, i.e. the HICP must be closer to 2%.

Exemplifying the case of five countries with inflation rates of 1.3%, 1.5%, 1.7%, 1.9%, 2.1% and 1.5%, the referential consists of the average of the lowest inflation rates; in line with the European Central Bank objective, the referential would result in a value of 1.9%.

Referring strictly to this phrase, the application of the criterion would imply taking into account the three countries closer to the value of 2% and the arithmetic mean should be calculated on the basis of the values 1.5%, 1.7%, 1.9 %, resulting in a referential of 1.7%.

To eliminate these concerns, it would be appropriate to establish the reference as a precise range of variation for inflation, envisaging mainly to extend the corridor by about 3 percentage points. This solution would not be viable if inflation spikes could occur, which would cause the violation of the reference.

Another solution would be to determine a referential under the form of a weighted average of the contribution to GDP of all HCPI of the Eurosystem member countries, which would reduce asymmetries observed in the prices of the member countries.

Table 2.10 shows the dynamics of this indicator calculated for the Euro Area, which reveals the ongoing deflationary process during the 2002-2011 period; this points to the fact that, given the situation outlined, it would be appropriate to extend the variation band, regarded as a benchmark for the nominal size of the convergence process.

Table 2.10

Evolution of the weighted HIPC in the Euro Area (%)

	Evolution of the weighted HIPC in the Euro Area (%)								
	2003	2004	2005	2006	2007	2008	2009	2010	2011
HCPI Euro Area	-3.14	-2.06	-2.12	-2.13	-2.13	-2.11	-2.31	-2.43	-2.22

Source: Own computations based on the data from www.eurostat.org.com.

Maintaining the same rigorous range (+ / -2%) in the context of a deflationary process might lead to negative effects on macroeconomic stability. On the other hand, the existence of an inflationary process is natural for accelerated economic growth, not implying negative effects if the

velocity of money remains at a sustainable pace. In fact, the inflationary process has negative features when the speed corresponding to the circulation of money is beyond the GDP growth; once a correlation between the two growth rates is maintained, inflation retains the sustainable connotation.

Table 2.11

Evolution of money velocity in the EU, 2000-2010 (absolute value)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro 17	NA	NA	NA	1.14	1.10	1.03	0.97	0.89	0.83	0.80	0.79
Belgium	0.78	0.81	0.77	0.72	0.72	0.69	0.66	0.65	0.61	0.91	0.94
Bulgaria	NA	NA	NA	NA	1.65	1.42	1.19	0.97	0.94	0.85	0.81
Czech R.	NA	NA	1.42	1.42	1.30	1.18	1.06	0.94	0.85	0.80	0.77
Germany	2.56	2.39	2.16	1.93	1.92	1.73	1.60	1.39	1.28	1.15	1.08
Estonia	0.58	0.57	0.56	0.53	0.52	0.50	0.49	0.48	0.50	0.62	0.63
Ireland	NA	NA	NA	NA	2.08	1.62	1.41	1.34	1.23	1.06	1.07
Greece	NA	0.29	0.32	0.28	0.31	0.40	0.58	0.84	0.99	0.99	1.18
Spain	NA	1.03	1.08	1.12	1.07	0.95	0.91	0.84	0.73	0.68	NA
France	1.02	0.96	0.92	0.84	0.72	0.58	0.47	0.41	0.38	0.35	NA
Italy	0.99	0.94	0.92	0.85	0.81	0.77	0.72	0.65	0.61	0.58	NA
Cyprus	1.22	1.17	1.09	1.04	0.99	0.92	0.85	0.73	0.64	0.56	NA
Latvia	0.63	0.58	0.55	0.53	0.52	0.50	0.45	0.39	0.29	0.28	NA
Lithuania	NA	NA	NA	3.17	2.82	2.23	1.79	1.72	1.75	1.47	1.32
Luxembourg	1.90	2.02	2.16	2.38	2.56	2.08	1.85	1.67	1.72	1.46	1.36
Hungary	NA	0.08	0.09	0.11	0.13	0.15	0.18	0.21	0.22	0.21	NA
Malta	NA	NA	NA	1.72	1.51	1.40	1.27	1.16	1.13	1.04	1.04
Netherlands	0.85	0.76	0.70	0.69	0.68	0.68	0.65	0.58	0.54	0.51	NA
Austria	0.72	0.66	0.62	0.57	0.53	0.47	0.45	0.43	0.41	0.37	NA
Poland	0.70	0.65	0.65	0.62	0.59	0.55	0.52	0.49	0.44	0.43	NA
Portugal	NA	NA	NA	NA	2.30	1.95	1.78	1.57	1.61	1.49	1.38
Romania	0.87	0.84	0.85	0.81	0.80	0.78	0.73	0.64	0.53	0.45	NA
Slovenia	NA	NA	NA	NA	3.19	2.28	1.77	1.50	1.53	1.37	1.27
Slovakia	2.57	2.03	1.86	1.80	1.70	1.66	1.63	0.93	1.26	1.02	NA
Finland	1.10	1.01	1.02	1.12	1.03	1.04	0.98	0.96	0.97	NA	NA
United Kingdom	1.50	1.47	1.34	1.28	1.21	1.12	1.06	1.00	0.90	0.82	NA

Source: Own computations based on the data from www.eurostat.org.com.

In this respect, the integration of an indicator to reflect the interference with the real economy, namely the correlation between inflation and velocity of money, is appropriate.

Tables 2.11 and 2.12 show the velocity of money as the ratio of M3 to real GDP, both in terms of absolute and relative values.

Table 2.12

Evolution of the relative money velocity in the EU, 2002-2011 (relative value)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro 17				-3.51	-6.36	-5.83	-8.25	-6.74	-3.61	-1.25
Belgium	3.85	-4.94	-6.49	0.00	-4.17	-4.35	-1.52	-6.15	49.18	3.30
Bulgaria	NA	NA	NA	NA	-13.94	-16.20	-18.49	-3.09	-9.57	-4.71
Czech R.	NA	NA	0.00	-8.45	-9.23	-10.17	-11.32	-9.57	-5.88	-3.75
Germany	-6.64	-9.62	-10.65	-0.52	-9.90	-7.51	-13.13	-7.91	-10.16	-6.09
Estonia	-1.72	-1.75	-5.36	-1.89	-3.85	-2.00	-2.04	4.17	24.00	1.61
Ireland	NA	NA	NA	NA	-22.12	-12.96	-4.96	-8.21	-13.82	0.94
Greece	NA	10.34	-12.50	10.71	29.03	45.00	44.83	17.86	0.00	19.19
Spain	NA	4.85	3.70	-4.46	-11.21	-4.21	-7.69	-13.10	-6.85	NA
France	-5.88	-4.17	-8.70	-14.29	-19.44	-18.97	-12.77	-7.32	-7.89	NA
Italy	-5.05	-2.13	-7.61	-4.71	-4.94	-6.49	-9.72	-6.15	-4.92	NA
Cyprus	-4.10	-6.84	-4.59	-4.81	-7.07	-7.61	-14.12	-12.33	-12.50	NA
Latvia	-7.94	-5.17	-3.64	-1.89	-3.85	-10.00	-13.33	-25.64	-3.45	NA
Lithuania	NA	NA	NA	-11.04	-20.92	-19.73	-3.91	1.74	-16.00	-10.20
Luxembourg	6.32	6.93	10.19	7.56	-18.75	-11.06	-9.73	2.99	-15.12	-6.85
Hungary	NA	12.50	22.22	18.18	15.38	20.00	16.67	4.76	-4.55	NA
Malta	NA	NA	NA	-12.21	-7.28	-9.29	-8.66	-2.59	-7.96	0.00
Netherlands	-10.59	-7.89	-1.43	-1.45	0.00	-4.41	-10.77	-6.90	-5.56	NA
Austria	-8.33	-6.06	-8.06	-7.02	-11.32	-4.26	-4.44	-4.65	-9.76	NA
Poland	-7.14	0.00	-4.62	-4.84	-6.78	-5.45	-5.77	-10.20	-2.27	NA
Portugal	NA	NA	NA	NA	-15.22	-8.72	-11.80	2.55	-7.45	-7.38
Romania	-3.45	1.19	-4.71	-1.23	-2.50	-6.41	-12.33	-17.19	-15.09	NA
Slovenia	NA	NA	NA	NA	-28.53	-22.37	-15.25	2.00	-10.46	-7.30
Slovakia	-21.01	-8.37	-3.23	-5.56	-2.35	-1.81	-42.94	35.48	-19.05	NA
Finland	-8.18	0.99	9.80	-8.04	0.97	-5.77	-2.04	1.04	NA	NA
United Kingdom	-2.00	-8.84	-4.48	-5.47	-7.44	-5.36	-5.66	-10.00	-8.89	NA

Source: Own computations based on the data from www.eurostat.org.com.

In terms of absolute growth, when the velocity is maintained at a consistent pace with GDP growth, the range can be extended. Although the analysis of nominal convergence indicators reveals Belgium, Denmark and Ireland as countries that violate the stance reference value of the inflation rate over the last three years, the related evolution of money velocity shows a stabilization tendency, even in the sense of growth. In this context, a proposal could be to increase the range of variation of 2.5 pp for countries where money velocity has dropped by more than 25%.

Although the analysis of the inflation rate criterion places Germany in the category of most disciplined countries in this respect, the velocity of money reflects a real versus monetary economy imbalance since GDP is only about 50% -60% of M3.

Greece, Spain and Portugal recorded, indeed, a constant decrease of the indicator, reflecting an increase in the volume of currency in relation to the flow of goods and services, as aspect occurring in the case of the nominal convergence indicator.

The same is true for the new Member States, a ratio of GDP to M3 higher than that showing that Central and Eastern European countries are characterized by a departure from the baseline, reflected in a decrease in money velocity.

As for the nominal interest rate, it must not exceed by more than 2 percentage points the level of the best performing Member States in terms of price stability (i.e. the arithmetic mean of long-term interest rates).

An issue of this criterion consists in using long-term government securities or similar securities since there are no bonds with a maturity close to 10 years in all Member States. In this case, different securities with various maturities are compared, which implies a high degree of flaw.

Another problem is limiting the interest rates corresponding to long-term securities, which leads to a high opportunity cost, namely eliminating the opportunities to valorize short-term interest differentials.

From this perspective, it would be more appropriate to select as referential the monthly average of Euribor 12M and to compare it with average interest rates on interbank monetary markets of joining countries (Robor 12M for Romania), all as monthly averages. Table 2.13 shows the evolution of short-term interest rates in the new Member States in the Euro Area; with the exception of Romania, Hungary and Poland, other countries show a high degree of convergence with the Euro Area since interest rates on short term are correlated with those in this area. Thus, by using this referential, the potential for interest rate harmonization is enhanced, unlike the classic indicator of nominal convergence.

Table 2.13

Evolution of the short-term interest rate (one month) in the EU and in the Euro Area, 2001-2011 (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	:	4.79	3.84	2.86	2.82	2.74	3.35	4.44	4.61	1.21	0.78
Euro 17	4.24	4.33	3.30	2.35	2.08	2.14	2.94	4.09	4.27	0.89	0.57
Bulgaria	4.14	5.01	4.32	3.14	3.11	2.71	3.09	4.61	6.71	4.50	2.41
Czech R.	5.31	5.15	3.58	2.30	2.26	1.97	2.22	2.97	3.81	1.92	1.08
Denmark	4.75	4.76	3.52	2.45	2.18	2.20	3.09	4.31	4.86	2.12	0.98
Latvia	4.65	6.58	3.93	3.54	4.07	2.95	3.89	7.21	6.32	9.19	1.22
Lithuania	7.53	5.27	3.25	2.56	2.20	2.26	2.99	4.90	5.26	3.70	1.00
Hungary	11.44	11.09	9.12	8.42	11.48	7.38	6.96	7.86	8.97	8.90	5.26
Poland	18.49	16.49	9.22	5.74	6.03	5.36	4.17	4.64	6.11	3.88	3.61
Romania	49.70	40.53	26.95	18.20	19.18	7.96	8.11	7.25	12.23	11.32	5.68
Sweden	3.90	4.10	4.21	3.28	2.30	1.86	2.43	3.75	4.52	0.78	0.72
UK	6.05	5.07	3.99	3.71	4.52	4.74	4.79	5.86	5.18	0.82	0.56

Source: Own computations based on the data from www.eurostat.org.com.

Another adjustment that could be proposed in this respect is the correlation of the difference of 2 pp with the corresponding CDS country risk, as it is necessary for the interest rate to integrate a part of the appropriate risk premium. In this respect, in countries where the CDS country risk remains related to values above 100 bp during the year, the margin of difference should be increased to ± 3 pp, and gradually, over 300 bp to reach ± 4 pp., and over 500 bp to reach a maximum of ± 5 pp.

Table 2.14

Evolution of CDS in the EU, 2006-2010 (%)

	2007	2008	2009	2010	2011
Romania	37.25	32.15	277.18	391.44	285.00
Hungary	35.36	28.24	196.33	336.39	242.92
Slovakia	30.85	27.78	238.42	352.25	232.36
Poland	10.17	8.36	64.03	106.44	79.75
Greece	18.75	13.42	95.41	190.31	132.75

Source: Own computations based on the data from www.reuters.org.com.

A difficult situation is created by tolerating a difference of over 5 pp, which could lead to excessively high interest rates (probably two digits), generating significant asymmetry. Table 2.14 presents the spreads dynamics for CDS contracts in case of a few countries from Central and Eastern Europe; as in recent years these spreads increase, a possible extension of the variation band in relation to the reference value would facilitate greater convergence at the level of this indicator, facilitating a connection with real economy.

As regards public finance, the government's financial position is considered to be sustainable if it does not create a deficit exceeding 3% of GDP. Similarly to the budget deficit, public debt in GDP must not exceed 60%. If the indicators exceed these threshold values, the budget deficit and public debt should be reduced substantially up to a reference value; similarly, it is advisable for any violation of the reference value to consider only on an exceptional basis. The wording of this criterion of convergence is characterized by ambiguity, reflected in the significant and continuous reduction (without specifying any percentage or precise time period), the substantial and permanent feature (without stating clearly the exceptional conditions) as well as the substantial reduction in an appropriate pace (not clearly delineating a specific value or temporal horizon).

Similarly to the correlation between inflation rate and money velocity, it is necessary to perform a structural analysis of budget deficit and public debt, since even the fact that they are beyond the level of the two threshold values, this might not automatically imply macroeconomic imbalances.

With budget deficit and/or public debt that grow mainly due to larger government investment and tax reduction, with beneficial effects on stimulating government initiative, this dynamics is considered to be sustainable even if the limits of 3% and 60% of GDP are not observed.

Macroeconomic imbalances occur if indebtedness and the share of negative budget balance in GDP grow massively in parallel with expenditures directed towards consumption. At the same time, an important aspect lies in the analysis of funding arrangements. If there is an over-exposure of banks to government securities and, therefore, it is necessary to resort to expensive funding sources, the degree of sustainability of the two indicators diminishes. Tables 2.15 and 2.16 provide a breakdown of government spending in relation to the functional classification criteria.

Table 2.15

Evolution of the current public expenditures weight in GDP in the EU, 2002-2011 (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU	19.9	20.4	20.7	20.7	20.8	20.7	20.3	20.8	22.4	22.1
Euro 17	19.8	20.2	20.5	20.4	20.4	20.3	20.0	20.5	22.1	21.9
Belgium	21.7	22.5	22.9	22.7	22.8	22.5	22.3	23.2	24.7	24.3
Bulgaria	18.8	18.9	19.9	19.4	18.3	18.0	17.2	17.1	16.3	15.8
Czech R.	21.1	22.3	23.4	22.1	22.1	21.3	20.3	20.4	22.1	21.8
Denmark	25.7	26.2	26.5	26.5	26.0	25.9	26.0	26.7	30.0	29.4
Germany	18.9	19.2	19.3	18.8	18.7	18.3	17.9	18.1	19.7	19.5
Estonia	18.8	18.4	18.3	17.6	17.2	16.2	16.7	19.5	22.0	20.6
Ireland	14.7	15.2	15.3	15.5	15.5	15.8	16.3	18.5	19.6	19.1
Greece	17.4	18.3	17.1	17.2	17.1	17.7	17.9	18.2	20.6	18.2
Spain	17.1	17.2	17.4	17.8	18.0	18.0	18.4	19.5	21.1	20.8
France	22.8	23.5	23.8	23.8	23.8	23.5	23.0	23.1	24.5	24.6
Italy	19.0	19.2	19.7	19.9	20.3	20.1	19.7	20.2	21.5	21.1
Cyprus	17.1	18.1	19.6	17.7	17.9	18.4	17.0	17.4	19.4	19.3
Latvia	20.5	21.0	21.4	19.5	17.4	16.6	17.4	19.6	19.6	16.9
Lithuania	21.4	20.9	19.9	19.4	18.7	19.3	17.9	19.3	22.0	20.6
Luxembourg	16.1	16.5	16.4	16.9	16.5	15.4	14.8	14.9	16.7	16.2
Hungary	21.1	22.0	23.3	22.3	22.6	22.9	21.3	21.6	22.2	21.4
Malta	20.1	20.0	20.6	20.8	19.5	20.0	19.1	20.6	21.2	20.6
Netherlands	22.6	23.7	24.5	24.2	23.7	25.1	25.2	25.5	28.4	28.5
Austria	18.9	18.6	18.8	18.6	18.5	18.4	18.2	18.6	19.9	19.5
Poland	17.9	17.9	18.1	17.6	18.1	18.3	18.0	18.5	18.4	18.8
Portugal	19.2	19.4	19.8	20.1	20.9	20.2	19.8	20.1	21.8	21.4
Romania	16.2	15.1	19.3	16.3	17.4	16.8	16.3	17.6	18.7	17.2
Slovenia	19.4	19.1	19.0	18.9	19.0	18.8	17.3	18.1	20.2	20.1

Source: Own computations based on the data from www.eurostat.org.com.

Indiscipline in the budgetary policy is reflected in the predominance of current government expenditures, which hold a share of over 20% in GDP, above those on investments, which generally are placed below 5% of GDP.

Table 2.16

Evolution of the investment public expenditures share in GDP in the EU, 2002-2010 (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU	2.4	2.3	2.4	2.4	2.2	2.5	2.6	2.7	2.9	2.7
Euro 17	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.6	2.8	2.5
Belgium	1.7	1.7	1.6	1.6	1.7	1.6	1.6	1.6	1.8	1.7
Bulgaria	3.4	3.1	2.9	3.2	3.4	4	5.2	5.6	4.9	4.6
Czech R.	3.5	3.9	4.5	4.8	4.9	5	4.7	4.9	5.2	4.6
Denmark	1.9	1.8	1.6	1.9	1.8	1.9	1.9	1.9	2	2.2
Germany	1.7	1.7	1.6	1.4	1.3	1.4	1.4	1.5	1.6	1.6
Estonia	4.1	5.3	4.4	3.8	4	4.7	5.1	5.3	5.1	3.6
Ireland	4.2	4.2	3.6	3.4	3.5	3.8	4.7	5.3	4.2	3.9
Greece	3.6	3.4	3.5	3.5	2.8	3.4	3.4	3.6	3	2.8
Spain	3.3	3.5	3.6	3.4	3.6	3.7	4	3.9	4.4	3.7
France	3	2.9	3	3.1	3.3	3.2	3.2	3.2	3.4	3
Italy	2.4	1.7	2.5	2.4	2.4	2.3	2.3	2.2	2.5	2.1
Cyprus	2.9	3	3.4	4	3.1	3	2.9	2.9	4.1	3.6
Latvia	1.1	1.3	2.4	3.1	3.1	4.6	5.7	4.8	4.3	3.6
Lithuania	2.2	2.9	3	3.4	3.4	4.1	5.2	4.9	3.9	4.6
Luxembourg	4.3	4.9	4.6	4.3	4.5	3.6	3.3	3.2	3.7	4.1
Hungary	3.7	4.9	3.5	3.5	4	4.4	3.6	2.9	3.1	3.2
Malta	3.4	4.1	4.7	3.9	4.7	4	3.8	2.3	2.2	2.1
Netherlands	3.3	3.5	3.6	3.2	3.3	3.3	3.3	3.5	3.9	3.7
Austria	1.2	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.2	1.2
Poland	3.4	3.4	3.3	3.4	3.4	3.9	4.2	4.6	5.2	5.6
Portugal	3.8	3.5	3.2	3.3	3	2.4	2.7	2.9	2.9	3.3
Romania	2.7	3.4	3.5	3	3.9	5.1	5.6	5.7	5.3	5.5
Slovenia	3.2	3	3.2	3.5	3.2	3.7	4.2	4.4	4.6	4.3
Slovakia	3.1	3.3	2.6	2.4	2.1	2.2	1.9	2	2.3	2.6
Finland	2.5	2.6	2.8	2.8	2.5	2.3	2.4	2.5	2.8	2.7
Sweden	2.9	3.1	2.9	2.9	3	3	3.1	3.3	3.6	3.5
UK	1.5	1.5	1.6	1.8	0.7	1.8	1.9	2.3	2.7	2.5

Source: Own computations based on the data from www.eurostat.org.com.

As regards the public debt, the financial position of a country may be considered sustainable even if the 60% reference value is not observed when there are sufficient reserves. In this respect, it is particularly

appropriate to determine an indicator that takes into account net foreign reserves of the public debt, whereas in this case we get a realistic picture of a country's indebtedness.

Table 2.17

Evolution of the share in GDP of public debt excess over FX reserves in the EU, 2002-2011 (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro 17	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.7	0.7	0.8
Belgium	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.9	0.9	0.9
Bulgaria	0.4	0.2	0.1	0.0	0.0	-0.1	-0.2	-0.2	-0.2	-0.2
Czech R.	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Denmark	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Germany	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8
Estonia	-2.0	-1.9	-1.9	-2.1	-2.3	-2.4	-2.2	-2.7	-3.0	-2.0
Ireland	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.4	0.6	0.9
Greece	1.0	1.0	0.9	1.0	1.0	1.1	1.0	1.1	1.3	1.4
Spain	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.5	0.6
France	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8
Italy	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1
Cyprus	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.5	0.6
Latvia	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.1	0.1
Lithuania	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Luxembourg	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Hungary	0.3	0.4	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5
Malta	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6
Netherland	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.6	0.6
Austria	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
Poland	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.4
Portugal	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.8
Romania	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0
Slovenia	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4
Slovakia	0.2	0.0	0.0	0.0	-0.1	0.1	0.0	0.1	0.3	0.4
Finland	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4
Sweden	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3
UK	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.7	0.8

Source: Own computations based on the data from www.eurostat.org.com.

Another appropriate indicator in this respect is the coverage of debt by gold reserves, considered to be the most protective, taking into account the gold resilience to shocks.

Table 2.18

Evolution of the share in GDP of public debt excess over gold reserves in the EU, 2002-2011 (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro 17	46.39	46.05	48.12	52.68	42.52	40.82	36.38	35.86	32.96	26.84
Belgium	1854.67	1838.20	1905.11	2050.95	1795.78	1660.84	1439.36	1423.55	1269.40	1015.18
Bulgaria	680.73	645.40	640.80	666.22	503.09	453.96	391.32	393.42	334.36	249.89
Czech R.	73.41	60.31	55.06	53.91	33.52	27.62	21.92	18.80	16.22	13.38
Denmark	27.32	31.47	33.31	40.66	32.81	33.41	31.57	31.32	29.34	24.82
Germany	2.55	2.52	2.43	2.51	1.63	1.32	1.00	1.18	1.11	0.88
Estonia	31712.06	30839.99	32175.42	35458.12	27221.32	25349.46	21335.32	20551.73	17785.38	15291.39
Ireland	6.06	7.07	7.65	7.84	6.09	6.34	5.38	6.18	6.70	4.66
Greece	33.61	32.57	38.00	39.73	29.43	25.38	23.04	35.20	37.81	39.11
Spain	28.76	28.95	30.23	33.85	30.53	34.67	46.52	46.62	43.05	34.39
France	12.38	12.06	11.88	12.59	9.90	9.23	8.00	8.71	9.35	7.73
Italy	34.43	35.35	38.53	42.49	33.41	30.22	27.05	26.91	24.71	19.13
Cyprus	27949.60	28518.69	26160.20	28405.23	22502.36	20815.98	17663.89	5994.97	5157.50	3904.69
Latvia	83.03	87.20	97.16	109.71	86.91	78.38	65.13	54.23	52.02	40.28
Lithuania	22.43	20.67	22.29	26.65	20.10	18.94	18.01	39.16	47.05	40.27
Luxembourg	132.72	134.63	139.49	147.30	119.41	120.52	115.15	111.82	142.09	137.62
Hungary	44.64	46.12	47.31	54.94	42.83	47.50	44.92	89.17	72.90	73.24
Malta	81096.50	101292.75	104589.00	124976.75	134283.50	154824.25	38792.53	18135.40	15104.22	26083.13
Netherlands	0.30	0.29	0.37	0.40	0.35	0.33	0.30	0.30	0.26	0.20
Austria	64.80	70.47	73.55	81.03	62.91	57.11	50.63	62.03	50.39	39.05
Poland	137.20	134.88	133.71	143.19	109.79	101.01	88.00	88.43	75.30	58.97
Portugal	13.69	13.63	15.36	21.64	20.55	22.25	21.08	18.92	17.68	15.08
Romania	64.40	67.05	71.55	78.57	66.11	63.06	61.45	60.64	54.86	45.37
Slovenia	155.07	140.07	129.03	151.27	176.10	160.53	250.50	267.44	354.97	343.27
Slovakia	12.02	13.05	13.49	15.88	12.52	13.13	11.14	11.80	15.90	12.69
Finland	23.55	22.52	24.17	28.72	19.53	19.31	18.22	19.00	18.49	16.23
Sweden	31.55	29.94	32.62	35.05	27.72	26.73	23.11	22.85	24.26	20.29
UK	38.75	42.43	43.54	45.72	34.12	30.41	23.46	18.26	16.78	13.90

Source: Own computations based on the data from www.eurostat.org.com.

An important respect in this regard is illustrated in Tables 2.17 and 2.18, showing the public debt coverage degrees by international reserves and gold.

The analysis of nominal convergence indicators reveal the lax policy of France and the UK in terms of public finance, which exceeded by 10% - 15% the reference values of budget deficit and public debt.

On the other hand, Italy, Ireland and Portugal show a degree of excessive debt, well above that of other countries; however, coverage of public debt in gold is higher for indebted countries in relation to those that are more cautious. Thus, France and the UK show a debt coverage in gold of 8% and 14%, while Greece and Spain have an indicator of over 30%. Ireland and Germany have a low indicator, 5% and 0.88%, respectively.

As for the exchange rate stability, the Maastricht Treaty requires maintaining the exchange rate within fluctuation margins characteristic of ERM and then to ERM II for a period of at least two years without experiencing severe tensions, especially without going on with its own initiative of devaluation/depreciation of the national currency against the euro. The new exchange rate mechanism (ERM II) replaced the ERM in January 1999 and aims at anchoring the currencies of non-euro member states to euro by establishing a fixed but adjustable exchange rate and a standard fluctuation band of ± 15 percentage points. A narrower fluctuation band can be established by mutual agreement, according to the evolution of convergence.

The exchange rate stability is related to other financial indicators, being basically determined by public finance indicators and price stability. On the other hand, an excessive tendency to stabilize the exchange rate results in removing the economy from the natural steady state, endangering its self-regulating capacity.

Also, the exchange rate stability cannot be conceived only in relation to a single currency, but in relation with a currency basket in which, taking into account the fact that a predominant share of trade flows is related to the Euro Area, the euro share may be higher, but it must be accompanied by other currencies, i.e. USD, GBP, JPY, and CHF. Their weight can be correlated with the structure of the balance of payments accounts, leading to the determination of an effective exchange rate.

Determining the right moment for the single currency adoption is substantiated by the reduction in gaps between financial flows economy and real economy; in essence, the Member State must be able to meet all the criteria of real convergence, so that the cost-benefit analysis should favor the euro adoption.

As adjustments of this convergence criterion, we propose enhanced flexibility while maintaining a managed floating exchange rate regime and the coexistence of trend appreciation in real terms and the variability of the quotations on short term. This system ensures a high degree of independence of the monetary policy, the efficiency of which in controlling inflation will increase.

Also the managed floating exchange rate regime is consistent with the nominal anchor choice. This system allows for a flexible response to unforeseen external and internal shocks.

As regards real convergence indicators, their adjustment by coefficients reflecting the impact of asymmetries, polarization, positive and negative externalities of economic growth in the Member States - with important effects in terms of global economic convergence - is required.

Among these indicators, we can mention:

- Percentage of population living below the subsistence level, broken down by categories of population;
- Index of pollution level in urban and rural areas;
- The share of non-conventional energy sources correlated with annual energy consumption per capita;
- Waste recycling and reuse rate;
- Gini coefficient of income inequality by geographical areas.

Research conducted in the recent years (Iancu, 2007, 2008, 2009) has shown that nominal convergence was favored in comparison with real convergence since the nominal dimension is likely to be achieved over a shorter period of time, unlike real convergence which involves major restructuring, of a higher degree of complexity on the macroeconomic plane.

In order to fulfil the Maastricht Treaty criterion, it is necessary for both convergence processes to be performed simultaneously, in full harmony. In essence, the two types of process influence each other as structural reforms drive convergence at the level of GDP per capita, leading to non-inflationary wage increase, collection of higher tax revenues and implicit fiscal consolidation.

At the same time, the convergence of productivity levels leads to cost reduction, speeding up deflation of the tradable goods; nominal convergence impacts favorably on real variables by reducing inflation and interest rates, which determines an increase in investment and therefore in GDP.

However, during recent years we have seen a clear disparity between the two processes of convergence; although at the EU level, there has been some nominal convergence, there are still significant gaps in terms of real

size. These substantial differences can be explained just in terms of contradiction between the nominal convergence criteria, as well as through the effects exerted by them on the macroeconomic plane. So enforcing the Maastricht criteria may affect the convergence of economies in which the investment is small. On the other hand, the application of lax fiscal policies, completed for creating sustainable deficits may contribute to faster structural adjustment of these economies to EU requirements.

Also, by reducing the inflation rate, real interest rates increase, leading to attraction of foreign capital and, finally, appreciation, with negative effects on net exports.

3. Sustainability of convergence in the context of economic cycles

3.1. Sustainability of convergence

Deficient aspects of the convergence criteria are highlighted especially in the context of economic cycles. Essentially, the Maastricht Treaty required the fulfillment of a pre-set values of a series of macroeconomic indicators, without involving a possible adaptation depending on the specific features of their business cycle. Economy as a whole is a living system, which is in constant transformation, marked by cyclicity; macroeconomic developments are influenced by different phases of the economic cycle, which creates difficulties in the capacity of Member States to meet a set of strict parameters with a conservative margin of variation on an ongoing basis. From this perspective, we see a significant discrepancy between the real economy and the system of nominal convergence indicators. The configuration of these indicators does not take into account cyclical economic developments and implicit changes in macroeconomic indicators.

Another problematic aspect of the economic convergence indicators is how they correlate with economic cycles within the Member States. The theory of optimum currency areas (OCA) is in fact the rationale of the the creation of the Euro Area. Founded by Mundell (1961) and McKinnon (1963) and expanded later by Kenen (1969) and Krugman (1991), the theory reveals the benefits of participation in an optimum currency area. These advantages are achieved in the context of some compromise, which consists in fact in giving up the autonomy of the monetary and exchange rate policy. The current imbalance in Greece are explained by many specialists by the absence of major levers of macroeconomic intervention, namely the inability to use macroeconomic policy tools. Theorists contended that the inconvenience of giving up these levers of macroeconomic nature could be overcome through the synchronization of business cycles. There is a consistent literature on the matter, numerous studies focusing mainly on three aspects (Cuaresma, 2011):

- Member States' prefiguration as cellular structures with a core (consisting of the Euro Area) and an area of peripherals based on several circular levels (the new Member States recently integrated) bringing forth an economic stratification even in the core in terms of synchronization cycles; from this perspective there has been a stronger correlation between Belgium, France, Germany, Luxembourg and the Netherlands and the entire Euro Area;

- The impact of the Euro Area enlargement through the integration of the Central and Eastern European countries on the harmonization of economic cycles in the EU;
- The two components of the business cycles synchronization, i.e. the idiosyncratic component, determined by certain features of the macroeconomic environment in these countries, as well as the systemic components, generated by developments at the global level.

In order to assess the degree of synchronization in the EU, based on quarterly series of the GDP per capita indicator reflecting the sigma-convergence, research has developed an empirical perspective based on the key indicator of real convergence. A high degree of convergence in the EU involves reducing disparities between countries by the harmonization of the GDP per capita indicator; on the other hand, as shown in the analysis of the convergence criteria in the EU, there still are significant gaps in the level of country development. In this respect, it is significant to consider the dispersion corresponding to this indicator. An important dispersion of the indicator may reveal a catching-up tendency in Central and Eastern European countries, and a comparative analysis in relation to the dispersion of the Euro Area may reveal a trend towards economic cycle harmonization.

First we analyze the dispersion of the GDP per capita in the new Member States integrated in 2004, in the EU27 and in the Euro Area. Similarly to the analysis on nominal and real convergence indicators, dispersion corresponding to the regions under review was calculated on the basis of a weighted indicator, taking into account the contribution of each country's GDP in the total EU27 GDP in order to properly adjust the indicator in the sense of differentiation depending on the degree of development of the EU countries.

This methodology was developed in line with the critical aspects of the convergence criteria, which highlighted the calculation of the linear convergence indicators in the region without taking into account a possible differentiation according to the criteria of qualitative or quantitative nature. In essence, determining a weighted average as opposed to a simple arithmetic average value adds information. Dispersion of the GDP per capita in the regions under review was determined on a quarterly basis.

In Figure 3.1 we notice a high level of heterogeneity of the sigma-convergence. From a global perspective, in the EU27, there was a sustained convergence process until 2005; in this period, the gap between the EU27 countries fell significantly while subsequently the rate of convergence decreased.

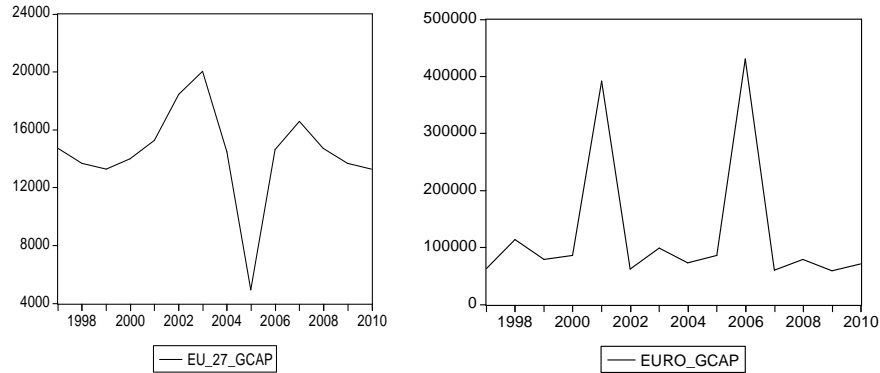


Figure 3.1. Evolution of sigma-convergence in UE27 (left side) and the Euro Area (right side)

The trend of dispersion reduction occurs in 2006 until mid 2007. This can be interpreted in terms of the enlargements in 2004 and 2007 when the integration of many countries led to enhanced disparities. The same dynamics is observed in the corresponding sigma-convergence in the Euro Area; the rate of convergence decreases under the impact of the Euro Area enlargement, namely the integration of new members leads to enhanced asymmetries between the Member States in terms of development levels.

In the new Member States, the dynamics of the sigma-convergence fluctuates; until 2005, differences from one state to another are noted while at the beginning of financial disturbances the convergence process gets a downward trend (see Figure 2). Unlike the Euro Area, where certain fluctuations are also noted, in the new Member States, the period of recovery, reflected in a downtrend of the sigma-convergence is longer. In the Euro Area the fluctuations occur over a shorter period, reflecting the ability of these countries to absorb quickly the differences between states.

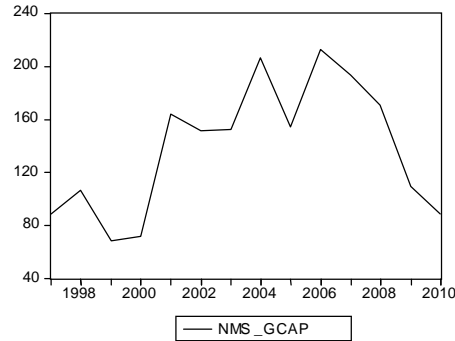


Figure 3.2. Evolution of sigma-convergence in NMS (2004)

Sustainability of the convergence criteria can be assessed from the perspective of sustainable economic convergence, which involves an analysis of how convergence reacts on the spur of certain external shocks. In essence, the idea of sustainability can be highlighted significantly in correlation with certain extreme events since an indicator is sustainable on condition that a shock (or an event with negative connotation) does not cause an important mutation in the dynamics of the indicator. If the sigma indicator proves to be stationary, any shock is absorbed without determining important structural breaks, with negative effects on sustainability.

In this respect, stationarity tests were performed (listed in Annexes 1-3) on the sigma-convergence indicator corresponding to EU27, to the Euro Area and the new Member States incorporated in 2004; the results reveal a high degree of heterogeneity. In EU27 and the Euro Area, the sigma-convergence indicator turns out to be a stationary, while in the new Member States incorporated in 2004, the indicator is non-stationary, which points out that in Central and Eastern European countries, the macroeconomic environment is characterized by fragility. Macroeconomic structures are still weak, vulnerable to certain shocks which, unfortunately, are not absorbed quickly, but propagate on a longer period of time.

Unlike the new Member States incorporated in 2004, the Euro Area countries have stronger economic structures, which makes them able to absorb shocks quickly, without long-term repercussions. The experience of the financial crisis confirms this hypothesis, reflecting a significant capacity of the Euro Area countries to return to the growth trend at a faster pace in comparison with Central and Eastern European countries, where the

imbalances generated by the economic crisis have spread over a longer period, requiring a longer time to return to this trend.

From this perspective, the convergence process is not characterized by the same degree of sustainability in the two regions; in Central and Eastern European countries, sustainability is lower, demanding a differentiation of the convergence criteria according to specific economic structures.

In the second stage, based on the Hodrick-Prescott filter, we estimated the economic cycles of recently integrated countries and their correlation with the Euro Area business cycle. In Figure 3.3, we notice the dynamic of the long-term component and a cyclical component in Central and Eastern European countries. Considering how the two components evolve from one country to another, we can appreciate a possible similarity between macroeconomic developments in these countries and, in essence, the synchronization of business cycles.

The long-term component was estimated for each new Member States integrated in 2004 and at the regional level; from a comparative perspective, this filter has been applied at the regional level to EU27 and the Euro Zone.

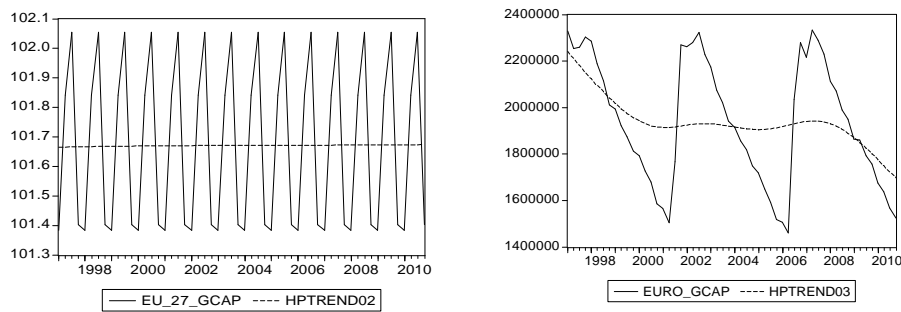


Figure 3.3. HP filter applied to sigma-convergence indicator in EU27 (left side) and the Euro Area (right side)

The analysis at the regional level reveals a clear de-correlation of economic cycles from the new Member States, EU27 and the Euro Area.

The long-term component of EU27 follows a linear trajectory, unlike the corresponding new Member States and the Euro Area; in the new Member States, the long-term component follows an upward trajectory, reflecting the continuity of the catching-up process, while in the Euro Area there is a more erratic trajectory (see Figures 3.3 and 3.4).

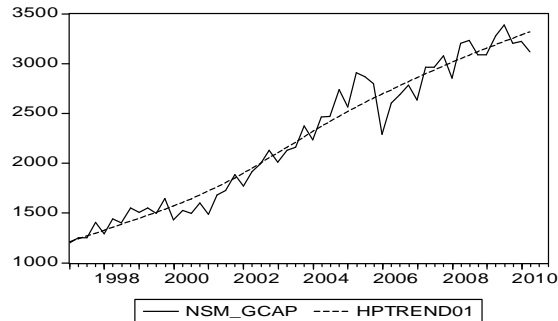


Figure 3.4. HP filter applied to sigma-convergence indicator in NMS

Bulgaria follows closely the trajectory of the new Member States at the global level, as opposed to the other new Member States that deviate from the line shown at the global regional level. In terms of correlation between economic cycles, we noted that Bulgaria is correlated to some extent with Hungary and the Baltic countries while Lithuania and Latvia are linked in a more significant way.

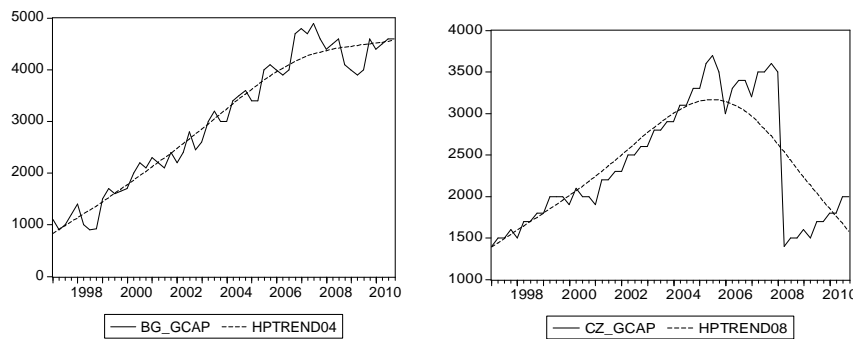


Figure 3.5 HP filter applied to sigma-convergence indicator in Bulgaria (left side) and the Czech Republic (right side)

Poland and Romania are clearly not correlated with other countries, presenting a long-term dynamic component different from other countries (see Figures 3.5-3.7).

The correlation of business cycles between new Member States and the Euro Area is virtually nonexistent, revealing a full desynchronization of the two groups of countries.

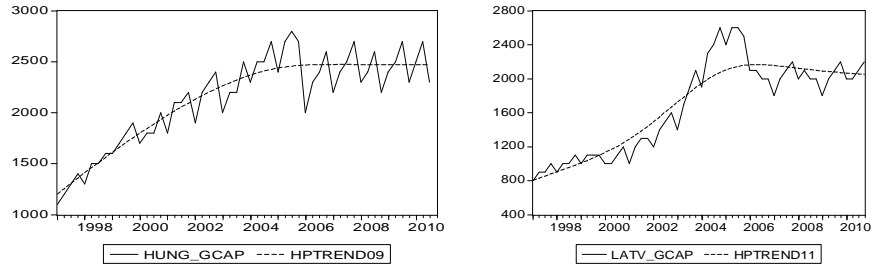


Figure 3.6. HP filter applied to sigma-convergence indicator in Hungary (left side) and Latvia (right side)

Thus, the optimal character of the Euro Area is questionable, as the benefits of the adoption of the single currency diminish under the impact of full decoupling between the business cycles in EU countries. From this perspective, the appropriateness of the convergence criteria in its current form can be contested on the basis of the empirical evidence, resulting from the quantitative analysis of business cycle correlation in the EU.

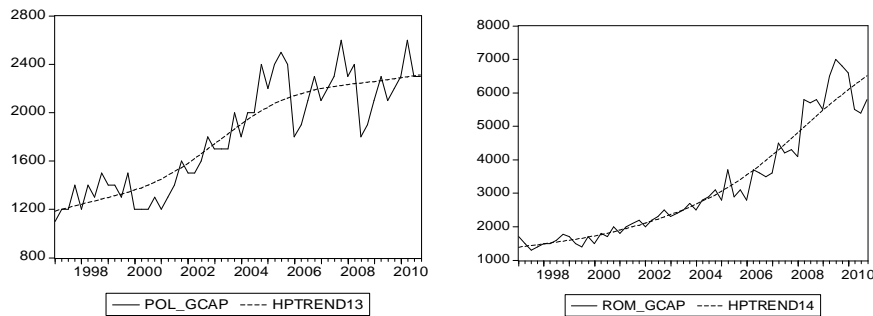


Figure 3.7. HP filter applied to sigma-convergence indicator in Poland (left side) and Romania (right side)

This deficiency of the Euro Area can be overcome by the harmonization of economic cycles. In the light of recent macroeconomic developments, nominal convergence criteria proved to be unable to make a significant contribution to the business cycles synchronization by setting pre-established levels.

Recent experience has revealed that although several countries meet the nominal convergence criteria as a whole, they do not automatically generate business cycles harmonization and, in essence, the valorization of the positive aspects of the single currency.

In this context, a viable technique can be represented by an enhanced convergence of the real convergence indicators or by redefining a more complex set of indicators, reflecting the junction between the two types of convergence. The literature highlighted key areas that, without being necessarily rendered under the form of an indicator of quantitative origin, could facilitate the synchronization of business cycles in the EU (Cuaresma and Amador, 2010). Essentially, there are significant disparities between Member States' economic cycles that can be explained by consistent asymmetries in these areas.

Among them, we can find the following:

- Financial integration, namely the creation of an EU-wide harmonized financial environment without significant discrepancies from one state to another in the development of a banking system (Caporale and Soliman, 2009). Afonso and Furceri (2008) emphasize that an enhanced level of financial integration leads to synchronization of real economies, with a positive impact on production structures.
- Mobility of production factors considered as favoring shock mitigation at the country level, through free circulation of the labor force to a country unaffected by macroeconomic disturbance and the restoration of the balance at the macroeconomic level, avoiding a massive exchange rate depreciation or strong inflationary pressures (Lei et al., 2008).
- Wage and price flexibility considered to be beneficial since it allows for adjustment both at the regional and the country level, following the shock, thereby avoiding unemployment or inflation (and Stehrer Foster, 2007).
- Opening of the economy, with positive effects on trade and foreign direct investment, seen as economic growth promoters and thereby accelerators of the catching up process (Jaroncinski, 2010).
- Similarity of production structures perceived as a harmonizing factor for economic development and equally a shock mitigant (Mayes and Viren, 2009).
- Integration of fiscal policy, considered an element favoring the harmonization of economic policies and, implicitly, of economic cycles (Fidrmuc and Korhonen, 2006).

In the section dealing with real convergence criteria, we have shown that in real convergence areas, in EU27, there are major disparities causing a decorrelation of economic cycles. In essence, the desynchronization between the emerging countries and the Euro Area and globally between

EU27 and each of the two groups of countries, namely the new Member States integrated in 2004 and the Euro Area can be explained in terms of notable differences among these countries, which, according to literature, can be considered as linking areas between nominal convergence and real convergence.

The real challenge lies in identifying sets of indicators to ensure relations between the two areas of convergence. Identifying quantitative indicators cannot be a panacea for addressing these concerns, but rather the creation of complex systems of indicators, based on a link between quantitative and qualitative dimensions.

3.2. Analysis of the interest rate convergence criterion in the context of financial disturbance

The convergence of the interest rate has been set in the Maastricht Treaty as a basis of economic growth; a low interest rate was considered to improve access to funding, enhancing the potential for future growth. Nevertheless, the strong convergence of the interest rate seemed not to produce positive effects in general; this new perspective as well as the experience of the financial crisis occurred in the context of an abundant liquidity, considering that a low interest rate policy might be harmful. Overlending and subsequent bubbles would force the destabilization of the macroeconomic environment, leading to recession.

A period marked by an important economic growth would imply a higher interest rate and a commensurate liquidity cost. In this context, the application of an abundant liquidity policy would be inappropriate due to the liquidity trap. In the light of the new economic paradigm, determined by the recent financial turbulences, the Maastricht Treaty provisions concerning the interest rate policy appeared to be uncorrelated with the macroeconomic developments.

According to the Maastricht Treaty, the average nominal long-term interest in the last 12 months must not exceed by more than 2 percentage points the best performing Member States in terms of price stability; the interest rate can be measured by long-term government securities or by other comparable securities. This expression is used as a compromise since there are no government bonds maturing close to 10 years in all Member States. But comparing different securities with different maturities is mathematically inaccurate. This problem could be avoided if short-term interest rates were used in order to valorize opportunities for speculative

interest rate differentials. Thus, from this perspective, it would be more appropriate to choose as a reference monthly average of Euribor and to compare it with monthly average interbank interest rates in candidate countries (Robor 12M, in Romania).

In addition, the difference of 2 pp should be related to the CDS for the country risk as the interest rate should include some risk premium. Thus in countries where the CDS is over 100 bp during the year, the margin of difference should be increased to 3 pp. But a difference of over 3 pp should not be tolerated since it might generate permissible interest rates close to two digits, which would induce too large asymmetries.

This study aims to analyze the dynamics of interest rate in the EU, providing a comparative perspective between the Euro Area and the non-euro countries. The interest rate is perceived as being impacted by several factors including economic growth, country risk premium and liquidity cost. The economic growth and inflation are reflected by the real GDP dynamics and consumption price index dynamics; the country risk premium is included in the spreads corresponding to country rating while liquidity cost is expressed in the form of money market interest rate. The data were taken from the Eurostat site (inflation rate, economic growth, liquidity cost) and from Damodaran site (the mapping of country rating with relative spreads).

The comparative perspective is oriented towards the Euro Area countries that are assumed to agree in a significant way with the interest rate convergence criterion and non-euro countries that include both CEE countries as well as countries that benefited from the exit-out option (Denmark, Sweden and the UK). The analytical approach is focused on the dynamics of interest rate along with the dynamics of determinant drivers.

The analysis intends to clarify the theory of interest rate convergence, concentrated mainly on low levels of interest rate. The objective of the study is to highlight some components of the interest rate that are likely to trigger an increase in the interest rate and to affect negatively the convergence criterion, but meanwhile to include a positive dimension. In essence, we conceive interest rate as a set of risk premiums in a holistic approach, i.e. the risk-free rate is a purely theoretical concept, with no applicability nowadays because of the sovereign debt crisis.

The risk premiums that are reflected in the analysis relate to macro-financial risk (risk of recession inherent in economic growth fluctuations, inflation risk and country risk) and liquidity risk (risk of liquidity cost increase).

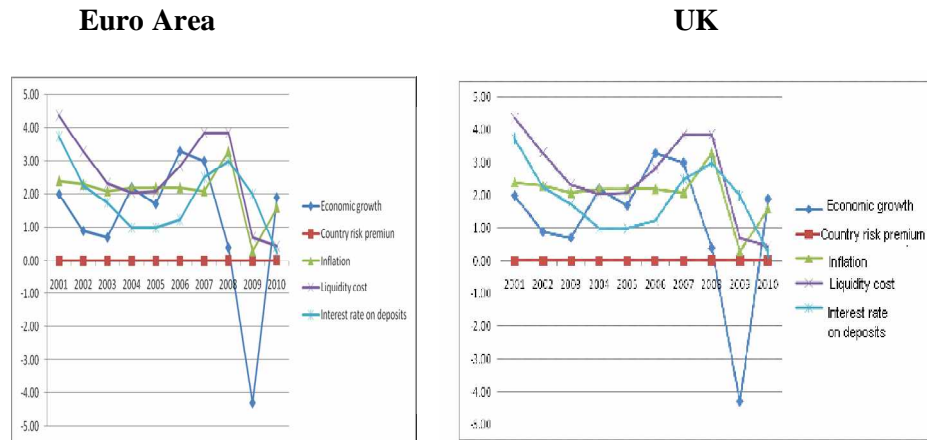


Figure 3.8. The dynamics of risk premiums corresponding to interest rate in the Euro Area (left) and the UK (right)

The graphs below show that non-euro countries have a higher interest rate in comparison with the euro countries. Among the CEE countries, Bulgaria, Hungary and Romania have the highest interest rate; a similar behavior is reflected in case of the UK, followed by Sweden and Denmark. The charts below reflect the dynamics of the drivers in correlation with the dynamics of the interest rate. As for the Euro Area, the period of economic growth is accompanied by a lowering interest rate, producing abundant liquidity; once recession has occurred, the liquidity costs increases and the interest rate follows up a upward trend.

A similar pattern can be identified for the UK and Denmark while in Sweden, the interest rate seems not to be significantly impacted by economic growth. The interest rate shows a high resistance to some fluctuations triggered by financial turbulences; nevertheless, the interest rate is situated at a higher level in comparison with the inflation rate, highlighting the capacity of the monetary policy to counteract adverse macroeconomic evolutions. The only difference consists in the fact that, in Denmark, the interest rate is lower than the inflation rate, revealing the negative real returns.

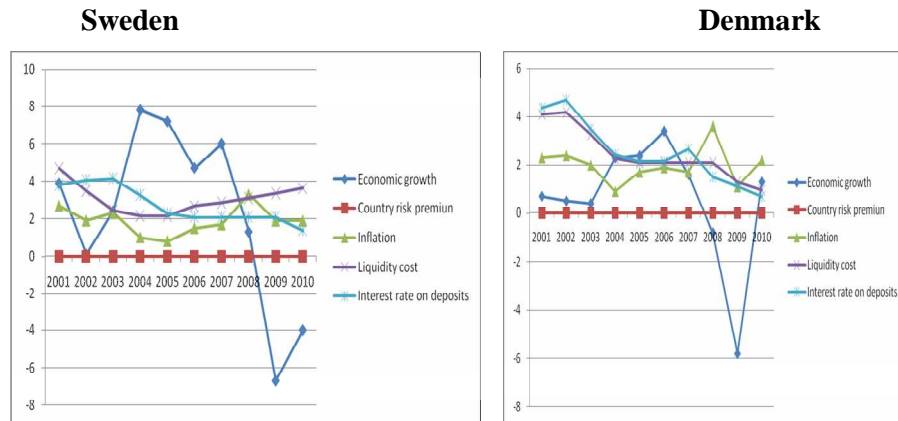


Figure 3.9. The dynamics of risk premiums corresponding to interest rate in Sweden (left) and Denmark (right)

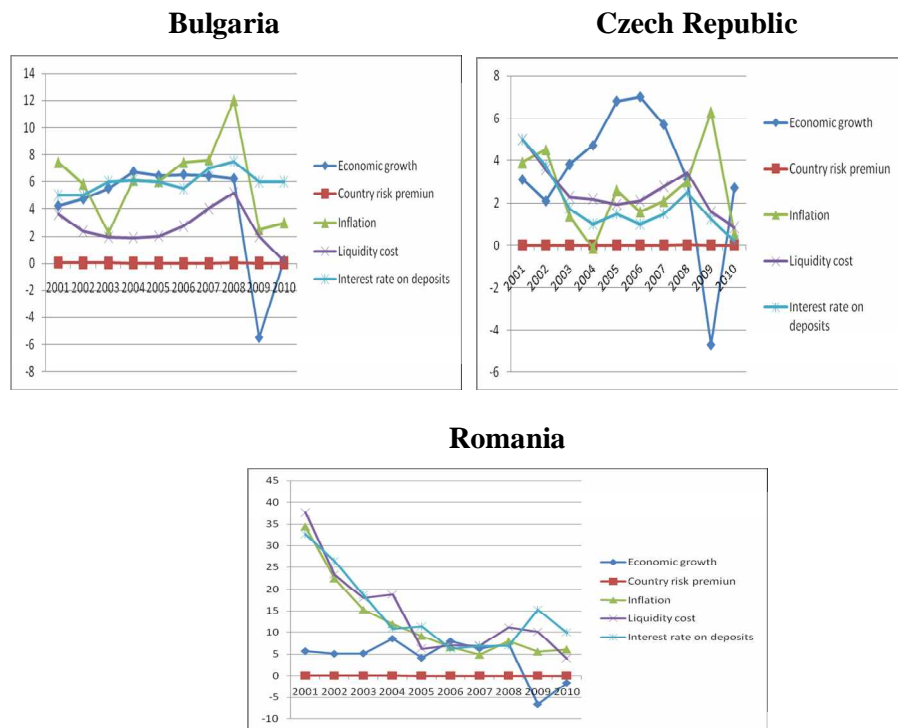


Figure 3.10. The dynamics of risk premiums corresponding to interest rate in Bulgaria (left), Czech Republic (right) and Romania (centre)

The CEE countries show an important economic growth, affected only by the financial crisis. The interest rate dynamics is higher in some cases to the inflation rate (Hungary and Poland) while in other cases it is maintained at a lower level (Bulgaria and Czech Republic). Romania follows a different pattern, with changes in the dynamics of the variables from one period to another; therefore, the interest rate follows closely the inflation rate dynamics.

3.3. Testing the Uncovered Interest Rate Parity (UIP) in the European Union³

3.3.1. Literature review on Uncovered Interest Rate Parity

Literature on UIP is abundant in papers that either test the efficiency of financial markets or reveal various relationships between interest rates and exchange rates. Different studies illustrate the UIP in various time periods, seeking to reveal the importance of time in explaining the accumulation of risks. Chinn & Meredith (2004), Mehl & Capiello (2007) revealed that UIP holds only for long periods of time (from five to ten years) due to the impact of macroeconomic fundamental factors; a short time horizon favors monetary policy actions that determine a negative correlation between exchange rate and interest rate.

Similarly, Fujii and Chinn (2001) revealed the importance of long-term variables for the UIP confirmation; emerging economies, with flexible exchange rate, create incentive for the validation of the UIP theory, especially in the context of long time horizons.

Lothiana & Wu (2011) made a research on a long period of time – 200 years - revealing that the UIP is validated only during some sub-periods of time. Other researches (Baillie & Bollerslev (2000), Flood & Rose (2002)) demonstrated that it was only after 1990 that UIP became relevant. Nevertheless, Chaboud and Wright (2005) revealed that UIP holds on shorter time horizon in the context of speculative transactions. Bekaert et al. (2007) revealed that UIP depends rather on foreign currency than on time horizon.

Most of the research has tested the UIP theorem based on country features. There is an abundant literature dedicated to the analysis of a certain differentiation of the UIP according to peculiarities of the macroeconomic environment, especially in the light of the differentiation between emerging

³ This part of our research is the result of the collaboration with Dr. Christian Richter, Senior Lecturer, Royal Docks Business School, University of East London.

and developed countries. The results usually regard two different lines: one including a confirmation of the UIP at the level of developed countries (Froot and Rogoff (1994), Taylor (2002), Sarno (2005), Bath (2011)), justified by the absence of a potential lack of risk premiums because of an important stabilized macroeconomic environment, and the other one reflecting the UIP failure in the case of emerging countries, which is explained by worse macroeconomic conditions.

Bansal and Dahlquist (2000) made a study on 28 developed and emerging economies based on data for the period 1976-1998; they show that it is more likely to stimulate deviations from the UIP in countries with a more fragile macroeconomic environment, reflected particularly in lower GNP per capita, lower credit ratings and higher average inflation.

Alper et al. (2009) emphasized that emerging markets were characterized by weaker macroeconomic fundamentals, more volatile economic conditions, shallower financial markets and incomplete institutional reforms. These differences of structural nature in comparison with developed countries affect the assumptions underlying the UIP theory, causing the rejection of this theory.

Most of the studies conducted during the last ten years revealed a predominant non-observance of the UIP with no differentiation at the country level (Marey, 2004a-b, Peasaran and Wale, (2006), Verdelhan, 2006). This was explained in the light of risk premiums determined by transaction costs or central bank interventions. Zhang (2011) shows that market dimension is a fundamental factor for the UIP confirmation; nevertheless, the current economic environment, characterized by a recessionary environment and government interventions, led to important deviations from the UIP theory.

Other studies analyze the UIP in the context of different exchange rate regimes. Flood and Rose (2002) revealed that UIP is confirmed especially in the case of fixed exchange rate regimes.

However, there are only a few papers that concentrate mainly on CEE economies, most of them being focused on the developed countries. Bansal & Dahlquist (2000) and more recently Alper et al. (2009) highlighted that UIP is confirmed especially in the case of emerging countries, emphasizing the role of high inflation rate. Mansori (2003) and Horobet et al. (2009, 2010) pointed out that for the Central and Eastern European countries, testing the UIP leads to results that vary from one country to another. Although the hypothesis is confirmed by positive slope coefficients, the corresponding statistic tests do not validate it.

Other studies showed indirectly the UIP failure in CEE countries because of additional risk premiums triggered by persistent inflation. Orłowski (2005) pointed out that important risk premiums associated with the inflationary process led to negative phenomena such as recession periods, unemployment and large imbalances.

Cihak and Mitra (2009) showed that CEE countries withstood firmly the financial crisis in the context of the inflationary pressure reduction.

Recently, Filipozzi and Harkmann (2010) analyzed the UIP in the light of the recent financial disturbances in the CEE area. The conclusions lead to the idea that the theory does not hold at the global level, but there still are many differences at the country level. Therefore, for countries with a higher degree of financial integration (Czech Republic, Hungary, Poland) the theory is confirmed, in opposition to countries with a lower degree of financial integration (Bulgaria and Romania).

Boubakri and Guillaumin (2010) revealed the failure of the UIP in the CEEC countries in relation to additional risk premiums. At the same time, Kocenda and Poghosyan (2010) valorized a methodology similar to the present study and included an important variable, encompassing the foreign exchange risk premium in amount of 4% on the basis of the GARCH in mean model.

Posta (2012) revealed the UIP failure in the Czech Republic; the additional risk premium is impacted to an important extent by macroeconomic bases, pointing to the volatility of long term nature.

However, the current literature does not include a global view on the relevance of the UIP for the CEE countries that have not yet adopted the single currency; the previous research lacks an integrated approach to the interest rate behavior in the light of the UIP theory, which should take into account the similarities of the macroeconomic structures of these countries. Apart from that, the current referential literature has concentrated on the status of the UIP in these countries, provided mainly under the form of a final statistical result that revealed the rejection of this theory for the countries under review. Besides, the question is to what extent this failure can be attributed to fundamental factors pertaining to the macrofinancial economic environment of these countries, with special emphasis on the multiple dimensions of the nominal and real convergence process.

The present paper aims to fill the gap in the literature and to provide an integrated perspective on the structural factors that could drive a certain behavior of the interest rate according to the UIP theory in these countries.

For this purpose, in an early stage, the paper tests the UIP theory at the level of the Central and Eastern European countries (Bulgaria, Czech

Republic, Hungary, Poland and Romania) by three types of GARCH models (TGARCH, CGARCH and EGARCH models).

The study valorizes the GARCH methodology having in mind technical peculiarities that allow to address the volatility from a complex perspective: therefore, the TGARCH model permits the integration of non-linear behavior in volatility, while the EGARCH model allows to integrate asymmetries in the structure in the light of a direct relationship between volatility and returns. Moreover, the CGARCH has in place the decomposition of the volatility on a two-dimension basis, allowing for the separation of the long-term component from the temporary one; according to these technical peculiarities, the GARCH models create favorable conditions for a more robust analytical framework.

After applying the models in question, the paper analyzes the statistical output in relation to specific aspects of the macrofinancial environment in these countries, which could explain the additional risk premiums that determined the UIP failure.

The study provides a complex perspective on the ability of these countries to comply with the interest rate and inflation convergence criteria. Once the risk layers that trigger important macroeconomic volatility have been revealed, the research shed light on the countries' limited capacity to achieve the nominal and the real convergence in the next period.

The analysis reveals several structural deficiencies related to the financial system depth, the soundness of public finance policies or the institutional framework that affect further integration of these countries into the Euro Area.

3.3.2. Methodology

This study approaches the UIP theory in the generalized autoregressive conditional heteroskedasticity models (GARCH) built by Engle and Bollerslev (1986). This model is depicted by the following equations:

$$X_t = a_0 + a_1 * y_t + \varepsilon_t + b_1 * \varepsilon_{t-1} \quad (3.1)$$

$$h_{t,2} = q_t + \alpha_1 * (\varepsilon_{t-1}^2 - q_{t-1}) + \gamma * (\varepsilon_{t-1}^2 - q_{t-1}) * D_{t-1} + \beta_1 * (h_{t-1}^2 - q_{t-1}) \quad (3.2)$$

$$q_t = \varpi + \rho * q_{t-1} + \varphi * (\varepsilon_{t-1}^2 - h_{t-1}^2) \quad (3.4)$$

where:

$D_t = 1$ for ε_t inferior to 0, $D_t = 0$ otherwise

and

ε_t represents the error term.

The first equation represents the mean equation, where x_t is the log-difference.

The term ε_t is supposed to be conditionally normally distributed, being dependent on past information and capturing any unexpected appreciation or depreciation.

The second and third equations reflect conditional variance (h_t^2) which is conceived as a linear function of a time-dependent intercept, the lag in the squared realized residuals (ARCH term), an asymmetric term (γ) and the lagged conditional variance (GARCH term).

The present study focuses on using three types of GARCH models: EGARCH model, TGARCH model and CGARCH model.

A. The EGARCH model

The exponential GARCH (EGARCH) model was proposed by Nelson (1991) who expressed the conditional variance equation as:

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{\mu_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|\mu_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \quad (3.5)$$

The model has several advantages over the simple GARCH in the light of the $\ln(\sigma_t^2)$ term that is subject to modeling and even if the parameters are negative, σ_t^2 is positive. In this context, the elimination of potential non-negative constraints imposed on the model parameters is beneficial. In addition, the asymmetries are permissive in the EGARCH structure in the light of a direct relationship between volatility and returns; consequently, if volatility and returns are negatively related, then λ is negative as well.

In the initial set up, Nelson assumed a Generalised Distribution Error (GED) structure for the errors. In essence, GED represents a group of distributions that can be used for several types of series. For computational purposes, the application of the EGARCH model employs conditional normal errors rather than GED usage.

B. The TGARCH model

The Threshold GARCH model introduced by Rabemananjara and Zakoian (1993) shows various volatility reactions under the impact of previous shocks, integrating the non-linear behavior in the volatility as well.

This model puts special emphasis on the conditional standard deviation instead of conditional variance:

$$\sigma_t = K + \delta\sigma_{t-1} + \sigma_1^+ \varepsilon_{t-1}^+ + \alpha_1^- \varepsilon_{t-1}^- \quad (3.6)$$

$$\varepsilon_{t-1}^+ = \varepsilon_{t-1} \text{ if } \varepsilon_{t-1} > 0 \text{ and } \varepsilon_{t-1}^+ = 0 \text{ if } \varepsilon_{t-1} \leq 0.$$

$$\text{Likewise, } \varepsilon_{t-1}^- = \varepsilon_{t-1} \text{ if } \varepsilon_{t-1} \leq 0$$

and

$$\varepsilon_{t-1}^- = 0 \text{ if } \varepsilon_{t-1} > 0.$$

C. The CGARCH model

The CGARCH model breaks down volatility into two components, a permanent and a transitory one. Permanent volatility component consists of a time-invariant permanent level (ω), an AR term (ρ) and the forecasted error (φ).

The short-term volatility component is obtained by the subtraction of the long term volatility from the total volatility, meaning that:

$$h_t^2 - q_t = \alpha_1 * (\varepsilon_{t-1}^2 - q_{t-1}) + \gamma * (\varepsilon_{t-1}^2 - q_{t-1}) * D_{t-1} + \beta_1 * (h_{t-1}^2 - q_{t-1}) \quad (3.7)$$

The forecasted error (φ) represents the difference between the lag in the squared realized residual and the forecast in the model (based on information available at time t-2). Engle and Victor (1993) reveal that CGARCH represents a GARCH (2,2) model, being less restrictive than a GARCH (1,1) model.

3.3.3. The data

The study valorizes exchange rate and interest rate data on a monthly basis for the sample of five CEE countries (Bulgaria, Czech Republic, Hungary, Poland and Romania) during the time period 1997-2011, from the European Central Bank website.

The monthly observations extend to the level of bilateral exchange rates reflecting both euro and dollar parities of the national currencies of CEE countries.

Indeed, one main criterion to build up of this sample of countries consists precisely of the consistency of their monetary regimes. The countries focused in the present study have not yet adopted the single currency and still benefit of their monetary autonomy.

3.4. Discussion and results

3.4.1. Analysis of the statistical output

When testing for UIP it turned out that the residuals were heteroskedastic and autocorrelated. We therefore decided to test for UIP using different GARCH models, in particular we tested EGARCH, CGARCH and TGARCH for all countries and for the dollar and euro denominations. From all models tested, we then chose the ‘most appropriate’ one in terms of minimizing the Schwartz and Akaike criterion. Table 3.19 summarises the results.

Table 3.19

Synthesis of the statistical output derived from the application of GARCH models

Model	UIP confirmation		UIP failure	
	Euro exchange rate	Dollar exchange rate	Euro exchange rate	Dollar exchange rate
TGARCH			Czech Republic	
EGARCH	Bulgaria		Romania	Poland Romania
CGARCH			Hungary Poland	Czech Republic Hungary

Source: Author’s calculations.

It turns out that UIP is rejected for all countries but one, namely Bulgaria. Moreover, different countries follow different data generating processes concerning their conditional standard deviations of residuals. For example, for Romania the EGARCH was valid whilst for the Czech Republic it was the TGARCH model. Given the overwhelming evidence of

UIP rejection in the CEE countries we may now ask what contributed to this result. Obviously, in this stage, we can only describe factors which are unique to the UIP countries. To test for these factors goes beyond the scope of this paper and requires further research.

The countries under review show similarities in terms of macroeconomic development since the collapse of communism; these countries have undergone a transition from centralized planned economies to market economies.

In addition, all these countries are still autonomous in terms of monetary policy, having their own national currencies. The monetary regimes of these countries are characterized by similarities as all the countries implemented the inflation targeting policy, supported by a controlled floating exchange rate, except for Bulgaria which has had a currency board regime since 1997.

In essence, the successful currency board leads to stable exchange rate expectations which in turn are reflected in the total failure of the UIP in terms of Bulgarian leva parity against dollar, while the parity against euro reveals a full confirmation of the UIP theory.

Moreover, Bulgaria reveals the highest share of euro-denominated exports in GDP (25%)⁴ among the CEE countries. Hence, the failure of the dollar denominated UIP test. As a result, the acceptance of UIP for Bulgaria was implicit; a currency board (starting in 1997) implies a tight control on exchange rate dynamics, which leads to a high degree of exchange rate predictability, implying the mitigation of risk premia.

For the Czech Republic UIP was rejected both cases. This could be explained by a potential risk aversion and implied high risk premia resulting in a difference between the interest rate differential and the expected change in the exchange rate. Despite a floating exchange rate regime in relation to the dollar and the euro, the Czech Central Bank is regularly intervening in the currency markets in order to stabilise the exchange rate volatility. Our results suggest that this does not lead to a stabilisation of the exchange rate expectations due to the discrete nature of those interventions.

⁴ Eurostat data for the year 2011.

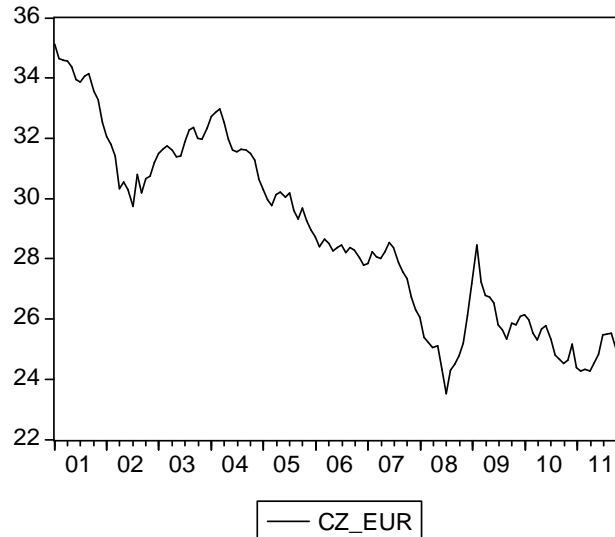


Figure 3.11. Koruna-Euro exchange rate

For Hungary, the CGARCH model revealed that the coefficient of the temporary component is bigger than the permanent one. We consider that the country has flexible macroeconomic structures enabling it to absorb potential shocks. In this context, the additional risk premiums reflected by the UIP failure do not imply a speculative behavior. This interpretation of our findings is in line with Ghoshray and Morley (2012) who found similar results.

Poland also rejects the UIP, and depending on the analysed currency the conditional standard deviation follows different processes. For the US dollar it is the EGARCH while for the euro it is the CGARCH.

Romania also rejected the UIP. In this context, the exchange rate differential includes an additional risk premium. The dynamics of conditional standard deviation is somewhat different for the two currency pairs (Figures 2 and 3). The peaks are more pronounced for the dollar exchange rate, while the persistence is lower on shorter time-periods. On the contrary, the euro conditional standard deviation shows a persistence on longer periods of time; nevertheless, the standard deviation is decreasing during the last period of time.

Figure 3.12. Romanian leu/euro parity

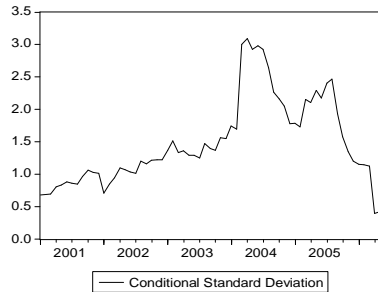
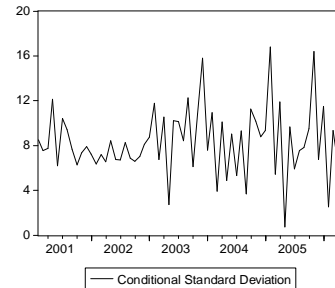


Figure 3.13. Romanian leu /dollar parity



We interpret the reduced Euro volatility of Romania in the recent years as an increasing focus of the Romanian economy on the EU, leading to a more stable exchange rate expectation. This cannot be claimed in the case of the US.

Summing up, the empirical results highlight that UIP is not confirmed. This predominant failure in the CEE countries can be explained by non-observance of the assumptions that underlie the UIP theory. For this theory to hold, it is essential that a large number of factors occur such as perfect capital mobility, risk neutrality and negligible transaction costs and so on. In addition, identical assets in terms of default risk, liquidity and maturity are also required for UIP confirmation.

The fundamental features of CEE countries, characterized by macroeconomic instability, may have led to imperfect capital mobility, high transaction costs as well as risk aversion.

Past studies show that emerging countries exhibit a higher macroeconomic instability, especially due to their low potential to conduct counter-cyclical monetary and fiscal policies (Kočenda and Poghosyan, 2010; Frankel and Poonawala, 2010).

An example of a CEE specific fundamental feature is the inflation dynamics which frequently circumvented the convergence criteria and eroded financial stability, contributing to an additional risk premium that envisaged the reward of the risk aversion behavior.

A review of the inflationary process in the CEE countries reveals a pathway with strong inflation pressures (Figures 4-6); indeed, in shorter periods of time, there is a temporary downturn dynamics, but the predominant feature includes a gradual increase.

The inflationary pressures were explained by the transition from the centralized planned economy to the market economy; in this context, shocks originating both in the supply and the demand side, reflected in administered prices and excises duties adjustments, as well as various developments in commodity prices, led to inflationary pressure.

Figure 3.14: Inflation Rates in Bulgaria and Czech Republic

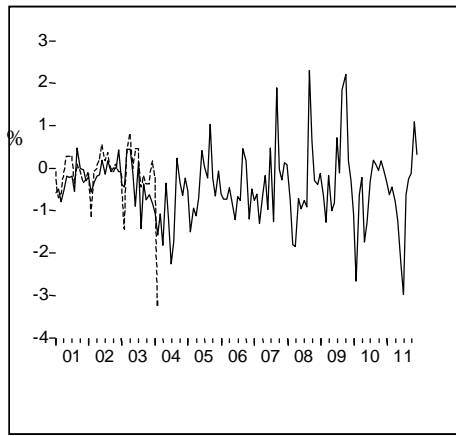


Figure 3.15: Inflation Rates in Hungary and Romania

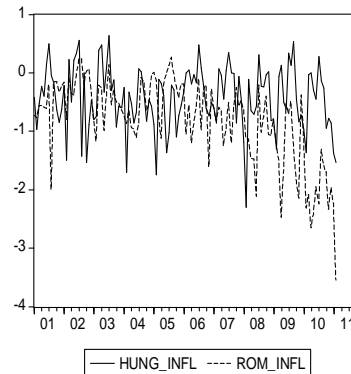
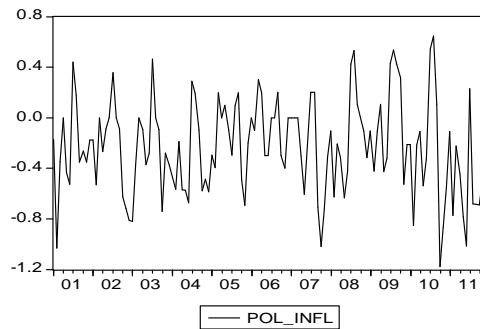


Figure 3.16: Inflation Rate in Poland



The initial inflationary pressure may be the result of the catching up process and the associated overheating phenomenon. This aspect is stronger in the context of a fixed exchange rate regime that does not offer the opportunity to operate adjustments in order to accommodate the money supply to the evolution of the macro-financial variables.

Essentially, the catching-up process favored an accelerated economic growth in the CEE countries; prior to financial crisis outbreak, Bulgaria, the Czech Republic and Romania underwent an average economic growth of more than 5%, while Hungary and Poland showed an economic growth over 4%. Francis et al. (2002) pointed out that steady economic growth leads to stabilization of the national currency; in the absence of an interest rate decline, excess returns increase and cause the rejection of the UIP theory.

Another potential explanation of the UIP failure might consist in the deterioration of public finance indicators; except for Bulgaria, which faces a budget deficit that complies with the requirements imposed by the relevant convergence criteria (below the 3% threshold), the other CEE countries have not complied with this indicator. Concerning public debt, Hungary seems to be the only country that failed to attain the 60% predetermined level. All the other countries show an important fiscal discipline from this perspective; for example, Bulgaria and Romania have an average public debt over this period of 16% and 30%, which is extremely conservative taking into account the reference value.

The worsening of public finance indicators occurred in the context of a series of structural deficiencies; these deficiencies are reflected in a low level of government revenues collection. During the 2004-2011 period, all the CEE countries reported relatively low average revenue as a proportion of GDP (Bulgaria and Romania – 30%, the Czech Republic, Bulgaria, Hungary and Poland – 40%) while countries from the Euro Area reported values in excess of 100% for this indicator. Apart from that taxes made up less than 50 % of government revenue in Hungary, the Czech Republic and Slovakia in 2011, but almost 85 % of government revenue in Denmark.

The low level of government revenue collection has been explained by inefficient policies in this field determined by volatility or loopholes in the fiscal legislation that changed frequently under the impact of different political regimes (Kocenda et al., 2008). In addition, official statistics report that on average 40% of taxable amounts currently remain undeclared in Romania and Bulgaria, indicating the fiscal evasion phenomena.

Other studies reveal higher values of the corruption index for Bulgaria and Romania during the last decade, showing that corruption risks in these two countries were widespread. The assessments performed for Romania and Bulgaria identified problematic areas: in Bulgaria, there have been set forth a weak institutional framework and politically oriented management and business, while in Romania the assessment showed deficiencies in the public sector, caused by significant involvement of the political parties.

As for the other CEE countries (Czech Republic, Hungary and Poland), official statistics relative to the corruption index reveal a better situation in comparison with Bulgaria and Romania; nevertheless, some structural changes are still required in order to ensure the harmonization with the Euro Area.

Moreover, the integration of these countries into the EU required amendments to the legal framework in order to ensure compliance with the requirements imposed at the European level. Previous researches show that the adaptation of the legal framework to various fields (financial and banking system, fiscal system, consumer protection) was not sufficient for the real convergence process since the amendments were formal; in essence structural reforms were required to accelerate the catching-up. Their absence caused important deficiencies that determined the risk aversion behavior among investors and the corresponding risk premiums.

The deterioration of budget balance contributes indirectly to inflationary pressures taking into consideration the mandatory financing process; from this perspective, the spiral effects might stimulate additional inflationary effects.

A similar effect might be explained in the light of the current account deficit that these countries revealed in the last decade; prior to the financial crisis outbreak, all the CEE countries have shown an important current account deficit, being demand-driven in most cases. Since macroeconomic structures were not solid enough in order to cover the high consumption by internal production, imports prevailed.

At the end of 2008, the share of net foreign asset position in GDP deteriorated in most of the countries, reaching negative values of almost 100% in the case of Hungary and 80% in the case of Bulgaria and Romania.

Nevertheless, Zorzi et al. (2009) revealed that the catching-up process favored the financing of current and capital account deficits by foreign direct investments amounting to more than 100% in case of Bulgaria, the Czech Republic, Poland and Romania. The potential of this financing mechanism decreased, once the financial crisis started, to almost 50%, but meanwhile, demand collapsed and the need for funding followed a similar trajectory.

Nevertheless, the predominant rejection of the UIP theory at the level of the countries under review shows that the equilibrium of the trade balance does not necessarily produce a positive impact on the interest rate differential, shedding light on potential structural causes that lead to accumulation of additional risk premiums (Balfoussia and Wickens, 2007).

In line with these aspects, an important structural element that might explain the failure of this theory consists in the financial system development degree; previous research⁵ revealed that there is a notable gap between the Euro Area and Central and Eastern Europe concerning the weight of the financial system in GDP, which reached 1584% in 2000 and 2287% in 2010 in the Euro Area, while in case of Central and Eastern European countries, it was much lower.

The highest value of the indicator is recorded in Poland (248% of GDP in 2000 and 372% in 2010), followed closely by the Czech Republic (85% in 2000 and 98% in 2010), Hungary (80% in 2000 and 87.73% in 2010) and Bulgaria (50% in 2000 and 95% in 2010).

Romania is the last in the ranking of Central and Eastern European countries by the financial system development degree, with a share of 32% of GDP in 2000 and 50% in 2010.

Apart from that, the financial system is predominantly banking-oriented. In opposition to the Euro Area where the banking system represents only 4% of the financial system, the average value of this indicator is 80% in the CEE countries. In spite of other studies that revealed an accelerated pace of the financial integration into this geographical area in the last decade (Ferreira and Leon-Ledesma, 2007), significant discrepancies in the real convergence process between the CEE countries and the Euro Area triggered by differences in the financial system development still persist. Therefore, the financial system change is still in an early stage, resulting in important transaction costs, which adds on other layers of risk premiums that determine the deviation from the UIP theory.

As mentioned above, the exchange rate regime in all countries is a controlled floating one, involving discretionary interventions of the central banks. These interventions have been considered in the literature as a cause of deviation from UIP (Cihac and Mitra, 2009). Previous researches revealed important interventions made by central authorities in order to sustain the exchange rate dynamics in the Czech Republic, Hungary, Poland and Romania beginning in the 90's; most of the researches show that these interventions are effective only in the short run, favoring a slight appreciation of the national currency (Egert, 2007; Fidrmuc and Horváth, 2008), which leads to the UIP theory rejection. Kocenda and Poghosyan (2010) underlined the important effect that monetary policy exerted on the behavior of exchange rates in Central and Eastern European economies, showing the contribution of this effect to the pricing of contingent claims of the investors.

⁵ Triandafil (2011).

4. Financialization and economic convergence in the European Union

4.1. General aspects

The financial crisis has revealed the paradox represented by the financial system amplitude and the financial stability. Amid extensive financial flows, which have generated abundant liquidity and hence the development of sophisticated products, the *too big to fail* principle has gained consistency and thus has led to a new philosophy of financial stability. According to this philosophy, a financial institution that has a significant volume of assets and is characterized by multiple connections at the jurisdiction and system level, is perceived as strong enough in size to withstand any shocks, not being likely to jeopardize financial stability.

The collapse of Lehman Brothers financial giant showed the limitations of this philosophy which revealed the nature and even the paradoxical discrepancy between the two sides of the coin - amplitude versus stability. In essence, just the unprecedented amplitude of the financial system created favorable conditions for banking to circumvent the prudential regulatory framework, revealing important weaknesses of the banking supervisory process, unable to capture the weaknesses in the risk management system based mainly on internal models. Unfortunately these internal models have shown a significant potential for regulatory arbitrage.

In fact, special emphasis was placed on the quantitative dimension of the models, which led to the creation, development and even the use of innovative but extremely complex financial instruments that caused supervisors' failure to monitor them in a more strict way, and especially, to become aware of the risks at the global level.

In the EU, financialisation created favorable conditions for excessive indebtedness, leading to accumulation of important deficits. Moreover, the spiral of the financial crisis originally manifested in the banking system and then migrated to the public finance and was caused by the financial system oversizing as against the real economy. In the Central and Eastern European countries, financialisation has permitted the relaxation of credit policies and supported the consumption at the expense of investment, generating an artificial economic growth.

This study considered the relationship between financialization and economic convergence in the European Union, focusing on the Eurozone and the Central and Eastern European countries. The financial system is

analyzed in terms of economic growth over the last ten years, as well as in terms of specific components. The approach is complex, both to the financial system as a whole and to the component level - banking, capital market securities, bond market and money market. The focus is placed on real convergence, reflected in real GDP growth, revealing the way it reacted on the spur of the financial system components.

4.2. Approaches to the relationship between financialization and convergence

Shaping a referential literature on the relationship between convergence and financialization represents a challenging endeavor as regards the innovative dimension of the research. Numerous researches have focused on the impact of financial globalization on macroeconomic stability (Tytel and Wei, 2008; Claessens et al., 2008), and on the effect of the financial system in triggering the crisis (Krugman, 1993, 1999, 2010; Kregel, 2007; Iancu, 2011).

The financial crisis revealed a new dimension of economic convergence, leading to theories on the EU configuration as an area limited by two fundamental levels – center-periphery – separated by a gap which tends to widen (Becker and Jager , 2011).

Previous research has viewed the economic growth as a gradual accumulation that in some cases interferes with the dynamics of the financial system.

Thus, Becker et al. (2010) have revealed the existence of a particular type of accumulation, based on a dichotomy which now acquires antagonistic valences, namely financial economy versus real economy: accumulation of a productive nature versus accumulation of a financial nature.

As for the productive accumulation, the emphasis is placed on massive investment in the productive sectors of the economy that generate growth. As for the financial accumulation, we can distinguish two sub-types: fictitious capital accumulation and (Marx, 1979) and the accumulation of interest-bearing capital (Becker et al., 2010). Fictitious capital accumulation occurs when special emphasis is placed on financial assets with high liquidity, especially in situations when productivity stagnates and a certain type of production structure is outdated, which shifts the investor's interest from fixed capital investment to intangible investment. In the case of financial accumulation based on interest-bearing capital, the focus is placed on the differential between the active and the passive interest, which leads to growth owing to excessive lending.

During the last decade, there have been two growth strategies: neo-mercantilism in Germany, Austria and the Netherlands and financial accumulation in Greece, Ireland and Spain. Within the European Union, neo-mercantilism practiced by some countries led to significant imports in certain countries recently integrated and thus to the accumulation of current account deficits that could be covered by foreign capital flows during the expansion of the economic cycle (Apeldoorn et al., 2009).

Literature lacks a solid referential focus mainly on the correlation between financialization and economic convergence; we can assume that the financial system was rather analyzed in correlation with tangential or equivalent processes, such as integration (Lane, 2007, 2008; Obstfeld, 2008), capital account liberalization or globalization. Eichengreen (2001), Henry (2007), Eatwell and Taylor (2002), Kose et al. (2006) have shown that financial development may favorably influence the integration process and, implicitly, convergence, subject to compliance with a robust regulatory framework of the financial system, a quality institutional environment and a stable macroeconomic framework. Growth and accelerated convergence occur due to the interaction between the financial system and the overall conditionality elements.

Prasad and Rajan (2008) have revealed that the relationship between financialization and economic integration is bi-directional, with mutual influences. Thus, not only financial development leads to an accelerated integration, but also integration fosters convergence, a qualitative institutional environment and macroeconomic stability.

This approach has continued a recent analysis undertaken by Holly and Raissa (2009), Paineira (2009), Becker et al. (2010). Unlike previous studies, the present research lays the stress on the financialisation of an economy in terms of correlation with the convergence within the European Union; the analytical perspective is confined strictly to the convergence process, focusing particularly on the contribution of the financial system as a whole to the acceleration of this process in Central and Eastern European countries. In order to make research relevant, the analysis is based on a comparison with the Euro Area, looking for differences in relation to countries seeking Euro Area membership.

In this respect, the research highlighted the conceptual relationship between the two types of processes, presenting different interferences between financialization and real convergence. Also, it implies an empirical perspective on the impact of the financial system as a whole on the real economy and further on real convergence. The difference between real and

nominal economy was revealed through real convergence, considered by experts as more relevant criteria, looking mainly for the impulses of two types of economies – financial and real – under their mutual influence.

4.3. Reflections and interpretations regarding the relationship between financialization and convergence

The financialization of the economy has gained worldwide magnitude in the last decades. Financial flows have increased massively, leading in time to a new economy, parallel to the current one, i.e. the nominal economy. Within the European Union, the financialisation acquires new meanings and is correlated with the process of convergence. In essence, the financialization of an economy has played a significant role in the configuration of the European Union, helping to reduce disparities between developed and developing countries. Thus, the financial system as a whole can be treated as a facilitator of economic convergence, serving to generate and boost economic growth through a multidimensional economy. In Figure 4.11, we see that the financial system has several vital functions in the economy.

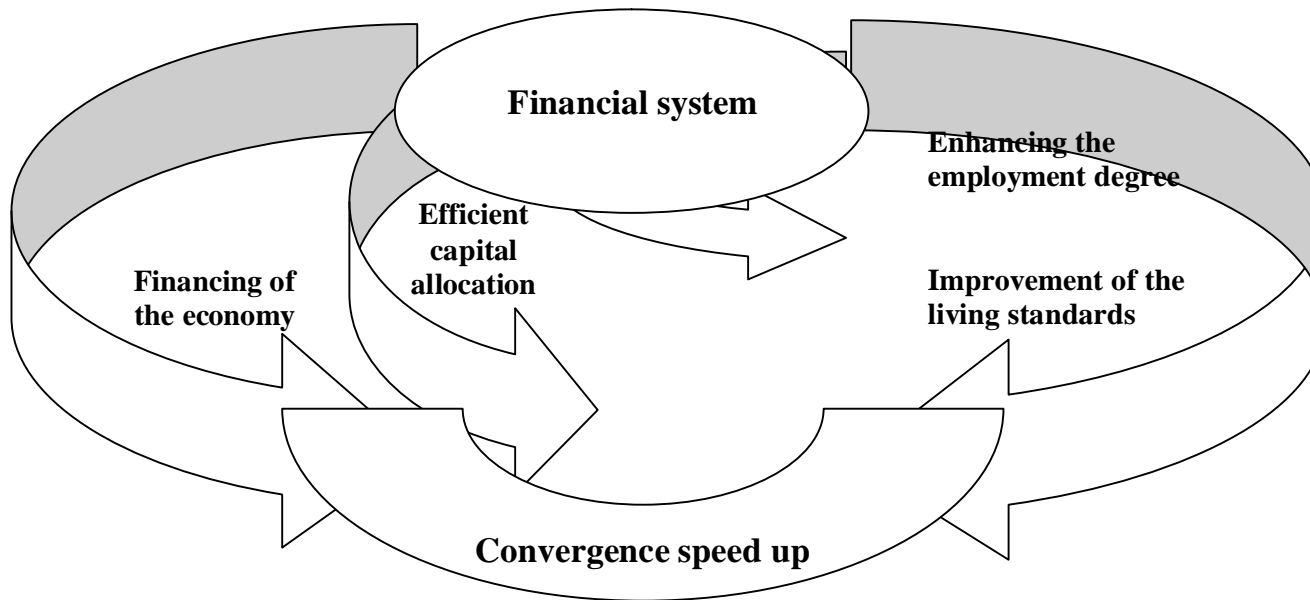


Fig. 4.11. – Contribution of the financial system in the convergence process

Envisaging mainly the financing of the economy, the financial system plays an important role in effective allocation of capital, focusing in turn on financial intermediation. Over time, the mix of roles has a positive impact on economic development as a whole, taking into account the indirect effects that may be caused by increasing employment and living standards. All these aspects have favorable repercussions on the real economy and implicitly on the convergence process, and the financial system becomes a vector for speeding up convergence.

On the other hand, the amplitude of the financial sector is not overwhelmingly positive, involving unfavorable aspects as well. The significant disparity of nominal flows in relation to real flows makes the financial system fragile, taking into account that the financial dimension has shown a total lack of correlation with the real economy; in case of turbulence periods, the financial economy is affected by the lack of effective support provided by fundamentals, which increases volatility and systemic risk.

In times of macro-financial imbalances, adverse effects propagate at amazing speed within the real economy, leading to recession. The effects of the recent financial crisis on real economy are well known; in fact, several studies have shown the cause of financial nature of most crises, which has caused massive macroeconomic imbalances (Chang and Velasco, 2001; Goodhart and Persaud, 2008).

Over the last 10 years, the accelerated economic growth in Central and Eastern Europe has been driven by the unprecedented scale of financial flows, which has led to the overheating of the economy, especially through the crediting channel, resulting in an essentially artificial increase.

On the other hand, during the expansion phase of the economic cycle, the countries in the region did not make an efficient allocation of resources at the level of the financial system, resulting in distortion; financial resources have been allocated mainly for consumption and not for investment, leading to unsustainable growth.

Non-sustainability of economic growth in these countries was demonstrated during the financial crisis, when, during the financial disturbance, “*hard landing*” was predominant. In this context, although at an early stage the credit magnitude caused a diminution in disparities in relation to developed countries (*catching-up process*) and implicit convergence in these countries, then the consequences were negative,

placing Central and Eastern Europe in an unfavorable light in the eyes of investors; as regards risk aversion, foreign capital flows dropped massively, causing significant depreciation of the exchange rate.

It is interesting that although the financial sector of these countries was not sophisticated enough to imply exposures to structured instruments generating toxic assets, which initially led to a clear opinion on the impossibility that these countries be affected by the crisis, taking into account its financial origin, then contagion was felt in full. Given the higher country risk premium for this region, once financial turmoil was triggered, investors reacted to measure, tending to make aggressive fund withdrawal which increased the macroeconomic risk in these countries. In the context of higher macroeconomic volatility, there was a severe contagion chain which determined real economy imbalances; real estate and other collateral sectors (e.g. constructions, retail) saw a major collapse.

In this context, convergence was severely affected, some previous progress tended to erode, causing a major setback. Analyzing in detail the relationship between finance and convergence, we estimate that the positive side of this relationship is not universal. Although, in general, the financial system can be seen as a vector of convergence, in some situations it may create distortions on the convergence plane. In addition, the way the two processes are related must be considered as based on the differentiation between the nominal and the real convergence.

The complexity of the relationship between financialisation and convergence implies a potential difficulty to draw valid conclusions, reflecting an unequivocal relationship. Financial globalization and massive financial flows directed towards emerging countries have multiple effects on the exchange rate; in periods of economic expansion, financial flows are directed predominantly to these countries, leading to exchange rate appreciation, while in periods of decline, massive withdrawals generate depreciation. Thus, the exchange rate is marked by sharp volatility, jeopardizing the capacity to fulfill the convergence criterion regarding exchange rate stability. In addition, speculative behavior is encouraged.

Adding sophistication to the financial system by increase in tradable securities may favor reducing inflationary pressures by absorbing market liquidity, especially in the context of attractive returns, but this process must be linked to the real economy. Emphasizing the differential between M3 and

M2 monetary aggregates can be beneficial for convergence only if the M1 aggregate reduces, leading to absorption of excess cash and reduction in inflation. Otherwise, simultaneously increasing M3 and M1 aggregates stimulates inflationary. However, the magnitude of M3 in the context of attractive yields may increase long-term interest rates, leading to non-observance of the convergence criteria.

We appreciate that due to the fulfillment of conditions, the financial system is likely to favor a certain degree of nominal convergence, especially financial convergence. However, financial convergence can be in contradiction with fiscal and budgetary convergence, creating distortions globally. As regards the long-term tradable securities, M3 growth can lead to extensive bond issues, with adverse effects on budget deficits and public indebtedness, adversely affecting fiscal and budgetary convergence criteria. In the light of recent global imbalances, we consider that de-coupling the real economy from financial flows gained important magnitude and the financial system may have a negative impact on real convergence.

4.4. Analysis of the financial system within the EU

The analysis of the financial system within the EU is relevant for the customization of the analytical approach based on the level of economic development and the state of economic convergence.

Euro Area membership can be designed as a filter various country samples characterized by different degrees of convergence. Table 4.20 shows the evolution of the ratio of the financial system to the GDP in the Euro Area and some Central and Eastern European countries. To obtain a meaningful picture of the financial system, flows of the equity market, the bond market, the money market and the banking system are aggregated. We notice that there is a difference between the Euro Area and Central and Eastern Europe in this indicator. In the Euro Area, this indicator reached 1584% in 2001 and 2287% in 2011 while in Central and Eastern European countries, this indicator reached a lower value.

In the CCE countries, the highest value of the indicator is recorded in Poland (248% of GDP in 2001 and 372% in 2011), while the lowest value is recorded in Romania (32% in 2001 and 50% in 2011).

Table 4.20

Ratio of the financial system to the GDP in the Euro Area and in CEE countries of (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro Area	1583.71	1438.01	1261.53	1194.93	1302.45	1432.53	1662.07	1874.79	1685.12	1813.60	2287.23
Bulgaria	49.54	51.32	43.18	55.73	69.53	88.39	115.53	140.26	103.52	91.24	95.27
Czech Republic	85.10	76.31	71.03	75.45	85.45	93.52	96.21	107.92	88.96	98.65	97.82
Hungary	80.45	70.65	62.07	63.59	74.77	84.48	95.44	88.47	69.79	89.63	87.73
Latvia	31.47	34.93	35.21	42.96	46.98	59.87	47.47	48.88	52.62	53.57	54.49
Lithuania	54.41	47.25	46.84	53.60	62.29	74.89	76.54	69.43	48.30	60.74	66.57
Poland	247.67	226.34	254.18	278.65	279.88	311.42	348.11	350.32	291.17	349.57	372.00
Romania	31.62	33.37	34.68	34.06	41.65	47.28	53.28	49.60	38.49	48.26	49.59

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

As for growth, we notice the same discrepancy between the Euro Area and Central and Eastern European countries; while in the Euro Area, the ratio nearly doubled over the last ten years. CEE countries show a slower dynamics of the financial system.

This slowing-down growth is inconsistent with catching-up theories specific to emerging countries, showing sustained economic growth rates above those recorded in developed countries, with positive effects on convergence. Tables 4.21 and 4.22 illustrate the dynamics of the financial system in relation to real GDP growth, which shows the different growth rates of the two variables.

Table 4.21

The relative dynamics of GDP in the European Union (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro Area	5.25	6.52	3.48	2.98	4.04	3.64	4.98	5.63	2.69	-2.46
Bulgaria	12.92	10.81	9.48	7.91	10.96	14.07	13.85	16.22	15.14	-1.40
Czech Republic	12.28	15.87	1.15	9.07	13.51	13.48	11.99	16.14	-7.25	6.40
Hungary	16.04	18.89	4.73	11.39	7.05	1.38	12.19	5.59	-12.63	5.92
Latvia	9.70	6.35	0.67	12.01	16.43	62.24	9.12	-19.53	-3.07	4.67

Lithuania	9.69	10.86	9.60	10.07	14.94	14.89	19.18	12.99	-17.90	3.39
Poland	9.58	-5.26	-9.18	20.82	14.59	11.47	16.52	2.43	-4.00	11.86
Romania	11.58	7.18	8.15	16.14	30.69	22.49	27.60	12.06	-15.96	3.82

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

As for CEE countries, GDP growth sped up during the decade, exceeding 10% in many cases; in the Euro Area it reached a maximum value of 7% in 2003. The financial disturbance caused a decrease in real GDP of 2.5% in the Euro Area in 2011, while in emerging countries the decrease was smaller.

Table 4.22

The relative dynamics of the financial system in the European Union (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Euro zone	-4.44	-6.55	-1.98	12.24	14.43	20.25	18.41	-5.05	10.52	23.01
Bulgaria	16.97	-6.76	41.30	34.64	41.07	49.08	38.23	-14.22	1.48	2.95
Czech Republic	0.68	7.85	7.45	23.51	24.24	16.74	25.62	-4.27	2.86	5.51
Hungary	1.90	4.46	7.30	30.96	20.96	14.53	4.00	-16.71	12.21	3.68
Latvia	21.77	7.19	22.86	22.49	48.37	28.63	12.38	-13.38	-1.31	6.45
Lithuania	-4.74	9.91	25.42	27.90	38.19	17.43	8.11	-21.41	3.24	13.32
Poland	0.14	6.40	-0.44	21.36	27.50	24.61	17.26	-14.86	15.26	19.03
Romania	17.72	11.41	6.22	42.03	48.34	38.02	18.79	-13.04	5.37	6.68

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

These issues largely confirm the catching-up theories, namely important growth rates in the CEE countries in comparison with the Euro Area, which is not true as regards the dynamics of the financial system.

This reflects the difficult progress in the financial system, requiring significant resources in Central and Eastern Europe and fundamental restructuring of the macroeconomic infrastructure, able to support the expansion of the financial system.

The lack of sophisticated financial instruments, accompanied by a classic financial system, based mainly on financial intermediation, led to

insufficient financialisation of the economy, with negative effects on real convergence.

On the other hand, the effects of the financial disturbance have not extended to this region at the same amplitude as in the Eurozone banking system, thus maintaining an area of protection. According to recent reports on the financial stability of the Central Banks in the region, the solvency of the banking system in the Central and Eastern European countries is an important one, on average, over 10%.⁶ As for the correlation between the financial economy and the real economy, we notice that both in the Eurozone and in the CEE countries GDP growth was below the growth rate of the financial system, reflecting a major lack of correlation between nominal economy and real economies. In the Euro Area, real economy grew 5% on average over the last 10 years, while the financial system grew by over 20%.

Table 4.23

The weight of the financial system components in the Euro Area (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	4.03	4.43	5.42	6.10	5.65	5.53	5.03	4.69	5.38	4.97	4.13
Money market	0.48	0.63	0.23	1.02	1.10	0.86	0.79	0.79	0.88	0.66	0.54
Equity market	70.60	62.01	53.26	44.92	46.81	48.73	50.68	50.56	39.15	26.75	25.23
Bond market	24.89	32.92	41.09	47.95	46.45	44.87	43.50	43.96	54.59	67.62	70.09

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

In Central and Eastern Europe, between 2001 and 2004 there were no significant discrepancies between the growth rates of the two types of economies - real and nominal - which practically was the start of a massive revival of the economic system under the impact of the accession to the EU. Considering the components of the financial system in the Euro Area and Central and Eastern Europe one can make an adequate analysis of the relevant peculiarities of the dynamics of the financialization process, especially concerning the effects in terms of nominal and real convergence. In the Euro Area, according to Table 4.23, we notice that the banking system holds an insignificant share in the financial system, i.e. an average of 4%; the beginning of the financial disturbance had no major impact on the share of bank assets since they remained stable.

⁶ According to Basel II, the minimum solvency requirement for the banking system is 8%.

During the 2001-2004 period, there were some fluctuations, when bank assets reached approximately 6%; in 2011, bank assets amounted to 4.13%. Another important component of the financial system is represented by the money market consisting of securities that on average accounted for 1%.

A significant share of the market is held by equity and bond securities, including derivative products related to these instruments⁷. In the Euro Area, the bond market is predominant, reaching an average of about 50% of total financial flows during the period.

The same general considerations are valid for bonds, which have an average weight of about 40% in the period. It is particularly interesting that bond dynamics is contrary to the dynamics of equity securities; while the share of equity securities market in the financial system decreased from 71% in 2001 to 25% in 2011, bond securities significantly increased, taking on by approximation the same values, but otherwise (25% in 2001 and 70% in 2011).

This reversal of the evolutionary trajectory can be explained by the collapse of the equity securities market under the impact of the financial disturbance, which affected the capitalization degree. In essence, total flows in the financial system have increased in the recent years; apparently, the recent crisis could lead to an implosion of the financial system, but Table 4.23 shows that in the context of major disturbances in 2008-2011, the share of the financial system in GDP decreased.

In 2009 only the weight of the financial system in GDP diminished by 5%, due to the collapse of Lehman Brothers. Another explanation may be the abundance of bond issues because the need for funding increased both at the macroeconomic level due to the accumulation of significant budget deficits, and at the microeconomic level, where the corporate sector often faced a severe liquidity crisis as well as a major destabilization of the solvency level. In addition, in the context of risk aversion, investors focused mainly on safe financial instruments, i.e. bonds at the expense of equity securities.

⁷ Data used for the analysis were mostly taken from the European Central Bank website (www.ecb.org.com), Statistical Section; in this database, the corresponding financial flows on the equity and bond market includes automatically derivative products.

Table 4.24

The weight of the financial system components in Bulgaria (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	120.17	109.68	122.11	92.74	74.74	71.58	60.94	57.88	73.33	75.34	77.84
Money market	-22.74	-18.05	-32.76	-8.43	6.88	0.07	0.08	0.07	0.21	0.15	0.11
Equity market	2.36	7.94	10.48	14.70	16.14	23.92	29.14	39.91	20.00	18.66	16.63
Bond market	0.21	0.43	0.18	0.99	2.24	4.43	9.84	2.14	6.45	5.85	5.42

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

This shift of the investors to bond market securities is not necessarily beneficial in terms of effects on real convergence; an investment in equity securities involves an accumulation of fixed capital, representing a claim on the company's tangible assets and leading to an increase of real economy, reflected in goods and services. On the contrary, investment in government bonds provides support for the accumulation of financial assets, which increases the financial economy; in time, this stimulates the antagonistic relationship between the nominal economy and the real economy, generating an artificial growth of a financial nature.

Bond issues may also contribute to moral hazard behavior, influencing indebtedness. Unlike the Eurozone, the CEE countries are characterized by the predominance of the banking system in financial flows; in Bulgaria (see Table 4.24), the average share held by the banking system is 70% in the period under review with important peaks (120% in 2001, 93% in 2004, 75% in 2010 and 78% in 2011).

Similarly to Bulgaria, the Czech Republic, Latvia and Lithuania have on average a GDP share of 70% of bank assets in the global financial system, thus revealing a financial system focused on classical financial intermediation (see Tables 4.25-27).

Table 4.25

The weight of the financial system components in the Czech Republic (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	76.43	79.71	78.59	76.38	66.26	64.26	66.01	63.10	74.47	73.97	75.69
Money market	0.00	0.00	0.01	0.01	0.05	0.03	0.02	0.02	0.02	0.02	0.01
Equity market	23.39	20.12	19.95	22.92	28.74	33.16	31.73	34.86	23.46	24.30	22.77
Bond market	23.39	20.12	19.95	22.92	28.74	33.16	31.73	34.86	23.46	24.30	22.77

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

The money market is underdeveloped; this is explained by the fact that in many countries M3 was introduced after 2004. The only countries that had a money market in 2011, accounting for over 1% of the financial system, are Romania (1.24%), Latvia (1.41%) and Hungary (8.89%) (see Tables 4.28-4.30).

Table 4.26

The weight of the financial system components in Latvia (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	97.26	86.02	85.98	77.00	74.46	72.01	78.04	79.59	86.31	84.88	88.65
Money market	- 22.45	- 12.29	-5.73	0.12	2.38	0.36	0.72	0.81	1.06	1.13	1.41
Equity market	24.92	26.21	19.70	21.05	23.16	27.50	20.46	18.81	11.86	13.55	9.10
Bond market	0.26	0.07	0.06	1.83	0.00	0.14	0.77	0.80	0.77	0.44	0.83

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

Table 4.27

The weight of the financial system components in Lithuania (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	56.43	62.36	60.99	54.28	51.65	54.64	56.53	63.45	80.44	78.49	75.76
Money market	17.82	18.71	17.02	13.57	6.07	0.67	0.83	1.11	1.39	0.98	0.62
Equity market	21.98	15.94	19.29	31.24	42.02	44.39	42.11	34.73	16.73	20.00	23.13
Bond market	3.77	3.00	2.70	0.90	0.26	0.30	0.53	0.71	1.44	0.53	0.49

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

Regarding the equity securities market, there are countries that experienced a constant evolution of capital market during the 2001-2008 period, amounting to a share of about 30% (Czech Republic, Lithuania, Hungary 35%, Romania 34%) or 40% (Bulgaria 40%, Poland 45%); Latvia is the only country having a market share of equity capital below 30% of GDP in 2008 (19%) of the financial system.

Table 4.28

The weight of the financial system components in Hungary (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	55.61	59.32	63.60	69.16	58.52	56.30	55.21	57.20	71.98	63.76	59.81
Money market	12.09	11.86	6.81	1.75	5.92	3.14	4.11	5.63	6.04	7.15	8.89
Equity market	30.97	27.57	28.33	27.99	33.71	36.85	37.07	35.35	17.82	25.11	23.95
Bond market	1.33	1.25	1.25	1.11	1.85	3.71	3.60	1.82	4.16	3.97	7.35

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

At the beginning of the financial disturbance in 2009, there occurred a downtrend in all the countries of Central and Eastern Europe (Bulgaria 20%, Czech Republic 24%, Lithuania 20%, Hungary 18%, Poland 23%, Romania 20%); the most dramatic collapse in equity market securities was felt in Latvia (9.5%).

Table 4.29

The weight of the financial system components in Romania (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	48.19	49.63	48.06	54.66	46.31	49.34	46.24	48.00	58.62	55.72	52.38
Money market	10.54	10.53	11.31	7.81	6.86	1.41	1.35	1.07	0.53	0.43	0.61
Equity market	25.44	22.24	19.43	21.14	30.69	36.65	42.06	44.55	23.34	31.77	34.19
Bond market	15.83	17.61	21.20	16.40	16.14	12.60	10.34	6.38	17.51	12.08	12.82

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

However, in 2010 and 2011 there occurred a turnaround in the equity securities market in countries of the region, with some upward growth trend (Romania, Poland, Czech Republic) (see Table 4.30 for Poland). As regards the bond market, only four countries have a large proportion (Czech Republic 23% and Romania 13%, Hungary 7%, Bulgaria 6% in 2011), while in the other countries, the share is below 1 % (Lithuania 0.5% and Latvia 0.83% in 2011).

Table 4.30

The weight of the financial system components in Poland (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Banking system	116.68	111.01	104.98	108.89	78.63	62.10	62.74	66.29	80.28	78.22	77.46
Money market	-23.34	-26.43	-26.69	-30.71	15.15	0.38	0.24	0.03	0.19	0.67	1.24
Equity market	3.04	8.32	14.08	15.05	31.71	35.67	36.75	33.68	19.53	21.10	21.29
Bond market	3.61	7.10	7.63	6.77	4.81	1.85	0.27	0.00	0.00	0.00	0.00

Source: Author's calculations based on data from the European Central Bank and Eurostat website.

4.5. Correlation between the financial economy and the real economy

The second part of this research integrates the application of the Vector Error Correction Model at the level of the specific indicators of the financial economy and the real economy. The quantitative expression underlying the model applied to each group of the NMS is as follows:

$$\Delta X_t = \delta_0 + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \Gamma_3 \Delta X_{t-3} + \alpha \beta' X_{t-1} + \varepsilon_t$$

where:

$$X_t = ((\text{PIB}), (\text{M2}), (\text{M3_M2}), (\text{STOCK_MK}), (\text{BOND}))$$

PIB = Real Gross Domestic Product

M2 = M2 monetary aggregate

M3_M2 = Difference between M3 and M2 monetary aggregates

STOCK_MK = Stock market capitalization

BOND = Bond market

These variables are used to reveal the real economy reaction reflected by the GDP growth under impulses from the financial economy. The vector error correction model focuses on two key parameters such as α and β .

β matrix is the vector of cointegration and incorporates long-term relationships between endogenous variables.

α matrix reflects the dynamic adjustment of endogenous variables to deviations from the long-run equilibrium represented by $\beta' x$.

Granger (1981) introduced the concept of co-integration techniques, due to the difficulties involved in non-stationary long-term relationships. The VECM model focuses on capturing reactions of variables under the impact of mutual influences; the advantage of this model is reflected in its power to capture the effects simultaneously produced under the impact of mutual influences.

The model is appropriate for this research owing to its ability to capture the mutual influence of the nominal economy on the real economy; given the dependence of the financial economy on the real economy, the research aims to identify the impact-induced features exhibited by financial variables. The focus is placed on the path and the intensity of the impact, focusing on the identification, analysis and explanation of possible fluctuations in time.

The co-integration methodology requires that all variables have the same order of integration, resulting in the need for variables to be tested for stationarity using Augmented Dickey Fuller and Philips-Perron methods. As a result for the application of these tests, we identified the non-stationarity

of the variables in the model, which shows that in recently integrated EU (NMS10) that do not belong to the Euro Area, as well as in the Euro Area, shocks propagate at a relatively high intensity, showing persistence over time. The inability of the EU economic system to absorb shocks implies high macroeconomic instability.

Table 4.31 summarizes the impact factors for determining the mutual relationship of the two types of economies.

The dimensional covers the following:

- impact factors originated in the nominal economy that influences the real economy;
- impact factors originated in the real economy that influences the financial economy;
- finally the relationships between components of the nominal economy.

Table 4.31

Impact factors to which the financial economy and the real economy react

	RECEPTOR VARIABLE ⁸	IMPACT FACTOR
Euro Area	<i>Real economy</i>	Equity securities market Bond market
	<i>Financial economy</i>	There is no significant impact factor ⁹
Bulgaria	<i>Real economy</i>	Monetary market
Czech Republic	<i>Real economy</i>	Monetary market
Hungary	<i>Real economy</i>	Equity securities market
Lithuania	<i>Real economy</i>	Monetary market
Latvia	<i>Real economy</i>	Monetary market
Romania	<i>Real economy</i>	Equity securities market

The Euro Area real economy reacts most intensely under the impact of the bond market, followed by the equity securities market; GDP reactions under the influence of the banking system are particularly weak (see Annex 4). This conclusion confirms the issues highlighted in the first report, i.e. an important share of the two components of the financial system in the Euro Area and a high degree of sophistication of the financial system. In determining the reaction of the financial economy under the impact of the real economy, we notice the absence thereof; financial system components are not significantly influenced by the dynamics of the real economy.

⁸ Variable that reacts under the impulse of the impact factor or variable that receives the influence of the impact factor.

⁹ The same relationship holds true for other CEE countries, namely the financial economy does not react to the real economy.

Thus, in the Euro Area, the impact vector has a financial origin while the real economy acts only under the form of a receiver of influences. In Bulgaria, the Czech Republic and Lithuania, the money market acts as a determinant of the real economy; similar phenomena are seen on the bond market in the Czech Republic and Latvia and on the equity securities market in Romania and Hungary; indeed, in comparison with Romania, the equity market exerts a lower impact in Hungary (see Annexes 4-11).

As for the response given by the nominal economy to the impulse of the real economy, we notice that countries of the region do not show a reaction of this nature; similarly to the euro, the financial economy is not significantly determined by the real economy. The recent financial disturbance revealed that financial flows are of disparate magnitude in comparison with the real economy; even if the financial economy shows contraction, the nominal economy has potential to develop if an intense capitalization process occurs for a certain component of the financial system. For example, bond issues determined significantly the need for financing following the financial imbalances, thereby increasing the financial system share in GDP.

Regarding the reactions of the financial system components to their mutual impulses, both in the Euro Area and in Central and Eastern European countries, the money market reacts to the impulse of the bond market; as for the other variables, although initially a reaction of equity market securities to the impact of debentures was presumed, as well as a reverse reaction, the statistical results did not reveal significant mutual determinations in the components of the financial system.

This can be explained by the absolute de-correlation of the two components in the current period; in the expansion phase of the business cycle, the capital securities market has grown significantly at the expense of bonds, while during economic downturns, the effect was reversed.

The most significant reactions occur in relation to variables specific to the banking system (M3 monetary aggregate fueled by money market and vice versa), which is not surprising, considering that the monetary aggregate M3 includes M2.

This can be explained by underdevelopment of certain components of the financial system in some countries, hindering a significant boost and a proportional response.

In Bulgaria, money market securities fall under the impulse of capital market securities; the latter reacts in a subliminal manner under the impact of the bond market. In the Czech Republic, capital market securities see a

growth under the impact of the banking system, but it suddenly falls under the impact of the bond market.

In Hungary, money market grows on the spur of securities market, but falls under the impulse of the bond market, while in Poland and Romania it faces collapse under the impact of both markets. The money market reactions fueled by other components can be explained by the fact that the money market includes short-term securities with similar peculiarities similar to markets where equity or long-term debt securities are traded.

In Latvia there was a slight reaction of the equity securities market under the impact of the bond market; a decrease in the money market under the impact of both capital and debentures market was remarked as well. In Lithuania, the money market reacts negatively under the impact of the bond market, while the banking system reacts favorably under the impact of the equity securities market and the bond market.

In Poland there is no relationship between equity and bond markets, while in Romania the bond market grew under the impact of the equity market while the reverse relationship is not valid.

5. Analysis of financialization in the EU by means of the Lavoie-Godley model

Financialisation has emerged as a result of increased deregulation of the banking system and capital account liberalization, which favored the migration of capital flows and the globalization. Gradually, besides the banking system, there appeared new financial markets dominated by innovative entities, investment funds, investment vehicles that sustained their securitization transactions taking into account the structured financial products. The size of the financial system, representing essentially the foundation of financialisation, led to a new economic paradigm based on accumulation based on financial dimension.

The European Union was marked by financialisation, which influenced significantly economic convergence. Moreover, important differences in the level of economic development among Member States were marked by varying degrees of financial system development.

This study applies the Lavoie-Godley model to the European Union, aiming to illustrate the whole complex of relations between the different entities that prevail in the economic system. The focus is oriented towards the integrated nature of this model, which allows to view mutual dependencies between households, central governments, the business environment and the financial system. Thus, financialisation is no longer considered only in terms of financial system dynamics, but in terms of flows by which various entities are related. Thus, financialisation is found in multiple interdependencies that govern the interaction with the real economy.

The research is structured as follows: in the next section we present the Godley-Lavoie model, then we apply the model at the level of the EU, focusing on dynamic key variables, and we present the key findings.

5.1. Presentation of the Godley-Lavoie model

The Godley-Lavoie model reveals the mix of financial economy and real economy in light of complex relationships between different entities operating in the economic system. Thus, the basic idea of the model is the migration flows from one entity to another, the perspective being a dynamic one. Moreover, the model focuses on capturing these flows consistently while the rigors of formal order are placed in the background (Lavoie, 2008).

According to the model, in the forefront of the economic system there are five main players: firms, households, banks, government administrations and central banks. Therefore, companies contract external financial resources for investment plans, and some of the external resources are drawn from the banking system, while others are attracted by the capital market. The rate of accumulation of fixed capital depends on the rate of productive capacity utilization, both significantly influenced by the interest rate.

Banks grant credits to households based on net income, while household consumption is a key factor in determining the amounts granted as loans since it determines the level of net income. The amounts advanced are negatively correlated with the interest rate of the loan.

Available income (Y_D) of households is expressed as net income from wages ($W * N_s$), from which we subtract taxes (T_s):

$$Y_D = W * N_s - T_s \quad (1)$$

Nominal short-term interest rates and long-term interest rates are strictly controlled by the central bank, while bond issues by central governments or the loans granted by banks are strictly under the impact of demand. Neither the central government nor the central bank exerts any influence on them.

Real wages depend on productivity and employment level; there is a predetermined target level of the real wage on the labor market, and the nominal wage growth is conditioned by the difference between the target and the current level of real wages.

Table 5.32

Transaction flow matrix in Godley-Lavoie model

	HOUSEHOLDS	COMPANIES	CENTRAL GOVERNMENTS	CENTRAL BANKS		Σ
				Current operations	Capital operations	
Consumption	-C	+C				0
Government expenses		+G	-G			0
Gross Domestic Products	+Y	-Y				0
Interest expenses	$r_{.1} * B_{h-1}$		$-r_{.1} * B_{h-1}$	$+ r_{.1} * B_{cb-1}$		0
Central Bank revenues			$+r_{.1} * B_{h-1}$	$-r_{.1} * B_{cb-1}$		0
Taxes	-T		+T			0

Variation in money supply	$-\Delta H$				$+\Delta H$	0
Variation in bonds	$-\Delta B_h$		$+\Delta B_h$		$-\Delta B_{cb}$	0
Σ	0	0	0	0	0	0

Source: Godley, W. and M. Lavoie, *Monetary Economics*, Palgrave Macmillan, 2006.

Household consumption depends on the available income (YD) and the consumption share in the available income (α_1), welfare accumulated in the past (H_{h-1}), and consumption in this (α_2):

$$C = \alpha_1 * Y_D + \alpha_2 * H_{h-1} \quad (2)$$

Government expenditures not covered by tax policy requires financing through bond issue:

$$\Delta H_s = H_s - H_{s-1} = G_d - T_d \quad (3)$$

By aggregating the previous expressions, GDP can be shown as:

$$Y = C + G = (\alpha_1 * (Y * (1 - \phi))) + G \quad (4)$$

where:

Y= Gross Domestic Product

C= households' consumption

G= government expenses

α_1 = appropriate share of consumption in available income

ϕ = fiscal rate

Each entity operating in the economic system has a buffer for a possible absorption of shocks occurring in the economy. For business, the buffer is found in the form of stocks and bank borrowing, and in case of households, it consists of the deposits. For government entities, the central bank and commercial banks, the buffer is reflected in the bonds held. The authors of the model explained this aspect by the fact that deposits and loans are primarily demand-dependent.

The Godley-Lavoie model has certain limitations due to the assumptions made, so the economy is assumed to be closed, any relations with the international financial system are ignored. Also, any holdings of financial assets by firms are not sufficiently capitalized.

5.2. The impact of interactions between households, business environment, banking system and central government on financialization in the Godley-Lavoie model. Analysis at the EU level

This study focuses on the operational dimension of the Godley-Lavoie model at the EU level, with emphasis on the interaction between the real economy and the entities of the nominal economy. The interaction between financial markets and banking, government, households and business environment in the context of transaction flows plays a key role in the approach proposed by Godley-Lavoie. The methodology involves the analysis of relevant variables in order to illustrate the transactional flows, which reveals the multiple facets of the real economy and of the financial system. Thus, it emphasizes the dynamic interaction between those entities, having implications for financialisation at the EU level. The indicators used in the analysis were taken from the Eurostat website, being followed up on an annual basis over the period 2000-2011.

A first set of variables on which the model focuses encompass the saving rate, the lending rate and the bond yield for securities issued by central governments .

Annex 12 shows graphically the dynamics of these variables in the European Union, emphasizing a comparative perspective between the Euro Area and Central and Eastern Europe.

Over the period in view, there is a remarkable similarity between the dynamics of the saving rate and government bond yields for securities in the Euro Area. For the CEE countries, the similarity is temporarily present in the following sub-periods; for example, in Bulgaria, the similarity is present between 2000 and 2004, and 2009 and 2010, and in the case of Latvia between 2003 and 2006.

The Czech Republic has the same similarity as the Eurozone in terms of growth corresponding to the two variables.

The lending rate is higher in comparison with the saving rate in the Euro Area in the first part of the period, and later it is surpassed by bond yields. Except for Bulgaria, in all the other CEE countries, the lending rate remains at a higher level than the saving rate.

The financial crisis has driven bond yields, surpassing the saving rate and the lending rate. In fact, except for the Czech Republic, in the other CEE countries, the growth rate is higher for bond yield, in comparison with

the saving and lending rates, reflecting a significant country risk premium. Euro Area bond yields follow this dynamics only in the last part of the period in view, when, under the impact of the financial disturbance, there was a sovereign debt crisis which attracted funding and caused bond yield upsurge.

In the Godley-Lavoie model (2007, 2008), enterprises can significantly influence the financialisation of the economy through funding on the capital market. A comparative analysis of the ratio of market capitalization to GDP in relation to the dynamics of capital market indices, brings in the financing policy of investment among companies; an accelerated price appreciation of capital securities reflected in a positive dynamics of the index in opposition to a decrease in market capitalization may indicate a reduction in capital market issues and a focus on profit reinvestment, which favors self-financing. The allocation of internal resources to support an important investment policy increases domestic costs, with subsequent implications for inflationary pressures.

Gradually, inflation erodes economic growth, affecting global welfare.

The phenomenon described by the Godley-Lavoie model (2007a) is reflected in the evolution of variables captured in the graphs presented in Annex 13.

Thus, in all countries, the market capitalization diminution is in relation to the dynamics of the shares market value, revealing a possible reduction in the share issue and implicitly the profit reinvestment in the investment programs.

The most significant discrepancy between the market value of equity securities and market capitalization occurs in the Euro Area and in Poland and Hungary. Other countries (the Czech Republic, the Baltic countries) show a smaller difference between the two variables, reflecting either equity issue or significant appreciation of their market value. This dynamics also highlights optimistic expectations that dominated financial markets in the European Union, especially in the second half of the period, which led to a significant appreciation of the market value of equity securities.

Inflationary pressures are highlighted at EU level by the below-unit ratio of productivity growth to wage growth. The most important difference between productivity growth to wage growth is observed in Poland, Romania and Latvia; these countries are characterized by negative values of the indicator, reflecting a disproportionate increase in wages compared to productivity.

In the Euro Area, the relationship between productivity growth and wage growth is maintained, except for the 2008-2009 period, highlighting the productivity gains that however are higher than, but close to the unit value in 2006.

Financial disturbances caused a steep decrease in this indicator, which reduced productivity for nearly two years. This development occurred in the context of global imbalances, accompanied by numerous restructurings in the corporate sector; however, in 2010 the situation was balanced, and the indicator was significantly closer to the unit value.

Another key variable which is in the forefront in the Godley-Lavoie model is represented by consumption; enhanced consumption leads to an increase in the utilization rate and accumulation rate, while creating a positive dynamics of profit, which reduces dependence on external funding through reinvestment of profit.

Annex 14 reveals the evolution of these variables in the Euro Area and in the CEE countries. Important levels of consumption are observed both in the Euro Area and in the Central and Eastern European countries. In general, except for the Czech Republic, the consumption is higher in the CEE countries in relation to the Euro Area, indicating that the growth registered in the last decade in the European Union has been strongly influenced by consumerism.

For all countries surveyed, the utilization rate remains at a significant level, reflecting a period of steady production capacity recovery. In the Euro Area, the utilization rate follows a stable trajectory over the period, free of fluctuations under the impact of financial disturbances.

Central and Eastern European countries are characterized by a reduction in the utilization rate in 2008-2010; the highest sensitivity under the influence of financial disturbances occurs in the Baltic countries. Thus, the fragility of the production structures in the emerging countries is obvious; this fragility depends on foreign investment flows, which - due to investor risk aversion triggered by financial disturbances - have led to numerous withdrawals, and to a higher macroeconomic volatility, passed on to business.

The dynamics of the accumulation rate follows almost the same linear trend as in the Euro Area countries, unlike the CEE countries, with certain fluctuations from one period to another, according to the stronger macroeconomic volatility. Moreover, in the other countries, the rate of accumulation, similar to the utilization rate, diminishes under the impact of financial disturbance, reflecting a decrease in the capital base; the financial crisis has affected the investment policy in the corporate sector, companies

showing a strong interest in activities that support liquidity and operational dimension, to the detriment of the investment.

The variable showing the most important movements in the CEE countries is the rate of return; the contrast with the linear nature of development in the Euro Area was obvious. The highly oscillatory dynamics of the profit rate in emerging countries includes periods when it decreases significantly, especially under the impact of the financial crisis.

Contrary to that, the Euro Area is characterized by a steady rate of return.

According to the Lavoie-Godley model, under normal conditions of economic growth, unaffected by any turbulence, a decrease in interest rate assets positively influences the rate of accumulation through the investment policy, while the growth rate favors passive consumption and utilization, affecting the productive capacity. This effect is explained by enhanced savings and revenues distributed to holders of capital.

For the macroeconomic disturbances, these relationships are not confirmed, interest rate reduction resulting in lower capital accumulation, even at a pace much faster than any increase in case of active interest reduction.

The research shows that in the Euro Area, the interest rate follows a trajectory similar to the asset accumulation rate; there is a consistency of the oscillatory evolution, as active interest reductions are closely followed by reductions in the rate of accumulation, confirming the assumption of the model Godley-Lavoie for the periods of macroeconomic disturbances. We cannot say that the 2000-2010 period was marked by such developments, characterized by increased volatility, but this situation occurred in the last 2-3 years. The absence of any impact exerted by interest rates on the level of capital accumulation can be interpreted through the accelerated development of the capital market in the Euro Area countries where the traditional banking system based on financial intermediation is surpassed by modern financial products.

As for Central and Eastern Europe, a similar trend is observed in Hungary and Poland; the situation can be explained by the fact that the capital market is more developed than in other countries in the region, as revealed by previous research .

In other countries, the interest rate is in the position of a driver of the accumulation rate, since a potential decrease causes an increase in the accumulation rate, confirming that in the financial systems based on traditional financial intermediation the loan interest rate may be a factor that

increases capital accumulation. In the other countries, there is an increase in the rate of accumulation on an ongoing basis until 2007, reflecting the period marked by low interest rates and, thus, important liquidity in the system.

Considering the second effect presented in the Godley-Lavoie model, i.e. the impact of the passive interest rate on the utilization rate in virtue of the positive effect on consumption, the research highlighted the absence of such impact in the Eurozone. In the Central and Eastern European countries, one can notice a sequential impact, over certain sub-periods. The financial crisis caused the elimination of the interest rate impact on production capacities, and revealed that during turbulence periods the relationships between variables, apparently in some classic dynamics, acquire other meanings.

According to the Godley-Lavoie model, an increase in consumption causes acceleration of the utilization rate and, hence, the rate of accumulation.

On short term, the effect on profit is negative, resulting in a decrease in profit, because on long term the effect is positive. In the Euro Area, there is a linear trend of the variables, as they present a nearly constant rate from one period to another, not affected by any fluctuations. The financial crisis cause a slight decrease in consumption, but an interesting aspect is the fact that the accumulation and utilization rates remain at the same level, free of fluctuations.

In the CEE countries, the profit rate dynamics oscillates, unlike other variables, recording the highest volatility. Under the impact of the financial crisis, profit falls and is negative.

In the case of Bulgaria and the Baltic countries, the utilization rate and the accumulation rate follow a similar dynamics, at a high degree of correlation, which shows that the investment policy is supported by the capitalizing capacity of production.

6. Macro-prudential policies and convergence

The financial crisis has revealed the paradox of the financial system amplitude and the financial stability. As for extensive financial flows, which generated abundant liquidity and hence the development of sophisticated products, the *too big to fail* principle gained consistency and thus led to a new philosophy concerning financial stability. According to this philosophy, a financial institution having a significant volume of assets and being characterized by multiple connections at jurisdiction and system levels, was perceived as strong enough in size to withstand any shocks, unlikely to jeopardize financial stability.

The collapse of the Lehman Brothers financial giant showed the limitations of this philosophy which revealed the nature and even the paradoxical discrepancy between the two sides of the coin - amplitude versus stability. In essence, just the unprecedented amplitude of the financial system created favorable conditions for banking to circumvent the prudential regulatory framework, revealing important weaknesses of the banking supervisory process which was unable to capture the weaknesses in the risk management system, based mainly on internal models. Unfortunately these internal models have shown a significant potential for regulatory arbitrage.

In fact, special emphasis was placed on the quantitative dimension of the models that led to the creation, the development and even the use of innovative but extremely complex financial instruments that caused supervisors' failure to monitor them more strictly, and especially to become aware of the risks at the global level.

On the other hand, the prudential regulatory framework focused mainly on the individual size of banking and financial institutions, based on the principle that institutions with a sufficient capital adequacy position at individual level have potential to create financial stability at the system level.

This paper aims to highlight the financial system in relation to convergence in the European Union, focusing on differences in the degree of nominal convergence at regional level. In this respect, given the similarity degree of nominal convergence revealed by previous research, we construct different groups of countries. In order to assess the level of financial stability in the EU, the research proposes an index constructed by the aggregation of a number of indicators characteristic to the financial system; then a number of statistical methodologies are applied (ANOVA

method, Principal Component Analysis) in order to reveal fundamental aspects of the correlation between nominal convergence, real convergence and financial system stability.

The paper is structured as follows: first we analyse the macro-prudential policy framework in relation to convergence, then we present the research methodology and analyse the statistical output.

6.1. The macro-prudential policy concept. Literature review

The financial crisis revealed the limitative aspects of this theory that ignored the importance of systemic connections, the mutual dependence of cross-border banking groups as well as the tail risks, i.e. those with a low probability of occurrence, but with a particularly severe impact.

In this context, at the global level, macro-prudential policies were promoted, namely those aiming at identifying and managing systemic risks. Basel III and the CRDIV require a proactive behavior of the authorities towards the identification and management of risks from a macro-prudential perspective. Thus, authorities would focus, besides overseeing risk at the institution level, on risk at system level; where the financial system shows some dynamics reflecting accumulation of systemic risk, the authorities are obliged to take measures in order to counteract those effects.

The macro-prudential policy integrates a set of measures to prevent systemic risk, defined as the probability of shock occurrence within the financial system, with potential to spread adverse macroeconomic effects. In literature, there have been highlighted a number of objectives for macro-prudential policies (Dell'Ariccia et al., 2011, Borio, 2010). On the one hand, macro-prudential policies are designed to avoid externalities associated with systemic imbalances, such as bank failure having significant repercussions on the real economy (Alessi and Detken, 2011).

Meanwhile, this externality is correlated with complementary strategies that show a herd behavior in the financial and banking systems, namely a pronounced propensity for risk during periods of economic boom or risk aversion phenomenon in downturns (Cardarelli et al., 2010; Gerdesmeier et al., 2009).

A number of studies have interpreted the decoupling of the real economy from the financial economy through monetary policy transmission channels and prudential policy instruments. Thus, a significant decrease in interest rates led to a surplus of liquidity in the banking system, triggering speculative bubbles in the housing market (Borio and Zhu, 2008).

Indirectly, a cheap money policy allowed easy accumulation of a significant amount of capital in the banking system, leading to an improvement in the prudential situation, with a positive impact on lending (Adrian and Shin, 2009). From this point of view, we may say that the philosophy of abundant liquidity enhanced real convergence by encouraging investments, by the multiplier effect, thus favoring economic growth.

However, a significant reduction in the interest rate endangered nominal convergence criteria on inflation while excess liquidity in the banking system caused the economy to overheat, resulting in demand-driven inflationary spikes (Almeida et al., 2006).

In this respect, a macro-prudential policy aims to prevent speculative bubbles, often in the form of inflated asset value (Lo Duca, Peltonen, 2011; Misina and Tkacz, 2009). Furthermore, the way the current macro-prudential policy framework is designed aims to prevent potential pro-cyclical effects caused by excessive lending during periods of economic expansion (Dell'Ariccia et al., 2011), which triggers the excessive increase of the balance sheet items. During a declining economic cycle, the value of assets falls, generating losses on financial-banking market, which, because of the transmission chain mechanism, could cause the blocking of lending, with severe recessionary effects on the real economy.

To mitigate these pro-cyclical effects, the macro-prudential regime currently aims to impose capital buffers during periods of economic expansion, and once recession has occurred, the buffers are relaxed to facilitate lending to the economy (Galati and Moesner, 2011). In addition, the initiation of a macro-prudential policy aimed at correcting deficiencies identified in the assessment and management of macroeconomic risks in Europe during the financial crisis (Misina and Tkacz, 2009).

However, at the conceptual level, economic convergence, which essentially is the core of the economic and monetary union, was affected.

Although conceptually we cannot say that macro-prudential policies could be in contradiction with other policies, such as the monetary policy, at the empirical level there may be cases when the two types of policies would act either at the wrong moment, or overlap (Cardarelli et al., 2011).

The implementation of macro-prudential tools under some circumstances might undermine the effectiveness of the tools through which the monetary policy is operationalized. Tighter capital adequacy ratios may increase funding costs and hence interest rates, determining the appreciation of the domestic currency. In this case, the monetary policy transmission channel is affected (Gerdesmeier et al., 2009).

On the other hand, macro-prudential measures were imposed as a reaction to financial crisis, which in fact revealed the inability of other types of policies (monetary, fiscal and budgetary) to ensure the financial system stability.

At the European level, this is reflected in the limitative dimension implied by the convergence process and, hence, by the convergence criteria for ensuring a robust macro-financial framework, able to withstand any adverse actions.

6.2. Presentation of the methodology

This study aims to analyze the relationship between the convergence and the stability of the financial system in terms of macro-prudential policies for the Euro Area and Central and Eastern European countries. In this respect, the study proposes three indices obtained by the indices aggregation of a set of indicators that are relevant to every facet of the three indices that are analysed. Thus, research is three-dimensional, being confined to real convergence and financial stability.

The indicators that are selected in order to set the nominal convergence index are represented by the nominal convergence criteria, namely:

§ *Inflation rate*

§ *Interest rate on long- term securities*

§ *Weight of budget deficit in the GDP*

§ *Weight of public debt in the GDP*

The index of real convergence is obtained by aggregating a set of indicators aimed at highlighting especially the living standards of the countries analysed, namely:

§ *The average disposable income per capita*

This indicator captures net income available for consumption.

§ *Gross domestic product per capita*

This indicator obtained by dividing GDP to population number reflects the surplus value generated by the economy of goods and services in relation to the number of inhabitants.

§ *Employment rate*

This indicator shows the economy's capacity to create jobs, which implies a significant impact on the degree of economic and social development of these countries.

These three indicators capture the living standards, operating according to the maximization principle; the effects are enhanced in the context of higher values.

§ *Labour productivity*

The indicator reflects the total monetary units produced per hour worked. An efficient economy is reflected in a significant labor productivity, leading to increased purchasing power and hence higher living standards.

§ *Export ratio*

This indicator shows the openness of the economy; ideally, strong economic performance, characterized by significant productivity, is reflected in a ratio higher than unit, i.e. a surplus of exports relative to imports.

The financial stability index is obtained by integrating the following indicators:

§ *Leverage* determined as the ratio of bank assets to own funds

The relevance of this indicator consists in a direct relationship between the lending propensity of the banking system as a whole and systemic risk. A significant increase in balance sheet reflected in a significant amount of leverage leads to a significant level of risk taking and hence the phenomena of moral hazard, which essentially lead to the relaxation of monitoring and risk management standards.

§ *The weight of credit in Gross Domestic Product*

This indicator captures any period of excessive lending in the economy, which generates essentially pro-cyclical effects. In the expansion phase of the economic cycle, lending standards are less stringent, causing possible adverse selection. In this context, there is also an inefficient allocation of capital and an inequitable treatment of borrowers, particularly borrowers with a lower creditworthiness are credited. At the systemic level, the correlation between the business cycle and the credit dimension stimulates to pro-cyclicality in times of economic downturn, generating considerable reduction in funding the real economy.

§ *Inter-bank interest rate*

The interest rate reflects the level of liquidity in the system. In periods of economic expansion, the inter-bank interest rate decreases, leading to abundance of liquidity. In the opposite case, the effects are reversed, resulting in increased funding costs and reduced liquidity.

§ *Capital Market Index*

As with all indicators, in periods of economic growth, the stock market index shows a continuously increasing trend, reflecting a potential speculative bubble and inflationary pressures.

§ *Market price of real estate assets*

This indicator has a similar behavior as the stock market index, indicating possible bubbles, with negative effects on the collateral. The recent financial crisis revealed the negative impact on financial stability exerted by inflated collaterals that were destined to credit guarantee.

§ *Return on Assets*

Indicators related to profitable banks tend to exhibit a pro-cyclical behavior similar to the index of the capital market. Unsustainable growth of profits can hide a significant exposure to risk, causing the inflammation of systemic risk.

Initially, the relevant indicators were followed on a quarterly basis over the 1997-2011 period in the Euro Area and in five Member States from Central and Eastern Europe (Bulgaria, Czech Republic, Poland, Romania and Hungary).

Subsequently, the indicators collected on a quarterly basis were subject to a normalization process in order to perform a relevant analysis and to integrate them into the index. By normalization, we obtain indicators ranging between (0,1), which facilitates their interpretation in the context of financial stability and convergence dynamics.

The normalization process implies treating the quarterly value of each indicator according to the following formula:

$$I_{it}^n = \frac{I_{it} - \text{Min}(I_i)}{\text{Max}(I_i) - \text{Min}(I_i)}$$

where:

I_{it}^n = normalized value of quarterly indicator i at time t

I_{it} = quarterly indicator I

$\text{Min}(I_i)$ = minimum value of indicator i during the period

$\text{Max}(I_i)$ = maximum value of indicator i during the period

By aggregating normalized indicators, we finally obtain the index:

$$I_i = \sum_{j=1}^6 I_{dj}$$

where:

I_i = Index i , and $i = 1 \dots 3$, where

i_1 = index of nominal convergence

i_2 = index of real convergence

i_3 = index of financial stability

I_{dj} = Indicator relevant for every facet

The methodology used to determine the indicators is similar to the one used by Albulescu și Goyeau (2009), Mörttinen et al., (2005), Blaise and Kaushik (2009), focusing on the aggregation of indicators within the index by a uniform treatment in terms of contribution, so the index is obtained by aggregating equally weighted indicators.

Following previous studies dedicated to the analysis of convergence in the European Union during the 1997-2011 period, there were identified a number of convergence and divergence poles, depending on the extent to which the CEE countries comply with the nominal convergence criteria.

Table 6.33

Country polarisation based on the compliance with convergence criteria ¹⁰

CONVERGENCE CRITERIA	CONVERGENCE	DIVERGENCE
Inflation rate	Czech Republic	Bulgaria Hungary Poland Romania
Interest rate	Bulgaria Czech Republic Poland	Hungary Romania
Budget deficit	Bulgaria	Czech Republic Hungary Romania
Public debt	Bulgaria Czech Republic Poland Romania	Hungary

Source: Previous research by the author.

The ANOVA method and the Principal Component Analysis aimed to identify certain features of financial stability depending on the degree of convergence of countries in relation to the criteria of nominal convergence.

¹⁰ Exchange rate convergence criteria.

6.3. Financial stability index analysis. Correlations with the convergence process

The basic idea of the study is to identify a potential match between convergence and financial stability; in essence, convergence represents the main vehicle in order to ensure macroeconomic stability, also at the level of the financial system.

First, the dynamics of the indices corresponding to financial stability in the Euro Area and Central and Eastern Europe was monitored over the period analysed.

In Central and Eastern Europe, there is a dynamics of major amplitude in comparison with the Euro Area; in spite of some fluctuations during certain sub-periods (1998-2000, 2004-2006, 2008-2010), the index reflects an evolution consistent with a potential accumulation of systemic risk. In essence, the dynamics reflects a significant propensity for taking risk in this region, revealing an accelerated development of the banking system in these countries, mainly determined by the catching-up process.

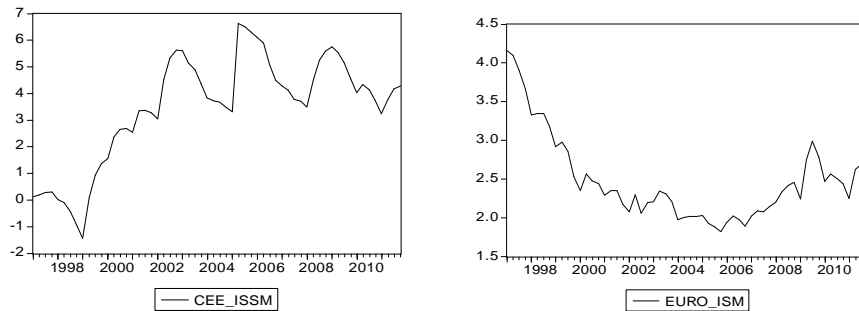


Figure 6.12 – The dynamics of the financial stability index in Central and Eastern Europe (left) and the Euro Area (right)

In the Euro Area, the index dynamics is of lower amplitude, since the intensity of fluctuations is mitigated. The interesting aspect is that in the Central and Eastern European countries, the index follows a predominantly upward trend in opposition to the Euro Area, where the dynamics is opposite. At the country level, the dynamics of the financial stability index is heterogeneous; except for Poland and Romania, which show a similar trend, other countries are characterized by different dynamics.

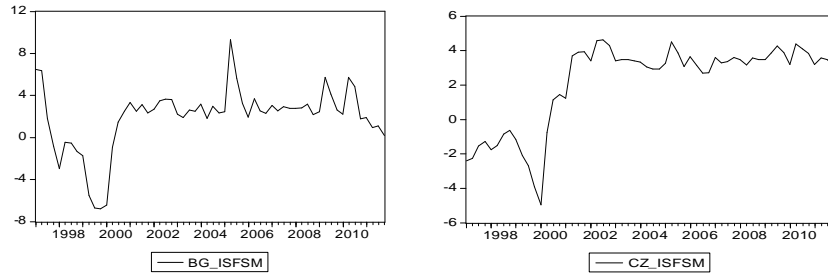


Figure 6.13 - The dynamics of the financial stability index in Bulgaria (left) and the Czech Republic (right)

The Czech Republic has the most stable dynamics, especially during the financial disturbance, while Hungary shows a point of maximum instability over the 2004-2005 period. Moreover, the Czech Republic is characterized by a high degree of convergence in the overall nominal indicators, showing that the compliance with the nominal convergence indicators has a positive impact on financial stability (see Table 6.33).

Poland and Romania are characterized by fluctuations over periods marked by significant volatility at international level. The 2000-2002 period, characterized by the crisis in Argentina, and the 2008-2009 period, marked by the global financial crisis, show significant levels of systemic risk accumulation.

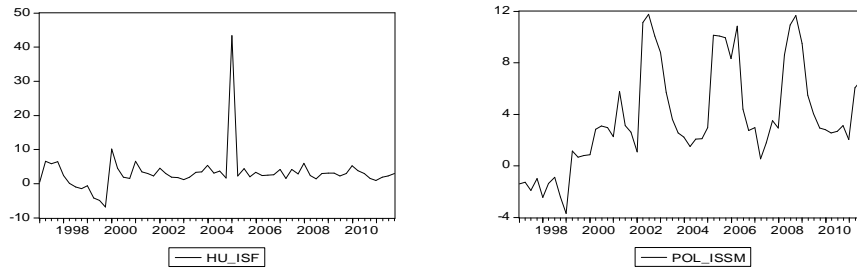


Figure 6.14 - The dynamics of the financial stability index in Hungary (left) and Poland (right)

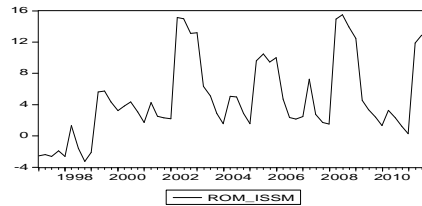


Figure 6.15 - The dynamics of the financial stability index in Romania

As for the other two indices, the analysis reveals certain features of the correlation between the nominal convergence and the real convergence. As for the indices calculated in the two regions - the Euro Area versus the CEE countries that have not adopted the single currency - the two processes have a similar trend dynamics.

However, the fluctuations are much more pronounced in the index of real convergence dynamics that shows three minimum points.

In essence, the dynamics of the real convergence index is broader in relation to the dynamics of the nominal convergence index; this feature occurs in all CEE countries of that have not adopted the single currency. This is surprising as important changes in the real economy require a longer period of time.

A similar appearance is noticed in the Euro Area. Moreover, the global real convergence index has several minimum points, while the index of nominal convergence has several maximum points.

Directing to the analysis to the country level, we notice that in Bulgaria the real convergence index shows a slightly negative dynamics in the first period; afterwards, the dynamics follows a slightly upward trajectory, with a stabilization tendency.

The nominal convergence index follows a declining path in the last part of the period, suggesting a possible impact of the financial disturbance.

In the Czech Republic, the nominal convergence index follows a downward trend during the first part of the period, while later it follows a positive trend. The real convergence index declines during the last part of the period in view; a similar aspect can be remarked in case of Romania, while in Hungary, the similarity is recorded only for the nominal convergence index. Poland shows a non-typical path for the nominal convergence index; the trend is an upward one in first period under review, followed by stabilization, while later the dynamics is negative.

Further on, the study highlights certain features of the financial stability index dynamics under the impact of convergence. In this respect, the ANOVA method was applied to the poles of convergence already identified in Table 6.33, following a possible differentiation in the financial stability indicator based on the degree of convergence in the following groups:

- Non-membership of the Euro Area;
- The degree of compliance with the nominal convergence criteria.

Initially, it was presumed that, according to the Euro Area membership, a differentiation in the the dynamics of the three indices was considered.

The output of the ANOVA method confirmed this assumption, showing a difference in the financial stability index based on the single currency criterion (see Annex 1). Moreover, Chart 1 shows a less consistent accumulation of systemic risk in the Euro Area compared to Central and Eastern Europe, a situation reflected in the amplitude of the financial stability index.

In addition, a similar situation is noticed with regard to the nominal and real convergence indices.

Thus, Euro Area membership produces solid macroeconomic structures, capable to overcome a significant volatility both in nominal and real plane. In this respect, we can say that the transmission effect is from the real economy to the nominal economy, as a solid macroeconomic environment is likely to generate a transmission effect within the nominal economy.

Other distinctions have been made in relation to the convergence criteria of the inflation rate and the budget deficit weight in GDP. Thus, countries with a significant compliance with these two criteria cannot be differentiated in terms of financial stability. On the contrary, the statistical output by the ANOVA method shows that countries with a high degree of compliance with the interest rate and the debt-GDP ratio can be differentiated in terms of financial stability index dynamics (see Annexes 2 and 3).

Moreover, the research results indicate certain limitations imposed by the configuration of the convergence criteria. Low inflation is not an absolute guarantee of financial stability, it may hide certain deflationary events or even liquidity trap situations. Given that inflation remains within a sustainable range, it can be regarded as supporting the economic growth potential.

Also, a rising budget deficit might be sustainable on condition that this is generated by significant investment expenditures. Its jeopardizing nature occurs predominantly in the context of a wide gap between consumption and investment expenditures.

On the contrary, higher interest rates would lead to a lower potential of funding the real economy and a subsequent liquidity crisis, while a large share of public debt in GDP may have adverse long-term consequences. Moreover, the financial crisis has shown the negative effect of a significant amount of public debt; while emerging as imbalances of a financial nature, especially in private banking, these disequilibria subsequently extend to public finance, causing an accumulation of unsustainable debt levels.

To find certain polarization trends in the European Union in terms of macro-economic dynamics, the method of Principal Component Analysis was applied to the three indices covered in this study.

Table 6.34

Statistic output corresponding to the Principal Component Analysis for the financial stability index characteristic of the Euro Area and CEE countries

Correlation of EURO_ISF BG_ISF CZ_ISF HU_ISF POL_ISF ROM_ISF						
	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Comp 6
Eigenvalue	2.841693	1.279707	1.038125	0.498651	0.231255	0.110569
Variance Prop.	0.473616	0.213285	0.173021	0.083108	0.038542	0.018428
Cumulative Prop.	0.473616	0.686900	0.859921	0.943029	0.981572	1.000000
Eigenvectors:						
Variable	Vector 1	Vector 2	Vector 3	Vector 4	Vector 5	Vector 6
EURO_ISF ¹¹	0.073962	-0.074554	-0.951028	0.266135	-0.114190	-0.025500
BG_ISF ¹²	0.474608	-0.386260	0.052949	-0.323482	-0.684808	0.221685
CZ_ISF ¹³	0.492891	-0.243700	-0.151392	-0.448871	0.687486	0.025029
HU_ISF ¹⁴	0.379067	-0.413603	0.261242	0.771824	0.143943	-0.023701
POL_ISF ¹⁵	0.485290	0.454940	0.039452	-0.001854	-0.152611	-0.729844
ROM_ISF ¹⁶	0.383584	0.638606	0.004318	0.165321	0.036764	0.645248

Regarding the financial stability index, statistical output shows a regional trend of polarization depending on Euro Area non-membership. In this respect, the Eurozone is correlated with the Central and Eastern European countries, showing a significant negative coefficient along the third vector, in which no other country reflects a degree of concentration.

Similarly to the analysis in dynamics, Romania and Poland tended to concentrate along the second vector, revealing a trend in the same direction.

Bulgaria and the Czech Republic mainly show a similar behavior along the first component, while Bulgaria has, to some extent, in a nontypical manner, a certain tendency to correlate with other countries.

Thus, the Principal Components Analysis shows a tendency towards polarization among the Central and Eastern European countries, in opposition to the Euro Area. According to the third vector, the Euro Area is

¹¹ EURO_ISF = EURO index of financial stability.

¹² BG_ISF = Bulgaria index of financial stability.

¹³ CZ_ISF = Czech Republic index of financial stability.

¹⁴ HU_ISF = Hungary index of financial stability.

¹⁵ POL_ISF = Poland index of financial stability.

¹⁶ ROM_ISF = Romania index of financial stability.

negatively correlated with countries in the region that have not adopted the single currency. We consider that while the financial system of the two types of regions has grown stronger in the period under review, the level of systemic risk accumulation, as reflected in the financial stability index, is different.

As for the nominal convergence index, we notice that the Czech Republic and Hungary show a trend of polarization of the first component, while Hungary and Poland show the same trend within the second component; as regards the second component, the Euro Area is negatively correlated with most countries, except Hungary and Poland. Meanwhile, Bulgaria, the Czech Republic, Hungary, Poland, Romania and Bulgaria are polarized in the third component, as well as in the fourth and the sixth components.

As regards the real convergence index, we notice that the first component shows a contradiction between the Euro Area and the CEE countries; in fact, similarly to all other components, the Eurozone differs from most of Central and Eastern European countries, which highlights the important difference between the Euro Area and recently integrated EU countries. Regionally, the Czech Republic and Poland tend to polarize on the fourth component, while Bulgaria and Hungary show a similar behavior on the fifth component.

As regards the real convergence index, countries have tended to polarize less as compared to the nominal convergence index, which suggests that in the real economy, the discrepancies are significant even at the intra-regional level. Different levels of socio-economic development causes different characteristics in terms of real economic flows.

The polarization of the Euro Area and the Central and Eastern European countries on different vectors shows that the Euro Area countries have benefited from more robust macroeconomic structures, which allowed for a faster absorption of shocks, while in Central and Eastern European countries, the assimilation of shocks endangered financial stability. The fragility of macroeconomic and institutional structures did not allow for mitigation, but worsened the macro-economic climate.

Conclusions

The paper has shown the sustainability of convergence criteria in the European Union by the amplification of financial flows and recent political initiatives on the adoption of macro-prudential nature. Thus, the study reflects a multidimensional approach to the concept of economic convergence in terms of interference with the dynamic process of financialisation and the initiation of measures for the macro-prudential risk regulation.

First, the research highlighted the sustainability of the convergence criteria. In this respect, it revealed the limiting side of nominal convergence criteria in the light of the dynamics of the convergence indicators corresponding to the NMS12 and EU15 over the last ten years.

The research qualified the ability of EU Member States to meet the real convergence criteria for the integration into the Euro Area as a poor one; this was explained in the light of the recent financial disturbance that occurred because of a massive de-correlation of the nominal economy, reflected in financial flows, and the real economy, as revealed, among others, by the volume of goods and services produced and the living standard (Iancu, 2011). Thus it was necessary to correlate real and nominal convergence criteria, namely the creation of an integrated set of indicators, including indicators anchored in both types of convergence.

The critical aspects of nominal convergence indicators are related to their stronger correlation with real convergence indicators (e.g. inflation rate should be correlated with the velocity of money circulation) so as to achieve a mix between the two types of convergence. On the other hand, the research has emphasized the need to extend the scope of the requirements established by the Maastricht Treaty in order to adapt them to actual macroeconomic conditions and to avoid certain macroeconomic problems caused by conflicting relationships among pre-determined values of nominal convergence indicators. The analysis of the business cycles synchronization reveals a clear decoupling of the countries belonging to the Euro Area from the new EU Member States, and among the new Member States, which largely explains the absence of junction between the two types of convergence.

In order to grasp the correlation between economic convergence and the dynamics of the financial system, the research has applied the Godley-Lavoie model to the European Union; the Godley-Lavoie model shows the mix of financial economy and real economy in light of the complex relations between various operating entities within the economic system.

The focus on this model took into account its integrated nature, showing the mutual dependence of households, central governments, business entities and the financial system. Thus, financialisation is no longer considered only in terms of financial system and dynamics, but also in terms of flows circulating between related entities. Thus, financialisation is analyzed in the light of many interdependencies that govern the interaction with the real economy.

The dynamics of variables captured in the Godley-Lavoie model was analyzed at the EU level; as for the real economy, when all countries are analyzed, the physical capital utilization rate remained considerable, reflecting a period of recovery of the productive capacity of the economy. In the case of the Euro Area, the physical capital utilization rate followed a stable trend over the period, without fluctuations under the impact of the financial disturbances; this aspect reflected the robustness of the production structures in the Euro Area, as well as the strength of the real economy reflected in the capacity of the corporate sector to withstand shocks caused by the financial crisis.

Central and Eastern European countries were characterized by a reduction in utilization of physical capital in 2008-2010; the highest sensitivity under the influence of the financial disturbance was observed in the Baltic countries. Thus, the study reflected the fragile production structures of emerging countries, which, because of the high dependence on foreign investment flows and the higher investor risk aversion in the context of financial disturbances, have opted for heavy withdrawals, leading to macroeconomic volatility, extended to the business environment.

The study has traced the relationship between financialization and economic convergence in the European Union. The financial system was analyzed from the perspective of the growth over the last ten years, as well as from the perspective of the specific components of the financial system. The approach was complex, focusing on the financial system as a whole and on its components - banking, equity securities market, bonds market, money market. A special focus was placed on real convergence, reflected in real GDP growth, aiming to show how it reacts under the impulse of the financial system components.

In essence, as regards the convergence process, the study shows the balance between the nominal economy and the real economy, with an emphasis on the implications for the macroeconomic stability. The recent financial disturbances have revealed that financial flows are of disparate magnitude in comparison with the real economy; even if the real economy

undergoes contraction, the nominal economy can develop in the context of intense capitalization of a component of the financial system. For example, bond issues backed significantly the need for funding following the financial imbalances, thereby increasing the financial system share in GDP.

In light of these findings, the complexity of the relationship between economic convergence and financialisation hinders a possible approach to clear-cut conclusions reflecting unequivocal relationships.

Although the overall research reveals that the financial system can be a vector of convergence, in some situations it may cause distortions to convergence. In addition, the relationship between the two processes - financialisation and convergence - must be considered in the context of differentiation between nominal convergence and real convergence. In order to deepen the relationship between convergence and macro-prudential policies, the research considers the financial system in correlation with differences in the degree of nominal convergence at the regional level. In this respect, based on previous research, different groups of countries were constructed, given the similarity degree of nominal convergence. In order to assess the level of financial stability in the EU, the research proposes three indices constructed by aggregation of several indicators specific both to the financial system and to nominal convergence and real convergence.

As for the Euro Area, the financial stability index captures changes of lower amplitude. The interesting aspect is the fact that in Central and Eastern Europe, there is an upward trend as regards the index in opposition to the Euro Area, where the dynamics is opposite. In CEE countries, the financial stability index dynamics is heterogeneous; except for Poland and Romania, which show a similar trend, the other countries have experienced different dynamic paths.

As for the other two indices, the analysis reveals some features of the correlation between nominal convergence and real convergence. As for the indices calculated for the two regions - the Euro Area versus the Central and Eastern European countries that have not adopted the single currency, there are two processes that show a similar trend. However, changes are more pronounced in the index of the real convergence, its dynamics presenting at least three aspects. In essence, the dynamics of real convergence index is greater in relation to the dynamics of the nominal convergence index; this feature is noticed in all the CEE countries that have not adopted the single currency. This is surprising considering that important changes in the real economy require a longer time to be effective.

The study reveals a distinction based on the single currency criterion. Other distinctions have been made based on the convergence criteria represented by inflation and the budget deficit share in GDP.

In countries experiencing a significant degree of compliance with these two criteria, there could not be any differentiation regarding the financial stability level. On the contrary, the study shows that countries with a high degree of compliance with the interest rate and the debt-GDP ratio can be differentiated in terms of financial stability index dynamics.

As a corollary, Central and Eastern European countries still face significant macroeconomic risks caused by fragile macroeconomic structures. These countries are undergoing a catching-up process that contributes to the amplification of divergence in the European Union. Being heavily dependent on external financial flows, these countries face a major macro-prudential risk, affecting the pace of real convergence.

Future research will focus on identifying mechanisms for macro-prudential risk management in the region.

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Annexes

Annex 1

Statistic output of the stationarity test applied to the sigma indicator corresponding to the GDP per capita variable in EU27

Null Hypothesis: EU_27_GCAP_SIGMA has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.478347	0.0026
Test critical values: 1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

Source: Own computation.

Annex 2

Statistic output of the stationarity test applied to the sigma indicator corresponding to the GDP per capita variable in the Euro Area

Null Hypothesis: EURO_GCAP_SIGMA has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.177244	0.0005
Test critical values: 1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

Source: Own computation.

Annex 3

Statistic output of the stationarity test applied to the sigma indicator corresponding to the GDP per capita variable in New Member States

Null Hypothesis: NMS_GCAP has a unit root

Exogenous: Constant

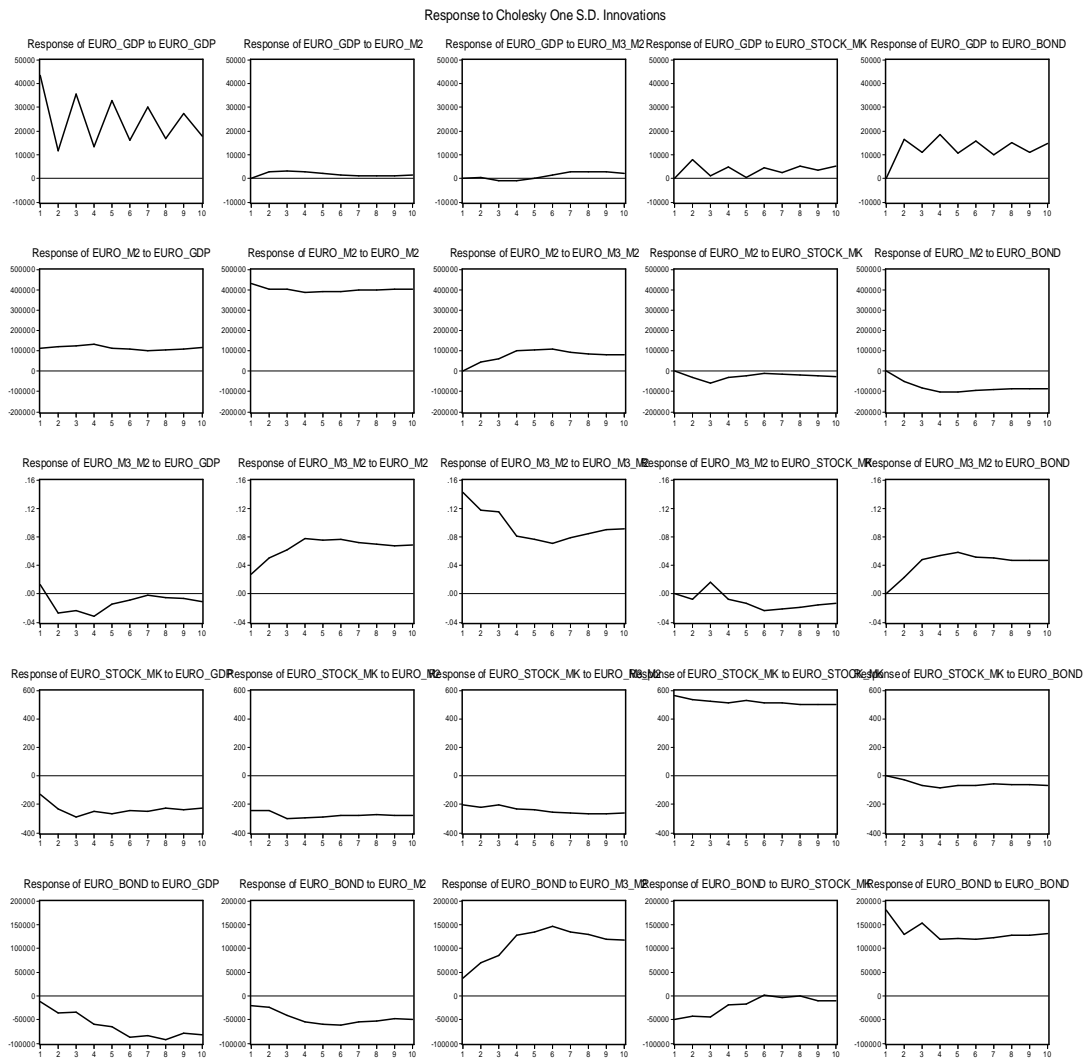
Lag Length: 4 (Automatic based on SIC, MAXLAG=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.953925	0.7623
Test critical values: 1% level	-3.571310	
5% level	-2.922449	
10% level	-2.599224	

Source: Own computation.

Annex 4

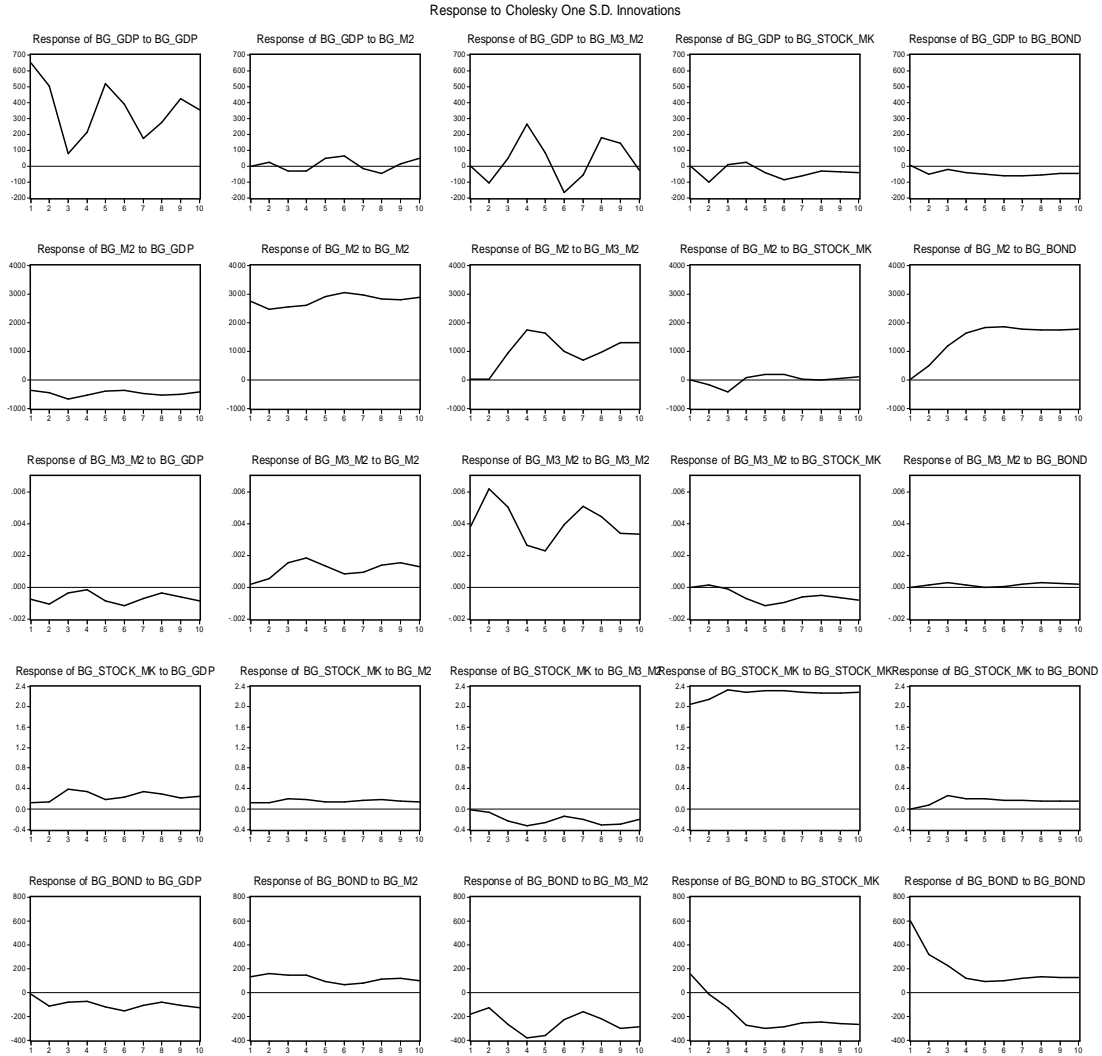
GDP response under the impulse of the financial system in the Euro Area



Source: Own computation.

Annex 5

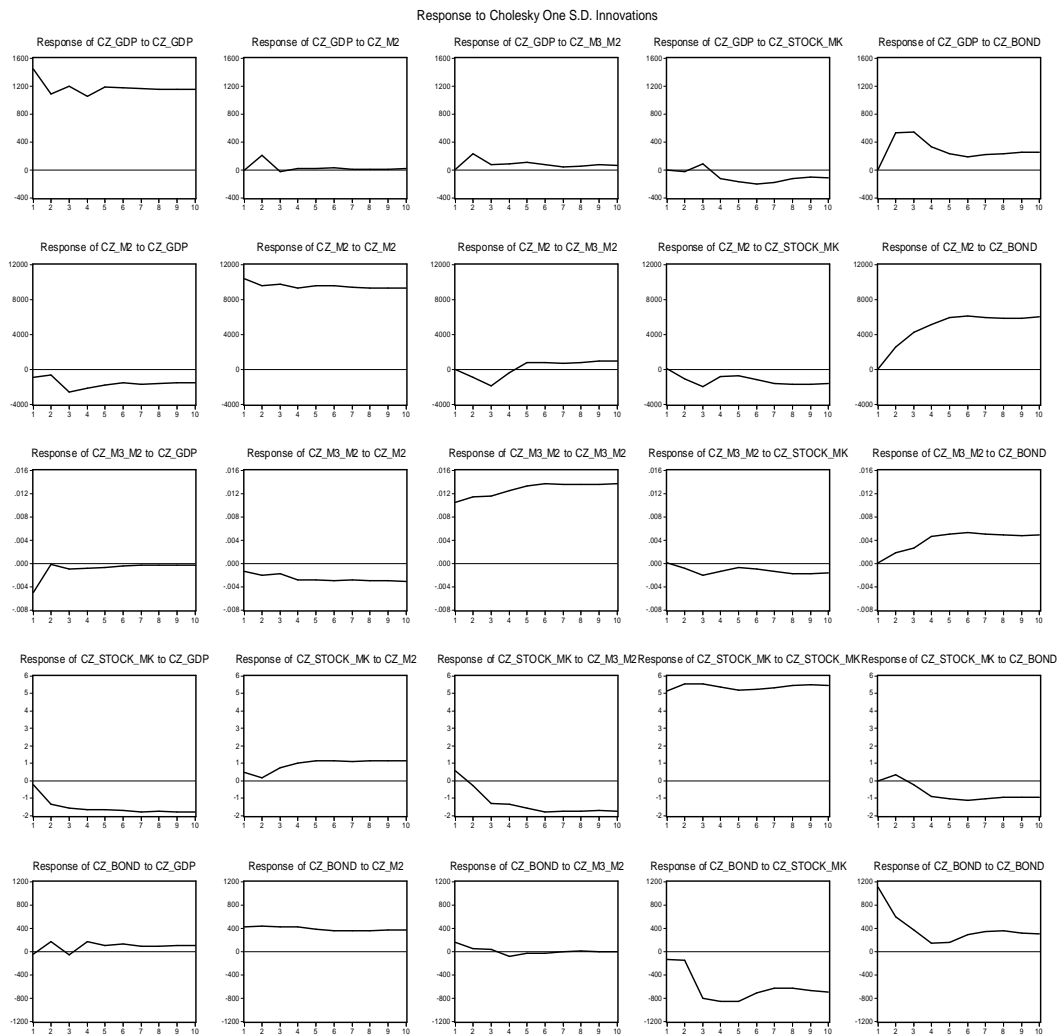
GDP response under the impulse of the financial system in Bulgaria



Source: Own computation.

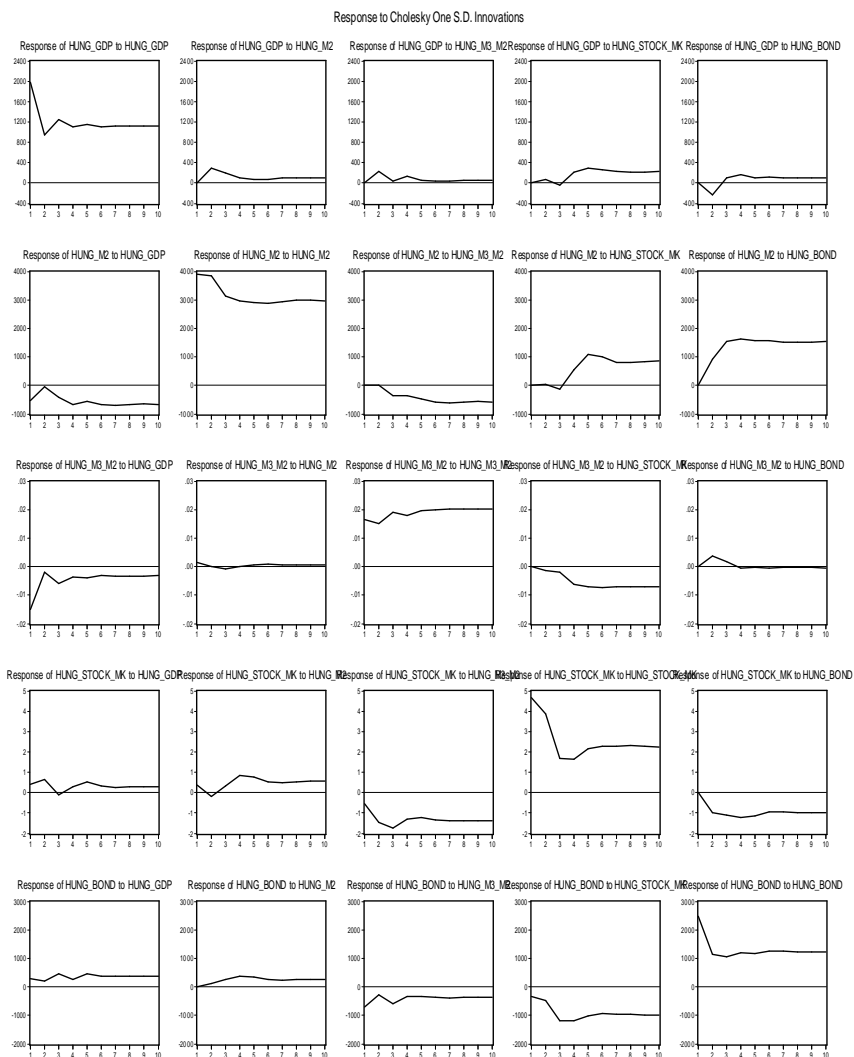
Annex 6

GDP response under the impulse of the financial system in the Czech Republic



Source: Own computation.

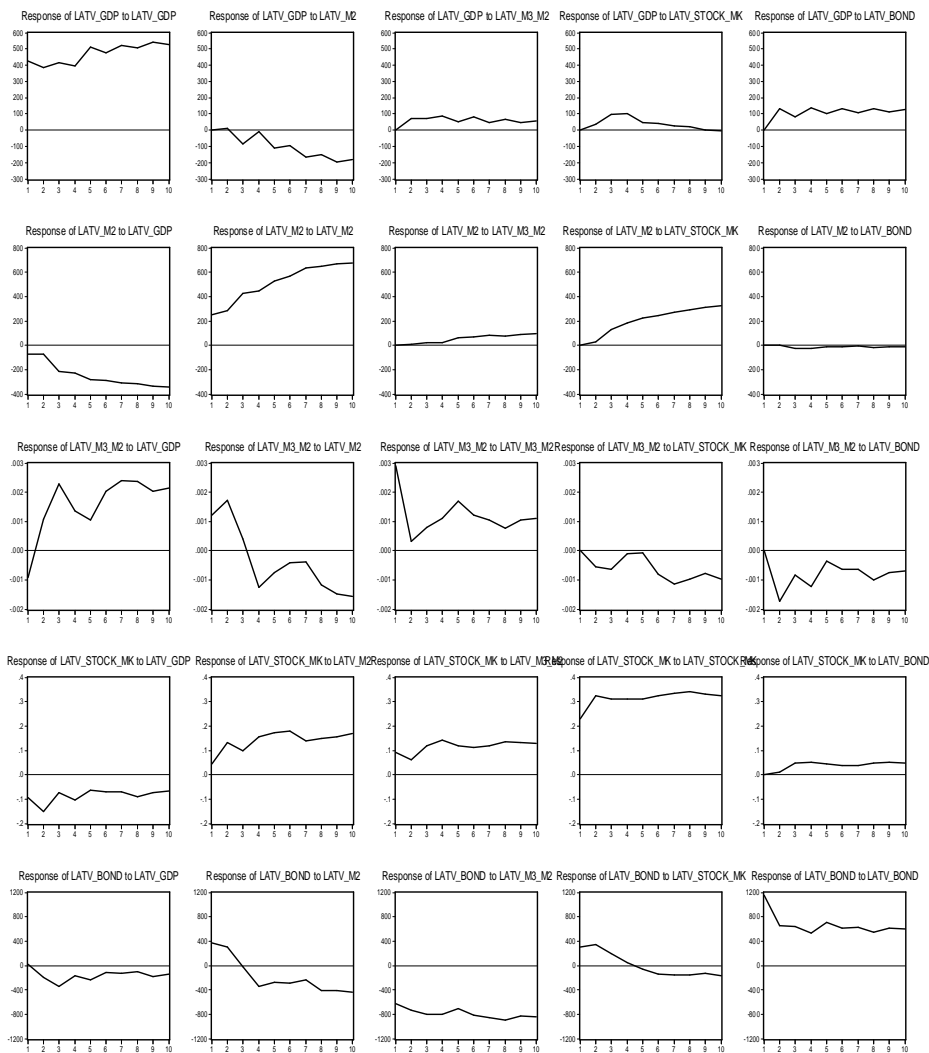
GDP response under the impulse of the financial system in Hungary



Source: Own computation.

GDP response under the impulse of the financial system in Latvia

Response to Cholesky One S.D. Innovations

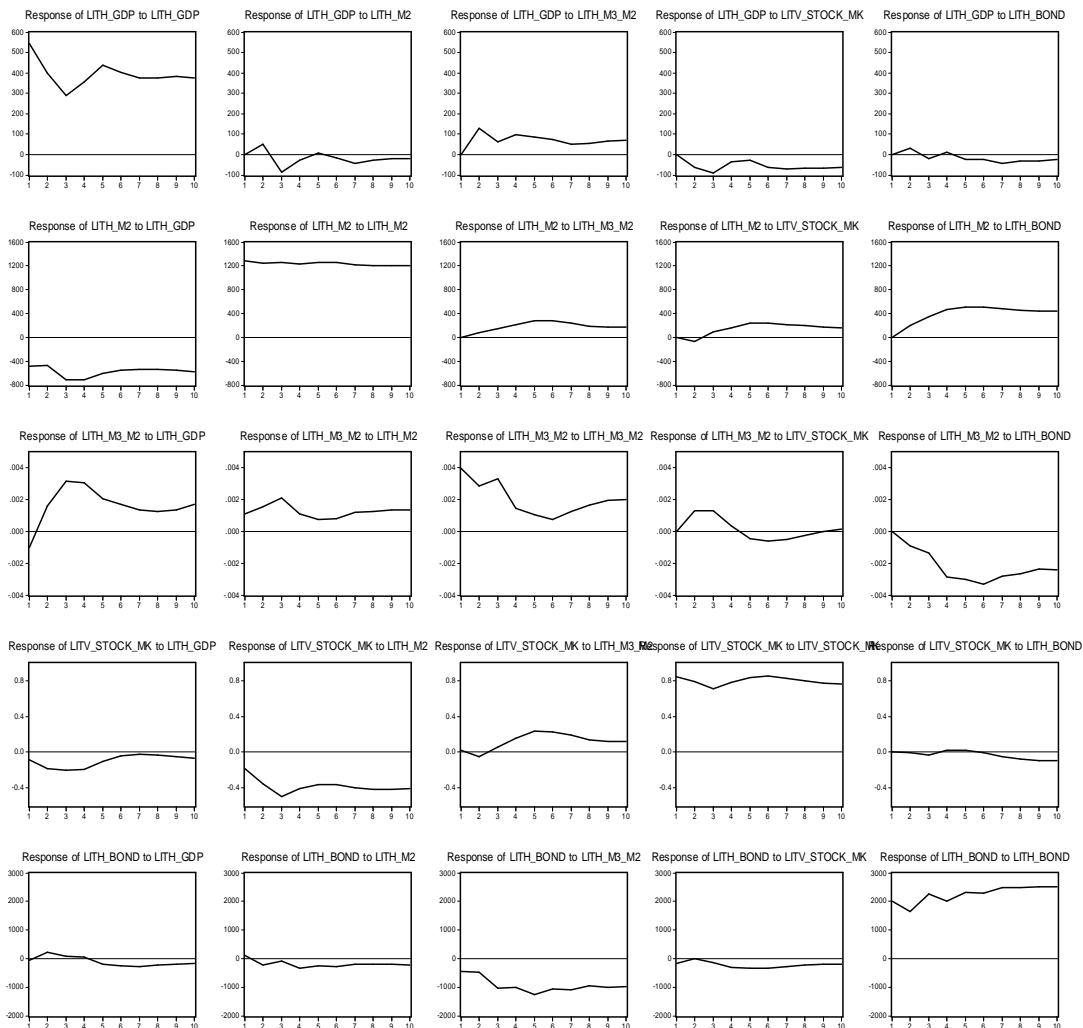


Source: Own computation.

Annex 9

GDP response under the impulse of the financial system in Lithuania

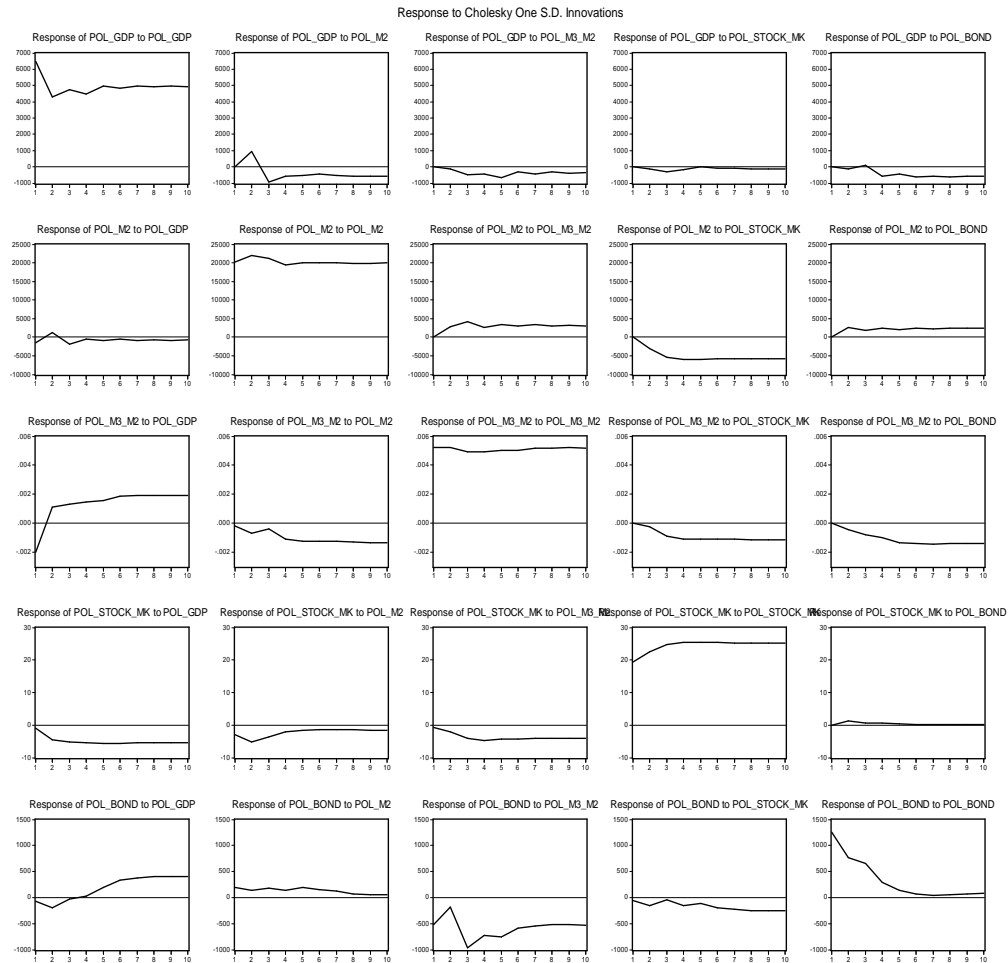
Response to Cholesky One S.D. Innovations



Source: Own computation.

Annex 10

GDP response under the impulse of the financial system in Poland

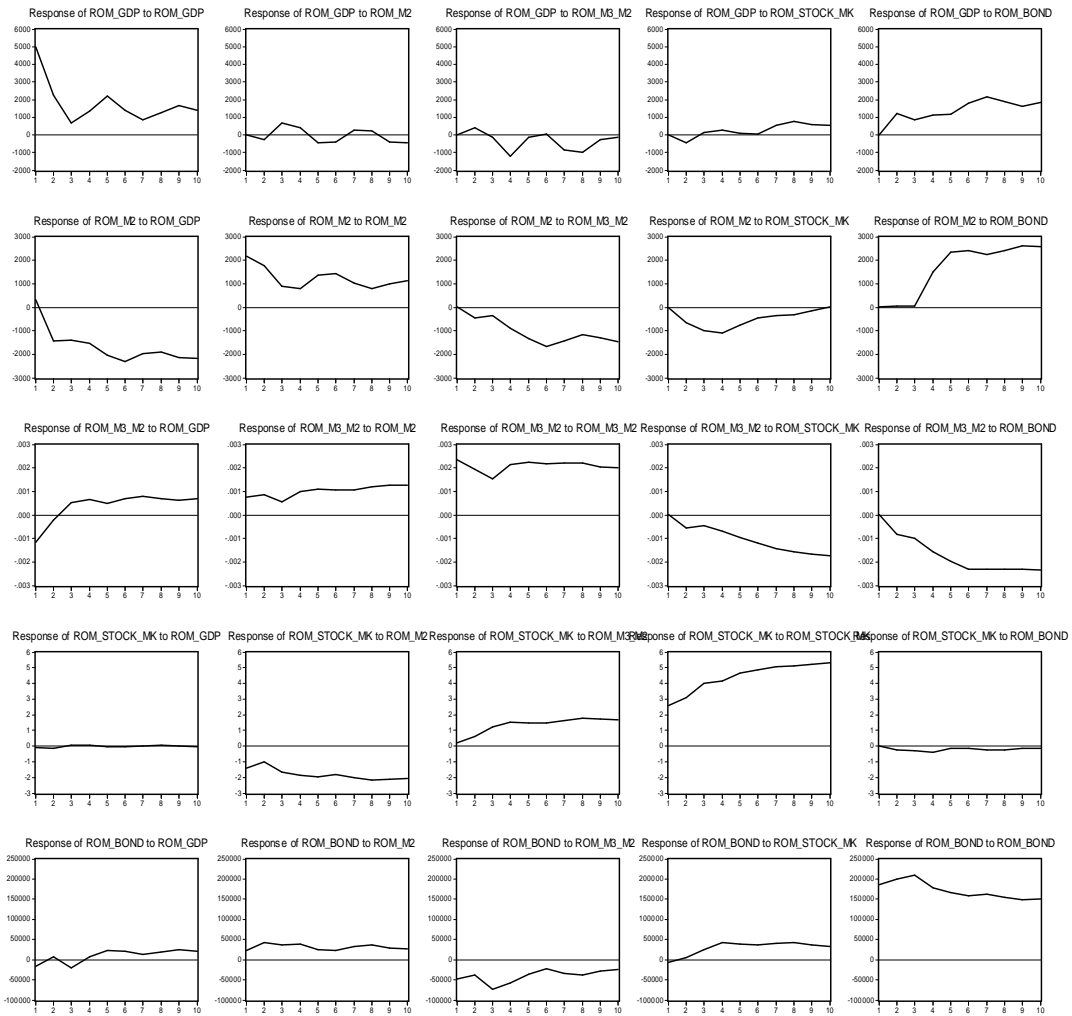


Source: Own computation.

Annex 11

GDP response under the impulse of the financial system in Romania

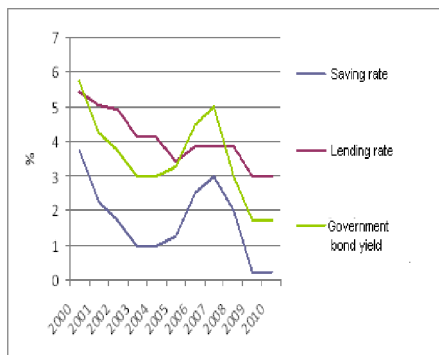
Response to Cholesky One S.D. Innovations



Source: Own computation.

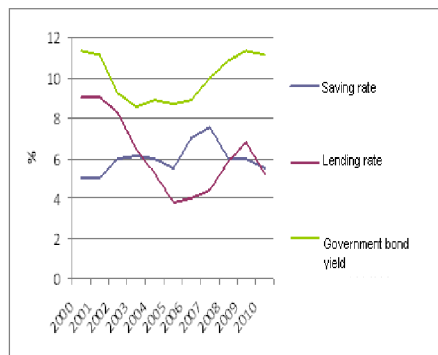
Results derived from the application of the Lavoie-Godley model: the dynamics of saving rate, lending rate and government bond yield in the EU, 2001-2011

Euro Area

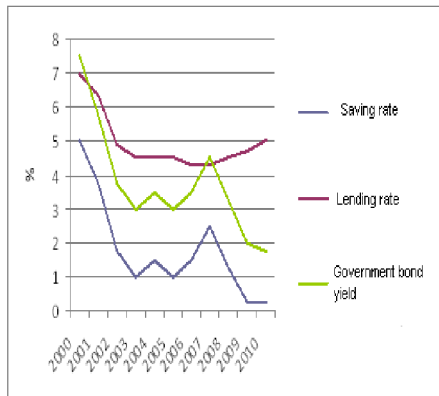


Source: Own computation.

Bulgaria

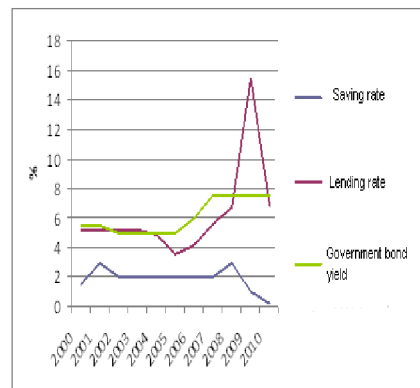


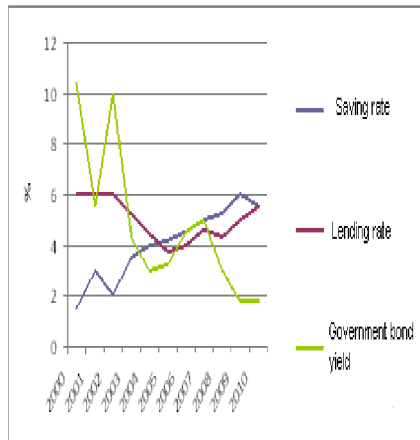
Czech Republic



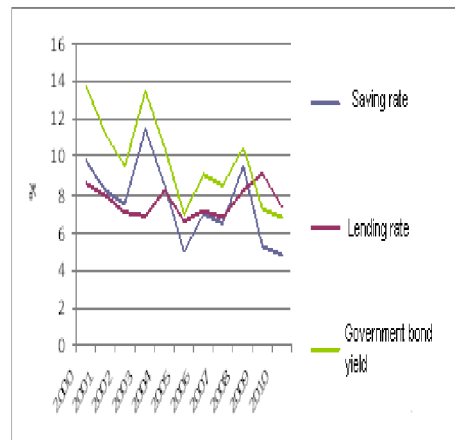
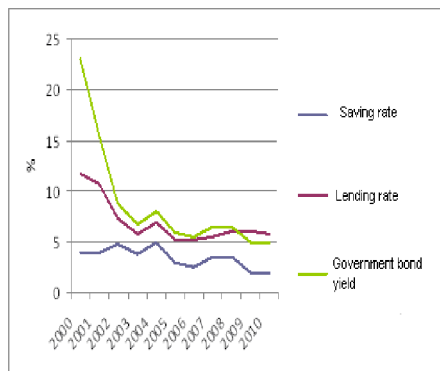
Source: Own computation.

Latvia

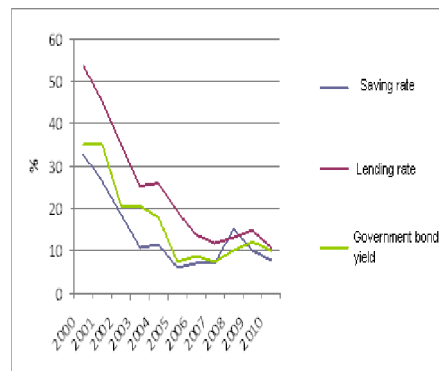


Lithuania

Source: Own computation.

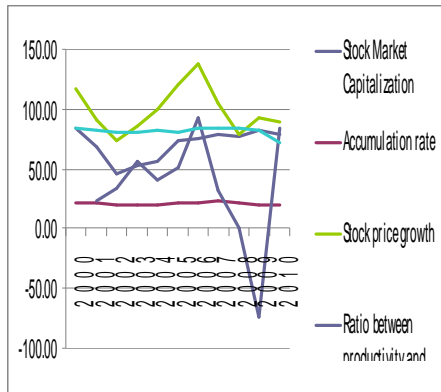
Hungary**Poland**

Source: Own computation.

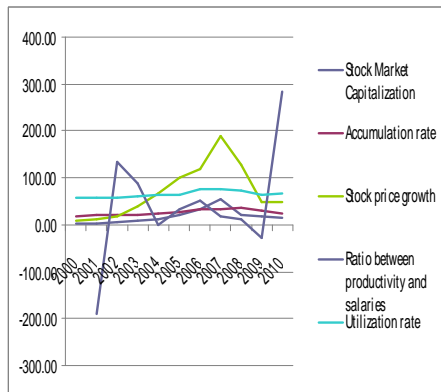
Romania

Results of the application of the Lavoie-Godley model: the dynamics relevant to the interaction between the real economy and the financial system in the European Union, 2001-2011

Euro Area

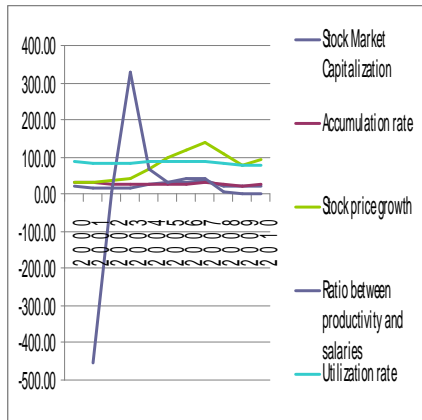


Bulgaria

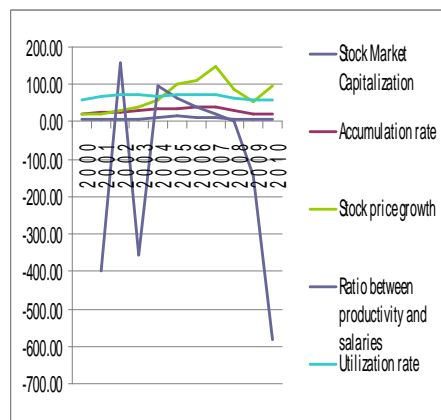


Source: Own computation.

Czech Republic

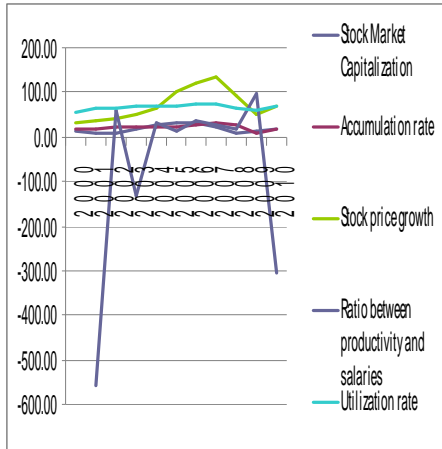


Latvia



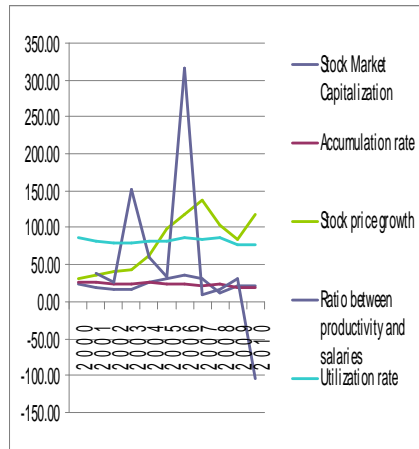
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Lithuania

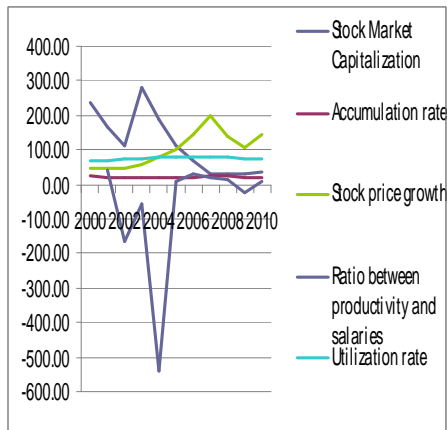


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Hungary

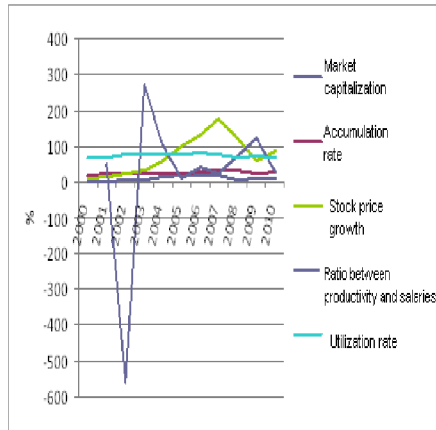


Poland



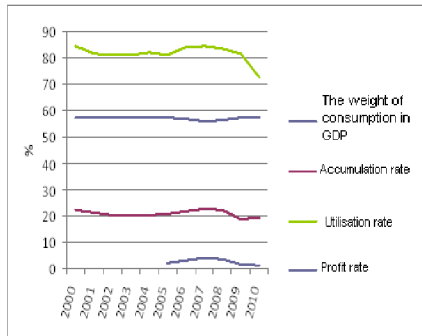
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Romania

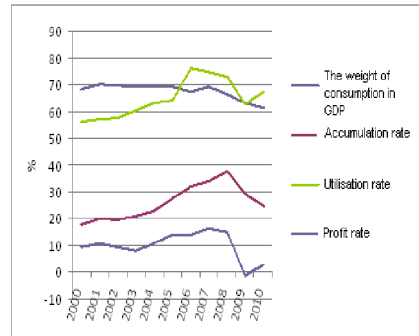


Results of the application of the Lavoie-Godley model: evolution of the accumulation rate, physical capital utilization rate, consumption weight in GDP and profitability rate

Euro Area

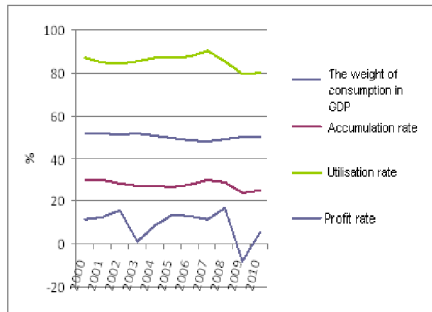


Bulgaria

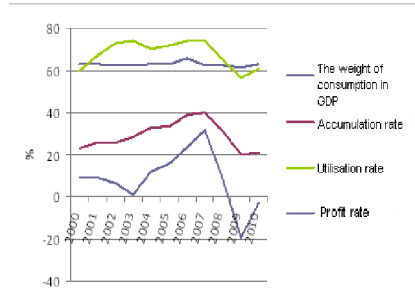


Source: Own computation.

Czech Republic

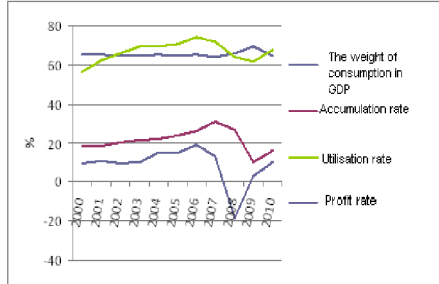


Latvia

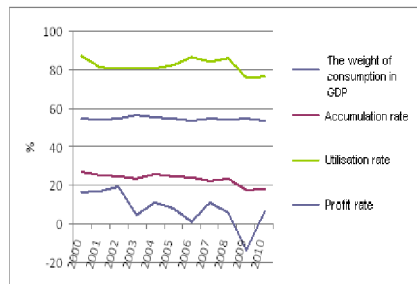


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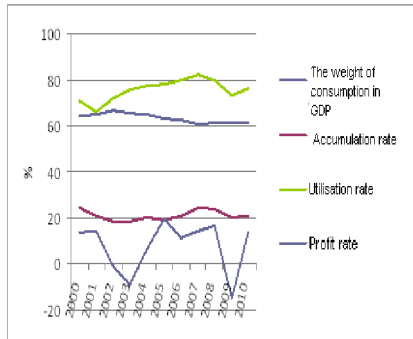
Lithuania



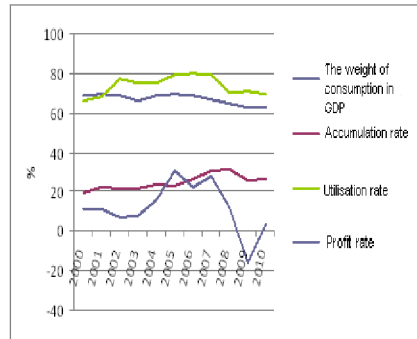
Hungary



Poland



Romania



Source: Own computation.

Annex 15

Statistical output derived from the application of the ANOVA method to the financial stability index in Central and Eastern Europe and the Euro Area

Test for Equality of Means of CEE_ISF

Categorized by values of CEE_ISF and EURO_ISF

Date: 07/04/12 Time: 19:20

Sample: 1997:1 2011:4

Included observations: 60

Method	df	Value	Probability
Anova F-statistic	(10, 49)	36.00653	0.0000
Analysis of Variance			
Source of Variation	df	Sum of Sq.	Mean Sq.
Between	10	467.4239	46.74239
Within	49	63.61005	1.298164
Total	59	531.0340	9.000576

Annex 16

Statistical output derived from the application of the ANOVA method to the financial stability index in countries with high convergence or divergence concerning the interest rate convergence criterion

Test for Equality of Means of ISF_RISM
Categorized by values of CONV_RI and DIV_RI
Date: 07/04/12 Time: 20:08
Sample: 1 300
Included observations: 300

Method	df	Value	Probability
Anova F-statistic	(57, 2)	14.29276	0.0675

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	57	364.4883	6.394531
Within	2	0.894793	0.447396
Total	59	365.3831	6.192933

Annex 17

Statistic output derived from the application of the ANOVA method to the financial stability index in countries with high convergence or divergence concerning the weight of public debt in GDP criterion

Test for Equality of Means of ISF_DESM
Categorized by values of CONV_DSM and DIV_DESM
Date: 07/04/12 Time: 20:33
Sample: 1 300
Included observations: 300

Method	df	Value	Probability
Anova F-statistic	(16, 283)	14.95020	0.0000

Analysis of Variance			
Source of Variation	df	Sum of Sq.	Mean Sq.
Between	16	1368.786	85.54912
Within	283	1619.403	5.722271
Total	299	2988.189	9.993942