XXII CICLO DEL
DOTTORATO DI RICERCA IN
POLITICHE TRANSFRONTALIERE PER LA VITA QUOTIDIANA
TRANSBORDER POLICIES FOR DAILY LIFE

SCENARIOS AND PROSPECTIVES REGARDING THE EURO
INTRODUCTION ON THE ROMANIAN MARKET

(Settore scientifico-disciplinare: MGGR/02 - GEOGRAFIA ECONOMICO-POLITICA)
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List of abbreviations

ADF – Augmented Dickey – Fuller
AIC – Akaike Information Criterion
AMECO Database – Annual macro – economic database
ANOFM – Agentia Nationala a Ocuparii Fortei de Munca (National Labour Force Agency)
BEER – Behavioural Equilibrium Exchange Rate
EA – Euro Area
ECB – European Central Bank
ECM – Error Correction Model
ECU – the European Currency Unit
EMI – European Monetary Institute
EMS – European Monetary System
EMU – European Economic and Monetary Union
ERMI – Exchange Rate Mechanism II
ERV – Exchange Rate Volatility
ESA95 – European System of Accounts 1995
EU – European Union
EU 27 – the European Union with 27 members
EUR - Euro
EUROLIBOR – Euro London Interbank Offered Rate
FEER – Fundamental Equilibrium Exchange Rate
GDP – Gross Domestic Product
HH – High – High
HL – High – Low
HP – Hodrick – Prescott
HQ – Hannan-Quinn Information Criterion
ICT – Information and Communication Technologies
iid – independent and identically distributed
ILO – International Labour Organization
IMF – International Monetary Fund
IPN – Inflation Persistence Network
KIS – Knowledge – intensive services sector
LH – Low – High
LISAB08-09 – Lisbon Agenda Index 2008 - 2009
LL – Low – Low
LM – Lagrange Multiplier
LM-SARMA - Lagrange Multiplier
MHTM – Medium high – tech manufacturing sector
NBR – National Bank of Romania
NIS – National Institute of Statistics
NLP – National Liberal Party
NMS – New Member States
OCA – Optimum Currency Area
OECD – Organization for Economic Co-operation and Development
OLS – Ordinary Least Squares
PCs – Personal Computers
PIBLOC08 – GDP per capita in 2008
PIBLOC99 – GDP per capita in 1999
PPP – Purchasing Power Parity
PPS – Purchasing Power Standards
PRETCOMP08 – Comparative Price Level in 2008
Q/ q - quarter
R&D – Research and Development
REER - Real Effective Exchange Rate
RON – Romanian New Leu
RPIBLOC99-08 – Average annual growth rate of GDP per capita
Sa – Alternative Scenario
Sb – Baseline Scenario
SDP – Social Democratic Party
SIC/ SC – Schwarz Information Criterion
SMEs – Small and Medium – sized Enterprises
STDEV – Standard Deviation
UIP – Uncovered Interest Parity
USA/ US – the United States of America
VAR – Vector Autoregressive Representation
VAR (p. 22) – Variance
VAT – Value Added Tax
VECM – Vector Error Correction Model
approx. – approximately
e.g. – for example
et al. – et alia (and others)
etc. – et cetera
i.e. – id est
irbest – Annual inflation rates of the best three EU performers
irea – Annual inflation rates in the Euro Area
irmast - Annual level of the Maastricht inflation rate criterion
irrom – Annual inflation rates in Romania
p.p./pp – percentage point(s)
q-o-q – quarter on quarter
vs. – versus

The countries of the European Union

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Chapter I

INTRODUCTION

On the 1\textsuperscript{st} of January 2007, after a long process of negotiations, Romania has joined the European Union. From that point on, Romania has become a member state with derogations in respect to the adoption of the common currency – the Euro. It implies a delay of the Euro adoption from the moment when a country becomes a member, until it fulfils a set of criteria established by the European Union.

Once with the entrance in the European Union, Romania’s policies and politics have become transnational. The decisions taken in Bucharest are no longer a matter only of the Romanian people, but they also affect the European peoples, as well\textsuperscript{1}. This phenomenon of transmission and its characteristics are very important for the stability of the Union itself. Consequently, studying the intensity of the contagion effect is one of the main issues for every analysis regarding European integration. If member states have similar paths and quite similar characteristics, the effects would be the same for them. If not, the contagion effect will manifest through asymmetric shocks (Berument et al., 2005), causing divergent national evolutions and instability within the Union. To reduce the contagion effect, the European Union has established through its treaties a series of criteria and an economic standard for the candidate countries.

The new-comers into the European Union did not have the opt-out possibility, as the Great Britain and Denmark. Starting with the accession day, they entered the second stage of the European integration – the completion of the convergence criteria\textsuperscript{2} which will lead to the Euro adoption.

Undertaking to join the Euro Area implies major changes at macroeconomic level, the most important of which being giving up the independent monetary policy, as it is considered to be the major tool in managing shocks to the economy. For an independent country, when shocks manifest on international markets, the monetary adjustment mechanisms come into force by devaluating or valorizing the national currency to reduce or even annihilate the shocks. Thus, in order to assess the costs and benefits of the European monetary integration is of most importance to explore the efficiency of the floating exchange

\textsuperscript{1} In a much greater degree than before.
\textsuperscript{2} Also known as the Maastricht Criteria.
rate and of the independent, autonomous monetary policy in neutralizing shocks. In the process of Romania’s transition from a communist country to a market economy, the floating exchange rate proved very good in stabilizing several fluctuations of the economic environment. When problems appeared, the NBR let the Leu (the Romanian currency) devaluate progressively. Consequently, the price of Romanian goods on international markets decreased and they became more competitive. The rise in the level of exports and the devaluation of the Leu caused the reduction of the budgetary deficit. Unfortunately, on long term, the solution is not satisfactory, as the improvement of the position on international markets is not made in real terms (due to productivity). It happens nowadays, too. Romania is currently under the Excessive Deficit Procedure decided by the European Commission in May 2009 for the value of the deficit in 2008. Instead of taking the necessary real measures to correct the deficit, authorities, together with the NBR, have let the national currency to devaluate progressively. This ensures an important reduction of the Romanian budgetary deficit in nominal terms. Hence, the exchange rate mechanism plays a major role on stabilizing the Romanian economy. The fixed exchange rate regime is more vulnerable to speculative attacks that may hinder economic development and stability.

Giving up the possibility of setting independent interest rates could increase very much the costs of joining the EMU. This because not always the common interest rate established by the European Central Bank fits the economic conditions of all the members. The degree of appropriateness is strongly dependent on the synchronization of national economies at the Union’s level. If member states are synchronized and have pro-cyclical movements, the common interest rate will have the same effect at national levels. If not, interest rates set by the European Central Bank could have the opposite effect than the one needed at national level. It happened before with Germany and Spain, might happen again with other members, especially in the present international economic environment.

In conclusion, the main question is: will the single monetary policy be suitable for Romania?

There are three adjustment mechanisms at national level: the independent monetary policy, the labour market and the fiscal policy. Once the first one is eliminated, shocks to the economy will be dealt with using the second and the third ones.

By joining the Euro Area, ensuring the labour market flexibility becomes one of the main goals. Negative disturbances can be mitigated either through real wage adjustments or through labour force mobility (of course, apart from the fiscal mechanisms). In case of
asymmetric shocks, countries or regions may experience severe drops in production and unemployment. If the labour market is not sufficiently flexible, the time needed for recovery will be very long. Mobile production factors allow a rapid return to macroeconomic equilibrium. But the labour market adjustment mechanism is efficient within the regions of one country or among countries with similar cultural background. From this point of view, Romanians were always more flexible. Regardless the existence of institutional barriers in some EU countries, that restricted foreign labour force access, the Romanians proved to have a high propensity to migrate. In few years they became some of the largest minority groups in countries like Italy and Spain. Of course, in the two cases the common Latin root was of great help. But Romanians also emigrated a lot in countries like Canada, USA or Germany.

Apart from the work force mobility, real wage adjustments may also mitigate asymmetric shocks. If trade unions and workers are willing to reduce wages in order to preserve the level of employment, wage flexibility is high. Contrary, the wage rigidity leads to severe increases in unemployment. Both the twelve new member states and the old members seem to be very heterogeneous in this respect. Babecky and Dybczak (2008) found a wage flexibility in Romania higher than the one of prices. The variation of real wages is explained half by the real shocks (permanent) and half by the nominal ones (temporary). However, the strong migration flows and the lack of consistent labour market reforms have led to a decline in wage flexibility.

A second stabilizing instrument after joining the EMU becomes the fiscal policy. There are two channels for the transmission of the fiscal policy: the automatic fiscal stabilisers and the discretionary measures taken by authorities. The second group belongs to the traditional Keynesian economics. Recently, it has been very much questioned as results. Discretionary measures have been proven to generate asymmetric effects due to the long time needed for their implementation. That is why the European Commission, through the Treaty and the Stability and Growth Pact recommend their use only in times of severe shocks, when structural changes are needed. As for the rest of the situations, authorities should act only to preserve a structural deficit low enough to enable automatic stabilizers to freely operate. The effects of the automatic stabilizers are strongly felt in demand shocks, while for supply shocks their reaction is weak. All in all, fiscal policy reactions depend on the elasticities of various components of the GDP – budgetary revenues and expenditures.

But giving up the floating exchange rate does not mean only loosing an adjustment mechanism and relying only on labour market and fiscal actions. Adopting a common
currency means also closing the exchange rate channel of shocks transmission to the real economy.

A monetary union enjoys much more credit on international markets than countries themselves. The rating of the European Union is the highest possible. Joining the Union and, consequently, the Euro Area, brings Romania more trust. This will improve its position on international markets, leading to a rise in welfare. Eliminating the exchange rate through the Euro adoption lowers transaction costs, which usually make doubtful the costs and incomes of any foreign trade operation. For the small and medium sized enterprises, costs related to foreign trade are an important burden, very hard to measure. Adopting the common currency would allow them to use all these resources for productive purposes. In addition, employees working in this area could be relocated for higher profits.

Another consequence is that the risk premium is eliminated. Capital costs drop\(^3\), leading to an increase in national investments. The Euro introduction should foster economic integration and lower international vulnerability. Among the major follow-ups are:

- the growth of foreign trade exchanges, investments flows and the development of financial markets;
- increasing competition with the main effect of more transparency on the goods and services markets\(^4\), together with a boost in specialization and scale of production;
- higher macroeconomic stability;
- higher credibility in the macroeconomic policy, based on the transfer to the ECB.

But monetary integration should not be viewed only from a strictly economic point of view. Allam and Goerres (2008) demonstrate that the dynamics of public opinion is of most importance for the process of Euro adoption. Beside the economic perspectives (which are, of course, important at individual level), the historical – ideational perspective has also a strong impact on individual attitude. The national currency is an important identity marker, together with the national anthem and the flag. That is why persons with a strong national identity would reject European integration. Politicians will have to find a way to convince this kind of persons that the economic benefits will overweight the identity losses.

\(^3\) The so called “sunk costs”.

\(^4\) Especially in what regards price setting.
European monetary integration proves, thus, to be very complex and difficult. All the aspects mentioned above must be analyzed, not only from the quantitative, financial point of view, but also from the qualitative one.

The whole European Monetary Union process has its roots in the Optimal Currency Area (OCA) theory. As R. Mundell (1961) stated, an OCA is a group of countries where introducing a common currency does not lead to a drop in welfare. Moreover, substituting an independent monetary policy with a common, single one is adequate as long as the union’s economies are affected by similar shocks. For the symmetry of shocks to exist, a high degree of integration must be between these countries, meaning similar economic structures, synchronisation of business cycles and integration through foreign trade.

The updated OCA theory states that economic similarity should not be seen independent of the common currency Union membership, as the costs related to exchange rates regimes cease to exist. The latest trends support the entrance in a monetary union even for economies that do not meet all the OCA conditions.

The official statements are that Romania will enter the ERM II (Exchange Rate Mechanism) in 2012 and adopt the Euro in 2015. Once with this, Romania will give up the floating regime of the exchange rate and will enter under the effect of the common monetary policy conducted by the European Central Bank (ECB). For dealing with asymmetric shocks, there will be left two channels: the fiscal one and the labour market one, which both require a high degree of flexibility on the two markets. Which of the three suits better in Romania’s case?
Box 1. Steps of Romania’s European integration process

3. 2000 – February, 15: Romania starts the negotiations with the European Union.
4. 2004 – December, 17: Romania closed the negotiation process.
5. 2005 – April, 25: Romania signed the Adherence Treaty in Luxembourg.
6. 2007 – January, 1: Romania officially became a member of the EU.
7. 2012: the entrance in the Exchange Rate Mechanism II.

The goal of this study is to assess the effects of the Euro adoption on the Romanian market. Would it benefit from it or the costs of the adoption would go far beyond what we can handle? Does Romania constitute an OCA with the Euro Area?

The complex analyses conducted throughout the paper regard all the components of the European economic integration, bearing in mind that Romania is among the largest countries of the European Union, both as area and as population. This is because one cannot compare the performances of a little country, which is very easy to manage, with the ones of a larger country. Moreover, another feature that has not to be forgotten is that Romania comes after a very long communist period, followed by 20 years of turbulent transition. The national economy entered on a stabilized path just few years ago, but was again shaken by the world economic crisis.

Entering a monetary union requires not only the fulfilment of the convergence criteria, but also an important degree of flexibility. Romania will not be able anymore to set its interest rate independently; the price stability criterion will induce a temporary drop in economic growth. It is also very well known that in almost all countries that have already adopted the Euro, there was perceived an increase in inflation. On the other hand, this should foster long term economic growth. Once with the extinction of transaction costs, the overall result should be an increase in welfare for the Romanian population.
The paper starts with a theoretical overview of the concepts regarding European economic integration in chapter II. After defining the concept of a monetary union, follows a short history of the European Union and the steps that led to the creation of the European Economic and Monetary Union (EMU). Till now, 16 out of the 27 member states have already adopted the Euro. Monetary Unions have their background in Mundell’s theory of Optimum Currency Areas. He describes the main characteristics that should have such a group of countries. From the OCA theory are derived the convergence criteria encompassed in the Maastricht Treaty. Hereinafter are presented theoretical costs and benefits for a country adopting the common currency. The conceptual part ends with a presentation of the stages of Romania’s adherence to the European Union. The second part of chapter II describes all the methodology used to run the analyses (from basic descriptive analysis, to time series and spatial analysis).

The study examines then the level of convergence between Romania and the Euro Area based on the cointegration approach, both at nominal and real level. As far as it may be seen from former analysis, Romania was not ready to join the Euro Area at the time they had been conducted (Kasman et al., 2008; Mare and Marcu, 2009). With whom does Romania resemble from the countries that have already joined the monetary union, in order to see lessons from their experience? Or, maybe, it would be better to see which are Romania’s closest partners from which shocks could easier get on the national market. Chapter III as a whole deals only with the study of the nominal convergence criteria. Although the Maastricht Treaty reports three groups of criteria, the formers are the only one taken into account when analyzing quantitatively the monetary integration progress. Price stability is of key importance. All other values are established based on the performance of the best three EU performers in terms of inflation. Unfortunately, due to the high inflation levels in Romania until the early 2000s, econometric analyses have found no convergence of the inflation level with the EU one. But one has to bear in mind that inflation rates in Romania have decreased a lot lately, approaching the average EU levels. More, price stability comes into contradiction with price convergence, which is an easier process and mostly automatic.

The interest rate criterion is very hard to analyze. The main reason is that it takes into account long term interest rates for governmental bonds with 10-years maturity. Romania issued them for the first time only few years ago. Consequently, instead of the normal
interest rate used for this criterion, several studies have opted for different proxies – market interest rates for different maturities or the uncovered interest parity (Kasman et al., 2008). The main reason is that once with the entrance in the Euro Area, the risk premium should disappear. Anyway, as it will be seen, from the interest rate point of view, Romania is not ready yet to change the Leu for the Euro.

The exchange rate criterion is not a quantitative criterion per se, but it speaks about the incumbency of all members to renounce to the floating exchange rate and become a member of the Exchange Rate Mechanism II for at least two years. Due to all the delicate issues related to this criterion, it is very important to see how much a national currency fluctuates in relation with the Euro and which the effects of these fluctuations are. For the ERM II period, a country has to establish a so called “equilibrium exchange rate level” and the fluctuation band. The volatility of the national currency against the Euro is the best starting point. Based on it, the candidate country chooses the width of the fluctuation band. Exchange rate volatility for Romania is compared in this research with the values computed by the ECB for the last members that joined the EMU. The ERV for Romania ranges from 6.37 in June 2009 to 14.46 in December 2008. Consequently, the best option for Romania is to choose the maximum width of +/- 15% for the fluctuation band in the ERM II.

The last two nominal criteria described in chapter III belong to the fiscal class and regard the general government budget. After introducing some descriptive analyses of the general government deficit and of the public debt, the size and the structure of the Romanian budget are discussed. They are both compared with the ones in the EU and EA. The size of the budget in Romania is lower, below 40% of the GDP for both revenues and expenditures.

The research than evaluates the degree of integration at economic and structural level and the degree in which the business cycles in Romania and the Euro Area are synchronized. Of major importance is the study of the monetary, fiscal and labour market policies as adjustment mechanisms in the case of asymmetrical shocks in the economy. Chapter IV deals, thus, with the other two groups of criteria – real and structural.

The evolution of the gross domestic product is the mirror of an economy. That is why the first part of chapter IV studies the convergence of GDP. In most of the studies about the GDP, this parameter is analyzed only from a chronological point of view. As previously mentioned, Romania is among the largest EU members and this feature has also to be taken into account. Consequently, the GDP convergence is tested here not only chronologically,
but also spatially. Until 2008, Romania had one of the lowest GDP levels in absolute value out of the 27 members, but one of the highest growth rates. The Romanian GDP in determined by the Euro Area one, but there is no time convergence between the two.

The spatial review of the GDP convergence clearly shows the known inverse relationship between the development level of a country and its growth rate. In Europe there is not only a North – South axis, but also a West – East one. Moreover, neighbours influence each other, giving birth to a spatial clustering within the union. With its highest growth rate for the GDP value between 1999 and 2008, Romania is still far away from the developed countries. Not to mention the tremendous negative effects given by the world crisis starting with 2008.

The convergence of prices is another part of the whole process. Its antagonistic development against the inflation rate criterion increases its weight in the overall integration process. Prices have evolved fast in Romania up to few years ago, when their growth rate diminished. The spatial approach revealed one of the lowest levels of prices in the EU. The problem is in the way the comparative price level of final consumption is constructed by the EU, because Romanians that go abroad come back with the feeling that Romania is, for many sectors, more expensive than its Western partners. Here may appear the same thing as for inflation measurements. Inflation is gauged for a medium income family, while in Romania more families are below that level. This means that products needed for the everyday use of a common family in Romania are more expensive, but are not accounted for, because they do not weight the same in the measurement units’ basket. The paper also presents the major changes that occurred in the price levels for different groups of products and services, taking also into account the regulated prices\(^5\).

For the common monetary policy of the European Central Bank to have the expected effect in Romania, the degree of structural convergence with the Euro Area has to be satisfactory. If fluctuations do not follow the same path and effects are contrary, for Romania would be better to remain outside the EMU. Structural convergence gives the level of economic synchronization, i.e. business cycle synchronization, foreign trade relations and the similarity of the economic structure.

If business cycles of Romania follow a pro-cyclical movement with the ones in the Euro Area, it would be benefic for Romania to join it. The type of cyclical correlation is studied here using several variables as proxies: the GDP, the domestic demand, the gross

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\(^{5}\) Gas, electricity, etc.
value added in economy and the households’ final consumption. The variables were chosen in order to analyze both demand and supply in Romania and the EA. The correlation coefficients between parameters for Romania and for the EA give the type of cyclical movement. They all came out to be positive, meaning a pro-cyclical relationship. In addition, this type of analysis also shows the period of time needed for a shock in one partner to manifest in the other economy.

Business cycle correlation is, unfortunately, not sustained by the same economic structure. A comparative analysis reveals important differences between the shares of different sectors in Romania and the Euro Area. The two variables chosen for comparison are the gross value added by each sector and the employment. The comparison was made for all sectors in time, to see if any convergence directions are observable. One of the major differences is to be found for the agricultural sector that still weights a lot in the Romanian total. The trend nowadays is to redirect industrial forces and investments towards high value added sectors. In accordance to this, another comparison was conducted, between the shares of the different manufacturing sectors in total manufacturing. As expected, in Romania prevail the low-value added ones. Another measurement of the economic similarity is done based on the structural asymmetry indicator, which confirms the outlier position of Romania.

The third characteristic strengthens some of the results given by the previous two. Romania’s main foreign trade partner is the European Union, having, thus, a high level of integration. The degree of openness and the structure of foreign trade are the ones that ensure the preservation of the cyclical convergence. In terms of international trade, the new comers perform better than the old ones. Structural convergence is studied with the help of the Grubel – Lloyd index which compares exports and imports for each economy. But Romania has to work a little on the mix of products offered to export⁶.

After joining the EMU, the flexibility of the Romanian labour market comes into attention as it becomes one of the main adjustment mechanisms. The last part of chapter IV is devoted to a deep analysis of its features. As mentioned before, Romania has one of the highest numbers of citizens. For the beginning are shown the demographic trends, which have changed a lot after the Revolution in 1989. The population entered a negative slope, which is forecasted to continue. Then comes into discussion the labour market, with employment and unemployment issues. Romania was pretty much helped in the past years by the massive migration of the work force outside its borders. The latest figures announce

⁶ As it consist mainly on labour-intensive products, with low value added.
an important increase in the rate of unemployment, due to enterprises’ bankruptcies. A complex demographic analysis of the labour force is made on different variables: sex, age group, type of occupation, level of education, etc, in order to accurately outline all the positive and negative things. There are two major aspects to be emphasized. The first relates to the high unemployment rates of the younger generations. The second is a plus for the pensions system, showing a tendency of the older persons with high levels of education to remain active long after the official retirement age.

The degree of stability of the Romanian labour force is also given by the relationship between wages, incomes and productivity. The goal is to see if wages augmentations had real bases, correlated with productivity increases, or where done independently. The convergence process also asserts in the labour market. Wages and labour costs tend towards the levels in the European Union. Consequently, if the convergence is only nominal, without real bases, the increase in labour costs will diminish considerably Romania’s competitiveness on international markets. Already foreign companies have moved towards East due to this. For a better understanding of the evolution, the cointegration approach was again used for wages, inflation and the industry production index.

The last part of the chapter brings into light the level of fiscality of the Romanian labour market and some of its institutional characteristics (social insurance, life-long learning, etc.).

The political environment cannot be absent in such a complex analysis. That is why chapter V is devoted to the study of convergence strategies, programmes and politics of different entities. Are brought into light the main ideas presented in the project of Romania’s post-accession strategy – that represented the starting point for the National Reform Programme, in the latest convergence programme issued by the Boc government and in the strategy of the NBR of inflation targeting. Then come the programmes of the political parties and, in the end, the government’s programme for 2009 – 2012.

Following is the analysis of the integration’s effects (as impact upon new member states, especially upon Romania) and some possible evolutions of the macroeconomic indicators, based on different scenarios, with their repercussions on the social life. Chapter VI opens with a scanning of the short term and very short term effects associated with the fulfilment of the inflation rate criterion. As always, the first one to be considered is the GDP.
And this is also the most important very short term and short term relationships found for Romania. The expected relationship between inflation and wages was not entirely found. This is a sign that wage evolution did not depend on productivity or directly on inflation in Romania.

The medium term evolution is then analyzed using an econometric approach. In a progressive manner, little models were constructed for the Romanian economy, using the most important macroeconomic variables. Domestic demand, GDP, inflation, interest rates and so on were evaluated in different scenarios of Romania’s entrance in the Euro Zone. The results are presented in chapter VI.

Romania’s competitiveness on the Euro market and abroad is another interesting issue. It takes into consideration the reports given by the World Economic Forum\(^7\) and the result of the simulation made above, in chapter VI. The idea of this chapter has its origins in the EU’s Lisbon Agenda on improving the Union’s competitiveness. The whole process is based not only on economic properties of the EU and their development, but also on social issues and environmental problems. Competitiveness can be studied from many points of view. The second part of the chapter is intended to utilize the most used parameters for assessing Romania’s competitiveness before and after the subprime crisis. Among them, are:

- the labour productivity per person employed, measured as the level of GDP in PPS per employee;
- the real output, both at national level and per person employed;
- the value added in economy;
- a series of labour market variables – based on the idea of more and better jobs for the European citizens;
- prices and quality of products and services (for example, the real effective exchange rate);
- infrastructure characteristics;
- the political and business environments;
- etc.

\(^7\) As the main body to study competitiveness problems worldwide.
In the end are also mentioned the rankings for Romania given by the main bodies that study competitiveness internationally – the World Economic Forum and the Doing Business department of the World Bank.

In the end, a short comparison of the benefits and costs arising from the analyses conducted and the main conclusion, whether Romania is or not prepared to adopt the Euro and would it be a plus for its citizens.
II.1. Concepts Regarding the European Economic and Monetary Union

II.1.1. What is a monetary union?

After the 2nd World War, one of the most important tendencies worldwide was the growing desire of economic, social and political integration. The most important result is the appearance of the European Union. Economic integration has its roots in a spontaneous phenomenon: as trade exchanges increase between national entities, so do capital flows. When countries additionally suppress artificial trade barriers, appears a free trade area among them. Moreover, if barriers are removed not only for goods, but also for services, capital and citizens, we can talk about a common market.

As stated in the Maastricht Treaty (1992), the Monetary Union is an ambition of the European Union. Its main feature is the replacement of national currencies with a common one – which today is called EURO. The characteristics of the Economic and Monetary Union are:

- A common currency;
- A common monetary policy;
- The free movement of capital flows;
- An institutional system to coordinate and administrate the monetary policy;
- A tight coordination of economic policies among the member states.
II.1.2. A historical review

Due to the USA’s foreign policy, the Breton Woods system started to fail in the 1960s, putting much pressure on the general monetary stability\(^8\) (Ciobanu et al., 2004). As a consequence, in October 1970, Pierre Werner presented a report on a three-stage plan for the accomplishment of an Economic and Monetary Union in 10 years. His ideas are at the basis of the Maastricht Treaty. The European Economic and Monetary Union is the product of a very complex process that started more than half a century ago (Bîrsan, 1995, Lutaş, 2005).

1. In 1950 was created a monetary arrangement called the European Payments Union. This is considered the first episode of the European monetary integration. Beside the European states, it also comprised the African colonies of France and the United Kingdom.

2. The free movement of goods and services was insured through the creation of the European Economic Community and the Common Market for the free movement of production factors.

3. In 1979, Roy Jenkins, the president of the European Commission, went on, creating the European Monetary System (EMS). This was built on the concept of fixed exchange rates, with a fluctuation band of 2.25%. Except for the British pound, all the other national coins were incorporated in the mechanism. The system thus created insured a certain stability for the exchange rates. In the end, the EMS created a common currency, the ECU (the European Currency Unit)\(^9\) – which was in fact a monetary basket. It was for the first time when the dollar was having a competitor\(^10\). This was the first 100% European system, without having an extra-European reference currency. But starting from the 1980s, countries that participated in the EMS started to have divergent economic developments, putting pressure on the system. The European Monetary System generated the so called “impossible trinity”\(^11\) (the impossibility to have, in the same time, an independent monetary union, a free movement of capital flows and fixed exchange rates).

\(^8\) Especially in Europe, where Germany and France were facing important monetary problems.
\(^9\) ECU was computed using the average weight of each national currency in the EMS.
\(^10\) In fact, the main reason for creating a common European currency is to counterbalance the power of the dollar on international markets.
\(^11\) Paul de Grauwe speaks not about a trinity, but about a quartet adding to the three above mentioned the free movement of goods and services.
4. In 1988, due to efforts of Jaques Delors, was created the Committee for the Study of the Economic and Monetary Union. Delors, which was then president of the European Commission, became the first president of this committee. The Delors Report proposed a three-stage transition plan to the EMU, with the first one opened in Madrid in 1989 – the liberalization of capital flows.

5. The Maastricht Treaty, signed in 1992, is the headstone of the Economic and Monetary Union. It established the creation of the European Central Bank\(^\text{12}\) and the criteria that member states have to fulfil in order to enter the EMU. The Germans had a great influence upon the process. They gave up the Deutsche Mark with the condition that the ECB to be created using the Bundesbank model. This meant no political influence for the ECB. But the Maastricht Treaty was followed by an intense crisis in the member states. In the same time was created the European System of Central Banks, made up of the ECB and the national banks.

6. The ECU changed its name into EURO and started to exist on the 1\(^\text{st}\) of January 1999\(^\text{13}\). The ECB announced the official exchange rates for the eleven currencies\(^\text{14}\) (Council Regulation (EC) No. 2866/98) that were first replaced by the EURO. The launching parity with the dollar was \(1 \text{ EUR} = 1.170 \text{ USS}\) (European Central Bank, 1999). A new reference interest rate was established – EUROLIBOR\(^\text{15}\). The Euro coexisted with the national currencies until the 1\(^\text{st}\) of January 2002, when it definitely replaced the latters.

7. Since then, new countries have adopted the common currency. Out of the present 27 members, 16 are in the Euro Area, UK and Denmark benefitted from the “opt-out clause”, while most of the newer European Union members are in the second stage of complying with the convergence criteria. From the late comers, 4 countries have the common currency: Slovenia (2007), Cyprus (2008), Malta (2008) and Slovakia (2009).

\(^{12}\) In fact, it was a sort of transformation of the European Monetary Institute into the European Central Bank.

\(^{13}\) First as an account currency.

\(^{14}\) The 11 countries that first adopted euro were: Germany, Belgium, Luxembourg, Spain, Portugal, Ireland, Italy, Netherlands, Austria and Finland.

\(^{15}\) Euro London Interbank Offered Rate – 3.25% for a week and 3.20250% for a year.
II.1.3. From the theory of Optimum Currency Areas to the European Economic and Monetary Union

In 1961, Mundell introduced the theory of Optimum Currency Areas. These are groups of countries or regions united by fixed exchange rates. It is based on the concept of economic integration between the members, i.e. the intensity of goods and services exchanges and the ease with which production factors\textsuperscript{16} move among the members. There are basically six main characteristics of an OCA (Mundell, 1961).

1. **Labour force mobility** – although it has increased in time, it is still low when compared to other optimum currency areas, such as the USA. The problem in the European Union is given by a low mobility not only among countries\textsuperscript{17}, but also within them. As will be shown later in the paper, Romania has a higher external flexibility of the labour force than other members.

2. **Similarity of economic structures** – is one of the key elements of the structural convergence. Mundell’s model does not say anything about the factors that lead to symmetric or asymmetric shocks. A similar economic structure minimizes the risk of asymmetric shocks, which cannot be annihilated by the common monetary policy. But the European Union is quite different. The Northern countries are richer in capital and high qualified labour force, while the Southern ones produce more with a low value added. After the introduction of the Euro, there is an increased tendency to diverge between the member states, instead to converge, showing a deeper regional specialization based on comparative advantages.

3. **The diversification of goods** – European countries produce a large variety of goods. In this way, asymmetric shocks are less likely to appear.

4. **Regional concentration of industries** – with fixed exchange rates, transaction costs and the risks related to foreign trade are much lower. As a consequence, producers do not have to expand geographically and can concentrate in specific areas, giving rise to the agglomeration effect, just like

\textsuperscript{16} Labour force and capital.

\textsuperscript{17} Due mostly to cultural and linguistic barriers, rather than to administrative ones.
in case of the USA. For the European Union this is not wishful, as it may lead to higher negative effects in case of shocks.

5. **Economic openness** – the higher the level, the lower the efficiency of the floating exchange rate as an adjustment mechanism in case of asymmetric shocks. For the European countries this is not a problem, as the share of trade among them in the total foreign trade relationships is very high.

6. **Fiscal federalism** – regards the possibility to transfer funds from the richer members to the poorer ones. But here is a trap – the poorer countries, knowing that they will anyway receive money from the richer ones, might diminish their efforts towards economic development. The fiscal policy remains a national issue, each state establishing independently its taxes. European fiscal competition may encourage spatial concentration of activities and incomes within the union.

Based on the above mentioned features of an OCA, there are three groups of economic convergence criteria for a candidate country to the EMU. After becoming a member of the European Union, each country has the status of a member states with derogation, in conformity with article 122 of the Treaty regarding the European Union. The derogation period lasts until the country fulfils the convergence criteria and is ready to adopt the common currency. The three groups speak about nominal, real and structural convergence. They were imposed to avoid destabilizing the EMU by the premature admission of a country not yet compatible with a common currency regime.

Among the three groups, only the nominal one is really monitored by the European Union. The real and structural criteria do not have limits imposed by the Commission, but they are the foreground for the firsts. They analyze the convergence of GDP, prices, incomes, productivity, business cycles’ synchronization, similarity of economic structures, foreign trade integration and so on. They also relate to the flexibility of the fiscal and labour force markets as adjustment mechanisms against shocks after adopting the Euro.

The main problem is that sometimes they contradict the nominal criteria in their evolutions.
The nominal convergence criteria are the ones monitored (the Maastricht Treaty, 1992). These will be taken into account when deciding whether a country can or cannot yet enter the EMU. There are five nominal criteria, for the main domains of a national economy, formulated as macroeconomic indices:

- the fiscal policy,
- the monetary policy,
- the exchange rate policy.

The five nominal criteria are:

1. **The inflation rate criterion** – is the main criterion as the levels of all others are established based on the levels of the best three performing countries in terms of inflation. It states that a country’s inflation rate cannot exceed by more than 1.5% the average inflation rate of the best three EU\(^{18}\) performers in terms of price stability.

2. **The interest rate criterion** is linked to the state issued bonds (for 10 years). The nominal long-term interest rate should not exceed the average of the best three EU performing countries in terms of inflation by more than 2 percentage points.

3. A candidate country to the EMU must demonstrate that the ratio of the general government deficit to GDP is not greater than 3%.

4. Moreover, the maximum share admitted for the general government debt is 60% of the GDP.

5. The last of the nominal criteria is the **stability of the exchange rate**. After fulfilling the rest of the nominal criteria, a candidate to the Euro adoption must enter the Exchange Rate Mechanism for at least two years (that is why it is also called ERM II). During this period, the national currency is not allowed to fluctuate by more than the established band from its central parity against the Euro. The maximum limit is +/-15%, but each country is free to chose a narrower fluctuation band if this appears as proper during negotiations. During the two years, no devaluation of the central parity is permitted.

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\(^{18}\) The three members do not necessarily have to be in the Euro Area.
Apart from the economic criteria, there are other legal criteria which are due to harmonize the national provisions with the European ones, especially at monetary level.

II.1.4. Costs and benefits of the Euro adoption

In theory, there are both costs and benefits of adopting a common currency. Their magnitude and the final result – profit or loss – depend very much on the level of economic development of each country. The higher the convergence with the Euro Area, the lower the costs of entering into it. In the following are presented in brief the benefits and costs of participating to a monetary union.

1. Benefits of the Monetary Union

   € Replacing national coins with the Euro eliminates the exchange rate risk and lowers transaction costs;

   € Entering the Euro Area increases national credibility on international markets;

   € The introduction of the Euro as a powerful and relatively stable currency relaunched Europe on international markets – the Euro was created to counterbalance the dollar’s position worldwide;

   € The reduction of financial markets’ volatility and increase in stability, by orienting them towards macroeconomic behaviour based on the low limit of budgetary deficit;

   € As the exchange rate is an adjustment mechanism, replacing national currencies with the Euro lowers the important differences between the image reflected by the exchange rates and the real fundamental economic parameters;

   € Eliminating inefficiency of the uncoordinated national monetary policies;

   € Expansion of financial markets – companies can expand their financing tools and gain access to international financial markets;

   € The optimal functioning of the Common Market – with the replacement of national currencies by the common one, internal exchanges within the EU are not anymore affected by exchange rate instabilities;
Decreasing interest rates and inflation rates, as entering in the Euro Zone the Central and Eastern European countries reduce the costs determinate by the exchange rate volatility;

On short term, the speculative interest rates for some currency will raise, this fact having major implications on economic and exchange rate policies, current account liberalization and structural reforms. On long term, the economy will benefit from the Euro introduction because the smaller interest rates can facilitate the financing of economic reorganization;

Development of trade, growth of investments and competition. The renunciation to national currency reduces the costs of transaction while resources reallocation can lead to a GDP growth estimated to 0.18-0.3%. The adoption of the Euro determines a GDP increase with 0.55-0.76% through the trade development.

The economic and monetary union intensifies the competitive pressures associated with market integration and leads to growth of investments through the creation a favourable climate. On the other hand, eliminating the exchange rate uncertainty and the costs of transactions lead to microeconomic gains, those countries with trade relations with the Euro Zone having more benefits as part of the Monetary Union;

A common currency means larger price transparency, increased competition in individual markets and as a consequence the reduction of differences in prices of the same product between countries and exclusion of competitive devaluations. All this contributes to the strengthening of the internal market. Other benefits are the disappearance of the foreign exchange transaction costs and the trade and the capital

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19 This is only in theory, as practice has demonstrated the opposite.  
20 For example, if the savings amount up to 0.3-0.4% of the GDP, Exchange rate uncertainty concerning payment obligations disappears.
movements that are often curved by the exchange rate uncertainty, are in this way stimulated;\textsuperscript{21}

There are also several advantages at microeconomic level. Companies:

\begin{itemize}
\item € gain access to financing services in a powerful currency – Euro;
\item € profit from ease of exchanges and investments;
\item € may simplify their internal accountancy systems;
\item € have to gain from increase competitiveness and initiatives;
\item € can involve in long-term projects;
\item € benefit from lower logistic problems and an increased mobility of the labour force.
\end{itemize}

2. \textit{Costs of the Monetary Union}

Costs of the Euro adoption are more difficult to measure. They imply not only economic developments, but also legislative.

Firstly, costs appear from the second stage of monetary integration, in the period of fulfilling the convergence criteria (the participation to ERM II, the independence of the central bank, the interdiction of budget deficit financing by the central bank, the liberalization of capital flows, the creation of sound financial sector, the harmonization of payment system for integration in the TARGET system).

Secondly, once with the entrance in the Euro Area, countries lose their independent monetary policies. In this way disappears one of the most used adjustment mechanisms at national level. To understand the costs one must bear in mind that it is hard and difficult to have the same monetary policy for different countries that have different needs, different unemployment rates\textsuperscript{22}, where production and unemployment develop different in the case of country specific asymmetric shocks\textsuperscript{23}. Evidence has already shown that the common monetary policy may have the opposite effect than the expected one\textsuperscript{24}. Different studies have shown that the effectiveness of the monetary policy is limited, devaluation of the national currency having only short-term results in assessing asymmetric shocks. The costs of the

\textsuperscript{21} When talking about monetary integration, one must discuss whether the EU member states can constitute an Optimum Currency Area, where the economic benefits generally exceed the costs. Usually this dilemma is given by opposing the microeconomic efficiency vs. macroeconomic stability.

\textsuperscript{22} Unemployment needs lesser monetary policies and the unemployment rate is asymmetric among countries → different monetary policy

\textsuperscript{23} Stability is a Janus head consisting of both nominal stability e.g. low and stable price inflation and real stability e.g. high and stable employment.

\textsuperscript{24} It happened with Germany and Spain after the euro introduction.
whole monetary integration depend on the flexibility of the remaining tools for macroeconomic equilibrium – the fiscal policy and the labour market.

The loss of seignorage is the main disadvantage. Due to policy transfer at the Union’s level, sound and stable countries have to accept decisions made by weaker countries.

Evidence has shown that during the ERMII period, the number of speculative attacks increases, so countries have to make higher efforts to sustain the national currency in the fluctuation band.

Instead of economic structure convergence, the Euro adoption was followed by a regional specialization of industries, based on comparative advantages. This increases the probability of asymmetric shocks.

At macroeconomic level, there appear:

- high conversion costs,
- power centralization,
- a political life out of reality,
- the absence of proper organisms for supervision and control of the monetary and fiscal policies,
- pressures related to the low inflation rates planned by the ECB,
- the lack of instruments at EU level to deal with shocks during crises.

For the small and medium size enterprises, there are important costs given by the necessary logistic transformations from the national currency to the Euro.

There are few estimations of the costs generated by the transition to Euro. According the Bundesbank, these amounted 0.5% of the GDP, covering the total expenses, made both by the public and private sector. The European Central Bank estimated the same costs in absolute values, ranging from 20 to 50 billion.

The impact upon prices is still very hard to quantify. Different national banks have presented different results. Overall, depending on the way in which prices were rounded up, the growth of the monthly Consumer Price Index ranged from 0.1% in France to 1.65% in Spain. Germany did not made public any figures, but declared that prices have gone up, especially for services. There were important differences between the level of inflation measured by Eurostat and the level of perceived inflation measured through the Eurostat
barometer. This is due to the phenomenon called “inflationary illusion”, i.e. prices went higher for products which are in the everyday use so there was a more subjective attitude in their case. In addition, Eurostat measures inflation using the basket of a family with a medium income level, while the most important price increases were for the families with lower incomes.

II.1.5. Stages and conditions for Romania to join the European Economic and Monetary Union

As the accomplishment of the European Economic and Monetary Union has been done in three stages, the EU strategy for the Euro adoption at national level is also composed of three stages. Due to this, a new member country can only adopt the common currency after a three-year period.

The first stage of the Romanian monetary integration has already been accomplished. After a long process of negotiations, Romania joined the European Union at the 1st of January 2007. The first result was the vanishing of geographical and national borders with the EU members and the free movement of capital flows.

Negotiations for Romania’s membership started in 2000. For Chapter 11 “Economic and Monetary Union” they were opened and closed at the Intergovernmental Conference for Romania’s Entrance in the EU – 28th of June 2002. The European Commission received from Romania the Position Document and the Complementary Position Document to chapter 11 and the Supplementary Information Document. These documents represented Romania’s acceptance of the acquis communautaire in the EMU field and its commitment to a full harmonization with the European legislation.

Romania is now in the second stage, when an important amount of efforts is needed for realizing the convergence process. As a new member state, Romania does not have the “opt-out” possibility. Thus, after complying with the convergence criteria, Romania is expected to participate in the Exchange Rate Mechanism II for at least two years. This is an intermediary stage of the monetary integration, which is also known under the name of the exchange rate criterion. During the two years, the Romanian Leu will be pegged to the

25 From an administrative point of view.
26 Among these, the most important regarded insuring the independence of the National Bank of Romania.
27 Like the United Kingdom and Denmark had.
28 Is one of the five nominal convergence criteria and the problems related to it will be discussed in Chapter III.
Euro at a chosen exchange rate and authorities will have to maintain exchange rate fluctuations within a band of maximum +/- 15%. The managed floating exchange rate regime applied now by Romania will be replaced by the fixed one. The establishment of the central parity and of the width of the fluctuation band is a matter of negotiations between Romanian and European political bodies. As no devaluation of the national currency is permitted during the ERMII it is better to choose the maximum length of 15%\(^{29}\). Romania will have to sign an agreement with the European Central Bank on this issue. The entrance in the ERMII is expected to happen in 2012.

The **third stage** is planned to start in 2014 – 2015. The Euro adoption on the Romanian market implies giving up its independent monetary policy and the exchange rate as macroeconomic adjustment mechanisms. Romania will have to respect the Growth and Stability Pact and elaborate stability programmes.

In brief, here is the schedule of the three stages:

- 1\(^{st}\) of January 2007 – the entrance in the European Union;
- 2012 – fulfilment of the convergence criteria and participation in the Exchange Rate Mechanism II for two years at least;
- 2014 – 2015 – adoption of the common currency and entrance in the Economic and Monetary Union.

\(^{29}\) Although lately has been advanced the idea of an extremely narrow fluctuation band of only +/- 2.5%.
II.2. Methodology

II.2.1. Descriptive analysis

Descriptive analysis of data is the first step in every study\(^{30}\). That is why it was used in all the chapters of this research. It provides a snapshot of the situation, being a logical starting point for more complex developments. Its main goal is to gather information, knowledge, about how things have been, how they are and how they developed. It may also comprise explanations for the development of the analyzed variables.

Data belonging to empiria\(^{31}\) contain both qualitative and quantitative features, that are studied, synthetized, resumed and structured using descriptive methods. The first step in any analysis is the qualitative one. The purpose of the qualitative research was to discover patterns and significance of relationships, without using econometric models. To generate different hypothesis were used qualitative methods, while for testing them the quantitative ones. Data were gathered using the main databases provided by the most famous international organizations (IMF, ILO, EU – Eurostat and AMECO Database, OECD, etc.) and the Romanian sources (The National Institute of Statistics, NBR, the Romanian Government with all its Ministries, etc.)\(^{32}\).

For the present research were employed simple methods of primary processing: frequency tables, graphs and different parameters (mean, median, variance, standard deviation, growth rates, and so on). Results where then compared and conclusions drawn. The analysis was done both for cross-section data and for time series. In this way was easier to see national specificity in national or sectorial evolutions of different parameters.

For descriptive analyses, comparisons and syntheses were used the following softwares: EViews 5.1, Microsoft Office – Excel, SPSS 17.0, STATA 9.1. These were also used for other more complex analyses. A special attention was given to time series which were mostly analyzed with the help of the EViews 5.1 statistical software.

\(^{30}\) Of course, after a thorough documentation using different resources.

\(^{31}\) Empiria = the tangible world of people, objects and events; studies are called empirical or factual.

\(^{32}\) Due to this, validation and verification of data was not necessary anymore.
II.2.2. Preparing data for analysis – seasonal adjustments

Economic data observed with frequencies lower than a year – semi-annual, quarterly, monthly – usually exhibit seasonal variations. In order to study the level of convergence between them, seasonal adjustments are necessary. The process consists in removing the seasonal movements and extracting only the trend component of a series. There are several methods, out of which, based on the plot of the series was chosen the **Moving Average Method – multiplicative**.

For the series filtered by $y_t$, in the first step is computed the centered moving average of $y_t$,

$$z_t = \frac{0.5y_{t-2} + y_{t-1} + y_t + y_{t+1} + 0.5y_{t+2}}{4}$$

for quarterly data.

The second step consists in computing the ratio $k_t = y_t / z_t$. Seasonal indices $i_q$ are computed as the average of the $k_t$ ratios in a specific quarter and then are adjusted as to multiply to 1. The adjustment is:

$$s = \frac{i_q}{\sqrt{i_1i_2i_3i_4}}$$

The $s$ are reported scaling factors, variable $y$ is $s_i$ higher in period $i$ relative to the adjusted values. Thus, the seasonally adjusted series is obtained by dividing $y_t$ by the seasonal factor $s_t$.

After the seasonally adjustment process, data is ready for the analysis.

Seasonal adjustment was used in all the cases when time series with frequencies lower than a year were analyzed, i.e. parts: III.1, IV.1.1, IV.4.3, chapter VI and related Appendixes.

II.2.3. Convergence analysis for time series – the cointegration approach

In the field’s literature, convergence of different parameters in time is studied using the cointegration theory, which has its roots in the late 1980s. The concept of cointegration indicates that while different variables have stochastic trends and short-run random divergences associated therewith, they develop in a coherent way in the long run.

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33 Time series data were introduced in the E-views 5.1 statistical programme.
The problem with time series is that they are usually non-stationary. This can affect the results of a modeling process, by returning spurious relationships among them. The phenomenon is also known under the term of “false regression”.

Several time variables are cointegrated if they are individually non-stationary, but there is at least one combination of them that is stationary. Thus, these variables cannot drift apart, having achieved a certain level of convergence.

For the analyses in this research were used two basic concepts – the Engle-Granger methodology (1987) and the Johansen test (1991).

The first step was to study the integration order of the variables and to see whether they are the same or not. Both of the above mentioned methods require that variables are integrated of the same order. The order of integration is analyzed using the unit root tests.

The most used unit root test is the Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979, Said & Dickey, 1984). It was used for identifying non-stationary inflation rates and, together with other unit root tests, for all time series analyses. A series is first order integrated I(1) if its first difference is stationary. The ADF test assumes an autoregressive model of order \( p \) with white noise residuals.

\[
\phi(L)Y_t = \varepsilon_t \quad \text{where} \quad \phi(L) = 1 - L \\
(1 - L)Y_t = \varepsilon_t \\
1 - x = 0 \quad \Rightarrow \quad x = 1
\]

Many economic time variables have a random walk behaviour, \( Y_t \) is not stationary, but \( \Delta Y_t = \varepsilon_t \) becomes stationary. If is necessary to differentiate the variable \( d \) times before it becomes stationary, \( Z_t = \Delta^d Y_t = (1-L)^d Y_t \), the autoregressive polynom has \( 1 \) as a multiple root of order \( d \). This is called that the series is integrated of order \( d \), I(d). The ADF tests the stochastic non-stationarity of the variables, with the null hypothesis of a unit root. The number of lags was automatically chosen using the Schwarz information criterion (Schwarz, 1978) and the Akaike one (Akaike, 1974), to avoid systematic errors.

For groups of variables, was used the summary option when studying integration order. Six unit roots were applied, three for common unit root and three for individual unit roots. Recent literature states that multiple-series unit root tests are more powerful than the ones made for individual time series. The maximum lag length has also been automatically computed based on the Schwarz criterion.
The six tests are:

- The Levin, Lin & Chu (Levin et al., 2002) and the Breitung t tests (Breitung, 2000) that assume common unit root processes and test the null of unit root,
- The Im, Pesaran & Shin W-stat (1997), ADF and Phillips-Peron (PP) Fisher Chi-square tests (1988) that assume individual unit root processes and have also the null hypothesis of unit root,
- The Hadri Z-stat (2000) that also assumes common unit root processes as the first group, but tests the null of no unit root.

For all of them, probabilities are asymptotically computed and the null is accepted for Prob > 0.05.

The tests were applied in the level of the variables and in the first difference, resulting that variables are I(1), i.e. integrated of first order.

The second step consists in running the cointegration tests for the unit roots. Here are two options. If only two variables are analyzed, the suitable one is the Engle-Granger methodology. For more than two variables must be used the Johansen test.

For two series to be interdependent on long-term, they have to be cointegrated. According to Engle and Granger (1987) if two series \( Y_{1t} \) and \( Y_{2t} \) are both I(d), a linear combination of the two will also be I(d), in general. But there is a vector \( (1, -\beta)' \), like for example the linear combination \( Z = Y_{1t} - \alpha - \beta Y_{2t} \), which is I(d-b), \( d > 0 \) and \( b > 0 \). Thus, \( Y_{1t} \) and \( Y_{2t} \) are cointegrated of order \( d-b \), i.e. CI(d-b), with the cointegration vector \( (1, -\beta)' \). The Engle – Granger methodology is more efficient when one of the variables is weak exogenous, i.e. it is driven by forces not related to the other one.

If two series are I(1), as in this research, and \( \varepsilon_t \in I(0) \), they are cointegrated of order CI(1,1). In this case, to estimate the long term relationship between variables is enough to use the regression model \( Y_t = \alpha + \beta X_t + \varepsilon_t \), and find its estimators using the Least Squares Method. The test amounts to testing for a unit root in the residuals of the regression, \( \tilde{\varepsilon}_t = Y_t - \hat{\alpha} - \hat{\beta} X_t \). If the null is rejected and residuals are stationary, the two variables are cointegrated. The cointegration relation is exactly the regression model and the long term equilibrium relation is \( Y_t = \tilde{\alpha} + \tilde{\beta} X_t \).
When more than two non-stationary variables are examined, the **Johansen test** (1988) is used. In a group of variables all of them are simultaneously analyzed, the goal being to explain the behaviour of one variable based on its past and based on the other variables in the group. The Johansen methodology is based on the maximum likelihood estimation. It tests the number of cointegration relationships in the vector autoregressive representation (VAR) simultaneously with testing the existence of cointegration. In the vector $\mathbf{Y}_t = (Y_{1t}, Y_{2t}, ..., Y_{kt})'$, if all the variables are stationary I(0), we can apply the VAR method. If at least one of them in non-stationary I(1), either there is a false regression system (there is no equilibrium relation), or there is equilibrium and the relationships are modelled through a vector error correction model (VECM).

The above mentioned vector:

$$Y_t = B + A_1Y_{t-1} + A_2Y_{t-2} + \ldots + A_pY_{t-p} + \epsilon_t$$

is transformed in an ECM:

$$\Delta \mathbf{y}_t = \Gamma_1\Delta \mathbf{y}_{t-1} + \ldots + \Gamma_1\Delta \mathbf{y}_{t-p+1} + \Pi \mathbf{y}_{t-p} + \epsilon_t,$$

where $\Gamma_i=-(I-A_1-\ldots-A_i)$, $i \in \{1, p-1\}$, $\Pi=-(I-A_1-\ldots-A_p)$, $\Pi = \alpha \beta'$, $\alpha$ = the adjustment speed and $\beta$= the long-term coefficients matrix. The rank of $\Pi$ shows the number of cointegration relations.

Depending on its value, there are three possibilities:

- If rank = $n$ – all variables are stationary I(0),
- If rank = 0 – there is no cointegration relation,
- If rank < $n$ – there are maximum $n-1$ cointegration relations.

The VECM is a VAR whereas the penultimate member "corrects" short-run fluctuations and describes the long-term relationship (the cointegration). There are two statistic tests used to identify the rank of $\Pi$ – the maximum eigenvalue and the trace test.

For selecting the number of lags in the VECM or VAR there are several criteria that can be used - AIC (Akaike Information Criterion), SIC (Schwarz Information Criterion), or HQ (Hannan-Quinn Information Criterion). The right lag value is the one that minimizes these functions in the vector representation.

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34 Which made up multivariate models.
After the VAR or VECM model is estimated, the next step is to see the appropriateness of the estimated model (Eviews 5 Users Guide, 2004). The following diagnostic tests were applied in this research:

- The AR roots table and graph: the model estimated is stable/stationary if all roots of the AR polynomial have modulus less than 1 and on the graphic representation they are situated inside the unit circle; in the case of the VECM with \( n \) cointegration relations and \( k \) endogenous variables, \( k-n \) roots should be equal to.

- The correlogram and Q-statistics correlograms display sample autocorrelations; the null hypothesis is of no autocorrelation up to order \( h \); if Prob>0.05, the null is accepted and residual values are not autocorrelated.

- The Portmanteau Autocorrelation test and the Autocorrelation LM test report the same thing as above – whether or not there is serial autocorrelation in the residual values of the model.

In the same time, stationarity of the residuals derived from the model is very important. As Greene (2008) shows, because the residuals are from a VAR or VEC model and not from a usual equation (they relate to cointegration relationships) they are special. Consequently, when testing for unit roots and stationarity in the residuals, the value obtained using the ADF procedure is not compared to the standard ADF values, but with the Engle-Granger critical values for cointegration tests presented by Mackinnon in 1991. The Engle-Granger critical values take into account not only the number of observations and the significance level, but also the number of variables in the model. The rest of the procedure is the same as in the ADF case.

The VECM and VAR can be used for forecasting. Besides the usual forecasting procedures there are two special ones that show the evolution of the endogenous variables in time in respect to the others. The two procedures are the impulse response and the variance decomposition.

The impulse response function shows the evolution of one variable following a shock into another variable of the model. It relies on the assumption that a shock to a variable of the model not only affects the future evolution of the same variable, but also the future evolutions of all the other endogenous variables of the model. This is due to the dynamic characteristic of the VAR or VECM in time. The impulse response function shows the intensity with which a current innovation is transmitted in the model. As variables and,
consequently, impulses and reactions are correlated, a transformation is applied for them to become uncorrelated: \( v_t = P\epsilon_t \sim (0, D) \), where D is the diagonal covariance matrix.

There are several methods used for transforming impulses, out of which, for the present research were chosen the Cholesky one and the user specified one. Through the first method, impulses are orthogonalized and variables are ordered in the VAR model. The effect of a common component is attributed to the first variable in the model. Thus, changing the ordering of the variables could result in dramatically different responses. The analysis is upon an impulse of one standard deviation and the evolution of all the endogenous variables in the model due to this innovation. Through the user defined methodology, the user constructs a matrix with the desired innovations in the specific variables. Each column in the matrix is an impulse vector.

The variance decomposition goes even further than the impulse response. It separates the variation in a variable into the component shocks to the VAR. It thus provides information regarding the relative importance of the innovations. More clearly, the variance decomposition shows how much of the variation in an endogenous variable is given by a shock into another variable of the model (the explained part) and how much of it depends on other variables or other shocks (the residual value).

This type of methodology was used in parts: III.1, IV.1.1, IV.4.3, chapter VI and related Appendixes.

**II.2.4. Granger causality**

The Granger causality analysis (Granger, 1969) tests whether past values of a variable help explaining current values of another variable. For every analysis, it is very important to test the nature of the relationships between variables. Granger causality is based on the concept of predictability, in the sense that in a stochastic process, the cause cannot appear without the imminence of the effect. When dealing with two processes X and Y, Y causes X if the relevant past information for Y allows a better prediction of X than without using this information. In other words, Y causes X if, quantifying how much of the current level in X is explained by its past values and then adding variables of the \( y_{t-i} \) type, the explained variance (the R-squared) increases.

Granger causality is tested in both directions. First, it is tested whether Y causes X and then if X is a cause for Y.
The null hypothesis of the test is that Y is not a Granger cause for X. To accept the null, the coefficients of $Y_{t-j}$ from the regression must be equal to 0.

$$X_t = \mu + \sum_{i=1}^{\delta} \phi_i X_{t-i} + \sum_{j=0}^{\delta} \delta_j Y_{t-j} + \varepsilon_t$$

$\delta_j = 0$, for $j \in [0; k]$, with $k$ fixed so that the residuals resulted from the equation are white noises.

In the other sense, to accept the null, the coefficients of the X terms have to be 0 in the regression model:

$$Y_t = \mu + \sum_{i=1}^{\alpha} \beta_i Y_{t-i} + \sum_{j=0}^{\alpha} \alpha_j X_{t-j} + \varepsilon_t$$

$\alpha_j = 0$, for $j \in [0; k]$, with $k$ fixed so that the residuals resulted from the equation are white noises.

In both cases, accepting or rejecting the null hypothesis is based on a Fisher – Snedecor test. If the F statistic is higher than the critical one, the null is rejected.

Depending on the results, there are the following possibilities:

- the variables are independent,
- there is a one-way causality,
- there is a two-ways causality.

Used in: III.1, IV.1.1, IV.4.3, and Appendix 1.

### II.2.5. Exchange rate volatility

There are more ways to measure the stability of a national currency. For the present research was selected the method used by the European Monetary Institute (EMI) and the European Central Bank (ECB) in their Convergence Reports. The indicator is the Exchange Rate Volatility (ERV). The ERV is computed as standard deviation of the annual rate of change of the exchange rate. The main idea of the indicator is that exchange rates will have similar evolution in the near future. Using the daily nominal exchange rates, the ERV is a measure of future changes based on current exchange rate developments.

If the daily nominal exchange rate is $Y_t$, let $Z_t$ denote the daily rate of change of the exchange rate: $Z_t = \ln(Y_t) - \ln(Y_{t-1})$. 
The methodology is based on two assumptions: the number of working days in a year is 256 and the daily rates of change in all the days starting from day $t$ are independent and indentically distributed:

$$Z_t \sim \text{iid, } t = 1, 256$$

The ex-ante annual rate of change in period $t$ ($R_t$) may be computed as:

$$R_t = \sum_{t=1}^{t+256} Z_t$$

resulting that: $ERV_t = \sqrt{\text{VAR}(R_t)} = \sqrt{\text{VAR}(256Z_t)}$.

But the daily rates of change $Z_t$ are independent and identically distributed. This leads to:

$$ERV_t = \sqrt{\text{VAR}(256Z_t)} = \sqrt{256\text{VAR}(Z_t)} = 16S(Z_t)$$

$S(Z_t)$ is the standard deviation estimated on the basis of the $Z_t$ for the 20 days preceding day $t$: $S(Z_t) = \text{STDEV}(Z_{t-19} : Z_t)$.

For analysis purpose, in the Convergence Reports, the ECB shows quarterly values of the ERV. These represent the arithmetic average of only three ERV values – the ones for the last day of each month within the quarter.

This type of methodology was employed in part III.3.

**II.2.6. The structural asymmetry indicator**

It is used to compare the level of similarity between national economic structures. Using the shares of different sectors in the whole economy ($r_{ij}$), based on a certain variable, the indicator is computed as a deviation from the Euro Area average. In Statistics, there are two ways of computing deviation: average linear deviation and the standard deviation.

In this research was chosen the standard deviation approach. Because differences between a specific country and the Euro Area are raised to power 2, the standard deviation is more sensitive to changes in absolute values.

$$\sigma_r = \sqrt{\sum_{ij}(r_{ij} - r_{EA})^2}$$

where $i$ represents the country and $j$ a certain sector of a national economy.

Structural asymmetry was analyzed in chapter IV, part IV.3.2.
II.2.7. Cyclical fluctuations – the Hodrick – Prescott filter and correlation issues

Time series have four components:

- the trend – carries the information on long-run growth tendencies;
- the cyclical movements around the trend – with time horizons different from a year\textsuperscript{35};
- the seasonal fluctuations of the variable, which are in direct relationship with the seasonal evolution of the year;
- the residual component – the random deviations from all other three components, which are due to other factors that randomly influence the studied variable and can be induced by any kind of shock to the series.

Taking into account the theory of spectral analysis, the cyclical component is seen as the movements in the series associated with periodicities within a certain range of business cycle fluctuations (Berument et al., 2005). The best known definition of business cycle fluctuations is given for the US economy by Stock and Watson (1999). Studying data from 1858, they discovered that almost all of the cycles lasted for no more than 32 quarters (90% of the cases), with the shortest of 6 quarters and the longest of 39 quarters.

For a linear filter to be applied, it would be necessary an infinite number of past and future data for the examined variables. This is the case of an ideal linear filter, that would be 1 for business cycle frequencies and 0 elsewhere. The ideal linear filter eliminates all other fluctuations except the cyclical ones.

For the type of data under analysis, two finite-order filters could be used: the Baxter-King filter (1995) and the Hodrick – Prescott one (1997). The latter was preferred for this research, as the former leads to a loss in values at both ends of the series. The HP filter attenuates less of the cyclical component and it does not amplify the high frequency noise.

Hodrick and Prescott (1997) viewed time series as a sum of cyclical and growth components\textsuperscript{36}. This conceptual framework can be written as:

\[ y_t = g_t + c_t, \quad \text{for } t = 1, 2, \ldots, T, \]

where the growth component is determined from solving the problem:

\textsuperscript{35} In general, cycles have periods longer than a year, but there are also cycles with periods shorter than a year, with non-seasonal behaviour.

\textsuperscript{36} To insure the validity of the results, prior to the analysis, data were seasonally adjusted – the seasonal component has been removed based on the methodology presented in part II.2.2. Preparing data for analysis – seasonal adjustments.
The cyclical components are deviations from the long run path and smoothness of the growth component is measured by the sum of squares of its second difference. The parameter $\lambda$ is a positive number which penalizes variability in the growth component: the larger its value, the smoother is the solution series $g_t$. As $\lambda$ approaches infinity, all the first differences tend to a constant $\beta$ and thus $g_t$ arbitrarily near $g_0 + \beta t$. The solution is given by the least square fit of a linear model. In the end, the most suitable value of $\lambda$ for quarterly data is given – 1600.

After obtaining the business cycle components of the variables, their co-movements were assessed using the cross-correlations. For two time series $x_t$ and $y_t$, the correlation between $x_t$ and $y_{t+k}$ is the cross-correlation for the $k$ lag between the series. The correlograms and cross-correlograms of the variables were computed.

The cross-correlations between two time series $x_t$ and $y_t$ are given by

$$r_{xy}(l) = \frac{c_{xy}(l)}{\sqrt{c_{xx}(0) \times c_{yy}(0)}}$$

where "$l$" gives the rank of the lag/lead and

$$c_{xy}(l) = \begin{cases} \sum_{t=1}^{T-l} [(x_t - \bar{x})(y_{t+l} - \bar{y})]/T \\ \sum_{t=1}^{T+l} [(y_t - \bar{y})(x_{t-l} - \bar{x})]/T \end{cases}$$

Cross-correlations are not necessarily symmetric around lag 0.

The values of cross-correlations at different lags indicate the type of cyclical behaviour between two entities. A large positive cross-correlation coefficient at lag/lead 0 indicates a pro-cyclical co-movement between two entities. This means that they are in the same stage of cyclical evolution (when one is in recession, the other is too). In the same time, a large negative correlation coefficient at lag/lead 0 is an indicator of a counter-cyclical co-movement. In this case, when analyzing two countries, for example, when one is in an inflationary position, the other one is in recession. Moreover, if the maximum cross-correlation is at a lag/lead different from 0 it means that one entity is lagged or leaded by the other with a certain period.

$\Delta^2 g_t = [(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]$
Furthermore, Hodrick and Prescott (1997) divide the data series into two equal groups to test for the stability of the results, based on standard deviations. Additional, I have also included the Chow stability test to verify the results obtained using standard deviations.

The Chow break point test fits separate equations for each subsample and then compares the sums of squared residuals through the F-statistic. The drawback is that the method requires the number of observations in each case to be at least as the number of estimated parameters\(^{38}\).

Cyclical issues were dealt with in parts IV.3.1, VI.1, chapter VI and VII.2 of the research.

### II.2.8. Spatial convergence among the EU members using spatial econometrics

The integration theory points out two main ideas. First, there is the so-called geographical divergence, i.e. factors mobility is in favour of richer locations. The second idea is based on mitigating disparities among members and this is the geographical convergence. The convergence theory mentions three types of β convergence:

- **Absolute** – divided in a level convergence and a growth one and it assumes that different growth rates are only temporary. It holds only when countries have similar structural features.
- **Conditional** – each geographical entity\(^{39}\) converges towards its own steady state. Thus, there are persistent inequalities among countries or regions and different equilibriums. Structural heterogeneities are partially present and the initial conditions do not matter.
- **Club convergence** – derives both from endogenous growth with multiple equilibriums and from neo-classical models (Solow, 1956) with heterogeneous individuals. Structural heterogeneities are partially present and the initial conditions do matter.

For European convergence is of most importance to study not only time convergence, but also spatial convergence. The main objective of spatial econometrics is to incorporate

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\(^{38}\) Here was not the case, as many observations were involved in the analysis.

\(^{39}\) In this case European member states.
Spatial effects into empirical research. This helps at discovering spatial dependence and spatial heterogeneity encountered in a data set.

Spatial dependence (or interaction) refers to the fact that an observation associated with a location \((i)\) depends on observations at other locations \((j)\): \(y_i = f(y_j), i = 1, \ldots, n\) and \(j \neq i\). Location and distance are important forces in market activity. Spatial dependence is also called spatial autocorrelation – the coincidence of value similarity with location similarity. Spatial autocorrelation is positive if neighbours have approximately the same values for the variables analyzed and negative if one geographical entity has around it values different of its.

Spatial heterogeneity deals with variations in relationships over space (spatial structure). It is a structural instability in the form of non-constant error variances (heteroskedasticity) or model coefficients (variable coefficients, spatial regimes). It is a particular case of a non-spherical model. The variance of each element fluctuates with each observation. The linear relationship for spatial heterogeneity can be written as: \(y_i = X_i \beta_i + \varepsilon_i\), where \(-i = 1, \ldots, n\) (the indexes of observations collected),

- \(X_i\) is the \((1 \times k)\) vector of explanatory variables with an associated set of parameters \(\beta_i\),
- \(y_i\) is the dependent variable at location \(i\),
- \(\varepsilon_i\) is the stochastic disturbance in the linear model.

The first step in spatial analysis is to construct the maps and other graphs which point out spatial relationships between variables. Here where used too types of maps – quartile and percentile maps of the European Union. They help at forming different groups of countries based on certain parameters. Besides these, cartograms and histograms also help at forming different hypothesis related to spatial relationships. Of major importance is to see the outliers – countries that have the lowest or the highest values.

After seeing how countries are grouped depending on the variables taken into account, the second step is to construct a spatial weights matrix.\(^{40}\) Weights have to be exogenous to the model and that is why they are computed based on pure geographical distances. They have to be positive, finite and non-stochastic. The standardized weights matrix has the following form:

\(^{40}\) A squared matrix which has the number of lines and columns equal to the number of countries observed.
where $d_i$ is the distance between the centroids of countries $i$ and $j$. So, the matrix will be 0 for the diagonal elements and any positive value for the others, indicating the connection between countries $i$ and $j$. When normalizing the influence of neighbours upon a country is obtained the spatial lag, which is the weighted average of neighbouring observations\(^{41}\). The matrix can be built in several ways: using the contiguity weights – rook and queen, or the distance weights\(^ {42}\) (the threshold distance\(^ {43}\) or the k-nearest neighbour spatial weights). After comparing results obtained through all these methods, the most significant proved to be the rook contiguity one and the spatial weights matrix was constructed using it. Rook contiguity uses common boundaries to define neighbours.

For detecting potential presence of spatial autocorrelation were used the ESDA techniques that detect global and local spatial autocorrelation.

The **global** type was tested using the Moran’s I statistic (Moran, 1950). It is an overall measure of spatial autocorrelation. The working hypotheses are:

- the **null** $H_0$: absence of spatial autocorrelation (the observed value of one location does not depend on the values of neighbours)

- the **alternative** $H_1$: there is concentration of similar values in space.

The Moran’s I statistic is computed as: $I_t = \frac{\sum \text{W}_{ij} \text{z}_i \text{z}_j}{\sum \text{z}_i^2}$, where $t$ represents the year, $z$ the observation vector in year $t$ as a deviation from the average and $W$ is the standardised weights matrix (Cliff & Ord, 1981, Upton & Fingleton, 1985). If $I_t$ is larger/smaller than $E(I) = -1/(n-1)$ there is positive/negative global autocorrelation. The Moran’s I statistic comes together with the Moran’s diagram. This has four quadrants, each representing a type of autocorrelation:

- The **HH** quadrant: regions with a high value of the parameters are associated with regions with the same level (high - high),

- The **LL** quadrant: regions with a low value of the parameters are associated with regions with the same level (low - low),

\(^{41}\) As the elements of a row sum up to 1.
\(^{42}\) Which take into account the $x$ and $y$ coordinates – longitude and latitude.
\(^{43}\) Based on Euclidean distance or on Arc distance.
- The **HL** quadrant: regions with a high value of the parameters are associated with regions with low levels (high - low),
- The **LH** quadrant: regions with a low value of the parameters are associated with regions with high levels (low - high)\(^{44}\).

Quadrants HH and LL correspond to positive spatial autocorrelation and indicate spatial clustering of similar values. Negative spatial autocorrelation is given by the HL and LH quadrants and there is spatial clustering of dissimilar values. To test for the stability of the Moran’s I statistic, the most used is the randomization procedure. It generates spatially random simulated data sets. It is an inference procedure based on a permutation approach\(^ {45}\) “in which a reference distribution is calculated for spatially random layouts with the same data (values) as observed” (Anselin, 2003 - GeoDa™ 0.9 User’s Guide). It results in a histogram with the Moran’s I statistic as a yellow bar. It shows the number of permutation, the pseudo-significance level (p-value), the theoretical mean (E(I)), the average of the reference distributions (Mean) and the standard deviation for the reference distribution (Sd).

**Local** spatial autocorrelation is measured using the Local Moran LISA statistic \((I_{i,t})\) and the LISA diagrams (Anselin, 1995).

\[
I_{i,t} = \frac{(x_{i,t} - \mu_t)}{m_0} \sum_{j=1}^{n} w_{ij} (x_{j,t} - \mu_t)
\]

where \(m_0 = \sum (x_{i,t} - \mu_t)^2 \). \(I_{i,t}\) measure spatial autocorrelation for each geographical entity analyzed. Results are shown in four types of diagrams: significance map, cluster map (the two are specific for LISA), box plot and Moran scatter plot. The research paper presents the first two. The LISA significance map presents the countries that have a significant Local Moran LISA statistic. There are several significance levels brought forward as different shades of green (no significance – which is white, p < 0.05, p < 0.01, p < 0.001, p < 0.0001). The LISA cluster map combines the diagram and the significance map. It shows the locations with a significant Local Moran LISA statistic based on their type of spatial correlation: red for the high – high correlation, bright blue for the low – low association, light blue for low – high and pink for high – low.

The **last phase** of a spatial convergence analysis is the estimation of the \(\beta\) convergence. This part is intended to find the regression model that best explains the spatial

\(^{44}\) The third and the fourth groups are called outliers.

\(^{45}\) In the GeoDa 0.9.5-i software the implicit number of permutations ranges from 99 to 999 with accuracy increasing in the same way.
relationship. First, it is used the classical Ordinary Least Squares (OLS) method to estimate the unconditional $\beta$ – convergence model. Apart from the traditional measures of fit (like $R^2$, adjusted-$R^2$, etc.) there are three parameters computed to ensure comparability of the fit with the spatial regression model: the log likelihood, the Akaike information criterion and the Schwarz criterion\(^{46}\). The higher the log likelihood the better the fit. For the information criteria, the lower the value, the better the fit. The two information criteria are computed based on the log likelihood value:

$$\text{AIC} = -2L + 2K \quad \text{and} \quad \text{SC} = -2L + K*\ln(N)$$

where $L$ is the log likelihood, $K$ – the number of parameters in the model and $N$ – the number of observations (the number of geographical entities).

The consistency of the OLS regression is then analyzed using the multicollinearity condition number, the Jarque-Bera test for the normality of the errors and three heteroskedasticity\(^{47}\) tests: Breusch – Pagan, Koenker – Bassett and White. A multicollinearity condition number over 30 is suggestive of problems in the model’s specification\(^{48}\). The Jarque –Bera test is distributed as a $\chi^2$ statistic with two degrees of freedom. For the Koenker – Bassett test, residuals are studentized, i.e. they follow a Student distribution. The White test implies a more general form of heteroskedasticity.

The final set of statistics used measure the degree of spatial autocorrelation. In the GeoDa 0.9.5-i software are implemented six such tests. The Moran’s I statistic which is the same computed in the second step of the analysis. But while it detects problems of misspecification in the model, it does not suggest the alternative to be used further. For this are the other five tests, all as Lagrange Multiplier (LM) statistics. The first two LM-lag and Robust LM-lag are for the spatial lag model. The next two – LM-error and Robust LM-error – point the spatial error model as alternative. The fifth one, LM-SARMA, is related to higher order models that combine spatial lag terms with the spatial error ones. The tests follow the $\chi^2$ distribution with 1 degree of freedom. The process of decision for the most suitable model starts from comparing the LM-lag and the LM-error. If none of them rejects the null (the p-value > 0.05), the OLS results are consistent and the analysis stops here. If one of them rejects the null and the other not, will be estimated the regression for the model that rejects the null. For example, if LM-lag rejects the null and LM-error accepts it, will be estimated a

\(^{46}\) In fact these are the proper measures of fit for spatial models and not the standard ones.

\(^{47}\) A non-constant error variance.

\(^{48}\) It suggests that explanatory variables are too correlated and provide insufficient separate information.
spatial lag model (spatial autoregressive model). If converse, the spatial error model will be estimated. If both LM test statistics reject the $H_0$, the decision is made by analyzing the Robust value. The alternative is the spatial regression for the Robust value that is the most significant (has the lowest p-value). If neither is significant, there are other problems of misspecification in the form of the model.

Diagnostics of the spatial models are given by the Breusch-Pagan test (for heteroskedasticity) and the Likelihood Ratio Test. The latter compares the OLS model with the new one. If the two parameters are highly significant, problems of model specification still remain and its components should be reconsidered. To see which of the two alternatives – lag or error – is better, comparisons are made between the log likelihood, the AIC and the SC values. The last measures of fit for the models are made using the predicted values and the residuals based on them, by graphical representations and the Moran’s I test.

Of major importance is that spatial analysis can track down the degree of dissemination of a shock’s effects in the neighbouring countries. Based on the $\beta$ parameters computed in the model, one can calculate the speed of convergence and the half-life. The convergence speed (%) is:

$$b = \frac{-\ln(1+t\times\beta)}{t},$$

where $t$ is the number of years of the analyzed period. The half-life is the period necessary for an economy or more to fill half of the gap. It is expressed in years and computed as:

$$\tau = \frac{-\ln(2)}{\ln(1+\beta)}.$$

Spatial analysis was used in sections IV.1.2, IV.2, VII.1, VII.2 and Appendix 3 and was done with the help of the GeoDa 0.9.5-i software.
Chapter III

THE ANALYSIS OF THE CONVERGENCE CRITERIA

The Maastricht Treaty includes a range of nominal, real and structural criteria that have to be fulfilled by the candidate states in order to enter the European Economic and Monetary Union (EMU). Unfortunately, the candidate states have to find the balance between the real and nominal convergence, as the two groups of criteria contradict each other. As it will be seen further on, fulfilling a criterion from one group, might lead to the impossibility to fulfil another one, from the other group.

The most important from an official point of view is the nominal convergence group, which has clear limits. The group is divided into two parts:

- The monetary criteria – price stability, also known as the inflation criterion,
  – the interest rate criterion,
  – the exchange rate criterion;

- The fiscal criteria – the deficit criterion,
  – the general government debt criterion.

These are the criteria that are evaluated by the European Commission when deciding whether a country is able or not to join the Euro Zone.

This chapter deals exactly with the analysis of the nominal criteria, the real and structural ones being studied further.

III.1. Price Stability and Inflation Convergence

This might be considered the main convergence criterion, as inflation captures the state of the art in a national economy and is the fundamental criterion for assessment of other reference values\(^\text{49}\). It refers to maintaining the inflation rate between certain limits, in order not to exceed by more than 1.5% the average of the three best performing member states of the European Union\(^\text{50}\).

Up to the introduction of the Euro, inflation rates throughout the Union were decreasing (1998 and 1999, 1.1% Euro Area average – see graph 2). As from the Euro

\(^{49}\) As for every other nominal criterion count the values of the three best performers in terms of inflation rate.

\(^{50}\) So the best 3 performers do not necessarily have to be in the Euro Area.
introduction, there is a tendency to diverge from one another (Mentz & Sebastian, 2003). What would then, happen, in the Central and Eastern European countries after the Euro adoption?

Inflation in Romania has decreased considerably in the last years, ranging from 154.8% in 1997, to 9.1% in 2005 when it reached the 1 digit level. The lowest level of inflation rate was in 2007, 4.9%. Due to the agricultural problems in Romania in the year 2007 and the world crisis, inflation raised again in 2008\(^{51}\), at 7.9%, while the inflation target of the National Bank of Romania was of 3.8% +/- 1% for the same year. In the same time, the value of the criterion was 4% (the 3 best performers in terms of inflation rates being the Netherlands – 2.2%, Portugal – 2.7% and Germany – 2.8%, resulting an average of 2.56%). For a better view of these evolutions, graphs 1 and 2 present the annual inflation rates in Romania (irrom), the Euro Area (irea), the level of the best three performers (irbest) and the level of the inflation criterion (irmast).

**Figure 1. Annual inflation rate in Romania and the Maastricht reference value**

\(\text{Data source: Eurostat and own calculations based on Eurostat, NBR and NIS data.}\)

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\(^{51}\) For the first time in the last years.
Figure 2. Evolution of the annual inflation rate (%) for the best three EU performers (irbest), the Maastricht reference value (irmast), the Euro Area (irea) and Romania (irrom)

Data source: Eurostat and own calculations based on Eurostat, NBR and NIS data.
When talking about inflation in a monetary union, a major aspect is the degree of inflation persistence. The European Central Bank has already studied the problem under the name of Inflation Persistence Network (IPN). The term refers to inflation’s time reaction, seen as the period of time necessary for inflation to return to its long-term trend. The studies conducted are divided into two groups: the ones that divide the firms’ pricing strategies into time-dependent and state-dependent; and the second group which studies the degree of inflation expectations’ anchoring. The degree of anchoring expectations is very important under a common monetary policy that cannot deal with individual inflationary effects. The best scenario is when inflation expectations are anchored, meaning that inflation shocks are seen as temporary. The level of anchoring is strongly related to the credibility of the monetary policy. As shown by the IPN, inflation persistence in the Euro Area is moderate, pointing out an increasing trust in the common monetary policy. Throughout the EMU, France is on the first place at inflation anchoring, its economy being driven mainly by temporary shocks.

Inflation inertia is still very high in Romania (Ciurila & Murarasu, 2008), inflation dynamics being influenced more by persistence than by expectations. This is highly characteristic for the transition economies (Vladova, 2008; MNB, 2008; Lendvai, 2005). In a study that compares the persistence estimates in the European Union between 1998 - 2007, Z. Vladova obtained a 0.37 coefficient for Romania. Only two countries have a higher persistence level – Poland (0.5) and Latvia (0.51).

A problem faced by the Romanian authorities in the convergence process is to change the inflation perception of the economic domestic environment. This because, before adopting Euro, Romania has to participate in the ERM II for at least two years. Strong inflation persistence may have a great impact on the real exchange rate, causing fluctuations outside the established band (maximum +/- 15%).

The type of dependency – time or state – is directly correlated with the size of the company in Romania (Copaciu et al., 2007, Fabiani et al., 2005). Usually, small companies tend to have a state-dependent approach, while big companies tend to be more time oriented. All in all, most of the Romanian companies prefer a mixed strategy. 60% of the economic

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52 Anchoring the inflation expectations means the view of the economic agents in terms of inflation shocks – whether they are seen as temporary or long term changes.
agents surveyed use either a time – dependent strategy or a mixture. These results reinforce the previous findings of a persistent inflation in Romania.

Mare and Marcu (2009) have studied the convergence of the Romanian inflation rate to the Euro Area inflation rate. Based on the cointegration theory, analyzed parameters converge if they are cointegrated. A low level of inflation cointegration equals a large amount of efforts that should be done in this field in order to adopt the common currency. The costs of the adoption would by far outbalance the benefits brought by it.

Using the Engle-Granger methodology and the Johansen test, the authors have studied the convergence of the Romanian inflation rate with the Euro Area inflation rate over the period January 2004 – February 2009.

**Figure 3. Evolution of inflation rate (%) in Romania and the Euro Area (EA)**

![Graph showing inflation rate evolution in Romania and the Euro Area from 2004 to 2008.](source)


Due to strict monetary and fiscal policies, up to the entrance in the European Union, inflation rate in Romania had a significant drop. After the 1st of January 2007, the two inflation rates have more or less the same trend. The final results (based on the ADF test) show no cointegration at inflation rate level, meaning no convergence.

In conclusion, from the inflation rate criterion’s point of view, Romania’s entrance in the Euro Area would be costly enough both for us and for the EMU countries. Efforts have to be made in order to readjust the level of inflation rate in Romania.

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54 See Appendix 1.
This lack of convergence at inflationary level may be due to the implementation of other criteria. As already mentioned, fulfilling a group of criteria, may lead to unfulfillment of others. Price stability is in deep contradiction with price and income convergence. Both of the latter lead to inflationary pressures, through an increase in demand. The national authorities have to find the equilibrium between the two sets of parameters. Maybe the retrenchment of the domestic consumer credit will help the government in this respect.

III.2. Interest Rate Criterion

The interest rate criterion is based on the long term governmental bonds (10-years maturity). The reference value is obtained as the average of the best three performers in terms of inflation\(^55\) plus 2%. Inflation rate and interest rate go hand in hand. This criterion is a protraction of the first one, as it measures the financial market’s expectations regarding the long term evolution of inflation. A high long term interest rate equals expectations for further inflation increase and domestic currency depreciation. In other terms, agents on the market do not trust the domestic economic policy and see the Euro adoption as being very far, i.e. the convergence process is not viewed as sustainable. The lack of trust materializes in all the risk premia which make the difference between two interest rates.

Romania does not respect this criterion, either, as in 2008 the long term interest rate for bonds was 7.7%, while the reference value was 6.3%\(^56\). But there is a problem in this field. Romania does not have an intensive activity in issuing long term Treasury bonds (10 years maturity). In the last years, there was no issuance of this kind. Moreover, the secondary financial market is not enough developed. The European Commission, through Eurostat, has started to compute the data for the Romanian long term interest rate only in 2006, when the level was 7.23%. It had a slight decrease in 2007 (7.13%), to rise again in 2008, on the basis of the global economic deterioration.

Anyway, studies have been made, including Romania. Kasman et al. (2008) have studied the monetary policy convergence of EMU candidate states, based on the uncovered interest parity (UIP), as monetary integration implies the evanescence of the risk premium. Using the lending rate values till 2005, the results show that Romania is not ready yet for the

\(^{55}\) In 2008: the Netherlands, Portugal and Germany.
monetary union, as international capital has an incomplete mobility. This deficiency was eliminated afterwards with the complete liberalisation of the capital account\(^57\).

From that point on, both the authorities and the National Bank have conducted their policies in order to increase the level of interest rate convergence. Still, due to its transition period, Romania has a lot more to do in this respect. Financial markets have started to develop only lately, the level of nominal interest rate is still high compared to the Euro Area and so forth.

A set of administrative decisions are needed, both monetary and fiscal, to insure the financial market convergence. But these have to be taken very carefully, as authorities have to find the equilibrium between the interest rate and the inflation rate in order not to overheat the national economic environment.

Still, as interest rate is highly dependent on the national economic environment, the convergence at this level might occur more rapidly after the Euro introduction. The Euro Area is perceived as a fairly stable economic environment and once with the entrance, the perception would extend upon Romania, too.

But there is also a problem about interest rates in the EMU. Its experience till now demonstrates that the common monetary policy conducted by the European Central Bank is not suitable for all the Euro Area countries and that its effects are sometimes quite the opposite of what is expected\(^58\).

Due to the shortage in data, for further analysis were taken market interest rates for different maturities.

III.3. The Exchange Rate Mechanism II (the Exchange Rate Criterion)

The exchange rate criterion states that a candidate country to the Euro adoption must give way to the floating regime of the exchange rate and be a member of the ERM II for a period of at least two years. Once with the entrance in the Exchange Rate Mechanism, the country has to establish a central parity and the domestic-Euro exchange rate should be maintained within a +/- 15% normal fluctuation band against that value. Of course,

\(^57\) This, combined with a very lax macroeconomic policy facilitated the propagation of the international financial crisis at the real sector level.

\(^58\) It was the case of Germany and Spain in the early 2000s, when the common monetary policy generated exactly the opposite evolution of national interest rates than the one needed.
depending on the national authorities, the fluctuation band can be established at a lower level. The exchange rate is fixed, as no devaluation of the national currency is permitted during this period. Lately, some voices from the European organisms have advanced even the idea of an extremely narrow fluctuation band of only +/- 2.5%.

The whole exchange rate criterion is a very delicate issue. For each country, more measurements have to be undertaken to see the characteristics of each currency regime (fixed or floating), the level in which it addresses to the national economic problems and so on.

The problem raised by economists is that giving up the floating regime means losing one of the most important tools in neutralising economic shocks. Indeed, in a country with independent monetary policy and floating exchange rate, the shocks occurring on the international and national markets are dealt with by fluctuations in the level of the domestic interest rate and of the currency parity, together with an increase in the inflation level. The same happened in Romania at the end of the year 2007 and the beginning of 2008. When the authorities announced the outbalance of the national indicators targets, the Leu suddenly dropped. Unfortunately, the falling of the Leu continued throughout the 2008, fuelled by the American financial crisis that spread all over the world. This movement was accompanied by a rise in inflation with more than 4 percentage points above the annual target of the National Bank of Romania. Questions have been raised regarding the influence of the financial indicators versus the influence of the real economy upon the exchange rate fluctuations’ level. More studies have shown that usually, there is the so called “contagion effect” upon the exchange rate’s volatility, i.e. the financial expectations have a higher influence upon the exchange rate level than real shocks, due to the risk premium associated with them. Changes in expectations generate exchange rate level fluctuations, leading to real shocks.

Analyzing the balance of payments equation\textsuperscript{59}, a financial shock is adjusted by variations in the level of the current account in the case of a floating regime, while during the ERM II period this is done through reducing the national reserves. Hence, by passing to a fixed exchange rate regime, the exchange rate transmission channel of shocks to the real economy is closed down.

The main issues regarding the entrance in the ERM II are establishing the equilibrium exchange rate and choosing the width of the fluctuation band against this value. Since 1994, Romania has a managed floating regime, meaning that the National Bank interferes on the

\textsuperscript{59} Current Account + Net Inflows of Foreign Capital – National Reserves = 0
market when needed. And, indeed, the NBR inverted quite a lot during the 90s, but less and less after the economy has stabilized a little bit. During the last period, there were more interventions of the NBR on the currency market to prevent the depreciation of the RON.

Figure 4. The RON/EUR monthly exchange rate level in the period January 1999 – June 2009

Data source: NBR

During the last 2 years, the minimum exchange rate against the Euro was reached on the 2nd of July 2007 – 3.1130, while the maximum value on January, 20th 2009 – 4.3470. The appreciation of the RON started in 2005 may be due to the Balassa – Samuelson effect which is very much encountered in transition economies. The differential between the tradable and non-tradable sectors caused a rapid valuation of the national currency, which was stopped in the autumn of 2007 by the Romanian agricultural problems. The world economic crisis did nothing else but to readjust the exchange rate towards its equilibrium level.

In order to establish the fluctuation band is necessary to see the volatility of the exchange rate over a certain period. In its 2008 Annual Report, the NBR specified a +9.7%/ -14.6% volatility for the RON. There are different ways of measuring exchange rate volatility, each of them with pros and cons. For the present paper was selected the method used by the European Central Bank in assessing exchange rate stability, the Exchange Rate Volatility (ERV) indicator. The ERV is measured as standard deviation of the annual rate of change of the exchange rate. The main idea of the indicator is that exchange rates will have similar evolution in the near future.

60 Taking as reference value the monthly average exchange rate in December 2006.
Even though the ECB uses only the last 2 years as reference (the equivalent of staying in the ERM II), in order to see the RON’s behaviour over a longer period, the analysis was extended from January 2005 till June 2009. The evolution of the ERV indicator for Romania is presented in the graph below.

**Figure 5. Exchange rate volatility in Romania January 2005 – July 2009.**

![Graph showing exchange rate volatility in Romania from January 2005 to July 2009.]

*Source: own calculations.*

Exchange rate volatility was very high at the beginning of the analyzed period (almost 0.3 at the beginning of 2005), but it tempered along with the stabilisation of the domestic economy. Fluctuations began to gather way from the second part of 2007, reaching the peak in autumn 2008. The high volatility of the RON/EUR exchange rate increased exchange rate risk, causing troubles both for investors and for exporters and importers.

As a comparison basis for the exchange rate stability are taken the last two years – quarterly data. The level of the Romanian ERV indicator for the last 8 quarters is presented in table 1, while table 2 and 3 present in comparison the ERV values for the last 3 countries that joined the Euro Area – Malta and Cyprus in 2008 and Slovakia in 2009, as presented in the 2007 and 2008 ECB Convergence Reports.

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61 2005 is a very significant year for the Romanian economy – it is the year in which inflation decreased to a one digit value (9.1%) and, starting with the 15th of July 2005, the Romanian LEU has been redenominated (1 New Leu RON = 10,000 old lei ROL).

62 Exporters began asking the NBR to intervene on the currency market to stabilize the exchange rate.
Table 1. Exchange rate volatility for Romania (%)

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of 3 months ending</td>
<td>6.78</td>
<td>10.9</td>
<td>10.61</td>
<td>7.73</td>
<td>9.31</td>
<td>14.46</td>
<td>6.92</td>
<td>6.37</td>
</tr>
</tbody>
</table>

Source: own calculations

Table 2. Exchange rate volatility for Cyprus and Malta– average of 3 months endings

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprus</td>
<td>0.9</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Malta</td>
<td>0.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: ECB Convergence Report 2007

Table 3. Exchange rate volatility for Slovakia– average of 3 months endings

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovakia</td>
<td>4.6</td>
<td>5.0</td>
<td>3.8</td>
<td>7.4</td>
<td>5.8</td>
<td>4.2</td>
<td>5.7</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Source: ECB Convergence Report 2008

As it can be concluded, Romania has still much more to do in what regards exchange rate stability. It demands for high discipline of the fiscal and monetary policies to insure this stability, bearing in mind that usually during ERM II a national economy has to support a series of speculative attacks. All in all, when entering the ERM II, Romania has to adopt the maximum fluctuation band of +/-15% and, if necessary, make intra-marginal interventions in order to sustain the exchange rate level.

The main problem still remains. Which of the two exchange rate regimes is better – floating or fixed? Will the RON volatility lower with the entrance in the ERM II? Opinions are divided based on the perception of which currency regime is riskier. Different studies have highlighted negative influence of the exchange rate volatility upon foreign direct
investments. Other studies (Clark, Tamirisa & Wei, 2004) have shown that over a period of 30 years the type of currency system had little effect on trade flow. The volatility of the exchange rate was approximately the same in fixed and floating systems. None the less, volatility in general remains an important issue for the exchange rate stability, affecting the decision about the suitable type of exchange rate system.

Apart from the fluctuation band, Romania has also to establish the central parity of the Leu against the Euro for the ERM II. Choosing the equilibrium exchange rate is very difficult, both due to theoretical aspects and to real economic effects.

There are several methods used to compute an equilibrium exchange rate, each of them returning quite different results among them and in comparison with the real market. For example, in the case of Poland in 2002, differences ranged from an overvaluation of 2.6% through one method (BEER) to +20% through another method (PPP) (Borowski et. al., 2004). Consequently, using only one model may lead to an erroneous setting of the central parity. The best option is to combine theoretical models with the real exchange rate on the market and use the latter as a bench mark, provided of a long period of high exchange rate stability before entering the ERM II. Unfortunately, it is not yet the case of Romania.

Among the methods for computing the equilibrium exchange rate, three are the most used.

The first one is the corrected Purchasing Power Parity (PPP) which consists of two phases: calculating the exchange rate by directly applying the absolute PPP and then correcting the value with the difference between the GDP per capita between the two entities (Brook & Hargreaves, 2001; Baude, Coudert, Couarde, 2002).

The Behavioural Equilibrium Exchange Rate (BEER) estimates a long term relationship between the real exchange rate and some of the most important macroeconomic variables that explain the long term behaviour of the equilibrium exchange rate (terms of trade, productivity, central balance budget, etc.) (Alberola et al., 1999; Brook & Hargreaves, 2001).

The third method, which is basically the best, is the Fundamental Equilibrium Exchange Rate (FEER) (Wiliamson, 1985). It merits special attention as it is the only method that assesses both internal and external equilibria, taking into account the

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63 Exchange Rate Volatility and Trade Flows – Some New Evidence, Peter Clark, Natalia Tamirisa and Shang-Jin Wei, IMF Study, May 2004
64 The value obtained differs very much from reality.
characteristics of each economy. The equilibrium exchange rate is the level that equalizes the current account balance with the medium term financing possibilities in each period of time, providing in the same time internal equilibrium. It is based on the exports’ and imports’ exchange rate elasticities and the sustainable position of the current account.

III.4. The Fiscal Criteria

This group comprises two criteria regarding the general government budget. The general government deficit must not exceed 3% of the GDP, while the general government debt should not exceed 60% of the GDP value. They were established mainly to enforce fiscal discipline in terms of government expenditure and to protect the common currency area countries against shocks related to costs of high public debts. Another important reason was to insure trust in the new currency. These are the only two criteria that do not have the reference value related to the European Union, but to the country itself.

As graph 6 shows, Romania has always been considerably under the reference value. The peak of the public debt was in 2001, when it amounted 25.7% of the GDP. Afterwards it constantly decreased till 12.4% in 2006. A slight increase is to be found lately due to all the problems already mentioned in previous parts of the thesis. For 2009, the situation is not very good, in the first quarter, the public debt rose to 16.1% of GDP. Because of the credit lines taken by the authorities from the International Monetary Fund and the European Union, the level of debt in the GDP has increased forward somewhere around 20%, taking also into consideration a negative growth level in the GDP. Still, this remains the only criterion that has always been fulfilled by Romania in its process of adherence to the Euro Area.
Figure 6. The annual evolution of the general government debt in Romania (as % of GDP)

Data source: Eurostat, NBR, NIS, AMECO

Figure 7. The annual evolution of the general government deficit (percentage of GDP)

Data source: Eurostat, NBR, NIS, AMECO

Graph 7 presents the evolution of the other fiscal criterion. In general Romania did well throughout the years, with a record level of only 1.2% deficit two years in range – 2004 and 2005. The problems appeared in 2008, when it increased to 5.4%, on the basis of the national\textsuperscript{65} and international problems (the subprime credit crisis). On the 4\textsuperscript{th} of May 2009 the European Commission opened the Excessive Budgetary Deficit Procedure for Romania

\textsuperscript{65} 2008 was also an election year characterized by expansionist fiscal and budgetary policies
which started on July, 7th. The deadline for reaching the 3% of GDP level is 2011\textsuperscript{66}. Otherwise, the entrance in the Euro Zone will be postponed after the 2014 - 2015 target.

Because of the real convergence process the deficit is under very high pressures (mostly affected by the wage level adjustment). Losing the monetary policy as an adjustment mechanism leaves one country in the care of the fiscal policy only to combat cyclical fluctuations. The degree in which the latter manages to do this depends very much on the characteristics of the GDP and its components. Moreover, a deficit level below 3% of the GDP insures the action of the automatic fiscal stabilizers which immediately diminish the shocks’ domestic effects. But the reaction of the governmental deficit to asymmetric shocks depends very much on the elasticity coefficients of its components – revenues and expenditures.

In opposition to the neoclassical growth theory, recent studies have shown that for two countries, the correlation of the economic cycles is strongly influenced by the level of differences in their budget balances (Darvas, Rose & Szapary, 2005). A significant difference decreases the level of convergence. The synchronization of economic cycles and fiscal policies imply also comparably small deficits. Fiscal convergence demands as well a discussion of the structure and the size of the national budget\textsuperscript{67}.

\textbf{III.4.1. The size of the budget}

Establishing an optimal size of the budget in respect to the GDP is very hard. It differs very much across the world and depends on the size of the resources needed to comply with the three classical functions of a government: allocation, redistribution and provision of economic stability. Throughout the years, different opinions appeared stating an optimal size of the budget at 30%– 35% of GDP for developed countries and around 40% - 45% of GDP for developing countries. In the European Union the situation is quite reverse, as old western members are somewhere around 40% - 50%, the Scandinavian countries are more centralized (above 50%) and most of the new members are at the bottom of the hierarchy 30% - 40% of GDP.

\textsuperscript{66} The targets are: 5.1\% in 2009, 4.1\% in 2010 and below 3\% in 2011.
\textsuperscript{67} The size of a national budget is usually measured by means of expenditure rather than revenues.
The evolution of the total general government expenditure and total general government revenue as percentage of GDP is Romania, EU 27 and the Euro Area is presented in Table 4.

Table 4. The evolution of the total general government expenditure and total general government revenue as percentage of GDP is Romania, EU 27 and the Euro Area68

<table>
<thead>
<tr>
<th>Year</th>
<th>Romania Revenue</th>
<th>Romania Expenditure</th>
<th>Euro Area Revenue</th>
<th>Euro Area Expenditure</th>
<th>EU 27 Revenue</th>
<th>EU 27 Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>30.5</td>
<td>34.9</td>
<td>46.8</td>
<td>49.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1998</td>
<td>32</td>
<td>35.2</td>
<td>46.3</td>
<td>48.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1999</td>
<td>35.2</td>
<td>39.6</td>
<td>46.8</td>
<td>48.2</td>
<td>45.8</td>
<td>46.8</td>
</tr>
<tr>
<td>2000</td>
<td>33.8</td>
<td>38.5</td>
<td>46.3</td>
<td>46.3</td>
<td>45.4</td>
<td>45.2</td>
</tr>
<tr>
<td>2001</td>
<td>32.5</td>
<td>36</td>
<td>45.5</td>
<td>47.3</td>
<td>44.8</td>
<td>46.2</td>
</tr>
<tr>
<td>2002</td>
<td>33</td>
<td>35</td>
<td>45.1</td>
<td>47.6</td>
<td>44.2</td>
<td>46.7</td>
</tr>
<tr>
<td>2003</td>
<td>32</td>
<td>33.5</td>
<td>45</td>
<td>48.1</td>
<td>44.2</td>
<td>47.3</td>
</tr>
<tr>
<td>2004</td>
<td>32.3</td>
<td>33.5</td>
<td>44.6</td>
<td>47.6</td>
<td>44</td>
<td>46.8</td>
</tr>
<tr>
<td>2005</td>
<td>32.3</td>
<td>33.5</td>
<td>44.9</td>
<td>47.4</td>
<td>44.4</td>
<td>46.9</td>
</tr>
<tr>
<td>2006</td>
<td>33.1</td>
<td>35.3</td>
<td>45.4</td>
<td>46.7</td>
<td>44.9</td>
<td>46.3</td>
</tr>
<tr>
<td>2007</td>
<td>34</td>
<td>36.6</td>
<td>45.7</td>
<td>46.3</td>
<td>44.9</td>
<td>45.7</td>
</tr>
<tr>
<td>2008</td>
<td>33.1</td>
<td>38.5</td>
<td>-</td>
<td>-</td>
<td>44.5</td>
<td>46.8</td>
</tr>
</tbody>
</table>

Source: Eurostat

Romania has always been under the 40% level69 (see also Graph 7), while the Euro Area and the European Union averages situated around 45% - 50% of the GDP. In addition, the cyclically adjusted figures decreased in Romania below 30% of the GDP from 1998 on, government redistributions becoming the lowest in the European Union70. The situation has changed in the first quarter of 2009, both revenues and expenditures going up above the 40%71. For example, at the end of May 2009, the budgetary deficit was 2.1% of the GDP and it will be hard for authorities to comply with the yearly limits imposed both by the European Commission and by the IMF.

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68 "-" data not available
69 And future plans are to remain the same.
70 Between 1998 and 2006, these decreased by approximately 10%.
71 Governmental revenues amounted exactly 40% of the GDP, while expenditures went up to 48.48% of GDP.
III.4.2 The structure of the budget

To sustain a certain level of the budgetary deficit or to reduce it permanently, restrictive measures have to be taken on the expenditures side. But these adjustments take full effect only if they consist in more than simply reducing their level. Structural expenditure reforms are needed as a mechanism of a sustainable budget management.

Studies have shown that different types of governmental expenditures have different impacts on economic growth. In most of the cases was studied the impact of investments in education, with very clear results. The general findings show that is not productive to decrease governmental investments while increasing government consumption expenditures. In the same time, there is a debate whether investment in human capital or the one in infrastructure determines more economic growth.

Kneller et al. (1998) divided both budget revenues and expenditures into two groups. Revenues consist in distortionary (income and profit taxes, social security contributions) and non-distortionary taxes (such as consumption taxes), while expenditures may be productive (education, health, transportation infrastructure) and non productive if they do not promote production growth directly (e.g. social assistance). As expected, productive expenditure and non-distortionary taxes have a significant positive effect upon economic performance.

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72 The white line on the diagonal of the plot represents an equilibrated budget, the blue part indicates budgetary surplus while the red one stands for budgetary deficit.
Productive expenditure stimulates growth only if financed through non-distortionary revenues, while financed from distortionary taxes, the impact is negative.

Another interesting study is that of Afonso et al. (2005) which focused on institutional structure. The authors highlight the characteristics of a good institutional environment with well qualified and honest public servants. Among other factors are: the efficient use of public funds, an effective and stable tax system, a good budget management, etc. One of the key acknowledgements of the authors is that no valid advice can be given in what regards fiscal policies as every situation has its own specificity.

Table 5. Structure of primary functional expenditure as percentage of GDP for Romania and the EU and EA averages

<table>
<thead>
<tr>
<th>% of GDP</th>
<th>2002</th>
<th>2005</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RO</td>
<td>EA</td>
<td>EU</td>
</tr>
<tr>
<td>General public services</td>
<td>5.2</td>
<td>7.2</td>
<td>6.6</td>
</tr>
<tr>
<td>Defence</td>
<td>2</td>
<td>1.4</td>
<td>1.6</td>
</tr>
<tr>
<td>Economic affairs</td>
<td>4</td>
<td>4.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Environmental protection</td>
<td>0.1</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Housing</td>
<td>1.8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Health</td>
<td>4.9</td>
<td>6.3</td>
<td>6.2</td>
</tr>
<tr>
<td>Recreation, culture, religion</td>
<td>0.6</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Education</td>
<td>4</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>Social protection</td>
<td>10.4</td>
<td>19.3</td>
<td>18.6</td>
</tr>
<tr>
<td>Total primary expenditure as % of GDP</td>
<td><strong>33</strong></td>
<td><strong>46.1</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

Source: Eurostat

Romania has cut its operating costs but it has increased with almost 50% its economic affairs expenditure in the 8 years under analysis. Although the share of productive expenditures like education and health has diminished, things were not that bad in Romania till the fiscal year 2007, as also social expenditure had a downward trend. Problems started to appear in 2008, causing the rise of the general deficit to 5.4% of the GDP\(^3\). The group of general public services had a growth rate of 67% in only two years (2007 - 2009). Expenditure on economic affairs and housing increased by 85%, 120% respectively. But one

\(^3\) And the opening of the Excessive Deficit Procedure by the European Commission.
of the biggest problems is that expenditure on education dropped by more than 20%, while all the reforms in the social security system had as a consequence an augmentation with 76.4% of the social protection expenditures. The government now is trying to find solutions for governmental expenditure reduction, but if it continues on the same path, it will be hard to find anything good. All these unproductive expenditure increases have taken place on the background of the international crisis, that reduced very much the national GDP. So, after a long good path of the Romanian fiscal policy, a structural break provoked chaos.

Figure 9 presents the annual rate of change of the primary expenses for 2008 and 2009 in comparison with the previous year and the rate of change from 2007 to 2009, based on the State Budget balance sheet. It is worthy and in the same time worrying to remark the high growth rates planned for 2009\textsuperscript{74}, while the latest forecasts speak about a negative growth rate of 8.5% of the Romanian GDP. Moreover, in two key sectors, health and education, the planned expenses have been reduced dramatically.

The government should seek ways to reduce general public service and, the most important, to solve the problems of the social security burden.

**Figure 9. Rates of change for the Romanian primary functional expenditure**

![Graph](source)

*Source: own calculations based on data from the General Consolidated Budget, Ministry of Public Finance*

\textsuperscript{74} Of more than 30% for most of the unproductive expenses.
Chapter IV

STRUCTURAL CONVERGENCE AND MARKET FLEXIBILITY

Real and structural convergence is very important within an Optimum Currency Area. Its level is the main determinant of the costs and benefits of adopting the Euro coins.

Once with the entrance in the European Economic and Monetary Union, a country gives up its independent monetary policy. This is a major loss, as monetary parameters are the ones that re-establish equilibrium in times of crisis and shocks. If the level of convergence is high, common policies adopted by the official entities of the European Union will have the same effects throughout the Union. If not, the job of re-adjusting a national economy remains only for its fiscal and labour policies. But if these two are not properly developed, that specific country will only lose (costs of the Euro adoption will by far overtake the benefits).

Real and structural convergence is very difficult to achieve for a former communist country. Communist regimes are characterized by political regulations of every other aspect of the real life, driven by the concept of social equality. There are established prices for products, established patterns for production, agriculture and so on. Everything in the country is taken and then redistributed by the government. Private initiative is forbidden. Due to all these aspects, levels of incomes and prices are very low in respect with democratic states. That is why the process of convergence in real terms implies unfulfilling the nominal convergences.

Moreover, planned economies were not opened to international market changes, nor were very flexible in adapting to it. Lack of competitiveness (due to planning and technology gap) is still the main factor for the nowadays output gap.

Much is left for the transition economies to achieve in terms of convergence. This chapter is intended to study the level of Romania’s real and structural convergence. As the GDP’s evolution is the mirror of an economy, the first part of the chapter assesses the convergence level of the Gross Domestic Product. Next comes the impact of the European Union on consumers, measured through price convergence analyzed under difference aspects.
Once with the Euro adoption, a certain country has to give up its independent monetary policy. From that point on, the possibility of annihilating asymmetric shocks depends on the level of structural convergence and on the effectiveness of the remaining adjustment mechanism: the fiscal and the labour market policies. As on the fiscal part more studies have been conducted, attention focuses on the structural issues and on the flexibility of the labour market.

**IV.1. Convergence of Gross Domestic Product (GDP)**

GDP convergence is one of the most complex as this macroeconomic parameter encompasses all the characteristics of a national economy. This criterion is analysed under 3 different forms: GDP level (both nominal and real), GDP per capita and the GDP growth rate. They are all very important as member states are very heterogeneous, from the point of view of their size, population, level of development... For example, the new members have, in general, low levels of GDP in comparison with the western countries, but when measuring the GDP growth rate, they go far beyond the latter.

Convergence, at any level, was usually studied from a chronological point of view. A new trend has appeared that uses elements of spatial statistics and econometrics to point out the influence of space and geographical properties on the evolution and impact of different processes and measures. Because of the importance of their results, both types of analysis will be used here.

**IV.1.1. Time convergence of the GDP**

Romania has always done badly in this respect.

In absolute values, the Romanian GDP at current prices\(^{75}\) was the 18\(^{th}\) among the EU27 states until 2007. In 2007 Romania switched places with Hungary, surmounting one place. After it, came only smaller countries and Bulgaria. Up till 2008, the national GDP has been in a continuous increase, arriving at 137035 mil. Euro. However, for 2009 was predicted a decrease in absolute value to somewhere around 125500 mil. Euro. Regardless of the ascending trend, when comparing per capita data (nominal GDP per capita, GDP per capita in Purchasing Power Standards) Romania is only before Bulgaria, with very

\(^{75}\) In millions of Euro.
significant differences compared to the Euro Area (see graph 10). The high growth rates as against the EU27 and EA averages were not sufficient to close the gaps. Romanians still remain the second poorest in terms of GDP per inhabitant.

**Figure 10. Per capita gross domestic product in Romania and the Euro Area**

![Graph showing per capita gross domestic product in Romania and the Euro Area](image)

*Data source: Eurostat, NIS*

This problem was fuelled by Romania’s communist past. Anyway, national history is not an excuse, as other transition countries have succeeded in lowering the gap between them and the Western European countries. A major factor that may have caused this divergent evolution is the size of countries. Romania is the second largest country among the Eastern European members, after Poland, both as area and as population (around 21.5 millions of inhabitants, but forecasted to drop in the near future). There is a famous Roman saying “Divide et impera”, which is very true. The smaller the territory, the greater the efficiency of ruling it. To sustain this comes the example of Slovenia, one of the smallest among the newly comers in the Union that was the first adopting the Euro. Another problem for Romania, as stated also by international forums, was its deficient political system after the fall of the communism. Because of these administrative lacunae and thanks to the NBR’s policy, Romania has begun converging towards the European Union later, after the year 2000.
To best describe the differences between Romania and the EA, for the graph below where chosen the GDP levels for Romania as percentages of Euro Area total based on millions Euro and on millions PPS\textsuperscript{76}.

**Figure 11. Gross domestic product at market prices as percentage of Euro area total based on millions Euro and millions PPS\textsuperscript{77}**

Data source: Eurostat, IMF, AMECO

Although between 1998 and 2008 the percentage of the Romanian GDP in the Euro Area total has increased very much (55\% in terms of PPS and 150\% in terms of Euro), its level remains for the moment very low – only 1.5\%, 2.8\% respectively – relative to its size, but much better than neighbouring countries. What is good to see is that using the Purchasing Power Parity, figures are higher (this means that at the same price level both in Romania and the Euro Area the gap narrows). When compared with other states, figures for Romania are even higher than the ones of some Euro Area members (Portugal, Ireland).

To open the convergence analysis, a simple cointegration approach was used for different forms of measuring the GDP level. As the Romanian growth rate for the GDP was much above the EA average and because of few data on the GDP per capita, the convergence was analyzed for the nominal GDP.

\textsuperscript{76} PPS – Purchasing Parity Standard – as defined by Eurostat is a common currency that eliminates differences in price levels between countries allowing for meaningful volume comparisons in GDP between countries.

\textsuperscript{77} For the values based on millions Euro, Eurostat also presents the forecasted figures for 2009 and 2010.
For the nominal GDP convergence, data ranges from the 1st quarter of 1998 to the 1st quarter of 2009, in millions Euro. The goal was to see whether the two entities have a common path in this respect. For a detailed output of the analysis, see Appendix 1. In the following will be presented briefly the main findings.

The data present seasonal evolutions, which were dealt with using seasonal adjustment methods.

Through different methods, the results were the same: there is no cointegration between the nominal GDP in Romania and the Euro Area for the period under analysis, which implies no long term convergence. But there was found a causality relationship. The Euro Area GDP Granger causes the Romanian one, i.e. changes in the first one determine changes in the second. This result was somehow expected, as Romania’s main trading partner is the European Union, in which the Euro Area states have the highest contributions.

IV.1.2 Spatial convergence

The latest trend in European studies is to analyze not only chronologically the process of convergence, but also spatially. This because spatial statistics and econometrics allows for better cross-section comparison among countries or regions.

It is very well known that old member states have high GDP values (including GDP per capita), while new member states, due to their convergence process, have higher growth rates. The goal of this analysis was to see the degree in which these differences are caused by spatial location of the EU member states.

Although economic literature usually opposes Northern countries with the Southern ones, geographical analysis shows that there are major differences between East and West. To assess this were chosen the following variables: nominal GDP in 2008, its growth rate in 2008, nominal per capita GDP in 1999 and 2008 and the average annual growth rate of per capita GDP in the period mentioned (1999 – 2008 – ten years).

The basic spatial exploratory analysis is done using maps. For the present study they help at understanding how economic growth is distributed among the EU members. The quartile maps in graph 12 show the expected results:

- high GDP values for the old member states accompanied by lower growth rates. 75% of the members had growth rates below 3.2% in 2008.
- low absolute values for the new members combined with the highest growth rates. The highest GDP growth rate is to be found in Romania (7.1%).

However, there are some exceptions. Poland, that joined EU in May 2004, belongs to the group of countries with the highest GDP levels. In the same time, it had one of the highest growth rates in 2008. Another exception is Portugal that performed quite badly for both parameters.

Figure 12. Quartile maps GDP (left-side) and GDP growth rate (right-side) in 2008

![GDP Quartile Maps](source)

Source: own calculations using GeoDa 0.9.5i software, based on Eurostat and AMECO data

Figure 13. Quartile maps GDP per capita in 1999 and 2008 and average annual growth rate of GDP per capita from 1999 to 2008

![GDP per Capita Quartile Maps](source)

Source: own calculations using GeoDa 0.9.5i
Even higher differences are to be found in the case of the GDP per capita. As shown in graph 13, few changes have occurred in ten years. Germany switched groups with Finland, while the Polish have become poorer. The discrepancy between North and South is more profound here than in the case of the nominal GDP. In addition, the polarization pattern between East and West remains important. Again, the new member states have opposite positions in absolute and relative terms. Romania is the leader in this case too, with an average annual growth rate of 17.5% in 10 years for the GDP per capita.

**Figure 14. Quartile map of average annual growth rate of GDP per capita (1999 to 2008)**

As can be deducted from the above presented maps, there is a strong negative correlation between economic development and growth rate. The more rapid growth of the poor economies relatively to the growth of the richer ones is defined by the absolute $\beta$ convergence. The position of Romania (which is the study object of this research is presented in Appendix 3 using cartograms). When analyzing spatial dependences it is necessary to construct a weights matrix. There are several ways of doing it. After testing all the possibilities, the most suitable proved to be the rook method\(^78\). The technique used here for sensing the presence of spatial autocorrelation is ESDA. It detects patterns of global and local spatial autocorrelation and suggests spatial regimes. The first step was to look for global spatial autocorrelation using Moran’s I statistic and the Moran’s diagram. They accept

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\(^78\) It had the lowest values for the I Moran test, the mean and the standard deviation.
the null hypothesis of no spatial autocorrelation for the nominal GDP in 2008 and reject it for the rest of the variables. This means that the two growth rates and the GDP per capita are spatially autocorrelated (consequently, the rest of this part will refer only to these four variables). The global result is positive spatial autocorrelation for the EU27 countries (see also Appendix 3), meaning spatial concentration of high/low values.

The Moran’s I diagram has four quadrants:

- **HH**: regions with a high value of the parameters are associated with regions with the same level (high - high),
- **LL**: regions with a low value of the parameters are associated with regions with the same level (low - low),
- **HL**: regions with a high value of the parameters are associated with regions with low levels (high - low),
- **LH**: regions with a low value of the parameters are associated with regions with high levels (low - high).

Quadrants HH and LL refer to positive spatial autocorrelation indicating spatial clustering of similar values. The other two, HL and LH show negative spatial autocorrelation – spatial clustering of dissimilar values. For a better geographical understanding, the European Union’s map was attached to each Moran diagram (see Appendix 3). As expected, the new Eastern member states are either in the HH quadrant when growth rates are analyzed, or in the LL one for absolute values. There are also outliers, belonging to the HL and LH quadrants. For example, Spain and Slovenia have moved from LH in 1999 for the GDP per capita towards LL in 2008.

To go deeper in the analysis, the local spatial autocorrelation was assessed through the LISA test. As an example are presented the LISA cluster and significance maps for per capita GDP in 2008. They come to restate the results discussed above – Western regions are richer while the Eastern ones are poorer. And Romania is among the poorest.

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79 The Moran’s I statistic is very close to 0, the p-value is 0.1550 > 0.05 and E(I) is smaller than the Mean but very close to it (-0.0385 < -0.0330).
80 In all of the cases, I > E(I) = -1/(n-1).
81 The third and the fourth groups are called outliers.
82 Meaning high growth rates.
83 Low values of GDP per capita both in 1999 and 2008.
After the descriptive analysis, the next step is to find the adequate regression model for the spatial autocorrelation (estimation of the $\beta$ convergence). Specific for spatial analysis is that usually the estimations of the OLS model are unreliable and misleading and the maximum likelihood approach has to be taken (either a spatial autoregressive model or a spatial autocorrelated errors model).

When studying conditional convergence, i.e. initial conditions do not matter, the empirical models all come to sustain and confirm the findings from the map analysis – the existence of conditional $\beta$ convergence. The absolute values of GDP and GDP per capita are strongly correlated in a negative sense with the longitude. This suggests the declining trend from West to East, i.e. the Eastern members are poorer than the old members. Meanwhile, the growth rates are positively spatially correlated, showing the growing pattern from West towards East.

When combining absolute and relative data in time – spatial analyses, the most important parameters that can be computed are the convergence speed ($b$) and the half-life period ($\tau$). For the present research, of most importance is the convergence speed of the GDP per capita $b = 0.031\%$. With this value, Eastern member states will need a very long period of time to get closer to the old and rich member states of the EU. The half-life has an extreme value of 2256.88 years, meaning that in this manner, Eastern members will need more than 2000 years to fill half of the gap that parts them from the richer members.

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84 As GDP per capita is a measure of individuals' wealth in a country.
But growth rates and the present state of convergence also depend on the initial conditions. As a consequence, club β convergence was analyzed for the European Union taking into consideration the GDP per capita and its average annual growth rate from 1999 to 2008\(^85\).

When introducing the initial status, i.e. the GDP per capita in 1999, the longitude lost its influence (the coefficient of the X variable was statistically equal to 0). As a result, the model was restated to include only the two significant factors – latitude and the level of the GDP per capita in 1999.

The regression model estimated is:

\[
RPIBLOC99-08 = \alpha e + \beta_1 PIBLOC99 + \beta_2 Y + \varepsilon, \quad \varepsilon \sim N(0, \sigma^2 \varepsilon)
\]

where:
- RPIBLOC99-08 – average annual growth rate of GDP per capita in the period 1999 – 2008,
- e – the unit vector
- PIBLOC99 – the value of GDP per capita in 1999
- Y – latitude

After running the OLS regression, was observed that the most suitable model is the spatial lag regression. A respecification of the model was made by including the spatial lag variable. The final equation obtained is:

\[
RPIBLOC99-08 = 0.437W_{RPIBLOC99-08} - 0.000205PIBLOC99 + \varepsilon
\]

All things considered, the average annual growth rate of a country, Romania included, is positively influenced by the average annual growth rates of the neighbours, indicating a spatial clustering of the EU members based on the GDP per capita growth rates. Concurrently, the growth rate is negatively influenced by the initial level of the GDP per capita, confirming the β convergence hypothesis. This implies convergence in growth rates, as members with higher initial incomes have smaller rates of growth than those with lower initial incomes. The speed convergence is \(b = 0.02%\).

All in all, spatial convergence is in the form of convergence in growth rates in the European Union, with poorer countries needing a lot of time to get closer to the richer older members. The hypotheses of spatial clustering made at the beginning of this analysis were all confirmed. Romania, the subject of this research has had the highest growth rates from 1999 to 2008, but the penultimate levels of absolute GDP values.

\(^85\) For detailed results, see Appendix 3.
IV.2. Price Convergence

The Maastricht criteria include two antagonistic classes: the inflation criterion (in the nominal convergence group) and the price convergence one (in the real convergence group). The Optimum Currency Area is an area in which, at one time, its members will come to have the same levels of incomes and prices (at least in theory). Price convergence is thus an intrinsic process of any monetary union. The Central and Eastern European countries have entered the European Union with an important inheritance of low levels of incomes and prices. During the communist regimes, everything in economy was state controlled. In the early 1990s, the end of the communist period left these countries with very low levels of prices and incomes in comparison with the Western old members of the European Union. Closing this great gap results in inflationary pressures that may deviate a country from fulfilling the price stability criterion. National authorities are thus faced with a major problem: what should prevail – price stability or price convergence? The answer is very easy. Price stability is more important as this is the main adherence criterion. But price convergence would anyway happen, so a good analysis of the process is necessary for any political decision.

Price convergence has increased lately in Romania, being faster than in other new members\(^{86}\) for different products. Still, for the household final consumption, in most of the years, only Bulgaria had a lower level than Romania (see map in figure 16), with France, Ireland and the Nordic countries being the most expensive. Taking the value of the European Union (EU 27) as reference, in 2008, the price levels of final consumption by private households, including indirect taxes, was 104.1 in the Euro Area, while in Romania was only 62.1.

\(^{86}\) Like Bulgaria, Slovakia, Latvia, etc.
Spatial price gap is quite denotive between old and new members. This creates inflationary pressures in the latters while leading to shopping fluxes which increase demand and then prices in the destination countries. As can be seen in the map above, price convergence takes place on too different directions: East – West (new members versus old ones) and North – South (the Northern countries which are known for their wealth and the Southern ones, poorer). These findings were also proved by the econometric analysis. When constructing the spatial interdependence model, the coefficient for longitude came out negative, while the one for latitude positive (see Appendix 3). Studying the speed of price convergence may help authorities at taking the right decisions when it comes to find the equilibrium between this and inflation evolutions.
The average level of price convergence is influenced by the individual evolution of all its components. Prices in Romania are noticeably lower for the majority of these components, with some exceptions that will be discussed further.

In what regards food and non-alcoholic beverages, prices for milk, cheese and eggs are almost equal to the ones in the Euro Area (see Appendix 2). From 2007, oils and fats have become more expensive in Romania (the comparative price level index was 116.1 in Romania in 2008 and 98.4 for the Euro Area, taking the EU27 as a basis for comparison – EU27 = 100). Almost at the same level are beverages, both alcoholic and non-alcoholic.

Comparable indices are also to be found for clothing and footwear, audio-visual, photographic and information processing equipments, etc. Using the ESA95 aggregates, indicators of the gross capital formation are closer to the Euro Area levels, indicating an increased price convergence. It is the case of machinery and equipments, metal products, electrical and optical equipment, transport equipment and civil engineering works. Software has lately become more expensive in Romania.

In terms of goods, semi-durable and durable goods have converged more quickly to prices in the Euro Area. The services sector has remained far behind it.

The situation is not very good. First of all, the problem is in the non-durable goods (which are basically food). Entering the Euro Area means bringing all prices as close as possible to the average level. The process will generate important inflationary pressures.
In addition, when adopting the common currency, prices will be rounded upwards\(^8\) and costs of monetary transformations will be supported by the consumer. In Romania will appear the so called “inflationary illusion” phenomenon\(^9\), i.e. the people will have the impression that prices have become higher for products they buy frequently, while the effect upon the real income will be the one measured by the official inflation rate. An important observation is to be made here. When measuring inflation is used an average household. Due to the existent low level for food products, prices will go higher for goods and services that weight more in the consumption basket of the under – average households. And because these are the majority in Romania, the inflation rate measured by the perceived inflation surveys will be higher than the one measured by Eurostat (Gocev, 2006). Indeed, all Eurobarometers intended to measure the citizens’ perception of the Euro in the months following the changeover found this – from the point of view of the consumer, prices have gone higher. Different types of households have different behavioural patterns. High income households are not affected by changes in food prices, utility prices and so on. In their consumption baskets, luxury products weight more. And usually is this type of products that has the fastest convergence path. Lower income households are affected by changes in food prices, utilities, transportation, health care and all that. Inflationary jump due to all the costs of adopting a new currency will be much more felt by the latter group of citizens.

Here comes in discussion another important issue – the convergence of regulated prices. Regulated prices are a component of the equilibrium real appreciation\(^9\). They comprise public utility services (water, electricity, gas, etc.), public transportation, communication, education, healthcare and all that. The level of regulated prices in Romania is still very low when compared to the Euro Area. Communications are the closest to the EA average (comparative price level indices of 78.4, 103.1 respectively in 2008). Other groups have half the prices of the EA. On the last places as price convergence are the health and education sectors. Prices in education represented in 2008 only 23.6% of the EU27 level in Romania, while in the EA they were 111.3% of the EU27 level. In healthcare, a Romanian paid the equivalent of 36.6% of the EU27 average and a citizen of the Euro Area paid 103.6%. No wonder there are many foreign students coming to Romania and a lot of medical tourism from the developed countries.

\(^8\) As previously happened in all the members that are already in the EMU.
\(^9\) Also called “inflationary masochism”.
\(^9\) The term refers to a steady rise in prices in sectors where there is no external competition and the market is monopolistic.
The regulated prices together with the overall price level are positively correlated with the level of economic development (National Bank of Hungary, 2008) for the countries of the European Union. A 1% increase in the GDP level leads to a more than 0.9% increase both in the level of prices in general and in the level of the regulated prices. The direct consequence is inflationary pressure. The level of inflationary pressure depends also on how much weight regulated sectors in the consumption basket. In the European Union and the Euro Area regulated prices represent somewhere around 24% of the total consumption basket, while in Romania they represent around 34%. So, increases in the regulated prices’ levels, in order to adjust them to the EA level, will be more intensively felt in the inflation level in Romania. Apart from electricity prices for industrial consumers, important differences are yet to be lowered.

Figure 18. Semi-annual evolution of prices for natural gas and electricity

Data source: NBR, Eurostat, NIS.
A part of the price convergence is given by the Balassa – Samuelson effect. Regulated sectors are sectors with no external competition. They are characterized by monopolistic behaviour, in some cases even regie. Sectors that are exposed to international markets through foreign trade are characterized by an increase in productivity and, of course, in prices. The Balassa – Samuelson effect manifests through an increase in the prices of goods and services which are not traded internationally (non tradables) much faster than the ones subjected to foreign trade (tradables). Is thus necessary to liberalize a part of the regulated sectors. The European Union has in mind to liberalize the postal sector by 2010 and to takeoff national postal monopoly.
IV. 3. Structural Convergence

When entering the European Economic and Monetary Union, a country gives up one of its main adjustment mechanisms – the monetary policy, entering under the rule of law of the European Central Bank. This is crucial, as monetary policy together with the floating exchange system are the main instruments in dealing with shocks to the economy. Under a common monetary policy, the type of shock occurring is very important. If shocks are symmetric, policy decisions taken at the Euro Area level have the same effect throughout the Union. But if fluctuations do not follow similar patterns in different countries, a common monetary policy is not able anymore to deal properly with the problem. Therefore, vulnerability to asymmetric shocks is of major concern. Mundell (1961) remarks in the Optimum Currency Areas theory that a national independent monetary policy can be substituted by the single one in a monetary union only if there is a high probability that shocks in that economy to be similar to the shocks in other member countries. For that to happen, there has to be a high level of economic synchronization, namely business cycle synchronization, ample foreign trade integration and similar economic structures.

In the same time, the same theory states that is not really necessary to attend to these criteria if the substituting mechanisms\textsuperscript{90} are flexible enough to offset the effects of an asymmetric shock. In addition, the endogeneity principle of the OCA holds good for the increase in business cycle convergence after adopting the common currency. The main consequence of entering a monetary union is the extinction of the exchange rate risk, with all the benefits deriving from it. Among them is the increase in external trade among the member states which automatically will lead to business cycle synchronization. Later evidence show yet limitations of this principle. If integration takes place based on Ricardo’s comparative advantage theory, augmenting intra-industry exchanges instead of the inter-industry ones, economic cycles will become divergent, increasing the costs of joining such a union (Krugman, 1993). And indeed, after the Euro introduction, the structural convergence among the area decreased instead of increasing, showing an intensification of regional specialization.

Thus, structural convergence has an extremely important role in appreciating the gains or losses of a monetary integration.

\textsuperscript{90} Namely the fiscal policy and the labour market policy.
As Romania does not have the “opt-out” possibility, the only thing left is to work for increasing its convergence on all levels. The problem is whether there is structural convergence and how sustainable is the degree of cyclical convergence between Romania and the Euro Area. After dealing with real convergence in the previous part of the chapter, this one focuses exactly on the issue of structural convergence and exposure to asymmetric shocks, leaving for the last part the problem of market flexibility.

For a better understanding of the analysis, it has been divided in three, based on the main economic criteria of the OCA\textsuperscript{91}.

\textbf{IV.3.1. Business cycles synchronization}

Numerous studies have confirmed the relationship between the cyclical convergence and the vulnerability to asymmetric shocks (Bayoumi & Eichengreen, 1997). If a cyclical economic co-movement was observed in the past between two entities, it is probable that it will continue, leading to similar fluctuations. Business cycles synchronization has been studied mainly using the GDP or its components as proxies for the national business environment. There are two main approaches: one that uses correlation between macroeconomic variables and the second that divides economic fluctuations in demand and supply shocks\textsuperscript{92}.

As mentioned before\textsuperscript{93}, the floating exchange rate is one of the main channels of shock transmission to the real economy (basically under the form of the so called “contagion effect”). The relationship between the GDP evolution and the Exchange Rate Volatility was previously studied (Bayoumi & Eichengreen, 1997), with results showing a statistically significant positive relation between nominal exchange rate volatility and the GDP growth rate, as a proxy for cyclical convergence. This is an evidence of the relation between cyclical convergence and vulnerability to asymmetrical shocks.

The synchronization of business cycles is very well captured by analysing the co-movement of the macroeconomic variables. To have an even closer result to reality, the most interesting part is the cyclical one. The results of such a study reflect the short-term and

\textsuperscript{91}But the three criteria are interdependent.
\textsuperscript{92}Both methods have advantages and disadvantages.
\textsuperscript{93}In chapter II.3. The Exchange Rate Mechanism II (the exchange rate criterion)
medium-term relationships between two entities. Cyclical co-movement is dealt with the help of correlation theory between parameters of Romania and the Euro Area. As GDP best expresses economic domestic evolution, cyclical correlations were computed for GDP and its main components to have a more complex picture of the business cycles synchronization level.

Using the Hodrick–Prescott filter for the period 1998:Q1 – 2009:Q1, the following macroeconomic variables were decomposed into trend and cyclical components: GDP, domestic demand, value added (per total economy), value added in industry and households final consumption. The reasons for this choice is to cover both sides of the economy – demand and supply – as many studies have approached economic fluctuations based on demand and supply shocks. For monetary integration, matters most synchronizing demand shock, as they can easily be counter fought by means of monetary policy. The effect upon supply shocks is quite limited, but it reflects economic structure differences, that may diminish or increase after integration. Another reason is based on the development of the Romanian economy in the last period. Until 2008, massive flows of FDIs came into Romania, thing that should be seen in an increase in the gross value added, both at national and sectorial level. Figures for industry are very important as it is the main indicator for structural and cyclical convergence and trade integration. In addition, credit volume grew faster which increased demand and, as a consequence, the final consumption expenditures of the privates. Fortunately, Romania has a low credit boom risk (Kiss, Nagy, Vonnak, 2006), this boost being just a consequence of the convergence process.

Besides analysing the existence of synchrony, is useful to see the type of cyclical behaviour between the two series. If at lag/lead 0, the cross-correlation coefficient is large and positive, then there is a pro-cyclical co-movement between the two entities (from the point of view of the series studied). In the same time, a large negative correlation coefficient at lag/lead 0 is an indicator of a counter-cyclical co-movement. This is very important in appreciating the effects of a single common policy. In the case of a pro-cyclical relationship, the two entities are in the same stage of an economic cycle, so the common monetary policy of the Euro Area would have the same effects, dealing in the same manner with fluctuations that appear (Berument et al., 2005). When negative cross-correlation appears, the counter-cyclical movement leads to the need of two different types of measures to be taken for re-establishing equilibrium, the cost of abandoning the independent monetary policy being significant.
For the purpose of the analysis, variables were first seasonally adjusted (to preserve only the growth component and the cyclical one) and then transformed into natural logarithms\textsuperscript{94}. As already mentioned, I have used the Hodrick-Prescott filter for decomposing the variables and not the band-pass filters as the latters need a greater amount of data for accuracy\textsuperscript{95}. Anyway, Baxter & King (1995) have demonstrated that for the same data there is a close correspondence between the cycles isolated by the Hodrick-Prescott filter and the ones generated by the band-pass filter.

After extracting the cyclical components, their chronological evolutions were plotted and presented below. Cyclical evolutions are more or less the same between Romania and the Euro Area. They are more different at the beginning of the analysis period and tend to converge towards now-a-days, a sign of the convergence actions undertaken by Romania on its way to Euro. However, variations are higher in Romania than the EA average. While parameters in EA vary between -0.16 and +0.06, the Romanian ones have a broader interval of +/- 0.3.

There are two steps in analysing correlation results. Firstly, is important the value of the 0 order in the cross - correlogram, as it gives the type of cyclical movement (pro or counter - cyclical). The same coefficients are displayed by the Correlation Matrix.

Secondly, the maximum value (in absolute terms) of the cross – correlations determines the lead – lag relationship between Romania and the Euro Area (Stock & Watson, 1999). If the maximum absolute value is in the lag column, then the Euro Area leads Romania for that variable (the Romanian economy is influenced with a lag of a certain order by changes in the Euro Area level). On the contrary, if the maximum absolute value is found in the lead column, then Romania leads the Euro Area with that lag.

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|}
\hline
& GDP & 0.5638 & Industrial gross value added & 0.5758 \\
\hline
Gross value added & 0.555 & Household consumption & 0.3816 \\
\hline
Domestic demand & 0.5947 & \\
\hline
\end{tabular}
\caption{Correlation coefficients between Romania and the Euro Area as resulted from the correlation matrices}
\end{table}

\textit{Source: own calculations}

\textsuperscript{94} In this way, first differences of the trend are, in fact, quarterly growth rates of the variables and we can speak of the variables in terms of elasticities.

\textsuperscript{95} Important amount of data is lost using the band-pass filters as they decompose the variable using the moving average method of high orders.
The results of the correlation matrices all indicate a pro-cyclical movement between Romania and the Euro Area. This means that the common monetary policy should be appropriate for dealing with fluctuations of the Romanian economy (the shocks occurring will be symmetric). Business cycle synchronization is around 56% in the GDP fluctuations, 55% and 57% - gross value added in economy, gross value added in industry, respectively, 59% in domestic demand. The lowest level is encountered in the case of households’ final consumption – 38%. This was somehow expected due to the credit growth before 2008 that led to an increase in private demand and, of course, in prices (especially on the real estate market).
Figure 19. Cyclical evolution of macroeconomic parameters in Romania and the Euro Area

Data source: NBR, NIS, Eurostat, AMECO, IMF.
Table 7. Results of the cross–correlations – lead-lag relations

<table>
<thead>
<tr>
<th>Order i</th>
<th>GDP</th>
<th>Value added</th>
<th>Ind. value added</th>
<th>Consumption</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lag</td>
<td>lead</td>
<td>lag</td>
<td>lead</td>
<td>lag</td>
</tr>
<tr>
<td>0</td>
<td>0.5638</td>
<td>0.5638</td>
<td>0.5555</td>
<td>0.5555</td>
<td>0.5759</td>
</tr>
<tr>
<td>1</td>
<td>0.2309</td>
<td>0.3182</td>
<td>0.2377</td>
<td>0.3277</td>
<td>0.2593</td>
</tr>
<tr>
<td>2</td>
<td>0.1337</td>
<td>0.3225</td>
<td>0.1233</td>
<td>0.3457</td>
<td>0.1876</td>
</tr>
<tr>
<td>3</td>
<td>0.0648</td>
<td>0.2543</td>
<td>0.0095</td>
<td>0.2500</td>
<td>0.1298</td>
</tr>
<tr>
<td>4</td>
<td>-0.0298</td>
<td>0.1702</td>
<td>-0.0795</td>
<td>0.1417</td>
<td>0.0675</td>
</tr>
<tr>
<td>5</td>
<td>-0.1091</td>
<td>0.0997</td>
<td>-0.1681</td>
<td>0.0615</td>
<td>-0.0037</td>
</tr>
<tr>
<td>6</td>
<td>-0.1691</td>
<td>0.0807</td>
<td>-0.2231</td>
<td>0.0555</td>
<td>-0.0470</td>
</tr>
<tr>
<td>7</td>
<td>-0.2076</td>
<td>-0.0509</td>
<td>-0.2394</td>
<td>-0.0856</td>
<td>-0.0986</td>
</tr>
<tr>
<td>8</td>
<td>-0.2218</td>
<td>-0.1169</td>
<td>-0.2491</td>
<td>-0.1316</td>
<td>-0.1290</td>
</tr>
<tr>
<td>9</td>
<td>-0.1901</td>
<td>-0.1306</td>
<td>-0.2102</td>
<td>-0.1388</td>
<td>-0.1175</td>
</tr>
<tr>
<td>10</td>
<td>-0.1476</td>
<td>-0.0268</td>
<td>-0.1626</td>
<td>-0.0230</td>
<td>-0.1077</td>
</tr>
<tr>
<td>11</td>
<td>-0.1432</td>
<td>-0.0041</td>
<td>-0.1426</td>
<td>-0.0068</td>
<td>-0.1259</td>
</tr>
<tr>
<td>12</td>
<td>-0.1159</td>
<td>0.0681</td>
<td>-0.1113</td>
<td>0.0636</td>
<td>-0.1034</td>
</tr>
</tbody>
</table>

Source: own calculations using the Eviews 5.1 software

The highest values are at order 0 for all variables, suggesting that Romania and the Euro Area are contemporaneously pro–cyclical: effects of a shock in one part manifest in the same quarter in the other part, with similar effects. Anyway, cross-correlation coefficients are further quite significant (at different lags or leads), showing a greater time interdependency between each set of variables.

Following the Hodrick-Prescott methodology (1997), data were divided into two equal groups, from 1998:Q1 to 2003:Q3 and from 2003:Q4 to 2009:Q1. To check for the stability of the measures over time, standard deviations where computed for the first sample, the second one as well as for the entire period.
Table 8. Standard deviations of the variables

<table>
<thead>
<tr>
<th></th>
<th>Whole period</th>
<th>First half</th>
<th>Second half</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GDP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>0.075619</td>
<td>0.075018</td>
<td>0.077977</td>
</tr>
<tr>
<td>Euro Area</td>
<td>0.011503</td>
<td>0.008498</td>
<td>0.014073</td>
</tr>
<tr>
<td><strong>Gross value added in economy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>0.076845</td>
<td>0.079939</td>
<td>0.075336</td>
</tr>
<tr>
<td>Euro Area</td>
<td>0.011368</td>
<td>0.009142</td>
<td>0.013372</td>
</tr>
<tr>
<td><strong>Gross value added in industry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>0.100587</td>
<td>0.111683</td>
<td>0.090171</td>
</tr>
<tr>
<td>Euro Area</td>
<td>0.027936</td>
<td>0.015881</td>
<td>0.036990</td>
</tr>
<tr>
<td><strong>Domestic demand</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>0.086920</td>
<td>0.082880</td>
<td>0.092805</td>
</tr>
<tr>
<td>Euro Area</td>
<td>0.011202</td>
<td>0.009889</td>
<td>0.012512</td>
</tr>
<tr>
<td><strong>Households final consumption</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>0.089539</td>
<td>0.010191</td>
<td>0.093875</td>
</tr>
<tr>
<td>Euro Area</td>
<td>0.009644</td>
<td>0.086811</td>
<td>0.009005</td>
</tr>
</tbody>
</table>

*Source: own calculations*

As expected, the greatest cyclical variability is to be seen in the case of Romania for the final consumption expenditure of households\(^{96}\) and the gross value added in industry. This is a consequence of the reforms taken by authorities that increased trust in Romania’s economic capacities and a consequence of the real convergence process that aligns incomes, prices and credits. The two parameters were also with the greatest fluctuations in the Euro Area.

Together with the standard deviations were also computed de cross-correlation coefficients for the two halves, to see what changes have occurred in the cyclical convergence process. Of course, at the beginning, for the first half, correlation coefficients are low, increasing very much in the second one.

Two conclusions can be drawn. The first one regards the convergence process of Romania which accelerated in time. This means that from the point of view of the business cycles convergence Romania is on the right path and costs of giving up its own monetary policy are low. Being contemporaneously pro-cyclical with the Euro Area, effects of the ECB’s decisions will be felt in the same quarter and in the same direction.

The second conclusion is that the overall cyclical convergence is pretty much influenced by the behaviour of different components that may, for a short period of time, have a counter-cyclical convergence with the Euro Area. Moreover, for each of the sets of

---

\(^{96}\) Final consumption expenditure of households is the leader both in Romania and the Euro Area.
variables is very important the period of time in which they react to changes in their correspondents (coefficients for different leads and lags). Decisions have to be taken to annihilate the short-time counter-cyclical evolution.

**Figure 20. Cross-correlation coefficients for the variables in the two groups and for the entire period**

![Cross-correlation coefficients graph](image)

*Source: own calculation*

Figures in graph 20 reinforce the conclusions found on the basis of the standard deviation analysis – the biggest fluctuation was in the case of private consumption, from a weak correlation of around 9% till 2003 to almost 75% correlation afterwards.

In the first part, 1998:Q1 – 2003:Q3, there were significant correlation coefficients (of maximum 50%) at higher integration orders (up to a lag or lead of 8), showing a delayed relationships between parameters in a group. For example, in the case of private consumption, the highest correlation was negative between Romania and the Euro Area (meaning counter-cyclicality) and with a delay of 8 lags. Changes in the Euro Area affected the level in Romania with a delay of 8 quarters and in a reverse manner. For the demand field, Romania was also leaded by the Euro Area, but this time only with 3 quarters. An interesting relationship was found for the two value added considered. They had a counter-cyclical evolution, with correlations above 40%, but in their case Romania led the Euro Area by more than a year (leads are minimum 4).
To prove the validity of the results, two more tests were applied, which use different methodologies\textsuperscript{97}. The Granger causality test was used to assess the short term causality relations in each pair of macroeconomic variables. Running the test for different lag values, results were consistent with the above findings. As an additional measure of stability, were used the Chow breakpoint and forecast tests. Integration through structural changes were found in the case of demand and consumption.

To maintain the synchronization of the business cycles of Romania and the Euro Area at a pro-cyclical level, a prudential approach is necessary from the governmental and administrative bodies, including the National Bank of Romania. As Berument et al. (2005) show using the case of Turkey, the type of current cyclical relationship is not necessarily for good. On the background of the present international crisis, internal ones may occur. That is why authorities have to enhance macroeconomic stability through different crisis prevention policies, but still, allow the national economy to develop and converge rapidly.

**IV.3.2. Economic structure similarity with the Euro Area**

Similarity of economic structures implies exposure to the same kind of shocks (symmetric), with a common policy able to annihilate fluctuations both in Romania and the Euro Area. For Romania to have a similar economic structure with the Euro Area, the share of different sectors has to be close to the Euro Area average. This share was computed in the field’s literature on the basis of two main parameters: the value added by each sector and the number of employees of the sector. The same path will be followed hereinafter.

The issue under discussion is very important as it emphasizes the gap between Romania and the Euro Area and leads to the conclusion of what decisions have to be taken to diminish the gap. Starting with late 20\textsuperscript{th} century, there was a realignment of the international economic structures from labour intensive sectors towards capital intensive sectors. Labour intensive production moves more and more unto Asian territories, in search for cheap labour force. The movement is driven by the main property of this sector – the low value added obtained. Emphasis is put on high value added sectors, characterized by a significant input of capital and research. The report of the National Bank of Hungary - *Analysis of the*\textsuperscript{97} This was to see whether through other methodologies results are the same, meaning that they are significant and consistent with reality.
Convergence Process, March 2008 – reveals that among the new member states, until 2006, Hungary had the most significant realignment of the economic structure with the European one (the smallest asymmetry indicator). In the following the same problem will be dealt with for Romania.

Beside the common policy reason already stated at the beginning, similar economic structures potentiate positive attitude of the population. The reason behind this affirmation is described by Allam and Goerres (2008). When analysing the economic explanations of the citizens’ attitude towards Euro adoption, two groups were identified. The first one that sustains the process is made up of high qualified workers and entrepreneurs that run their business in capital intensive sectors. They consider the Euro Area full of opportunities for their future development. The second group consists in low qualified persons that are mainly employed in the labour-intensive sectors (such as textile). They are against monetary integration as income and wage convergence is seen as a threat that will materialize in adjustment costs.

This realignment trend could also be observed in Romania recently, as several companies from the textile sector moved Eastward. It is very important to see changes that have occurred and if Romania is able to catch up with the Western part of Europe and so to minimize its adjustment and convergence costs.
Table 9. Shares of sectors (%) in Romania and the Euro Area based on the value added\textsuperscript{98}

<table>
<thead>
<tr>
<th>Sector</th>
<th>Romania</th>
<th>Euro Area</th>
<th>Romania</th>
<th>Euro Area</th>
<th>Romania</th>
<th>Euro Area</th>
<th>Romania</th>
<th>Euro Area</th>
<th>Romania</th>
<th>Euro Area</th>
<th>Romania</th>
<th>Euro Area</th>
<th>Romania</th>
<th>Euro Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, hunting, forestry and fishing</td>
<td>15.9</td>
<td>6.4</td>
<td>-7.7</td>
<td>2.6</td>
<td>1.9</td>
<td>-0.3</td>
<td>2.8</td>
<td>1.8</td>
<td>-1.0</td>
<td>2.2</td>
<td>2.1</td>
<td>0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>2.9</td>
<td>1.2</td>
<td>-0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0</td>
<td>11.7</td>
<td>0.5</td>
<td>3.2</td>
<td>6.7</td>
<td>6.8</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>23.5</td>
<td>24</td>
<td>0.4</td>
<td>20.3</td>
<td>17.9</td>
<td>-0.2</td>
<td>10.5</td>
<td>11.7</td>
<td>0.5</td>
<td>6.7</td>
<td>6.8</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Electricity, gas and water supply</td>
<td>2.8</td>
<td>1.8</td>
<td>0.0</td>
<td>2.2</td>
<td>2.1</td>
<td>0.1</td>
<td>2.8</td>
<td>2.3</td>
<td>0.6</td>
<td>2.8</td>
<td>3.1</td>
<td>0</td>
<td>6.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Trade</td>
<td>12.1</td>
<td>12.6</td>
<td>0.5</td>
<td>11.6</td>
<td>10.9</td>
<td>-0.4</td>
<td>10.5</td>
<td>11.7</td>
<td>0.5</td>
<td>6.7</td>
<td>6.8</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>2.8</td>
<td>2.3</td>
<td>0.5</td>
<td>2.8</td>
<td>3.1</td>
<td>0</td>
<td>2.8</td>
<td>2.3</td>
<td>0.5</td>
<td>2.8</td>
<td>3.1</td>
<td>0</td>
<td>6.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Transport, storage and communication</td>
<td>10.5</td>
<td>11.7</td>
<td>0.5</td>
<td>6.7</td>
<td>6.8</td>
<td>-0.1</td>
<td>10.5</td>
<td>11.7</td>
<td>0.5</td>
<td>6.7</td>
<td>6.8</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Financial intermediation</td>
<td>2.4</td>
<td>2.9</td>
<td>0.5</td>
<td>4.9</td>
<td>5.1</td>
<td>-0.1</td>
<td>2.4</td>
<td>2.9</td>
<td>0.5</td>
<td>4.9</td>
<td>5.1</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Real estate, renting and business activities</td>
<td>10.5</td>
<td>16.4</td>
<td>5.2</td>
<td>20.5</td>
<td>23.2</td>
<td>1.1</td>
<td>10.5</td>
<td>16.4</td>
<td>5.2</td>
<td>20.5</td>
<td>23.2</td>
<td>1.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Public administration and defence; compulsory social security</td>
<td>3.8</td>
<td>5.1</td>
<td>-0.2</td>
<td>6.8</td>
<td>6.4</td>
<td>-0.3</td>
<td>3.8</td>
<td>5.1</td>
<td>-0.2</td>
<td>6.8</td>
<td>6.4</td>
<td>-0.3</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Education</td>
<td>3</td>
<td>3.6</td>
<td>-0.2</td>
<td>5</td>
<td>4.9</td>
<td>-0.1</td>
<td>3</td>
<td>3.6</td>
<td>-0.2</td>
<td>5</td>
<td>4.9</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Health and social work</td>
<td>2.4</td>
<td>2.9</td>
<td>0.1</td>
<td>6.4</td>
<td>6.9</td>
<td>0</td>
<td>2.4</td>
<td>2.9</td>
<td>0.1</td>
<td>6.4</td>
<td>6.9</td>
<td>0</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Other community, social, personal service activities</td>
<td>2.1</td>
<td>-</td>
<td>-</td>
<td>3.7</td>
<td>3.6</td>
<td>-0.1</td>
<td>2.1</td>
<td>-</td>
<td>-</td>
<td>3.7</td>
<td>3.6</td>
<td>-0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Activities of households</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>0.6</td>
<td>0.1</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>0.6</td>
<td>0.1</td>
<td>6.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Total economy</td>
<td>100</td>
<td>100</td>
<td>-</td>
<td>100</td>
<td>100</td>
<td>-</td>
<td>100</td>
<td>100</td>
<td>-</td>
<td>100</td>
<td>100</td>
<td>-</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Eurostat, National Institute of Statistics (NIS), own calculations

Romania’s economic structure is still far from the Euro Area average. The agricultural sector, with all its components, plays an important role. The share of value added in agriculture was more than 6% in 2007, more than triple the Euro Area average. Almost 30% of the Romanian employment is in agriculture, a difference of 25% from the average employment in the Euro Area. Even though agricultural parameters have decreased in time very much, we still are far beyond the Common Currency Union. And the most important problem is related to the low value added in agriculture and the fact that in Romania agriculture is still an extremely labour intensive sector.

The sectors that are closer to the Euro Area are manufacturing, trade and transport, storage and communication. But in the manufacturing sector the main problem is to see what types of activities are prevailing. Europe, in general, tends to go towards high value added sectors, which are capital intensive and use high technologies. The construction and transport sectors have increased very much, exceeding the average Euro Area levels.

More investments are necessary in education and health.

\textsuperscript{98} The first available data on Eurostat for Romania are in 1998, that is why it has been chosen for presentation

\textsuperscript{99} For 2007, data were available only for the whole industrial sector, so values of the Mining and quarrying, Manufacturing and Electricity, gas and water supply sectors are own calculations based on the press releases of the NIS regarding Industry.
Table 10. Shares of sectors (%) in Romania and the Euro Area based on employment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, hunting, forestry and fishing</td>
<td>38.1</td>
<td>29.7</td>
<td>-8.4</td>
<td>4.6</td>
<td>4.0</td>
<td>-0.6</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>1.9</td>
<td>1.1</td>
<td>-0.8</td>
<td>0.3</td>
<td>0.2</td>
<td>-0.1</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>22.28</td>
<td>20.6</td>
<td>-1.7</td>
<td>19.4</td>
<td>16.3</td>
<td>-2.9</td>
</tr>
<tr>
<td>Electricity, gas and water supply</td>
<td>2.1</td>
<td>1.5</td>
<td>-0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>-0.1</td>
</tr>
<tr>
<td>Construction</td>
<td>4.4</td>
<td>6.1</td>
<td>1.7</td>
<td>7.3</td>
<td>7.8</td>
<td>0.3</td>
</tr>
<tr>
<td>Trade</td>
<td>9.5</td>
<td>13.2</td>
<td>3.7</td>
<td>15</td>
<td>14.9</td>
<td>0</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>1.1</td>
<td>1.6</td>
<td>0.5</td>
<td>4.1</td>
<td>4.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Transport, storage and communication</td>
<td>5.2</td>
<td>5.3</td>
<td>0.1</td>
<td>5.7</td>
<td>5.6</td>
<td>-0.1</td>
</tr>
<tr>
<td>Financial intermediation</td>
<td>0.9</td>
<td>1.1</td>
<td>0.2</td>
<td>3</td>
<td>2.8</td>
<td>-0.2</td>
</tr>
<tr>
<td>Real estate, renting and business activities</td>
<td>2.8</td>
<td>5.2</td>
<td>2.4</td>
<td>10.2</td>
<td>13.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Public administration and defence; compulsory social security</td>
<td>1.5</td>
<td>2.2</td>
<td>0.7</td>
<td>7.8</td>
<td>7</td>
<td>-0.7</td>
</tr>
<tr>
<td>Education</td>
<td>4.8</td>
<td>5.0</td>
<td>0.2</td>
<td>6.3</td>
<td>6.2</td>
<td>0</td>
</tr>
<tr>
<td>Health and social work</td>
<td>3.6</td>
<td>4.6</td>
<td>1.0</td>
<td>8.7</td>
<td>9.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Other community, social, personal service activities</td>
<td>1.8</td>
<td>2.7</td>
<td>0.9</td>
<td>4.2</td>
<td>4.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Activities of households</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.6</td>
<td>2.8</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total economy</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>-</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>-</strong></td>
</tr>
</tbody>
</table>

*Source: Eurostat, National Institute of Statistics (NIS), own calculations*

Anyway, realignments have been made and the convergence to the Euro Area is pretty observable. As shown by the World Economic Forum (Global Competitiveness Reports 2008 – 2009 and 2009 - 2010), Romania passed from the stage of an efficiency driven economy to the transition phase from stage 2 to stage 3. In the 2008 – 2009 report only Romania and Bulgaria were efficiency driven economies, all other European Union members being in transition between stages 2 and 3 (most of the new members) and in stage 3 – innovation driven economies (some new members and all of the old ones).

The biggest changes can be seen in the agricultural sector, driven by the present evolutions.

The manufacturing sector weights also more than in the Euro Area. This is very important as industry is the main trade convergence and integration factor. The difference is to be found in the level of different manufacturing subsectors. Romania has been a labour-intensive country during the communist regime. Increasing international competition has led to the development of high-tech activities, based on research and development. In the same time, credit expansion and income convergence had as a consequence an increase in private demand for low-added value products, such as food, cloths, etc. As table 11 shows, there is still a significant gap in the manufacturing sector. Branches with low value added represent more than 40% in Romania, while the level in the Euro Area is around 25%.
Table 11. Shares of manufacturing branches in total manufacturing in Romania and the Euro Area based on the total value added (%)

<table>
<thead>
<tr>
<th>Branches</th>
<th>Romania 2006</th>
<th>Change since 1998</th>
<th>Romania 2006</th>
<th>Change since 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food products; beverages and tobacco</td>
<td>27.5</td>
<td>-1.5</td>
<td>11.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Textiles and textile products</td>
<td>7.7</td>
<td>-1.5</td>
<td>3.5</td>
<td>-1.4</td>
</tr>
<tr>
<td>Leather and leather products</td>
<td>2.1</td>
<td>-0.1</td>
<td>0.9</td>
<td>-0.2</td>
</tr>
<tr>
<td>Wood and wood products</td>
<td>4.1</td>
<td>-3.2</td>
<td>2</td>
<td>-0.3</td>
</tr>
<tr>
<td>Pulp, paper and paper products; publishing and printing</td>
<td>3.9</td>
<td>0.8</td>
<td>7.6</td>
<td>-0.8</td>
</tr>
<tr>
<td>Coke, refined petroleum products and nuclear fuel</td>
<td>5.1</td>
<td>-0.2</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Chemicals, chemical products and man-made fibres</td>
<td>4.2</td>
<td>-1.2</td>
<td>10.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>3.5</td>
<td>1.2</td>
<td>4.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td>5</td>
<td>-1.2</td>
<td>4.6</td>
<td>-0.1</td>
</tr>
<tr>
<td>Basic metals and fabricated metal products</td>
<td>9</td>
<td>-2</td>
<td>15</td>
<td>1.5</td>
</tr>
<tr>
<td>Electrical and optical equipment</td>
<td>7.6</td>
<td>2</td>
<td>12</td>
<td>0.4</td>
</tr>
<tr>
<td>Transport equipment</td>
<td>10.8</td>
<td>5.5</td>
<td>11</td>
<td>0.3</td>
</tr>
<tr>
<td>Manufacturing n.e.c.</td>
<td>4.6</td>
<td>3.7</td>
<td>3.8</td>
<td>-0.1</td>
</tr>
</tbody>
</table>

Source: Eurostat, National Institute of Statistics (NIS), own calculations

To compare the European Union’s members, the most common is the Structural Asymmetry Indicator. Using the shares of different sectors in the whole economy, the indicator is computed as a deviation from the Euro Area average. For this analysis, I chose the standard deviation approach\(^\text{100}\): \(\sigma_r = \sqrt{\frac{1}{N} \sum_{ij} (r_{ij} - \bar{r}_{EAj})^2}\), where \(i\) represents the country and \(j\) a certain sector of a national economy.

Romania is penult among the union (\(\sigma_r = 15.6\)), with a higher structural asymmetry indicator being only Luxembourg (\(\sigma_r = 26.17\) - which obtains almost half of its value added from the financial, real estate and business activities). The consequence of such value might be the appearance of asymmetrical shocks in Romania. Howsoever, due to the high share of low value added sectors, that are labour-intensive, Romania is an easier victim of international fluctuations. Relocation of these sectors towards Asia and the increased competition on the global market deserve all the attention of the government. Politics and policies conducted by the Euro Area could have reverse effects on the Romanian market than the overall Area, adding to the costs of adopting the common currency. Figures are even worse when analysing employment.

\(^{100}\) In other similar studies, authors employed the linear deviation. The standard deviation is much more appropriate from the statistical point of view, as it is more sensitive to changes in the variables’ level. That is the reason for choosing it.
Among other members, Italy had the closest economic structure to the Euro Area average ($\sigma_r = 2$), followed by Belgium and Austria. Among Central-Eastern European states, the best performer is Hungary with an economic structure similar to the Euro Area average.

**Figure 21. The structural asymmetry indicator for the European Union countries (based on value added shares 2006)**

![Graph showing structural asymmetry indicator for European Union countries.](image)

*Source: own calculations*

Fortunately, in 2007, the Romanian economy came closer to the Euro area, with a decrease of more than 2 standard deviation points, from 15.6 in 2006 to 13.27 in 2007.

Economic structure of Romania is still very different from the Euro area average. Romania is thus exposed to asymmetric shocks coming from the labour intensive domains that will not be properly handled by a common monetary policy. Adopting now the Euro would imply too high costs from this point of view.

Convergence is a continuous and slinky process that has to be officially sustained through investments in research and development, education, health... in order to increase the high-tech ratio in economy. It is therefore a problem of administrative will for Romania to respect the 2015 target of entering the Euro Area.

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101 For Spain and the United Kingdom, the indicator was computed using 2005 data, as 2006 data were not available.
IV.3.3. Foreign trade integration

Among economic features, the degree of foreign trade integration deserves special attention. Trade integration is directly influencing demand fluctuations. As studies have shown (Frankel & Rose, 1996) there is a positive relationship between the bilateral openness of economies and cyclical convergence. But it is very important to see how much a certain degree of cyclical convergence is sustainable on long term. Current position on the international market is hard to maintain due to increasing competition. Sustainability of this position is given by the structure of foreign trade operations and the national capacity to adapt to changes in demand. Flexibility of the national economy is, thus, a key factor.

The share of foreign trade in Romania’s GDP has been above 50% lately. After an increasing period, it reached its peak in 2004 and stabilized afterwards around 75% of the GDP’s annual value. The slight decrease in 2008 is not a consequence of a diminished volume, but of the continuous depreciation of the Romanian Leu during the year (more than 14%). When comparing Romania with the European entities, the degree of openness is quite similar in time, with little differences in the years analyzed. As in the case of the other European Union members, the introduction of the common currency in 1999, followed by the market introduction of the Euro coins in 2002 led to an increase in foreign trade operations (as a consequence of diminishing exchange rate costs – more national currencies were replaced by one). In Romania, the effect was even greater than the Euro Area average in 2002.

Figure 22. Foreign trade openness of the Romanian economy

Source: own calculations based on Eurostat, NIS, NBR data
Surprisingly, as a group, the new member states perform better in terms of trade than most of the old ones. With its ratio, Romania is ahead France and the Club Med countries (which are Euro Area members) and ahead of the United Kingdom. Unfortunately, among Central and Eastern European countries, Romania is the last. The problem will be studied further when analysing the type of goods and services exported or imported. As already mentioned above, there may be a huge volume of exchanges, but if they are labour intensive and not capital intensive, the overall foreign trade value is low.

Figure 23. Economic openness of the European Union members in 1999\(^\text{102}\), 2002, 2008

![Economic openness graph](image)

\(^{102}\) For Greece there was no data available.

Romania’s main partner is the European Union and, within it, countries of the Euro Area. Graph 24 presents the evolution of the shares of exports and imports with the Euro Area, European Union and the rest of the world. Both with the European Union and with the Euro Area, the trade balances are positive, Romania being a net exporter. This discussion regards trade with goods. The share of services foreign trade in GDP is rather small. Even though it has increased a lot, it still represents less than 10% of the GDP.

In 2008, the main partners were countries of the EMU. Germany is on the first place with a share of 16.5% of total exports and 16.3% of total imports. Italy comes on the second place, accounting for 15.4% of the Romanian exports and 11.4% of imports. On the following places are France (7.4%), Turkey (6.5%), Hungary (5.1%) and Bulgaria (4.1%) as destinations for the Romanian exports. Starting from the 3\(^{\text{rd}}\) place, imports originated in...
Hungary (7.4%), The Russian Federation (5.9%), France (5.7%) and so on. In conclusion, Romania has intense foreign trade relationships both with the Euro Area members and with its neighbours, which are on the same path towards the monetary union.

Figure 24. The evolution of exports and imports of goods with different partner groups as a percentage of the total

![Graph showing the evolution of exports and imports with different partner groups as a percentage of the total from 1998 to 2008.]

*Data source: Eurostat*

The goal of this analysis is to emphasize the level of structural convergence between Romania and the Euro Area. Intensity of foreign trade between the two is a satisfactory indicator of the risk of asymmetrical shocks, but not the best. Theories of the Optimum Currency Areas claim that a sustainable synchronisation of business cycles can be achieved only by strengthening intra-industry foreign trade and through a good product composition of exports.

As with the majority of the former communist countries, Romania’s foreign trade commodity structure during the 1990s was based on labour-intensive goods. The entrance in the European Union, accompanied by an important inflow of capital made some changes in this respect, towards more high value added sectors. Lately, more and more of the Romanian exports belong to the medium level value added. The structure of foreign trade exchanges with the Euro area in 2008 was as shown below.
Table 12. Structure of Romanian foreign trade with the Euro Area countries in 2008, based on the Standards of International Trade Classification

<table>
<thead>
<tr>
<th>Sector</th>
<th>Exports (%)</th>
<th>Imports (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and live animals</td>
<td>2.44</td>
<td>5.24</td>
</tr>
<tr>
<td>Beverages and tobacco</td>
<td>1.39</td>
<td>0.77</td>
</tr>
<tr>
<td>Crude materials except fuels</td>
<td>3.95</td>
<td>1.7</td>
</tr>
<tr>
<td>Fuels</td>
<td>1.88</td>
<td>0.95</td>
</tr>
<tr>
<td>Animal and vegetable oils</td>
<td>0.15</td>
<td>0.26</td>
</tr>
<tr>
<td>Chemicals</td>
<td>3.72</td>
<td>12.69</td>
</tr>
<tr>
<td>Manufactured goods</td>
<td>18.38</td>
<td>23.32</td>
</tr>
<tr>
<td>Machinery and transport</td>
<td>40.75</td>
<td>45</td>
</tr>
<tr>
<td>Other manufactured goods</td>
<td>27.26</td>
<td>10</td>
</tr>
<tr>
<td>Products n.e.c.</td>
<td>0.082</td>
<td>0.027</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: own calculations based on NIS data.

The Grubel – Lloyd index\(^{103}\) is the typical indicator of intra-industry trade. Computing it for Romania in 2008 resulted a value of 0.77. This is a very high value, indicating increased vertical and horizontal interrelationships and, as a consequence, a good synchronization of business cycles. However, in comparison with previous years, the index value has declined. For example, in 2006, Romania’s index was 0.81, the highest in the European Union. In the same time, France, which was the best rated among Western countries, had an intra-industry index of 0.8.

Regardless of the level of intra-industry trade, of major importance is the structure of the foreign trade and the type of integration – horizontal or vertical. In the latter type is of major importance to be integrated in the last stages of the production process, were the value added is higher. Unfortunately, the new member states, Romania included, are usually involved in the lower levels of production, which are more labour-intensive and, thus, with lower value added. As previously demonstrated in the field’s literature, these countries are

\(^{103}\) Grubel-Lloyd index = 1 - \(\frac{\sum |x_i - m_i|}{\Sigma (x_i + m_i)}\), where \(x_i\) is a country’s sectoral exports to the Euro Area and \(m_i\) the imports.
more exposed to asymmetrical shocks which cannot be annihilated by a common policy and
which have their roots in the labour market problems.

In 2008, only six sections of the Combined Nomenclature represented 75.9% of the
total Romanian exports, while for imports almost the same sections weighted 76% of the
total. It’s the case of: machinery and mechanical appliances, electrical equipment, sound and
image recorder and reproducers (24.1% of exports and 24% of imports), base metals and
related articles (14.6%, 11.3% respectively), vehicles and associated transport equipments
(12.4% of both exports and imports), textiles (10.5%, 6.1%), mineral products (9.3%,
13.8%) and plastic, rubber, etc. (5% for exports) and chemical products for imports
(8.4%)\(^{104}\).

Most of the Romanian exports are either low value added or medium value added.
More investments have to be made and more central decisions to be taken to sustain the
development of high value added sectors, based on high technologies and capital intensive.
Exports of high technology products are only a very small part, below 5%, in the total
exports (see table 13), while in the European Union, the average share is above 15%.

**Table 13. High-tech exports – exports of high technology products as a share of total
exports**

<table>
<thead>
<tr>
<th>Year</th>
<th>Romania</th>
<th>European Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>2.81</td>
<td>20.41</td>
</tr>
<tr>
<td>2000</td>
<td>4.63</td>
<td>21.39</td>
</tr>
<tr>
<td>2001</td>
<td>4.97</td>
<td>21.23</td>
</tr>
<tr>
<td>2002</td>
<td>3.09</td>
<td>18.89</td>
</tr>
<tr>
<td>2003</td>
<td>3.31</td>
<td>18.57</td>
</tr>
<tr>
<td>2004</td>
<td>3.08</td>
<td>18.49</td>
</tr>
<tr>
<td>2005</td>
<td>3.11</td>
<td>18.74</td>
</tr>
<tr>
<td>2006</td>
<td>3.85</td>
<td>16.65</td>
</tr>
</tbody>
</table>

*Source: Eurostat*

This part of the study analyzed the structural convergence between Romania and the
Euro Area. The goal was to see what kind of convergence is and whether common policies
would have a good effect at national level. Three main issues were used to gather
conclusions: the synchronization of business cycles, the level of symmetry between the
Romania economy and the Euro Area average and the level of foreign trade integration.

Romania is contemporaneously pro-cyclically synchronized with the Common
Currency Area. One shock would have similar effects upon the other part and in the same

\(^{104}\) National Institute of Statistics.
quarter. From this point of view, adopting Euro would not be costly, as a common monetary policy would properly deal with economic fluctuations.

The same results were obtained when analyzing foreign trade relationships. The European Union and the Euro Area are the main partners for Romania. The latter has even greater economic openness than older members. In addition, the Grubel-Lloyd indicator has extremely high values, resulted from intense intra-industry exchanges. The only problem is that Romania has still much to work on the mix of products offered to export. The vast majority are low or medium value added products, intensive in work force. Only a small part (below 5%) is given by high-tech commodities. Romania is thus an easy victim of international labour market fluctuations that would not be anymore counter balanced through exchange rate fluctuations. Hereinafter will be assessed the level of flexibility in the Romanian economy, i.e. whether the labour market is able to replace the monetary policy as an adjustment mechanism.

The structure of the Romanian economy is very different from the EU members in general and the Euro countries, in particular. The structural asymmetry indicator is the second largest, after Luxembourg. But Luxembourg owes this to its extremely developed financial sector, while Romania is based mostly on the old manufacturing system. Foreign trade with services represents below 10% of its exports. Up to the point when the Romanian economic structure will get closer to the Euro Area one, adopting the common currency would imply too many costs in comparison with its positive effects. Fulfilling this goal is not that easy as it seems. Instead of converging towards one another, countries of the EMU have diverged after entering the union. The process has its roots in Ricardo's comparative advantage that increased specialization within the EMU. At one moment in time there were even voices claiming that Romania should invest more in agriculture to benefit from its natural resources.
IV.4. Labour Market Flexibility

When adopting the common currency, Romania will give up its own monetary policy. Shocks in economy will be adjusted with the help of two national policies: the fiscal one and the labour market one. While the effects of the fiscal policy and its flexibility depend mostly on the National Bank of Romania and on governmental decisions, the efficiency of the labour market adjustment mechanism is not that easy to measure. Labour market’s flexibility and its capacity to deal with asymmetric shocks depend on many factors. There are complex relationships between productivity, output, wages, different costs related to employment, migration, education of labour force, trade unions legislation, unemployment, incentives, and so on.

The theory of Optimum Currency Areas (Mundell, 1961) states as a main feature the absolute mobility of factors: capital, human, and so on. From this point of view, labour market flexibility is intended as territorial re-allocation among different regions of a single currency union. This geographical movement is however conditioned by a series of national aspects like: language, national tastes, religion and other cultural characteristics and human skills mismatches. From this point of view, Romanians have always had the advantage of being a Latin people. In this way, language and cultural barriers have been more easily hurdled and Romanians became more territorial mobile than other Central and Eastern European peoples. Is no wonder that Romanian workers are among the largest minority groups in countries like Spain and Italy. Moreover, in 2008, the volume of money transferred home by Romanian emigrants was on the eighth place at international level, representing more than 5% of the GDP.

But most of the European employees are not very mobile from the geographical point of view. Therefore, other adjustment mechanisms had to be found within the labour market to counterbalance this territorial deficiency. Newer approaches speak about two main ideas: wage elasticity and institutional factors that are able to maintain employment at high rates. However, labour mobility must not be viewed only from the external point of view. It may easily mitigate asymmetric shocks by a high degree of mobility between national regions or across jobs and firms. This part of the analysis will deal with all the above mentioned aspects of the labour market adjustment mechanism in order to have a view of its impact after the Euro adoption on the Romanian market.
Romania is a transition country. So, above all these inter-relationships, the labour market flexibility is under the influence of the Balassa – Samuelson effect. This is a common feature of the developing countries. On the path of integrating on international markets, demand for tradable goods leads to an increase in prices and of workers’ wages in sectors subjected to foreign trade. This creates pressures in the non-tradable sectors, where wages will be adjusted without an equivalent increase in productivity. In this way, the Balassa – Samuelson effect increases the labour market rigidity. Workers ask for different levels of minimum wages, preventing employers from adjusting them in case of crisis.

Lately, Romania has increased its convergence, passing from a factor-based economy to an investment-based economy\textsuperscript{105}. Labour productivity has improved, leading to an increase in labour costs. This raised competitiveness problems for Romanian producers. But labour costs were also influenced by the shortage in well-educated labour force. Among the European countries, Romania has one of the lowest levels of life-long learning. In addition, as all the new member states, Romania is also facing a dual issue: labour and skill shortages in some sectors with and excess in working supply in others. Due to the restructuring process that took place after the fall of communism, many of the workers were not able to adjust to the new market demands. The problem of life-long education played an important role in sending these workers either in unemployment or in agriculture. As a consequence, the increasing demand led to an increase in the nominal wages above the productivity level, especially in sectors like construction that had an over-night boom in the recent years.

IV.4.1. Demographic trends

Romania’s population decreased very much after the year 1989. From over 23.2 million persons in 1990, the latest data show below 21.5 million inhabitants at the 1\textsuperscript{st} of January 2009. It still remains the 7\textsuperscript{th} country in order of population size in the European Union. Unfortunately, predictions regarding the evolution of Romania’s population in future are very pessimistic. Our country is among the ones with the biggest population decreasing rate forecasted in the EU\textsuperscript{106}.

\textsuperscript{105} According to the World Economic Forum, there are three stages of a country’s development: factor-based economy, investment-based economy and innovation-based economy.

\textsuperscript{106} In 2008 only 5 countries had a smaller natural growth rate than Romania.
Figure 25. Population by sex on the 1st of January 2009 in the European Union (million persons)

Data source: Eurostat

Figure 26. Crude birth rate in Romania (births per 1000 inhabitants)

Data source: NIS, Eurostat
Before the 1990s, birth rate in Romania was extremely high due to the official natality policies. Afterwards, it has declined rapidly and, combined with a high mortality rate, has led to a negative natural increase. From almost 16% in 1989, the crude birth rate declined sharply until 2002 when it had the lowest level (9.66%). Since then it stabilized around 10%. On the basis of this evolution, for the natural increase there was a transition from a positive range (until 1992) to a negative range, which had its minimum also in 2002. Adding this to the intense emigration fluxes\textsuperscript{107} results the population decline already presented above. Romania has a major demographic problem – its population is aging; not only the natural growth rate is negative, but also the most important migration movements are in the group of the young population (under 30 years of age). Leaving the country are exactly the persons that should sustain it in the near future.

**Figure 27. Natural growth rate in Romania (per 1000 inhabitants)**

![Natural growth rate in Romania](image)

*Data source: NIS, Eurostat*

\textsuperscript{107} Migration issues will be dealt with further on in this chapter.
IV.4.2. Labour market size, employment and unemployment

As a consequence of the population fall, both the working age population and the active one have declined. As most of the working-age population (from 15 to 64 years) was born during the communist period, the decrease has not been yet very dramatic. In the last 20 years it has fluctuated around 15 mil. persons. A greater drop is to be found in the number of active inhabitants. As a consequence of the emigration process in the past years, the active population has decreased by almost 1.5 millions in only 10 years. Activity rates computed for the population of 15 years and over were higher than in the Euro Area and the European Union averages until 2003. Since then, the Romanian one has become smaller, but it did not fall of too much under the European averages\textsuperscript{108}.

Following a long period of decline, employment rates have stabilized in Romania. Still, this involution has thrown Romania at the end of the European hierarchy, after being in the top 10 during the 1990s\textsuperscript{109}. In 2008, there were only three members with a lower employment rate than Romania: Italy, Hungary and Malta. The Romanian 59% level is extremely modest in comparison with the EU average of 65.9% and the Euro Area average of 66.1%. In the same time, it is far away from the Lisbon Agenda target of 70%. Unfortunately, employment level is expected to decrease even more in 2009 and 2010, due to the subprime international crisis. The analysis of the first quarter of 2009 has shown an overall reduction of employment with 0.8% when compared with previous quarter and with 1.2% when compared with the same quarter of 2008, both in the European Union and the Euro Area. Things are not better in Romania, either. When comparing the first quarter of 2009 with the same quarter of 2008, the seasonally adjusted industrial employment dropped by more than 10%. Fortunately, in the services sector, employment was quite stable (with a slow increase during 2008).

\textsuperscript{108} In 2008, activity rates were 54.5% for Romania, 57.2% the Euro area average and 57.8% the EU average, according to Eurostat.
\textsuperscript{109} For example, in 1997, Romania ranked 6\textsuperscript{th} among the present 27 members, with an employment rate of 65.4%, while the Euro Area average was 58.6%.
Romania has started its transition period with a very high level of female employment. The political administration before 1990 was based on the equality principle among different classes of inhabitants. That is why, at the fall of communism, women’s employment rate was extremely high in Romania. But the transition period brought many changes, out of which some of the most important were related to the industrial restructuring process. Many of the women that lost their jobs preferred to remain unemployed and stay home, instead of requalifying. An additional effect was given by the prolongation of the maternity and child care leave which nowadays may be extended up to three years.

From employment levels above the European averages, for some groups the values are now much lower. Males employment rate was 71.9% in 1997, while the Euro Area one was 69.2%. The decline led to 65.7% in 2008 compared with the 73.4% of the Common
Currency Area. With this value, Romania was the penultimate among the member states, in front of Hungary.

The transition period was strongly felt by the female employees. In 1997, Romania was very close to the Lisbon target of 60% employment level for women, with a value of 59.1%, and much above the average of the Euro Area – 48%. After a slight increase in 2006, employment rate for women was 52.5% in Romania in 2008. The Euro Area average has continued to grow up to 58.8% in the same year. With this score, Romania plays better than the new comers Poland, Hungary and Malta\textsuperscript{110} and also than the old members Greece and Italy.

The same evolution as the female employment rate had some specific age groups. Young people and older workers got out of the labour market more intensively than the middle aged.

**Figure 30. Employment rate development in Romania for the young (15-24 years) and the old groups (55-64 years) (%)**

![Chart of employment rate development in Romania for different age groups](image)

*Data source: Eurostat*

There are two main reasons for the fall in employment of the young persons. Initially, this was caused by the development of the educational system. During the socialist period, there were few students involved in tertiary education. Once with the liberalization of the educational market, new universities have appeared, while the state owned ones have improved their offer. The result was an increase with more than 150% in the number of students in a period of 10 years (1998 - 2007). In addition to the extension of the educational

\textsuperscript{110} Malta has the lowest level of women employment – 37.4% in 2008.
system, the migration process is another explanatory factor. It is very well known that most of the Romanian emigrants were young persons seeking for better paid jobs.

**Figure 31. Employment by sex and occupation for Romanian persons of 50 years and over**

![Chart showing employment by sex and occupation for Romanian persons of 50 years and over](image)

*Data source: Eurostat*

The group of older workers had basically the same path as women. All the industrial restructuring process forced them into unemployment or agriculture (see graph in figure 31). Most of the persons considered themselves too old for a professional conversion or were considered too old by employers. But the main reason for the diminishing employment rate in the 55-64 years group was the low retirement age. The Romanian authorities have started to increase the official retirement age, thing that led to a positive evolution in old age employment (see graph in figure 30). The trend is expected to remain unchanged as there are discussions about eliminating disparities in the retirement age between men and women (the issue regards raising the retirement age of women at 65 years gradually until 2030). Nowadays, more and more people with tertiary education have the tendency to remain employed for longer than the official retirement limit.
Anyway, older workers have in Romania more or less the same rate of employment as the European average, higher than the ones in eleven member states (9 out of which are in the Euro Area), among which Italy, France, Luxembourg, Hungary, Poland and so on.

An additional increment is due to the Labour Code issued in 2003 that introduced supplementary provisions regarding part-time employment. This type of employment has always had high rates in Romania in comparison with other European Union members, although its level had decreased in time\textsuperscript{111}. With around 9.9% of the total employment in part-time type, Romania has one of the highest rates among the new members, being outrun only by Lithuania and Malta. Looking a little bit more in detail at situations by sex, the male part-time employees place Romania on the sixth position in the EU. Women are more involved in part-time jobs than men, but their level of 10.8% is far behind the 35% of the Euro Area average.

An encouraging evolution is attributed to part-time employment of the young persons, between 15 and 24 years, which have by nature a low participation rate and high unemployment.

Romania is also distinct from the European average in what regards the professional status of a person. The weight of employers in total employment is more than 3 times lower in Romania. This is counterbalanced by a double rate of the self-employed. The biggest discrepancy is to be found for the family workers which represent 11.8% of the total employment.

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\textsuperscript{111} The decrease is due to migration and increase in the level of full-time employment.
Romanian employment, while figures for the European Union and the Euro Area are 1.66%, 1.19% respectively, in 2008.

As previously discussed, Romania is the member with the highest number of persons employed in agriculture (29.8% in 2008, while the nearest value is 15.5% in Poland). 30.5% of the total employment is to be found in industry. The service sector has developed very much in the near past, encompassing 39.7% of the employed persons (24.6% in market services and 15.1% in non-market services).

Unemployment is a problem of all the countries that adopt inflation targeting as a monetary policy strategy. It is very well known that inflation and unemployment coexist and there has always to be found a balance between them. Under the influence of the economic growth, unemployment has slowly lowered in Romania, to a level of 5.8% in 2008. The downward trend was sustained by the migrating process as an external factor, and by the substantial diminution of the female unemployment rate (which fell to 4.7% in 2008). Unemployment among women was in 2008 with 2 percentage points below that of men, suggesting that the latter are more affected by economic reforms. For the moment, the situation does not pose any problems as the rate is below the European averages of 7% for the EU and 7.5% for the EA. In reality, unemployment is even lower, as there are persons working without registered contracts, in order to avoid wage taxes.

The international subprime crisis has affected the unemployment level. The fall of demand had as a consequence an increase in the Euro Area unemployment up to 9.4% in June 2009. Fortunately, Romania had one of the smallest increases, of only 0.5% in the first quarter (to 6.2%). What is a little bit worrying is the powerful increase of unemployment rate in Spain, where Romanians represent one of the biggest minority groups.

As expected, unemployment affects most the young population. Not only Romania has problems in this respect, but also old members like France, Italy or Spain, which have even higher rates. In general, persons below 25 years of age are more involved in education. But previous studies (Voinea et al., 2007) show that unemployment among the youngsters is high at all educational levels. Practically, there are low employment opportunities, irrespective of the individual’s educational background – primary, secondary or tertiary. Did the educational system fail to adapt to changes in the labour demand or there are other causes for this situation?
Indeed, the Romanian society is changing. But old democratic countries like France, Spain, Sweden and others have even greater unemployment rates for this group of age. Did their educational reforms also fail to develop in accordance with the market demand for skills?

It may be that there was a lack of flexibility in education and learning in Romania but this cannot be the main reason. Roots of this problem may also be found in the structural issues of the labour market. Most of the employers search for employees with experience in a specific field, or experience is exactly what young people lack when they leave school. In addition, wages for beginners are extremely low and many graduates prefer to go abroad instead of getting a job in the country.

Figure 33. Unemployment rates by age groups in the European Union in 2008 (%)

Data source: Eurostat

There is also a cultural aspect. By tradition, Romania has never been a country with a high propensity of part-time jobs among students. This type of employment was officially introduced by the Labour Force Code in 2003. Following, instead of a drop in the young unemployment, in 2004 there was a significant rise, especially for men. The decrease that followed must be carefully dealt with in the present situation, when more and more people remain without a job.

112 The rise was of 4 percentual points, from 20.3% in 2003 to 24.2% in 2004.
Transition countries have a major problem. In the same time, they face both unemployment and labour shortages. Sectors that developed rapidly like manufacturing, constructions, ICT and different types of services (including health and education) lack skilled labour force. This imbalance had as an immediate effect an out of reality increase in wages, especially in the private sectors. Wage growth rate above the productivity one puts inflationary pressures on the entire economy.

The reasons leading to this phenomenon have been previously discussed. First of all, large groups of workers were released from the big socialist industrial enterprises during the job destruction process. Their educational background did not allow the growing sectors to absorb them rapidly, due to skills mismatches. In this way, they increased the number of the unemployed or the number of workers in agriculture. Is no wonder that agriculture, hunting, forestry and fishing represent 30% of the Romanian economy based on employment data. Unfortunately, most of these activities are for subsistence and not profit producing.

An indirect consequence is the low number of tertiary students coming from the rural areas. The subsistence incomes do not give them access to education, which forces them to remain in the same territory, with the same agricultural occupations. Indeed, Romania has a great agricultural potential and many politicians think that we should take advantage of it. But the value added is extremely low in agriculture and working equipment is primitive. Intense investment in agricultural equipment should be considered as Romania has a great production capacity for ecological products, which are more and more looked for on international markets and which are more expensive than the regular ones. Anyway,
agriculture in Romania has always been by its nature more ecological than the western ones. In this way, labour force from agriculture would be better used. There is also another interesting issue that should not be neglected. Scholars at international level say that the next world crisis will be a food crisis.

Although Romanians have a high international mobility when compared with other Central and Eastern European countries, internal labour mobility is quite low. The past migration from the big urban industrial centers towards rural areas has created an important gap between them. Nowadays, when urban areas have regained their place as growth engines, the flow of labour force towards them is modest. It consists more or less in students coming to study in big university centers that remain there after leaving school, especially tertiary education graduates. Nevertheless, there has been a narrowing in the gap between labour demand and supply in the recent years, but the Romanian labour force is not yet sufficiently flexible. It is interesting to see what will happen next, as the world crisis has already sent into unemployment an important number of persons and more are expected to remain without jobs because of the agreements with the International Monetary Fund to cut public expenditure.

With all the external migration flows and the high inactivity rates for different groups of population, Romania is not very bad positioned in what regards vacancy rates. On the whole economy, job vacancy rates are very close to the averages of the European Union or the Euro Area.

**Figure 35. Job vacancy rate (%) in Romania, the European Union and the Euro Area**

Data source: Eurostat
IV.4.3. The development of wages, incomes and productivity

Between Romania and the Western Europe gaps in the labour market parameters were deep. Both real and nominal wages were extremely low and productivity and output needed an important amount of time to recover after the five-years planned production of the socialist administration.

Romania has a legal minimum wage established, which has increased up to 153 Euro in the first semester of 2009, the equivalent of 262.6 in Purchasing Power Parities. Among the member states, Romania and Bulgaria have always had the lowest minimum wages\textsuperscript{113}, both expressed in Euro and in Purchasing Power Parities. All other countries have the minimum wage above 250 Euro, with the highest value in Luxembourg\textsuperscript{114}.

Despite the negative economic growth, average nominal wage has increased, both in gross and net terms. In June 2009 it was the equivalent of 449 Euro gross and 328 Euro net.

Due to very big size and economic development differences within the European Union, comparing the absolute wage values does not give a very good image on the wage flexibility level of national labour markets. A more appropriate approach compares the share of minimum wage to the average one. The lower the share, the higher employers’ possibility to freely adjust workers’ wages. The ratio of the minimum monthly wage in the average monthly earnings in industry and services decreased in time. This is a sign of a more relaxed labour market. After fluctuating in time, in 2007, the ratio made Romania the most flexible in terms of wage adjustments in the European Union. But the boom in some sectors before the crisis has created a lot of pressure, diminishing a lot this flexibility.

Incomes and labour productivity have grown rapidly. Still, the gap between Romania and the Euro Area has remained wide. The level of incomes is usually measured using the national income or the GDP per capita in Purchasing Power Standards. Taking the EU27 as a benchmark, income has increased in Romania, while in the Euro Area it has slightly decreased.

\textsuperscript{113} Exchanging places in time.
\textsuperscript{114} Which also has the highest GDP per capita in the European Union.
The Romanian business environment has improved according to the World Bank’s Doing Business annual report 2009. With one place up in comparison with 2007, Romania ranked 47 out of 181 countries, well ahead the Czech Republic or Poland and very close to its neighbours Hungary (41) and Bulgaria(45). As a result, labour productivity has substantially augmented. The real labour productivity per person employed has increased recently with a yearly average of 6.85%, while the annual average growth rate for the real productivity per hour worked was 7.1%. The Romanian growth rates are extremely high in comparison with the Euro Area (0.73%, 1.15% respectively). But one has to bear in mind that the real absolute values from which each entity has started are extremely different. That is why, for the purpose of this analysis were chosen two other measures of economic productivity – the output and the GDP in Purchasing Power Standards per person employed, relative to EU27.

Real output has been quite constant as a percentage of GDP, fluctuating around 18%, with a drop in 2002 to 16.7% of the GDP followed by an increase up to 20.1% in the next year. Between 1999 and 2008, the Romanian output has increased by more than 4 times, from 6093 million Euro to 25311 million Euro.
The PPS GDP/person employed represented in 2008 47.6% of the EU total. The only country with a lower labour productivity than Romania is our neighbour, Bulgaria. Measured in this manner, labour productivity had a positive evolution, but not fast enough and not good enough, as it is not even half of the Euro Area value. Much is to be done further on to catch up with the Common Currency Area and insure a good convergence process.

After a constant fall starting from 1990 onward, the increase in productivity determined an even higher increase of the real wages.

On the basis of these developments, labour costs also augmented, affecting Romania’s international competitiveness. For example, in 2007, labour costs in manufacturing reached the value of 8.81 RON per hour worked (approx. 2.6 Euro)\(^{115}\) (see

\(^{115}\) According to the International Labour Organization (ILO).
figure 39). Already, several foreign investors have relocated their Romanian production points in non member countries, which have lower labour costs.

**Figure 39. Annual evolution of the hourly labour cost in manufacturing in Romania**

![Graph showing annual evolution of the hourly labour cost in manufacturing in Romania.](image)

*Data source: ILO, NBR, own calculations*

Economic dynamics of the transition period were very much present in the labour costs. The nominal unit labour cost had great fluctuations in the past 6 years, in accordance with fluctuations in the gap between supply and demand of labour force in different sectors.

The highest difference was from 2004 in 2005, when the nominal unit labour cost, after a fall of 4.5% increased by 36%. The second episode with a high fluctuation is to be found in 2007. The latter has its roots in the boom of the construction sector which increased workers’ wages up to the equivalent of 700 – 800 Euro, while the average net monthly wage for the entire economy did not overrun 350 Euro. In real terms, fluctuations were not that high and were closer to the European trends.

The structure of the labour costs does not differ too much among the member states and Romania is very close to the European average. Total wages and salaries represent around 73% of the total labour costs, while the share of direct remuneration and bonuses is approximately 66%. Due to labour market and fiscal reforms, social security paid by the employer together with other costs have diminished to a ratio of 26%.
After the introduction of the common currency, it has been noticed that member states have started to diverge instead of converge. This is the consequence of David Ricardo’s comparative advantage in foreign trade. When increasing economic international relationships, external demand leads to an increase in productivity in these sectors. Following is an increase in wages which, corroborated with the Balassa – Samuelson effect give birth to inflationary pressures.

For the labour market flexibility it is very important to see whether different parameters have developed together or not. The descriptive analysis previously used presents the general evolution of the labour market parameters, without emphasizing the interrelationships among them. This part of the study intends to test the causal relationships between the labour market, economic growth and inflation to see whether these are true or not for the Romanian economy.

Of major interest is the relationship between wages, inflation and productivity. If these three variables converge it means that economic evolutions at national level are stable and real. If not, economic evolutions can destabilize the national economy in any moment.

As a proxy for productivity was chosen the monthly industry production index. There were four variables that regard wages taken for analysis: the gross and net average monthly nominal wage for the whole economy and the gross and net average monthly
nominal wage for the industrial sector\textsuperscript{116}. As the analysis was made on monthly data (from January 2002 to June 2009), the first step was to seasonally adjust the variables.

Inflation and wages had basically the same trend, with inflation starting from a higher y-intercept. Whereas both wages and inflation constantly rose, the slope of the industry production index is approximately constant till 2005. After a short fall, it started to increase. The most dramatic drop in productivity was at the end of 2008 and the beginning of 2009. As graph 41 shows, since then, wages and industrial productivity have more or less the same evolution. So, for around half of the period studied, wage increases in Romania were based more on inflation changes than on productivity, creating economic pressure at national level.

The goal was to look for any connections between productivity, inflation and wages. From the theoretical point of view, the best situation is when wage changes are determined by productivity evolutions. For the data analyzed, the Granger causality found no such thing. Moreover, due to their contradictory evolutions, wages (both on the whole economy and at industry level) are the ones that Granger caused industrial production. In time, inflation changes influence with a lag of 1 month both wages and productivity, while alterations in industrial production and modifications of wage levels are felt in inflation with a delay of 3 months.

Figure 41. Average monthly net wage rate of change (left axis), inflation rate and industry production index (right axis) for Romania (seasonally adjusted data)

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure41.png}
\caption{Average monthly net wage rate of change (left axis), inflation rate and industry production index (right axis) for Romania (seasonally adjusted data)}
\end{figure}

\textit{Source: NIS, Eurostat, NBR, own calculations}

\textsuperscript{116} But when comparing them, wages at the level of the national economy had the same evolution as the ones in industry.
The different evolutions presented in the graph above were also verified using the cointegration approach. The tests run and the VECM specifications proved the existence of no cointegration between wages, productivity and inflation in Romania. This sustains the fact that wage increases (that automatically led to inflationary pressures) were not based on productivity changes, but on other factors.

**IV.4.4. The labour market environment - fiscal burden and institutional characteristics**

Beside wages, structural flexibility of the labour market is of key importance. When employers are not able to freely adjust wages based on market fluctuations, there are other incentives and legal regulations that matter.

Through a series of reforms, authorities have tried recently to reduce the fiscal burden of the Romanian labour market. The introduction of the flat tax – 16% - for both incomes and corporate profits and the reduction of the different social contributions have created the path for new job creation. Indeed, unemployment has dropped, but there are still persons that prefer to work without legal contracts in order to avoid paying taxes. However, social tax rate is not that large in comparison with different European entities. As graph 42 shows, the differences existent in the late 1990s were diminished with the above – mentioned reforms. Tax wedges are lower than in the older members and slightly above the averages of the European Union and of the ten members that joined EU in May 2004 (with only approximately 1 percentage point).

**Figure 42. Tax wedge on labour costs – comparison between Romania, EU 27, EA 13 and the group of the 10 new member states from 2004 (NMS 10)**

<table>
<thead>
<tr>
<th>Year</th>
<th>EU27</th>
<th>NMS10</th>
<th>EA13</th>
<th>RO</th>
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<td>40</td>
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<td>50</td>
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<td>2007</td>
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<td>95</td>
<td>100</td>
<td>105</td>
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</tbody>
</table>

*Data source: Eurostat*

For reasons of comparison, the new member states that adopted Euro up to 2009 were included in the NMS 10 group, instead of the Euro Area group.
The level of tax wedge affects demand for labour as higher taxes imply higher gross wages. In what regards employees, the resulting low net wages influence their work performances and also their availability for different types of jobs. In this way, disparities in sectoral labour supply are deepened and people are forced to migrate.

The process of relaxing fiscal burden for employers and employees is also suggested by the evolution of the implicit tax rate on labour. It represents the ratio of taxes and social security contributions on the income of employed labour to the total compensation of employees. From the 13th position in 1999, with a ratio of 37.6%, Romania now comes right after the top 5 member states with the lowest implicit tax rates on labour.

All in all, tax rates in Romania have become more competitive in the European Union, creating the background for improvements in the labour market flexibility. Further tax reductions will not be possible for the moment due to budgetary constraints related to the international economic problems.

There is one exception. In their wish to gather as many budgetary revenues as possible, Romanian authorities have made a huge mistake. Instead of increasing consumption (as it would be best during recession periods in order to stimulate production), they have introduced the lump tax for companies, causing the closure of an important number of economic agents, especially SMEs. Recently, it has been announced that this tax will disappear in the near future.

Social security expenditure is another group that accentuates fiscal burden for the labour market. It encompasses all the payable transfers in kind towards different groups of the population – pensions, child care allowances, social protection of the unemployed and all other types of social insurance.

The Romanian population is a middle-aged one. The average population age is around 40 years – characteristic for an adult population – with the expected differences between the two sexes (in the sense that the female population is older than the male one when comparing the average age). For the moment there are not such big problems, but in future the sustainability of pensions is under a huge question mark. That is why several adjustments in the official exit age have been made. The last proposal is to equalize pension age for women with the one for men until 2030. This decision will mostly affect persons

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118 The share was 30.1% in 2007.
119 The limit age for going into pension is 65 for men. The gender gap will be gradually closed until 2030 if the proposal is adopted.
with primary and secondary education, as there is already a tendency for Romanian tertiary graduates to remain active longer than their correspondents from the rest of Europe (see figure 32).

Social security expenditure has increased very much. From values of approximately 2500 million Euros in mid-1990s, in ten years it has tripled. Continuing this path, transfers of this kind have arrived at 14500 million Euros in 2008. Among the components, continuous increase of pensions had the biggest influence. Even now, with all the economic problems, pensions have grown with 2% in the second quarter of 2009, while wages have decreased by 25%. But the real average pension has only lately arrived at the 1990 level.

**Figure 43. Indices of the average real pension in Romania (1990=100)**

![Graph showing the indices of the average real pension in Romania](image)

*Source: NIS, Romania in figures (statistical abstract), 2009,*

Romania still has rigid employment legislation and regulations. In the Doing Business 2009 report, it ranks 143 out of 181 countries for Employing Workers\(^\text{121}\). The Employment Indices, measured both by the World Bank in the Doing Business report and by the International Labour Organization, show that Romania has the highest employment rigidity in the area among the new member states, higher even than the candidate country Moldova.

Employees are quite well protected in Romania, especially in what regards working hours. There are several restrictions on extending the working week, on night work, etc. There are also different priority rules for firing workers and for re-employment.

On the other side a worker has only a 21-days paid annual holiday and the mandated minimum wage is quite low (only 23% of the value added per worker).

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120 For 2008, provisional data.
121 It went up 6 positions from the previous year.
For employers, the very bad positioning based on the employment rigidity is counterbalanced by the low firing costs. With an average cost of 4 weeks of salary for different stages of the dismissal process, Romania rank 21³ among the 181 countries studied. Only two European countries are cheaper than Romania in this respect: Denmark and Austria.

Fiscal burden in Romania is not that high as against European averages. But the social security system puts more and more pressure on the national budget. Important sums of money, instead of being used in productive investments were directed towards the social insurance budget. Future regulations have to be put into practice to increase the labour market flexibility. The main goal has to be the creation of new jobs and unemployment reduction. But the two go hand in hand only if the labour force is well prepared and able to move from job to job in accordance with the labour demand.

Education and research play important roles in improving the labour market environment.

Research and development is basically non-existent in Romania by European standards. With its gross domestic expenditure on research and development of only 0.53% of the GDP, Romania is, again, one of the last members.

Access to education is not a problem in Romania. Structural reforms have raised the quality of the educational system and youth education has increased. Romania has some catching up to do for the young lower secondary graduates, which represent almost a quarter of the population aged 18-24 (19.2% in 2007). The ratio is sensitively higher than the European averages (15.2% - EU, 17.2% - EA), but extremely high in respect to the group of 10 member states that joined the European Union in May 2004 (7.5% in 2006). As a whole, Romanians are more educated than the European citizens in general, at all age levels.

The problem does not consist in the educational level last attained, but in the lack of educational involvement afterwards. After leaving school, few persons take part in the so called life-long learning process, their ratio in total employment being insignificant, regardless of the growing path.
The Romanian National Agency for Employment has developed a series of programs for professional reconversion to help increase internal labour force mobility.

While internal mobility is still low, being mostly characteristic for the younger generations, external mobility has always been high. More than 2 million Romanians are working abroad, sending home around 5 – 6% of the GDP yearly. In 2008, Romania ranked 8th at international level based on emigrants’ money transfers at home. Most of these transfers were used for personal consumption and not for productive activities. Beside the financial benefits, the external migration flows also contributed to the reduction of unemployment (some consider it as a “safety valve” of the labour market\textsuperscript{122}). For the first time after the fall of communism in 1989, migration flows were positive for Romania in 2007.

In brief, hereinafter are the main findings of the analysis for the labour market flexibility in Romania.

As the entire European continent, Romania is also getting older. Its average age is around 40 years old – an adult population. Things are not going to get better, as natural growth is low. Social security transfers weight more and more in the national budget,

\textsuperscript{122} Voinea et al., 2007.
becoming a burden. The main issues under discussion are pensions and all the related topics. Taking into account all the demographic and social evolutions, authorities have decided to eliminate the gender gap in the retirement age\textsuperscript{123}. For Romania, this will mostly affect persons with at most upper secondary education, as for tertiary level graduates there is already a greater tendency to remain active after the retirement age than in the rest of the member states.

Labour costs in Romania are among the lowest in the European Union, although they have increased under the influence of economic growth. Wage adjustment flexibility is high in Romania, but this is counterbalanced by a very rigid employment legislation. The only part were Romania scores very well regards firing costs for employers, which are among the lowest in the European Union, after Denmark and Austria. Several reforms have improved the employment environment, but the rigidity of employing workers still exists.

On the path of economic growth, employment has increased, while unemployment has decreased, especially for women. This, up until the international crisis. The latter was also helped by the important migration flows outside Romania. The industrial restructuring process and the low level of wages forced a lot of citizens to search for work in other countries. The over 2 millions Romanians working abroad have also substantially contributed to the Gross Domestic Product, with money transfers of 5 – 6\% of the GDP annually. The Romanian labour force has a greater external mobility than internal, creating internal gaps between labour demand and supply.

Being a substitute for the independent monetary policy, the labour market adjustment mechanism also best deals with shocks in demand. A drop in demand has as a consequence a reduction in the marginal productivity, taking into account a temporarily fixed amount of production factors. A new equilibrium can be obtained either by labour force mobility or by changes in the wage level. The flexibility of wage adjustments in Romania was recently demonstrated. In the first semester of 2009, Romania had a negative economic growth of -8.8\%. The labour market quickly reacted by decreasing wage on average with 25\% from their previous levels. Except for the rigidity of the labour legislation, other features describe the Romanian labour market as a flexible adjustment mechanism. Nevertheless, it does not have the same reaction speed to asymmetric shocks as the monetary policy, but with further improvements, it could become a good replacer.

\textsuperscript{123} To bring it to 65 years old for both men and women until 2030.
Chapter V

CONVERGENCE STRATEGIES, PROGRAMMES
AND POLITICS

In the study of the Euro adoption on the Romanian market, of great importance is analyzing what the main structures of the political and economic life have planned. That is why this chapter will briefly present some of the most important programmes and strategies of different entities in what regards convergence to the Euro Area. Are taken into discussion official positions of the government, the National Bank of Romania, different political parties and so on.

When talking about strategies, programmes and politics related to Romania’s convergence process, there are two main documents that need attention: Romania’s National Reform Programme 2007 – 2013 and the Convergence Programme 2008 – 2011.

V.1. Romania’s National Reform Programme 2007 – 2013

At its launching for discussions, the post-accession strategy for Romania gave birth to a series of long debates. Agents of the business environment contested the way in which the government at that time conducted discussions with different social partners. Apart from several conceptual problems, the document advanced some clear positions of Romania regarding different issues of European integration.

For some of the parts in the strategy document, the statements are simple extensions of political parties’ programmes. There are mainly general issues as modernization and development in different sectors and areas.

The objective for 2007 – 2013 is social cohesion based on economic and institutional strengthening. There are several directions pointed out which are due to sustain the main objective.
The first one is increasing Romania’s economic competitiveness, through reforms aimed at:

- Infrastructure modernization (transportation, ICT, energy, environment) – Romania is still an energy intensive country and has the lowest degree of transportation infrastructure development;
- Increasing human capital quality – reforms in education, life-long learning\textsuperscript{124} and so on;
- Structural reforms to consolidate the efficiency of a market economy;
- Promoting research and development in a society based on knowledge – this is a very important detail, as Romania has extremely low indices for R&D in comparison with the European countries (including the share of R&D expenditure in the GDP);
- Increasing attractivity of the Romanian business environment;
- Stimulating labour market flexibility and competitiveness;
- Adopting macroeconomic policies that stimulate competitiveness;

The second direction aims at diminishing social and regional disparities, with great emphasis on rural areas, but also on labour force developments. According to the strategy the general employment level should reach 70\% in 2013, with 60\% for women and 50\% for persons in the 55 – 64 year group. One of the most important targets regards life-long learning process which in 2013 should arrive at 12.5\% of the adult population.

Using national resources, both economic and social, in a more efficient manner is the third direction of the strategy. To national resources of any kind are added the structural funds that Romania should benefit from starting January, 1\textsuperscript{st} 2007.

The most important part of the strategy for the present research consists in the fourth direction – insuring convergence for the Euro adoption on the 1\textsuperscript{st} of January 2014. The most important step was made in 2005 when the National Bank of Romania adopted inflation targeting as its main strategy\textsuperscript{125}. There are other general issues discussed regarding real convergence, but without any specific figures quoted.

\textsuperscript{124} For details regarding the life-long learning issues in Romania see \textbf{IV.4.4 The labour market environment – fiscal burden and institutional characteristics}

\textsuperscript{125} More details about the inflation targeting strategy hereinafter when discussing the NBR’s approach regarding convergence.

The government of Romania launched throughout the years several convergence programmes. The latest of them was published in May 2009 and it encompasses conclusions drawn after discussions with the International Monetary Fund and the European Commission. Its main goal is to enforce tighter budgetary targets and restructure public expenditure (based on “European Council’s Opinion” issued on the second edition of the Convergence Programme from April 2009). Through this document, Romania maintains the 2014 target for entering the Common Currency Area.

One of the most important assumptions of the convergence programme is that the deficit will become 0.9% of the GDP in 2012, insuring in this manner a very safe margin in comparison with the 3% limit. This value will also allow for the automatic stabilizers to react at shocks and re-establish equilibrium.

After stating the government’s general structural reforms, the Convergence Programme presents some macroeconomic scenarios, first at international level (based on IMF estimations) and then at national level. On a whole, the potential GDP is expected to increase till 2011 with 3.28%. This should be sustained by an augmentation of the capital stock and of the potentially employed population. The output gap is forecasted to decline rapidly in 2009 and remain negative for the entire period. 2009 is the year of negative growth rates for most of the economic indicators. The GDP’s expected rate of change was -4% in the Convergence Programme, but was recently adjusted to -8.5% after analyzing the overall economic evolution in the 1st semester of 2009. The only area which could remain in the positive zone is the net export (+2.6%), which is expected to have a lower contraction than imports. As a consequence, the trade deficit will lower by 5.1 percentage points.

In 2010 Romania is expected to overcome the recession period and have a positive evolution of the GDP in 2011 (+2.4%). The worst year is forecasted to be 2009, with little amelioration in 2010. The global financial and economic crisis with credit restrictions affected very much the demand. The consequence was a constant decrease of inflation which will continue all year long in 2009. For 2011, the inflation rate is expected to be 3.2%.

This baseline scenario took into account assumptions of different international organizations. Several domestic problems of Romania could worsen the situation – like

126 For example, unemployment is previsioned to go up to 8% in 2009, and then fall constantly onward.
negative evolutions of the financial sector, the bad weather conditions for agriculture\textsuperscript{127}, deteriorated competitiveness, etc.

The present Convergence Programme is substantially different from the previous one, issues in November 2007, due to the world economic environment. 2009 is the first year of negative evolutions after a long period of time, increased uncertainties leading to an expected contraction of 4\% of the GDP\textsuperscript{128}. In the former programme, the forecast was for a positive evolution.

The main problem of the Romanian government is now to set and put into practice a series of objectives and strategies to ensure fiscal development on the path designed by the European Commission. Romania is under the Excessive Budgetary Deficit Procedure and has to reduce the deficit below 3\% of the GDP in 2011.

For this, the main goals of the present government regard:

- maintaining prudential budgetary and salary policies to promote a combination of consistent macroeconomic policies,
- creating a binding fiscal and budgetary framework on medium term,
- improving the revenue administration through the tax administration reform and the reduction of the collection costs,
- broadening the tax base in sectors such as the environment, the state enterprises and agriculture,
- substantial improving the efficiency of public funds spending, by formulating clear priorities, especially for the investment projects, through the horizontal coordination of the economic policies.

The government intends to maintain the same levels for profit and revenue taxes (16\%) and for the value added tax. In comparison with 2008, the fiscal results will consist in reductions caused by negative economic evolutions. The social security contributions will be brought back to the 2008 levels by increasing both employee’s and employer’s contributions to pension funds.

\textsuperscript{127} Problems in agriculture also had a negative impact in 2007.
\textsuperscript{128} This level was already revised to 8.5\% contraction after the first semester.
On the expenditure side, measures consist in freezing employment and wages\textsuperscript{129}, acquisitions of fixed assets in the public sector and monitoring of the state-owned enterprises.

As scenarios for the study, the Convergence Programme considers reduction of the gross wage’s influence from 5.8% to 4.8% on the revenue side, corroborated with a negative rate of change of the employees’ number to 0.6% and a slowdown of the nominal increase rate of the GDP by 1 percentage point. The influences range from -0.01\%GDP to -0.11\%GDP.

For the public debt, the baseline scenario (Sb) is given by the macroeconomic framework of the 2009 budget. For an alternative scenario (Sa) with an annual economic growth lower by 1\%, the share of the government debt in the GDP will be with 0.2\% higher (an increase by 8.4\% in 2011 leading to a share of 22\% in the baseline scenario compared with an 8.6\% increase in 2011 for the alternative scenario, up to a ratio of 22.2\%). When changing the alternative scenario’s assumptions to a 5\% depreciation of the domestic currency against the Euro and the Dollar, the interest payments’ increase is of 1.5\% in 2011 for Sb and of 1.52\% in 2011 for Sa. The augmentation of market interest rates lead more or less to the same effects as the exchange rate volatility (the alternative is 1.53\% in 2011).

The Pillar II pension scheme has a low budgetary impact. Its maximum is expected to reach 1\% of the GDP in 2017, when the quota will become 6\%. The optional pensions under private administration – Pillar III – is still in its infancy, as there is a lack of trust from the part of the contributors.

Budget expenditure strategies relate to enhanced efficiency, transparency and accountability in the use of public funds. Future reforms are planned for the taxation system.

The programme also measures the size of the grey economy in the GDP – around 11\% in 2008 – and gives examples of ways of improving the collection process.

There are very pessimistic forecasts of the Romanian population’s evolution. The continuous decrease will have as a direct consequence a rate of dependency for persons above 65\,years of age of 65\% in 2060, while the total dependency rate will reach 87\%\textsuperscript{130}. The analysis compares two scenarios: – the baseline that uses present labour market regulations for pensions and social security contribution (where the pension point is linked to the gross average salary, representing 43.2\% of it and planned to become 45\% in 2010)

\textsuperscript{129}\text{Salary increases will be correlated with the development of the consumer price index.}
\textsuperscript{130}\text{Based on Eurostat forecasts.}
– the alternative scenario which indexes pensions according to inflation.

The differences are very big among the two scenarios, with pension expenditures raising to 14% of the GDP in 2060 in the wage – based pension and only 5% of the GDP in the inflation-based scenario.

V.3. The Inflation Targeting Strategy of the National Bank of Romania

In August 2005 the National Bank of Romania shifted its monetary policy strategy to direct inflation targeting. Thus, its primary objective became ensuring and maintaining price stability. The introduction of inflation targeting in Romania is the result of a series of reforms made to provide independence of the National Bank and to strengthen its credibility.

The direct inflation targeting strategy goes hand in hand with the managed floating exchange rate regime. Consequently, the National Bank has an additional role of managing the exchange rate volatility and preparing the national currency for the ERM II period.

Inflation targets are set on annual basis (December/December) with a variation band of +/- 1% for a two-year horizon. They represent a consensus between the National Bank and the government and aim at better anchoring inflation expectations.

Romania has been in a disinflationary process for some time now, thing that could also be seen in the targets that have been fixed. In 2005, the target announced was 7.5%, with a fluctuation band between 6.5% - 8.5%. It than decreased slightly, to 3.5 percentage points for 2009 and 2010. The annual values are presented in the table below.

**Table 14. Annual inflation targets for Romania (%)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation target</th>
<th>Variation band</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>7.5</td>
<td>6.5 – 8.5</td>
</tr>
<tr>
<td>2006</td>
<td>5.0</td>
<td>4.0 – 6.0</td>
</tr>
<tr>
<td>2007</td>
<td>4.0</td>
<td>3.0 – 5.0</td>
</tr>
<tr>
<td>2008</td>
<td>3.8</td>
<td>2.8 – 4.8</td>
</tr>
<tr>
<td>2009</td>
<td>3.5</td>
<td>2.5 – 4.5</td>
</tr>
<tr>
<td>2010</td>
<td>3.5</td>
<td>2.5 – 4.5</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>2 - 4</td>
</tr>
</tbody>
</table>

*Source: NBR*
Beside the targets the NBR presents quarterly projections and the uncertainty interval\textsuperscript{131} based on forecast errors. It is the NBR’s job to find the equilibrium between lowering inflation rates and the level of interest rates in order to diminish the effects of an overheated economy.

Table 15. Inflation projections and the associated uncertainty interval

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>3.8</td>
<td></td>
<td>3.5</td>
<td></td>
<td>3.5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual/Projected* (%)</td>
<td>6.3</td>
<td>6.7</td>
<td>5.9</td>
<td>5.1</td>
<td>4.3</td>
<td>2.9</td>
<td>2.3</td>
<td>2.5</td>
<td>2.6</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Uncertainty Interval (%)</td>
<td>± 0.5</td>
<td>± 1.1</td>
<td>± 1.5</td>
<td>± 1.8</td>
<td>± 2.1</td>
<td>± 2.1</td>
<td>± 2.3</td>
<td>± 2.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: NBR

V.4. Programmes and Politics of the Political Parties

At the time of Romania’s accession in the European Union, the major political parties came out with their own convergence programmes. Since then, these programmes have changed according to national and international evolutions. Nowadays, political parties have advanced a series of anti-crisis programmes fated to reduce international crisis’ effects on the Romanian market and to readjust the national economy on its convergence path. The plans are more or less the same between different political entities and some of them form the basis for the governing programme.

The Social Democratic Party (SDP)\textsuperscript{132} proposes the creation of several structures and Funds with the main goal of increasing national demand and stimulating industrial activities. Some examples are: the National Housing Fund, the Fund for Investments in Infrastructure and Regional Development, the “Lisbon Agenda” Fund for Increasing Economic Competitiveness, Research and Innovation, a Council for the Supervision of

\textsuperscript{131} It is derived from comparing actual values with model based projections made in the period between August 2005 and August 2008.

\textsuperscript{132} In Romanian – Partidul Social Democrat (PSD).
Public Funds Expenditure, etc. An important part of the measures are due to sustain agriculture, including infrastructure for agriculture and taxation related issues.

The fiscal and social measures regard elimination of the minimum tax on turnover starting with the 1st of September 2009, royalties in different percentages for the ones that pay their taxes in time, the reduction of the VAT for chicken meat, bread and milk, and so on. Emphasis is put on stimulating investments and the creation of new working places. Of major importance are the ideas to fine the Ministry of Public Finance for overrunning its legal payment deadlines towards citizens.

The anti – crisis programme should lead to:

- more than 150000 new working places in the following two years,
- maintaining approximately 500000 of the existing working places,
- raising the European funds’ absorption rate with 20% yearly,
- reducing the urban – rural differences with 20% till 2010,
- increasing GDP growth rate with 1 percentage point in comparison with the present scenario,
- the reduction of poverty.

As the SDP was at that time in the governmental coalition, these ideas are also to be found in the governing programme.

The strategy of the National Liberal Party (NLP)\textsuperscript{133} has some common points with SDP strategy. It aims at encouraging investments, stimulating economic activity, preserving the working places and creating new ones, de-bureaucratization. Most of the measures proposed regard fiscal relaxation:

- elimination of the flat-rate tax,
- reduction of social contributions(with 10% for employees and 50% for employers),
- abolishment of the expenditure restrictions for economic agents set up at the beginning of the year,
- the development of the electronic and information system for all the processes of the fiscal administration,

\textsuperscript{133} In Romanian – Partidul National Liberal (PNL).
- penalties for the public authorities that overrun their payment deadlines in relation with tertiary entities.

**V.5. Government’s Programme 2009 – 2012**

The Government’s Programmes 2009 – 2012 was issued at the beginning of the year 2009, when forecasts for the Romanian economy were not that pessimistic. That is why, many of the provisions in it are already outdated and the programme can no longer be taken for granted in any analysis.

For example, the government was planning to adjust the budgetary expenditures in order to diminish the consolidated budgetary deficit up to maximum 1.7% of the GDP in 2009. Taking into account the fall in the GDP level and the rise in social expenditures, this will not happen.

Another key aspect was to increase the share of Education budget to 6% of GDP, as Romania is far beyond the European averages for education and health expenditures.

The government plans to improve labour market flexibility and reduce the labour force sectorial deficit. For this, employment should go up to a level of 65% in 2012 and life-long learning stimulated to boost to at least 7% of the working age population (25 – 64 years). Until the end of 2012, the gross minimum wage per economy should reach 50% of the gross average salary per economy, while for the latter is forecasted a growth rate on 55% in the period 2009 – 2012.

The social security regulations provide the pension point to arrive at 45% of the average gross salary and a minimum guaranteed social pension of 350 RON.

Going further on, the plan is to increase R&D expenditures to 1% of the GDP till 2012.

Chapter 13 – Transport infrastructure – contains a detailed agenda of the works in infrastructure on all transportation means.

Information society is the basis for Romania to enter the third stage of development and become an innovation driven economy. That is why, ICT infrastructure is to be further developed, especially in relation to the public administration. The World Bank project “Knowledge based economy” is to be continued to increase the number of rural localities with access to large band communication network.
The Government’s Programme contains general action plans for all chapters of the Romanian economic and social life. In the table below are presented the forecasted key figures as they are in the programme:

Table 16. Key indicators for Romania as presented in the Government’s Programme

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP – billion lei, current prices</td>
<td>505,0</td>
<td>582,7</td>
<td>660,7</td>
<td>745,9</td>
<td>838,1</td>
</tr>
<tr>
<td>GDP – real growth, %</td>
<td>8,5</td>
<td>3,5</td>
<td>4,5</td>
<td>5,5</td>
<td>6,0</td>
</tr>
<tr>
<td>Average inflation rate, %</td>
<td>7,9</td>
<td>5,0</td>
<td>4,0</td>
<td>3,5</td>
<td>3,0</td>
</tr>
<tr>
<td>Gross average earnings, lei/month</td>
<td>1700</td>
<td>1830</td>
<td>2070</td>
<td>2340</td>
<td>2635</td>
</tr>
<tr>
<td>Gross average wage, lei/month</td>
<td>1580</td>
<td>1702</td>
<td>1925</td>
<td>2175</td>
<td>2450</td>
</tr>
<tr>
<td>Budgetary revenues, % of GDP</td>
<td>32,0</td>
<td>32,5</td>
<td>34,0</td>
<td>35,1</td>
<td>35,9</td>
</tr>
<tr>
<td>Budgetary expenditures, % of GDP</td>
<td>35,5</td>
<td>34,2</td>
<td>35,6</td>
<td>36,2</td>
<td>36,8</td>
</tr>
<tr>
<td>Consolidated general budgetary deficit, % of GDP</td>
<td>3,5</td>
<td>1,7</td>
<td>1,6</td>
<td>1,1</td>
<td>0,9</td>
</tr>
<tr>
<td>Current account deficit, % of GDP</td>
<td>13,3</td>
<td>10,5</td>
<td>9,7</td>
<td>9,3</td>
<td>8,8</td>
</tr>
</tbody>
</table>

Chapter VI

SCENARIOS REGARDING THE EURO INTRODUCTION ON THE ROMANIAN MARKET

The Euro currency raises a series of problems both before and after adopting it. It is not only important to fulfill the convergence criteria, but it is also important to study the economic and social developments after taking this step. Giving up the national currency – the symbol of national identity – is a very delicate issue. Citizens are usually reluctant as there is the sense of independency loss. That is why a country should push forward or delay the moment of adoption so that to minimize the costs and maximize the benefits. Future is like a “terra incognita”, full of uncertainty and unforeseeable.

Economic research has tried to emphasize the positive and negative effects of a common currency\textsuperscript{134}. The exchange rate implies a series of transaction costs which could be invested in other parts of the activity after entering the EMU. Additionally, employees involved into such operations would be relocated in more productive sectors and activities, leading to higher profits. Eliminating the exchange rate risk, the interest rate will diminish with an amount equal to the exchange rate risk premium. The direct effect will be a lower cost of capital on the Romanian financial market. Giving up the RON means eradicating exchange rate crises and closing one of the main entrances for asymmetric shocks into the real economy. As the Romanian Leu is pegged to the Euro, shocks in the European Union affect anyway Romania, even without being in the Euro Area. Additionally, the major foreign trade partner for Romania is the European Union.

It is very well known that the European Union and the Euro Area enjoy high credibility at international level. Joining them, Romania would benefit from the same treatment. A direct effect would be an increase in investments, along with the development of foreign trade, specialization, know-how transfer, increased competition and more transparency.

But for a country like Romania, who is at the end of the European ranking in many fields, it is more wishful to carefully assess the monetary integration process. If Romanian companies are not competitive enough, increased competition would lead them into

\textsuperscript{134} They are presented in a theoretically manner in Chapter II.1. 4. Costs and benefits of the Euro adoption.
bankruptcy. The result will be a boost in unemployment and a drop in welfare – an extremely hard to deal with disequilibrium.

Based on several simulations, the present chapter is intended to present possible evolutions of the Romanian life after joining the European Monetary Union. It combines predictions, scenarios and strategies to highlight the risks and opportunities related to Euro. The approach is progressive, from very simple models based on two variables, to more complex models.

As the main convergence criterion is the level of inflation rate, the first part of the chapter studies the short term effects the fulfillment of this criterion would have upon other macroeconomic parameters. Beside the GDP, which is the main macroeconomic variable, this part also takes into account two variables that are directly connected with the individual level of welfare – the average monthly net wage and the domestic demand.

The main part of this chapter uses macroeconomic modeling for assessing the gains and losses of fulfilling the convergence criteria and entering the EMU. This is a very complex analysis that required the construction of simulation models for the Romanian economy. The models and the variables taken into account are presented in Appendix 5. The results obtained through the simulations are interesting and, in some cases, even contrary to the economic theory. This is due partly to the shortage in data (an important problem for Romania) and partly to the interesting evolution of the Romanian economy after the fall of communism. That is why this part of the analysis employs smaller models that deal only with some of the variables of interest, to make easier the forecasting process. The general model presented at the end of Appendix 5 is intended for future research that may assess the Romanian integration into EMU on all the fields of the day-by-day life.
VI. 1. Fulfilling the Inflation Rate Criterion on Short Term

The inflation rate criterion is the headstone for monetary integration. Based on it are chosen the countries that give the level of the other nominal convergence criteria (the best three EU performers). As previously mentioned, the reference value is computed as the average of the best three EU (not EA) performers in terms of inflation, plus 1.5 percentage points. This is the maximum limit allowed for joining the EMU. As experienced with other countries that already adopted the Euro, the level achieved for price stability will be analyzed at the end of the ERM II period. Till then, the NBR will have to find the equilibrium between price stability and price convergence and counter-fight speculative attacks that usually appear in the period of fixed exchange rates. The process has already proved to be very difficult, considering the fact that only in 2007 inflation rate in Romania was within the targets of the NBR. Last year, in 2008, the average annual inflation rate was more than double the annual target of 3.8%. In the same time, the reference value was considerably outrun. At the end of the ERM II period, the NBR has to find the proper way to reduce inflation in order to comply with the Maastricht reference value.

It will be interesting to see if the targets established by the NBR will be respected in the following years, taking into consideration the precarious political environment (full of supremacy fights and fueled by the November 2009 round of the presidential elections). Even more important is to see if the targets are in accordance with the Maastricht Treaty\textsuperscript{135}. In a globalized environment is very hard to predict which are going to be the countries with the lowest inflation rates in the EU and at what level are going to be.

\textsuperscript{135} The NBR has fixed the targets of 3.5% for 2009 and 2010 and 3% for 2011, with a variation band of +/- 1 percentage point.
Figure 45. Difference between the Euro Area inflation rate and the average inflation rate of the best three EU performers (%)

Source: own calculations.

For a snapshot of the very short term and the short term effects of fulfilling the inflation rate criterion, an analysis derived from the Phillips curve (Phillips, 1958; National Bank of Poland, 2004) and Okun’s law (1962) was run, combining inflation with different other macroeconomic parameters (see Appendix 4). The results were afterwards tested using more complex econometric modeling procedures.

The very short term effects were analyzed to see the immediate influences the inflation rate has upon several macroeconomic parameters.

As resulted, a 1 percentage point reduction in the level of the inflation rate will have as an immediate effect a 0.22% drop in the level of the GDP. Thus, appears a delay of 1 quarter between changes in the inflation rate and changes in the GDP. Additionally, a 1 percentage point in the difference between inflation gaps in two successive quarters leads to a variation of 0.35% in the level of the GDP gap.

The relationship between the inflation rate and the GDP level in Romania is not that strong, because Romania comes from a past with high levels of inflation (above 200%) and very low levels of the GDP. This made the analyzed relationship to be contrary to the economic theory for several shorter periods of time, having as a result these low values for the coefficients.

The GDP results show that fulfilling the inflation rate criterion on very short term would not have as a consequence an important drop in the national welfare. It would guide

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136 Measured quarterly.
the GDP towards its natural level. This means that Romania will enter the Euro Area on real bases.

But the National Bank of Romania establishes the inflation rate targets on a yearly basis. In accordance to this, the above mentioned relationship was also studied comparing one quarter with the same one, but in the previous year (year/year). Of course, the intensity of the inflation rate’s influence upon the GDP increases. In each quarter, the sign of the relationship changes. Thus, an innovation of 1 standard deviation decrease in inflation will cause a drop in the GDP with 0.005 standard deviations in the first quarter after the innovation. Due to this shock, in the second quarter the GDP will increase sharply and fall again in the third, but not that much as in the first one. The fourth quarter will bring a new augmentation. On the whole, on a yearly basis, the reduction of inflation rate gap would cause the increment of the GDP gap, forcing the Romanian GDP to deviate from its natural trend. The main reason for these results lies in the economic theory: transition countries usually have higher GDP growth rates than the developed ones, which allow them to reduce the welfare gap between them and the latters.

In economics, the best-known pass-through processes are from inflation to wages and vice-versa and from the exchange rate to wages and inflation. That is why the effects of fulfilling the inflation rate criterion on short term were also analyzed in connection to wage changes.

Following the same path as for the GDP gap, the connection between wages and inflation proves to be even stronger. A reduction in inflation in Romania causes an increment of wages in the next quarter. But this induces a rise in the domestic demand that eventually will give birth to other inflationary pressures. Quantitatively, a reduction of the inflation gap by 1 percentage point gives handle for an increase in the net wage gap by 0.5 %. Thus, the individual welfare should go up in the first quarter after the reduction. On longer term, the fluctuations smoothen, but the influence disappears only after almost 4 years. Around 10% of the variations in the net wage are given by inflation rate changes. In the same time, variations in inflation rate gap from one quarter to another are positively correlated with wages. The difference in the inflation rate gap in two consecutive quarters has as an effect the same direction of the movement in the net wage gap, but by 0.1 units. This is the statistical result. From an economic point of view, the relationship is somehow strange, as wages react both ways to inflation rate changes.
But the sign of the first coefficient is the one expected. After the Revolution in 1989, Romania entered a path of macroeconomic stabilization. The high rates of inflation were eventually reduced, arriving to a one figure value in 2004. In the same time, wages had an ascending trend, especially due to the convergence process.

As the relationship between inflation rate and wages is bilateral and the pass-through effect goes both sides, the wage influence was also tested. The results are according to economic theory. An increment in wages conduces to inflation. A one standard deviation shock in the net wage in Romania is immediately followed by a 0.6 standard deviation points in inflation. Not surprisingly at all, inflationary fluctuations are given mostly by wage variations. The variance decomposition shows that almost 60% of the variation in the inflation rate is given by an innovation in the net wage.

In order to preserve or to lower inflation, Romanian authorities should limit long term positive wage variations. As demonstrated, on short term they are benefic for the price stability criterion, but on long term, net wage variations give birth to high inflationary pressures due to higher demand. An important thing would be to link wage changes to real productivity changes. As demonstrated before in chapter IV.4.3., wages in Romania did not evolve on real bases. Their increments were caused by demand pressures on the labour market. No cointegration relationship was found between wages and productivity. To ensure macroeconomic stability, efforts should be made to direct the two variables towards one another and towards their natural levels. In addition, other levers have to be found to sustain the inflation rate reduction without causing a boost in net wages and a heating of the national economy.

When inflation rate gap diminishes, the demand gap diminishes either in the next quarter, but very little in respect to the initial level. This is the period of reluctance from the part of the citizens, when inflationary expectations are readjusted according to the new value. In the second quarter from the inflationary change, cyclical fluctuations of demand increase (with a higher slope) and then enter in a period of stagnation to that specific level. Inversely, cyclical fluctuations of inflation also need some adjustment period until entering an ascending trend in case of a positive shock in demand. Shocks in inflation lose their power of influence upon demand after a while. In contrast, the response of inflation gap to a demand gap fluctuation increases in time, creating a snow ball effect active for a long period of time.
All in all, the conclusions have to be divided in two.

The results for inflation rate versus GDP are the ones expected. They rely on the supply side of the economy. When the level of welfare and of incomes in a country is expected to rise, producers automatically increase the selling prices (Lucas, 1972). Thus, income expectations and the price setting behaviour give the form of the relationship between inflation and the GDP.

The results on short term between the inflation rate and wages are explained by the stickiness of the labour market. Thus, according to the economic theory, an increase in inflation fluctuations should be followed by an increase in wage fluctuations and vice-versa. The analysis accepts only the pass – through process from wages towards inflation. As the variance decomposition shows, almost 60% of the inflation rate fluctuations are given by wage changes in Romania. But the same variance decomposition method found only around 10% influence from inflation towards wages. This is caused by the rigidity of the Romanian labour market (as seen in chapters IV and VII). When changes occur, it is very hard for wages to be adjusted due to trade unions movements. Wage setting in Romania is not freely floating. The labour market is sticky, lacking the power of rapidly adjusting when needed. As Lucas (1972) shows (Lipsey & Chrystal, 2007), decisions and processes are all based on rational expectations and all the market prices (labour market included) fluctuate as to equalize demand and supply. Thereby, on a rational market wage stickiness is the reaction to less risk averse employers in respect to employees (Solow, 1979).

Consequently, the results are not strange at all for Romania, as macroeconomic variables and relationships are formed based on microeconomic foundations that take into account households’ and firms’ behaviour, including reactions of the trade unions and legislation rigidity.
VI.2. Scenarios Regarding the Euro Introduction on the Romanian Market

Reaction of several macroeconomic parameters to short term changes in inflation rate was assessed above. Among them, the most significant that emerged was the GDP. For it were found the most consistent short term changes caused by diminishing the inflation rate in order to comply with the price stability convergence criterion.

This part prolongs the period of analysis to longer terms, taking into account the most important macroeconomic variables. The goal was to construct little models of the Romanian economy (see Appendix 5), based on which to analyze several possible evolutions caused by the monetary integration process. The shocks intended to be applied in the variables that form the model are based on the convergence criteria that have to be fulfilled by Romania in order to enter the ERM II and then the EMU and on the main lines drawn by different political and administrative entities in accordance with this goal. Of major importance are the development of the labour market and the evolution of the investments’ flows. The list of variables and the equations of the models are presented in Appendix 5. Data ranged from the first quarter of 1997 until the second quarter of 2009. Different models were approached in order to see the influence of the Euro introduction on more fields.

Several observations should be made regarding the variables for the Romanian market. These observations may help at explaining the peculiarities resulted from the analysis, that are sometimes contrary to the economic theory.

An interesting thing discovered is that almost all the internal demand was satisfied through imports. The graph below shows the strong interdependency between the two variables. Consequently, any change studied in one of the two variables would definitely be found in the other.
Moreover, until 2004, inflation rate in Romania was a two-digit value (even higher than 100% before the second part of 1998). That is why, in some cases, the sample was restricted to data with lower inflation levels in order not to affect the quality of the results.

From all the models studied, the ones presented further came into notice. Using the vector error correction specification and the simultaneous equations systems, they proved to be the most significant and consistent in presenting possible evolutions related to the monetary integration. These are short and medium term models, whose validity on long term depend very much on the evolution of the variables in use. As these are simple models and, at macroeconomic level the interdependencies are very complex, the results of the two models presented here are restricted by the number of variables taken into account (many influences are neglected). Moreover, the models are also restricted by the shortage in data for Romania. The econometric part of the analysis is presented in Appendix 5.

The first model continues the very short term analysis in part VI.1. It emphasizes the influence of monetary policy decisions upon output (seen both as a growth rate and as an output gap). Combining monetary and foreign trade issues, the system was constructed on the tradeoffs between inflation rate and output and between interest rate, exchange rate and output.

The second model assesses the reaction of the labour market and of the FDIs to the Euro introduction. As competitiveness is one of the main problems now-a-days for every country, a negative impact on competitiveness implies directly the bankruptcy of a series of companies and, consequently, a boom in the rate of unemployment. This materializes into
higher public costs to sustain the unemployed persons and, in the end, returns as a cost of the lack of competitiveness.

The innovations in the models, as previously mentioned, are based on the main actions Romania has to take for entering the European Economic and Monetary Union. To join the ERM II starting with 2012, the most important thing is to comply with the Maastricht criteria.

VI.2.1. The output and the Maastricht criteria

The Maastricht criteria encompass not only the pass-through effect from inflation to output, but also other important tradeoffs linked to the interest rate and to the evolution of the exchange rate. To analyze them was constructed a system that comprises the three criteria – inflation, interest and exchange rate – together with the Romanian and the Euro Area real output, the inflation rate in the Euro Area, the Romanian potential real output and the terms of trade (for the structure of the model see Appendix 5, part A5.1.). Two types of impulses were applied – one consisting in a 1 pp innovation in the three Maastricht parameters and one that deals in the same time with inflation and interest rates. For the second type of shock were measured the differences between Romania’s level and the target values of the EMU. The results obtained\textsuperscript{137} were applied as simultaneous negative impulses – 7.67 pp for the interest rate and 4.21 pp for the inflation rate.

Both the output growth rate and the output gap are more affected by variations in the exchange rate and in the last case of contemporary impulses. The results are the ones expected. The high present values of Romania for the Maastricht targets imply restrictions at national level in order to enter the EMU in the schedule. The real output growth rate will decrease. For example, in the last case of combined shocks in inflation rate and interest rate, the growth rate of the real output in the first quarter after the innovation will decrease by 1.2 pp. The negative trend will continue on medium term, arriving in q3 at -1.5 pp. Bearing in mind that the analysis is made quarter-on-quarter, the short term yearly effect will be very powerful. Only after one year of abrupt descending slope, the output growth will enter a positive path. Complying with the EMU criteria diminishes the output gap (in the first quarter after the innovation by even -3.5 pp), leading the Romanian real output towards its natural levels.

\textsuperscript{137} The variables were considered for their values in 2009.
Another important aspect is that in all the four cases, the maximum fluctuation band for the Ron/Eur exchange rate does not exceed +/- 5%. Thereby, if the present conditions are preserved, Romania should not have problems with exchange rate fluctuations during the ERM II period, provided that authorities choose the maximum fluctuation band possible (+/- 15%).

The above model, as all the ones presented in this research, belongs to a partial analysis made for Romania’s European monetary integration. The major drawback is the poor specification of the foreign trade sector, that led to an insignificant reaction of the former to the innovations applied.

What is important to remember is that the results in the first part of the chapter were once again confirmed. Leading the national economy towards fulfilling the Maastricht criteria in order to enter the EMU, has as an immediate consequence a slowdown of the economy. The growth rate of the real output diminishes, carrying away a drop in welfare for Romanian citizens on short term.

VI. 2.2. The labour market and the FDIs

First of all, Romania is under the Excessive Deficit Procedure. This means it has to reduce it according to the EU calendar. In 2009, the budgetary deficit exceeded 7.3% and the target for 2010 is 5.9% of the GDP. Until 2012 it has to go below 3% of the GDP. Thus, in the hypothesis of constant evolutions of the GDP and of the budgetary revenues\(^{138}\), the government should diminish the budgetary expenditures with an average of 1.5% yearly.

A monetary scenario is hard to define as Romania does not really have the values necessary for assessing the interest rate criterion. As described in chapter III, one cannot really talk about convergence in this respect. What can be analyzed in relation to this criterion are the interest rate levels for different maturities and the effects of the NBR’s monetary policy decisions. Anyway, from what has been demonstrated in the field’s literature (National Bank of Poland, 2004), the fiscal impulse of reducing governmental expenditures would have a more rapid and intense effect than increasing the degree of monetary policy restrictiveness. And, usually, between the two types of actions, there is a reverse relationship – when the monetary policy is more restrictive and the National Bank

\(^{138}\) Both the major international institutions and the national ones forecast a very slow recovery of Romania from the crisis, meaning almost constant revenues at the general budget and an almost constant GDP.
uses higher monetary policy interest rates, the fiscal policy is more lax. An impulse of 1%/year was also applied to the interest rate.

For the main criterion, the inflation rate, its level in 2009 in Romania was 4.74%, a little bit above the target of the NBR of 3.5%, +/- 1 percentage point. The innovations applied to the inflation rate are based on two hypotheses.

One takes into account the target of the NBR of 3.5% in 2010 and 3% in 2011, both +/- 1 percentage point. In this scenario, the reduction would be made slowly in the next couple of years, while accelerating it in proportion as the deadlines established approach.

The latest figures for the European Union render the average of the best three EU performers in terms of inflation at the level of -0.96%. Taking this into account, Romania’s inflation should have been now between -2.46% and 0.53% to comply with the criterion. According to this, the second type of inflation impulses applied consider a constant reduction of the inflation rate with 2 percentage point per year in order to enter the ERM II in 2012 and with 1 percentage point yearly if the official deadline is postponed for 2014.

Then, the last impulse studied relates to the evanescence of the exchange rate.

The innovations described above were applied both individually and together, for a common influence.

Appendix 5 (part A5.1) shows the econometric results related to the study of the effects the monetary integration would have upon the Romanian economic environment, with accents on the labour market and on the flows of FDIs. No matter the type of impulse, the total employment will be negatively affected if the premises of the present study are preserved further on. The weakest variation appears when an innovation in the interest rate occurs. This result was somehow expected after analyzing the variance decomposition. The relationship between the two variables is weak enough not to be taken into consideration (not even 0.15% in the variation of the total employment is given by interest rate fluctuations). At the other side, there is the response to the fiscal impulse of diminishing the public budgetary expenditures. Once again, results demonstrate that for different changes necessary in a national economy, the fiscal impulse is more reliable and more powerful than the monetary one.

But for the whole integration process, authorities have to work on different macroeconomic aspects. That is why a combined shock was applied, taking into consideration the major changes specified above. In this case, the response of the total
employment was more intense. In the next quarter, the total employment diminished by 0.023% and recovered only after a while.

In the same time, the average monthly net wage is positively affected by the multiple shock applied, reaching an increase by 0.09% after a while.

The econometric analysis using the VAR/VECM methodology sustains the results for the very short term reactions studied in chapter VI.1 and for the short and medium term evolutions in part VI.2.1. European integration has as an outcome on short term a sensible economic slowdown, followed on medium term by recovery and economic growth.

The most negatively affected among the parameters studied are the flows of investments. For example, a reduction of the budgetary expenditures by 0.375% in one quarter causes a rate of change of -0.18% in the volume of investments in Romania in the following quarter.

The intensity of the reactions multiplies a lot when it comes to suddenly dropping the national currency and adopting the common one. When bringing the exchange rate to 0, fluctuations of employment amplify. From one quarter to the next the rate of change in the total employment for Romania becomes -0.7%, while the one for investments goes below -14%. Due to this and to the income convergence process, the average monthly net wage will, on medium and long term increase with a maximum rate of 1.6%.

In conclusion, European integration in general and monetary integration in particular will have important influences upon the Romanian economic environment. These results are very much influenced by the degree of competitiveness present. The European Union brings with it a series of convergence types that affect internationally the level of competitiveness and the position of a country. Questionless, the EU area is better ranked, thing that redounds upon the members, too. But each member individually has to find ways of preserving its individual position. For Romania would be very hard. Wages are increasing gradually, tending towards the levels in the rest of the Union. Consequently, the part of competitiveness related to the costs of the labour force is lost. Investors will withdraw their funds from Romania unless they can find something else here to attract them. The fluctuations in employment may be neutralized by an increased specialization of the labour force that, for the moment, is too rigid.
This part focused on little models for specific sectors of a national economy. Were analyzed with preference the effects the Euro introduction would have on the Romanian labour market and on the FDIs.

The goal for future researches is to arrive to the model presented in Appendix 5, part 5.3. This, because there is the need for a short model of the Romanian economy to encompass all its vital aspects. The more complex the model, the more reliable the results of the simulations are.
Chapter VII

RESTRUCTURING AND COMPETITIVENESS
IN POST-CRISIS CONDITIONS

With the entrance in the European Union and afterwards in the Euro Area, international markets open more easily for Romania. The Euro adoption will have as a direct effect an increase in competition for Romanian economic agents. In order to survive, Romania will have to increase its competitiveness. The degree of competitiveness determines the balance between the costs and the benefits of entering the EMU.

At its origins, the term “competitiveness” refers to the ability of an entity (company, sector, country, region, etc) to sell and supply goods in a given market. It is thus established in accordance with the level of prices (and all their components, including taxes) and with the exchange rate between the currencies under analysis. Recently, the concept has emerged as a new paradigm in economic development. Countries are looking more and more at their competitiveness on international markets. There are some that have created special bodies and agencies to deal with the competitiveness problem. At a time when almost all governments are facing budgetary constraints and there are significant barriers to economic actions, the concept of competitiveness has enlarged, capturing both limitations and challenges posed by global competition. Competitiveness is important for any economy that must rely on international trade and is of most importance for economies that are in a monetary union or are on the path of entering a monetary union. That is why, one of the best known EU strategies – the Lisbon Strategy – was created to enforce European competitiveness all over the world.

More and more bodies at international level are conducting comparisons of national competitiveness. The trend is to find ways of quantifying the process which was mainly qualitative at its origins. Except for the European Union, which has its own reports on the development of the Lisbon Strategy, there are two major bodies to study this issue internationally – the World Economic Forum in the Global Competitiveness Report and the Institute for Management Development in its World Competitiveness Yearbook. Additionally is to be mentioned the Doing Business ranking of the World Bank.

139 The first was Ireland (1997), then Greece, Croatia, Bahrain, etc., even Dubai and the Basques Country.
But as all theories and concepts, national competitiveness in the sense it is used nowadays has also gave birth to criticisms. Out of these, the best known relate to Paul Krugman, which, in his 1994 article “Competitiveness: A Dangerous Obsession” in the Foreign Affairs magazine140, said:

“The view that nations compete against each other like big corporations has become pervasive among Western elites, many of whom are in the Clinton administration. As a practical matter, however, the doctrine of "competitiveness" is flatly wrong. The world's leading nations are not, to any important degree, in economic competition with each other. Nor can their major economic woes be attributed to "losing" on world markets. This is particularly true in the case of the United States. Yet Clinton's theorists of competitiveness, from Laura D. Andrea Tyson to Robert Reich to Ira Magaziner, make seemingly sophisticated arguments, most of which are supported by careless arithmetic and sloppy research. Competitiveness is a seductive idea, promising easy answers to complex problems. But the result of this obsession is misallocated resources, trade frictions and bad domestic economic policies.”

As Krugman notes, for the concept of “national competitiveness” to have any sustainable meaning, it must be based on national factors that facilitate productivity, as the latter determines the level of national economic welfare.

Thompson (2004) also considers national competitiveness as a controversial term. In his opinion, is has a “both (i) a narrow, concise conception, that relates primarily to cost conditions as determined by exchange rates and (ii) and a broader, more nebulous conception that comprises the institutional and systemic circumstances of an economy, such as legal, governmental, public policy and other factors framing countries' wider business environments.”141 The results of his study show that, from a practical managerial point of view, institutional circumstances are by far significantly more important than cost conditions to the competitiveness of an economy.

Taking all the above mentioned into consideration, this chapter is intended to develop on Romania’s competitiveness, considering both pre- and post-crisis conditions. As Romania is a member of the European Union and a future member of the Euro Zone, the first

140 http://www.foreignaffairs.com/articles/49684/paul-krugman/competitiveness-a-dangerous-obsession
part focuses on describing the Lisbon Agenda. The second part of the chapter puts the light on competitiveness issues for Romania, as they come out of international rankings and domestic environment.

**VII.1. The Lisbon Agenda – Improving EU’s Competitiveness**

In March 2000, in Lisbon, Portugal, the members of the European Council have set the goal to make the European Union “*the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*”. It is of outmost importance to point out that the benchmark is represented by the USA. The sum of policies intended for achieving this are known under the names of The Lisbon Agenda or The Lisbon Strategy and are based on three pillars:

1. **The economic** one – prepares the ground for a competitive, dynamic, knowledge-based economy, with emphasis made on information society and the boost of research and development;

2. **The social** pillar – the European social model is to be modernized by investments in human resources and by combating social exclusion (member states have to increase their investments in education, training, life-long learning and to actively sustain employment);

3. **The environmental** pillar – draws attention upon the use of natural resources (was added later in June 2001 at the Goteborg European Council meeting).

Unfortunately, the report presented in 2005 showed that developments in line with the Lisbon Strategy have been weak and unconvincing. As a consequence, the strategy was simplified and relaunched in 2005 as “The Partnership for Growth and Jobs” (also called the Lisbon II). The Strategy involves:

- More research, development and innovation,
- A more dynamic business environment,
- Investing in people,
- Greening up the economy,
- Coherent macroeconomic policies,
- Cohesion policy,
Opening up to trade with third countries.

The European Commission has conducted a series of studies to estimate the effects of putting into practice the Lisbon provisions. The 0.2 percentage points increase in the GDP growth rate (from 2.0% in 2005 to 2.2%) is partly attributed to the structural reforms related to the Agenda\textsuperscript{142}. Another set of results was presented in the study “\textit{Quantitative Assessment of Structural Reforms: Modelling the Lisbon Strategy}” (Arpaia et al., 2007). According to it, unemployment rate decreased by 1.4% since 1995. By 2025, effective retirement age will go up by one more year and the rate of employment for older workers will reach 60%. The consequence should be an additional 1.5% of GDP until 2025 and 2.5% of GDP till 2050 (measured for EU15). Moreover, if member states increase their share of R&D expenditure up to 2.7% of the GDP till 2010, these activities will rise by half till 2025, generating an additional increase in GDP between 2.6% and 4.4%. In what concerns the ease of doing business, the simulation obtained an additional growth rate for the GDP with 1.1% by 2010 when reducing administrative and tax burden with 25% (for EU25) and a supplementary capital accumulation of 1.3% by 2015.

For further studies, the World Economic Forum\textsuperscript{143} has broken these action lines into eight categories critical for fulfilling the goal of becoming the world’s most competitive and dynamic knowledge – based economy:

1. Creating an information society for all – the prioritization of ICT by the government, ICT penetration rate (internet, PCs), students’ access to internet in schools and business usage of Internet. The Lisbon Agenda stresses that “\textit{businesses and citizens must have access to an inexpensive, world-class communication infrastructure and a wide range of services}”, while member states’ governments are expected to make real efforts “to exploit new technologies to make information as accessible as possible”. The truth is that economies that sustain and disseminate ICT ensure higher productivities of their industrial sectors, as more value is added in comparison with labour intensive sectors.

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\textsuperscript{142} European Commission’s Strategic Report 2008.
\textsuperscript{143} World Economic Forum, \textit{The Lisbon Review 2008 – Measuring Europe’s Progress in Reform}.
2. Developing an European Area for innovation, research and development – improvement of private R&D investments, R&D partnerships and high-tech start-ups. The goal of the EU is to reach a 3% of the GDP level of R&D expenditure. Protection of intellectual property and an inexpensive patent system, together with governmental incentives should stimulate the retention of the best brains into the European Union. This area is of special importance for countries that are in top of the ranking for the first criterion. Only through R&D will they be able to preserve the positions achieved.

3. Liberalization: completing the single market/ state aid and competition policy – this, together with the following categories, contain aspects that sustain the “four freedoms” (free movement of goods and services, capital and labour within the European Union). The provisions under this dimension relate to the free flow of goods and services. State aids to different national sectors, especially industry, have represented a major barrier on the path of market liberalization. If the goods movement is on the right path, there is much to be done for the service sector, whose development is still slackened by impediments.

4. Building network industries in telecommunication, utilities and transportation – as these are supports for economic development and for a more competitive environment. Officially, Europeans are able to freely choose their energy supplier (once with the directives from 2004 and 2007), but in reality, things are not yet that easy. Another step forward for the service market liberalization is the Postal Directive adopted in February 2008 based on which member states should abolish postal monopoly till the end of 2010.

5. Creating efficient and integrated financial services – for increasing availability of capital for investments on cross-border basis. An integrated financial market would reduce the costs of capital allocation within the members. Evidence suggests that heterogeneity is still high in the performance of different financial systems and more structural reforms are needed.

6. Improving the enterprise environment: business start-ups/ regulatory frameworks – To improve employment, first improvements have to be made in the ease of doing business. The Lisbon Agenda intends to level the administrative actions required to conduct a business, by lowering the time needed for starting the
business and the distortionary of burdensome taxes. This aspect is very much studied by the World Bank’s Doing Business Report.

7. **Increasing social inclusion: bringing people to workforce, upgrading skills and modernizing social protection** – in the Lisbon II Strategy, the employment target is 70%. Investing in people through more and better jobs and sustained life-long learning is a key aspect for the ageing population of the European Union. High rates of employment are necessary to sustain the growing pension expenditure.

8. **Enhancing sustainable development** – is based on the idea that improvement in the present generation’s quality of life should not negatively affect future generations. This dimension was added in Stockholm in 2001. Priorities regard: climate changes, transport, public health and natural resources. The development plans at both European and national level have to be environmental friendly.

Different reports have pointed out that the EU member states are very different in their performances according to the Lisbon Agenda criteria. As expected, the Nordic members have the best performances. Sweden, Denmark and Finland are known as countries with very sound social systems. Moreover, Nordic companies are more “aggressive” in complying with new technologies and spending on R&D. The usual discrepancies between North and South in Europe are also present in the performance level for the Lisbon Strategy criteria. The Mediterranean countries are easily surpassed not only by their old partners, but also by many of the new member states. For example, according to the World Economic Forum’s 2008 Lisbon Review, Italy and Greece are only ahead of Romania, Poland and Bulgaria (see figure 45). The whole situation was somehow expected, as Mediterranean countries had the worst evolutions after the adoption of the common currency.

The financial subprime crisis that began in the United States in early 2007 made the economic outlook of Europe less friendly. Multiple shocks and increased volatility reduced economic performance and affected the measures proposed to enhance competitiveness. European leaders (and not only) have to focus on finding a middle path between dealing with shocks and complying with the Lisbon Agenda. Inflationary pressures created by rising

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144 Denmark is known as the pioneer of the “flexicurity” system, which combines flexible work arrangements with strong social protection.
regulated prices, international loss of markets (based on the fall in demand) that led to workplace losses increased poverty levels and eroded public trust. Countries have now more to work on improving and creating jobs. For the near future the Lisbon Agenda will be a real challenge for governments.

Figure 47. Percentile map and histogram of the EU countries for the Lisbon Agenda index in 2008 – 2009.

Source: own calculations using the GeoDa 0.9.5-i software based on The Lisbon Review Index (World Economic Forum, 2008)

VII.2. Romania’s Competitiveness Pre- and Post-Crisis

In line with its recent developments, Romania has passed from a factor-based economy to an efficiency – driven economy, being now in the transition stage. Still, there is much left to be done in order to become an innovation – driven economy (the last stage of national development and the scope of the Lisbon Agenda).

The problem of competitiveness is very complex. Depending on the parameters used for the analysis, results can vary significantly. An overall picture is given by the criteria of the Lisbon Agenda established by the European Commission. The Monitoring Platform is applied at both national and regional levels to see disparities that exist throughout Europe, how much has been done to fulfil the Lisbon requirements and so on.

The convergence process has downsized the gap between Romania and both the European Union and the Euro Area. As previously shown, economic parameters have improved, although most of them remain far away from the targets imposed or the averages.

145 R – Romania, P – Poland, B – Bulgaria, G – Greece, I – Italy.
of the European Union and the Euro Area. For example, in 2008, the Romanian GDP per capita represented only 22.4% of the Euro Area level when measured in Euro per inhabitant and 42.1% in Purchasing Power Standards per inhabitant.

As Paul Krugman (1994) said, productivity and the factors that facilitate it are key issues in discussing competitiveness. The European Union focused its attention upon the human production factor, constructing the Strategy around the idea of better jobs and more jobs.

Romania is one of the biggest countries of the European Union, both as area and as population. But when analyzing the degree of productivity of the human capital, it always came the penultimate, ahead only of Bulgaria.146 Things are even worse when comparing labour productivity in Romania with the Euro Area average (which has always been higher than in the EU27).

Figure 48. Labour productivity per person employed in Romania (GDP in PPS/employee relative to EU27, EU27 = 100)

Anyway, one has to bear in mind that the growth rate of real labour productivity (per person employed and per hour worked) was significantly higher in Romania in all this time. It is a special feature of the European Union: new member countries have lower levels when comparing absolute values, but much higher levels when comparing growth rates - a sign of continuous and sustained convergence.

Output represents the value of all the goods and services produced in an economy, the result of interactions between production factors. That is why its evolution and the evolution

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146 Before 2004, Romania was the last among the EU27 countries at labour productivity per person employed.
of the real output per person employed can also be used to measure domestic productivity. Both of the two parameters are affected by seasonal influences, with important differences between the first quarter of one year and the last of the previous. The graphs below present trend and cyclical component for the seasonally adjusted data. As can be seen, the general ascending trend was preserved until 2009. In the first quarter of 2009, the deterioration of the Romanian business environment had as a consequence a dramatic drop. Real output in absolute values and per person employed represented only around 60% of the values recorded in the previous quarter (q4 2008), the lowest share since 2000.

Figure 49. Real output and real output per person employed in Romania (in millions RON), trend and cycle using the HP filter

Another structural indicator included in the Lisbon Monitoring Platform is the value added in economy. As shown in chapter IV.3.2., Romania remains structurally very different from the European average. In 2006, Romania had the second highest structural asymmetry indicators (computed based on value added by each sector) – 15.6 (measured as standard deviation from the EA average). This decreased by two standard deviation points in 2007 to 13.27. The only country more structurally different than Romania is Luxembourg. But the latter obtains almost 50% of the value added from the business, financial and real estate sectors, while Romania is more intensive in low value added sectors.

At a more aggregated level, the Euro Area average is below 2% for the value added in agriculture. The Romanian agricultural sector contributes with around 7% of the gross

Source: Own calculations based on OECD and ILO data
value added in economy; only few years ago the share was with double digits\textsuperscript{147}. The ratio of the industrial sector has constantly decreased from around 30\% in the early 2000s to approximately 25\% lately. The service sector has improved its performance, producing more than 50\% of the total value added. Still, it is far from the European average of 70\%. Building and constructions account for the rest of the value added in Romania – 11.8\% in 2008, the highest among European states and not only in 2008, but with a sudden drop in 2009.

The Lisbon II Strategy sees competitiveness as the way to achieve economic growth and enhance prosperity through the creation of more and better jobs for the European citizens. Thus, labour market is one of the key aspects. In the same time, the goal is for the European Union to become the most “knowledge – intensive” economy in the world\textsuperscript{148}. Combining the two strategic lines, may pencil an idea about a country’s level of competitiveness.

Romania entered the transition period with very high employment rates at the beginning of the 1990s. The socialist ideology based on equality among citizens insured high levels of employment rates among women. But the transition period brought with it a lot of industrial restructuring, which Romanians did not know how to deal with. They lacked mobility and, more painful, their skills were no longer required on the labour market. Additionally, part-time working was almost inexistent. It started to increase once with the adoption of the Labour Code in 2003 which contained provisions meant to ease and encourage part-time employment. Of most importance is its diffusion among the young labour force (up to 24 years) which has a particularly low participation rate to employment.

Investing in people is one of the main objectives of the Lisbon Agenda. Life-long learning is the key issue in insuring flexibility and competitiveness of the labour market. It pays off for all the parties involved, tackling social exclusion. Even nowadays life-long learning is scarce among Romanians, regardless of the efforts of the National Labour Force Agency (ANOFM). From the adult population (aged 25 to 64 years), only 1.5\% was involved in education and training in 2008, by far fewer than the European averages or the average of the ten member states that joined the union in May 2004. Not too speak about the Lisbon target of 12.5\% of the adult working – age population. Women are more flexible in

\textsuperscript{147} In 2004, the share of value added in agriculture was 14.13\%, decreasing from 2005 to a one digit value. In the same years, the EA average for the same sector was 2.21\%.

\textsuperscript{148} In fact, the main goal is to (a detrona) the USA from the leader position in research and development. Unfortunately, as shown by many studies, Europe is still far away from the US performance.
this respect than men. The problem is at conceptual level, people being reluctant to learn more and re-specialize. The problem should be first attacked at lower educational levels to increase work force availability and openness towards life-long learning.

Once with the liberalization of the educational market, the number of tertiary graduates has sensitively augmented\textsuperscript{149}. In only 10 years, it almost tripled, arriving nowadays at around 1 million tertiary students. Although the number of students and graduates in science, maths and technology had the same ascending path, as a share in the total number, it has decreased. This is due to an explosion of tertiary education in the fields of social sciences (especially economics) and law. Thus, with approximately 200,000 students in science, math and technology, and the remaining 800,000 in other fields of education, the Romanian labour market is short in engineers and researchers in these fields, while abundant in economists and lawyers. Another shortage in tertiary educated labour force is to be found in the health sector. However, employment of tertiary educated persons is high. With an employment rate of 86.9\% of the tertiary graduates, aged 25 to 64, in 2008, Romania performs much better than most EU member states. It ranked 8\textsuperscript{th}, after Sweden, Denmark, Lithuania, Netherlands, Slovenia, Cyprus and Latvia. Almost half of the tertiary graduates are working in the knowledge – intensive sectors and in the high-tech sectors.

In an aging society, with increasing fiscal burden given by the social security system, the retirement age is extremely important. In Romania, the latest tendency is for tertiary educated work force to remain longer active than the official retirement limit. Employment rates for individuals above 55 years old are higher than the EU and EA averages. The minor differences between genders will be cancelled by the latest official decision of augmenting the retirement age for women to 65 years old gradually till 2030.

Several reforms have improved lately the quality of the Romanian labour market. Employment rates have increased, unemployment rates have decreased\textsuperscript{150}, but the latters were also influenced by the high migration flows. The more than 2 million Romanians working outside the country represent a safety valve of the Romanian labour market. With all this, long-term unemployment remained high in comparison with European averages until

\textsuperscript{149} Not only there appeared private universities, but also the public ones have enlarged their offer.

\textsuperscript{150} This until the financial crisis from 2007 corroborated with several decisions of the Romanian government from November 2008 onward, which caused many SMEs to close down and more than 800,000 job losses.
2008, when it dropped to 2.4% of the active population\textsuperscript{151}. In addition, almost half of the unemployment is in long-term form. There are two main reasons for this. First, there is a slow process of work force absorption generated mostly by the lack of flexibility. Second, many of the persons that were officially unemployed were also working under the counter. In this way, they were benefiting both from unemployment benefits and from unregistered wages.

**Figure 50. Long-term and very long-term unemployment in Romania, the European Union and the Euro Area (as % of active population)**

![Bar chart showing long-term and very long-term unemployment in Romania, the EU, and the Euro Area]

*Data source: Eurostat*

**Figure 51. Evolution of long-term employment as share of total employment in Romania, the European Union\textsuperscript{152} and the Euro Area**

![Line chart showing evolution of long-term employment]

*Data source: Eurostat*

\textsuperscript{151} The EU and EA rates were 2.6% and 2.9%.

\textsuperscript{152} No data available for the European Union in 2005.
High value added sectors develop slowly in Romania. We lack both the qualified labour force and the infrastructure. Research is done mainly in public research centres or in universities. Public – private partnerships are rare, while the time needed for obtaining a patent is too long. Romania is the worst European performer at patent applications per million of inhabitants – only 1.35 in 2006.

The European Council decided in Lisbon to reach for R&D expenditure the target of 3% of the GDP. Romania spends only between one sixth and a third of this target\(^\text{153}\). Out of this, approximately 0.22% of the GDP is spent by the business enterprise sector, 0.18% of the GDP by the government and 0.13% by the higher education sector. Employees in R&D have represented 0.45% of the total employment in Romania for some years now (just one third of the EU average). Almost half of them are university personnel. The problem in Romania is with the governmental sector, which is practically inexistent (both as employees number and as R&D results).

Employment in the high-tech sectors (high – tech manufacturing and knowledge-intensive high-technology services) has been constant at a very low rate – it fluctuated between 1.7% and 1.92% of the total employment in the last five years. Out of it, the high technology manufacturing sector is responsible of only 0.4% of total employment, the rest of around 1.5% being found in the high-tech services sector. Participation rates do not vary too much depending on sex.

In the medium high technology sectors are employed more men than women, with a general rate around 5% of total employment, while women’s share is double in the knowledge intensive services.

\(^{153}\) But more than Bulgaria, Cyprus and Slovakia.
Figure 52. Participation rates of men and women in the medium high-tech manufacturing sectors (MHTM) and the knowledge – intensive services sector (KIS) in Romania

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Data source: Eurostat

It is said that the engine of an economy are the SMEs. A nation which relies its economic force on small and medium size enterprises is less exposed to asymmetric shocks on international markets. Meanwhile, a country or an industry based on industrial giant companies could even disappear as a consequence of external shocks. The result would consist in a huge number of unemployed persons to be sustained through the social security system. Moreover, transition to new jobs would be deferred by the lack of training and workforce education. Understanding all these, the European Union has based its Lisbon Strategy on the development of the SMEs sector. Several structural funds are available for member states to increase productivity and competitiveness of the SMEs. The development of operational programmes corroborated with the convergence process has set an ascending trend for the small and medium size enterprises in Romania.

On international markets, all that matters in terms of competitiveness is for the goods and services supplied to have competitive prices and the required level of quality. Improvements in the Romanian labour market have led to an increase in the cost of the labour force, negatively affecting Romania’s international competitiveness. Meanwhile, the devaluation of the national currency has had a reverse effect. That is why complex indicators are needed to assess both exchange rate movements and price and cost trends.

The simplest way to see changes in international competitiveness is to analyze the unit value indices of foreign trade. For example, the European Union uses the Laspeyres,
Paasche and Fisher formulae to calculate unit value indices for exports and imports\textsuperscript{154}. Based on Eurostat data for Romania, from 2000 till 2008, the export unit value index has augmented with 35.2%, while the unit prices of imports have increased with 23.9%. As the share of high-tech exports has remained constant, upward price movements of exports were caused by other factors (such as increases in the guaranteed minimum wage per economy, the process of price convergence, increased quality and so on). Higher prices for imports were given, among other factors, by fluctuations in the oil price on international markets and the devaluation of the Romanian Leu (caused by the effects of the international subprime crisis on the Romanian economy, the unstable political environment, the loss of competitiveness, etc.).

Another possibility is to compute a country’s exports and imports competitiveness based on export and import prices, exchange rates and producer price indices.

The European Commission, through its Statistic Bureau also computes the Real Effective Exchange Rate (REER), also called Relative Price and Cost Indicators. This is a Sustainable Development Indicator that measures a country’s cost and price competitiveness relative to its competitors in international markets. Beside fluctuations in exchange rates and prices, the REER also contains information about the nominal unit labour cost. The comparison basis is a panel that includes the EU27 countries and other nine industrial countries: Australia, Canada, United States, Japan, Norway, New Zealand, Mexico, Switzerland, and Turkey. The REER value for Romania in the last 10 years was, unfortunately, the highest in the European Union. The transition period and the convergence process have caused a constant loss of competitiveness for Romania, which accelerated from 2005 on. Romania’s extremely bad competitiveness position is very well emphasized in the percentile map below.

\textsuperscript{154} Elementary unit values are computed as trade value/quantity.
But competitiveness does not imply only price-related aspects. A competitive economy has to be able to attract investors through infrastructure, political stability, a good business environment and, why not, a healthy environment.

Infrastructure in Romania is in general poorly developed. There are few kilometres of high-ways and works for building new routes are advancing extremely slowly. It is being said that a country’s stage of development is directly proportional with the number of kilometres of high-ways it has. From this perspective, Romania is in the lowest level group. Not only that rapid road transportation routes are missing, but the general quality of the road system is in a poor condition. Fortunately, the railroad system is very well developed and improvements are being made for other means of transportation. The telecommunication system is well developed. A large part of the citizens have a personal mobile phone. The rate of internet users is high.

Politicians and public institutions lack public trust. There is the so called “political clientage” in favour of which are taken different decisions. The policymaking process has no transparency. With the latest international evolutions, public funds were wasted on unimportant issues instead of being used for enhancing economic recovery. The political scene is full of scandals that destabilize Romania. As mentioned in the European Commission’s reports, corruption and bureaucracy kill us.
In general, the business environment is not very bad. As in all cases, improvements could be made, especially for the labour market flexibility and the ethical behaviour of companies. The new government\textsuperscript{155}, instead of reducing the existing high taxation level, has added to it.

Labour force is still cheaper in Romania than in other European countries and is quite well prepared, especially in maths and sciences. The quality of education is the highest for this sector. So companies would also find the necessary personnel for innovation, research and development. The problem is that due to low incomes, well prepared persons (“the good brains”) are emigrating towards better paid jobs in more developed countries.

Based on all the evolutions described so far, Romania’s international ranking has improved throughout the years. For example, in the Global Competitiveness Index 2008 - 2009\textsuperscript{156}, Romania went up 6 places since the previous report, from place 74 to place 68. The best performance was obtained for the efficiency enhancers group (rank 54). What is curious is that many of the efficiency - driven countries, while they satisfy quite well the efficiency criteria, they still perform worse at the basic requirements.

In the 2009 – 2010 Global Competitiveness Report, Romania goes up 4 places to the 64th place. It also passed from an efficiency – driven economy to the stage of transition from 2 to 3. The best performance remains for the efficiency enhancers group (rank 49).

The main problems for Romania remain infrastructure and the political environment. They are now accompanied by tax regulations and tax rates and access to financing.

The twelve dimensions taken into study by the World Economic Forum and Romania’s results for them are presented below. The Global Competitiveness Index is obtained based on surveys applied in each country on economic agents. The score for each indicator ranges from 1 to 7 (the best performance possible).

\textsuperscript{155} From November 2008 – the Boc government.
\textsuperscript{156} World Economic Forum.
Another very important ranking is made by the World Bank and compares regulations in 181 countries – Doing Business. In the 2009 issue Romania is the 47th country, with the best performance for starting a business and getting a credit and the most difficult to employ workers and pay taxes. It was considered easier to make business in Romania than, for example, in the Czech Republic or Poland.

The global crisis affected Romania very much. This, together with the sets of elections from 2008 and 2009 caused instability and lack of trust. Consequently, Romania lost 8 places, going down to the 55th rank in the Doing Business 2010 report. Still, it remains far ahead of Poland and the Czech Republic. The best results remain in the banking sector – the 15th place for getting a credit157, while the worst performance is for paying taxes – 149th. The deterioration of Romania’s competitiveness in the ease of doing business was cause by several “reforms” that had negative impacts instead of sustaining economic activity. There are three areas most affected by these negative reforms – the construction sector (although it should have been vice versa as the constructions sector fell the most starting from 2008), paying taxes and closing a business. The only positive reforms were made in the field of registering properties. Romania increased the costs of construction permits, insolvency procedures and the labour taxes.

157 The same as Poland and Slovakia.
To attenuate the effects of the international crisis, Romania has to undergo a deep restructuring process. And the first step has to be taken at high level. Politicians have to understand that they have to increase public trust in their actions. Instead of dealing with the urgent issues that would enable the exit from the crisis, politicians are involved in a series of disputes. This instability, together with the round of elections from 2008 and 2009 have put a lot of pressure on the macroeconomic development of Romania. The national currency devaluates day by day. Unemployment rate rises. Romania’s competitiveness on international markets is falling down together with its rating.

The loss of competitiveness related to wage and price convergence may be offset by encouraging the development of high – tech sectors and sustaining education. But for the latter to be effective, efforts have to be done not only to educate the work force but also to retain it in Romania. Additionally, investments are necessary to increase the rate of the citizens involved in life-long learning, as this may lead to lowering unemployment rates.

Another aspect that could weight a lot when talking about competitiveness is the agricultural sector. Romania is among the biggest countries of the EU, with all the natural factors necessary for developing this sector. Rumours say that the next world crisis will be a food crisis. Thus, it would be a pity not to take advantage of what we have. But agriculture is still made in Romania in an extensive way, for subsistence. A lot of investment is needed to increase competitiveness of this sector.
Chapter VIII
CONCLUSIONS

European integration is a continuous, long-term process. Its last stage is the adoption of the European common currency, the Euro. After joining the EU countries on the 1st of January 2007, Romania is now preparing for replacing its own currency, the new Romanian Leu – RON, with the European one. The process implies a lot of restructuring and its effects can hardly be foreseen. Until January 1st, 2015\textsuperscript{158}, the changes that occur are complex and the effects can be seen both internally and externally. Consequently, Romania’s entrance in the Euro Area becomes a transnational issue, going outside its national borders. The policies and politics conducted by the main administrative bodies have to take into account both this transborder feature and the daily problems of the Romanian citizens. Beside the economic aspect (which is the primary one in monetary integration) of almost the same importance is the social one. Much harder to quantify, the social and cultural problems related to giving up a national symbol are more subjective. Here come into force individual perceptions of national identity that cannot be measured by simple econometric models. Attempts have been made (Allam & Goerres, 2008). The attitudes of the post-communist countries towards the single currency are formed less on political and economic issues and more on historical and ideational explanations. From these three aspects was chosen the economic one to be studied here as it encompasses all the actions taken for European monetary integration. These actions imply not only national, but also transborder policies for the life of the Romanians in particular and the Europeans in general.

As discussed in the first parts of this research, the European Monetary Union has its roots in Mundell’s theory of Optimum Currency Areas (1961). Nowadays, the new trends in integration relay more on the endogenous theory. According to it, countries that want to join a monetary union do not necessarily have to be in a certain stage of development. Integration can occur without fulfilling all the criteria, as it is considered that after integration the convergence process will intensify.

The goal of this research was to study the possible effects of the Euro introduction on the Romanian market. The results are of most importance as no other study of this kind was

\textsuperscript{158} The data set as a target for the Euro adoption in Romania.
yet made for Romania. To fulfill this aim, the Romanian economy was gradually studied. The research opens with a presentation of the state-of-the-art in what regards the convergence process and ends with different scenarios and competitiveness issues.

The first convergence criterion to be studied was the inflation rate. Romania comes after a long period of very high inflation levels, above 50%. It first reached a one digit values in 2004, but instead of going down towards the Maastricht reference value, it increased due to several internal and international problems\footnote{For example, the agricultural problems in 2007 that increased inflation in 2008.}. Still, the National Bank of Romania remains optimistic that the criterion will be fulfilled in order to join the Euro Area in 2015. Beside the poor inflationary convergence, Romania has another problem – a high inflationary persistence, the third in the European Union after Poland and Latvia. And all the political movements do nothing but to deepen this problem. The NBR will have to fight against this inflationary persistence as it may cause important fluctuations in the real exchange rate during the stay in the ERM II.

Another problem of the NBR is to deal with contradictory criteria. Inflation convergence is opposite to the price and income convergence. They both lead to inflationary pressures, through an increase in demand. And it was seen for Romania that almost all our domestic demand went into imports. From here comes another problem – productivity level and the internal capacity to satisfy the needs of the citizens.

Consequently, in the present form of inflationary convergence, the entrance in the Euro Area would be costly enough for Romania and for the EMU countries.

The second criterion, which goes hand in hand with the first one is not very easy to be studied. The interest rate taken for analysis for the convergence process regards 10-years maturity governmental bonds. But Romania has issued only twice such bonds. Thus, the object of analysis is missing. Instead of it, studies made use as proxies the money market interest rates for different maturities\footnote{In this analysis were taken three maturities – 1, 3 and 12 months.} and the uncovered interest parity. All in all, the conclusion is the same: the interest rate differential between the EA and Romania is still high enough. However, as the Euro Area is perceived as a highly stable zone, this is the field in which convergence could occur more rapidly after joining it.

When entering the Euro Area, Romania loses one of its main adjustment mechanisms – the monetary policy. This is very important as history shows that monetary mechanisms have played a key role in the stabilizing process. When problems occurred, the exchange rate
was modified in order to minimize the effects. If the schedule remains, in 2012 Romania enters the Exchange Rate Mechanism II, the managed floating exchange regime giving place to the fixed one. In the field’s literature there are pros and cons for both regimes. The floating one is a channel of transmission for shocks to the economy, while the fixed one is very sensitive to speculations. There are two main things to be considered when entering the ERM II. First, there is the central parity. Establishing its level is very difficult and has to account for all the characteristics of the national economy. Then comes choosing the width of the fluctuation band, which can go as much as +/- 15%. Due to this, the research has analyzed the volatility of the RON against the EUR, based on the methodology used by the European Central bank. From January 2005 to June 2009, the volatility of the RON was very high, especially at the beginning of the period, when it reached almost 30%. The stabilization of the domestic economy was also seen in the decession of the volatility. But from the second part of 2007, fluctuations began to gather way and the NBR reported a volatility of +9.7% and -14.6% in its 2008 Annual report.

For a better understanding of Romania’s position in this respect, the data obtained was compared with the last three EU members that adopted the common currency – Malta, Cyprus and Slovakia. While the first two had almost no fluctuations at all, Slovakia reached 7.4, still, low in comparison with the values for Romania. There is much to be done for the exchange rate stability, higher fiscal and monetary discipline, bearing in mind the speculative attacks that we will have to support in the ERM II period. Anyway, a thing is certain: we have to go on the maximum fluctuation band admitted +/- 15%.

Until 2008, the fiscal criteria were the only two respected by Romania. Now just one has remained – the general government debt which is below 60% of the domestic GDP. The other one, the deficit, went to 5.4% in 2008, making Romania to enter under the Procedure of Excessive Deficit in May 2009. Complying with the procedure and its requirements depends on the size of the budget and on its structure. As most of the new member states, Romania’s budget represents around 30 – 40% of the GDP. In the same time, the Euro Area and the EU range between 40 – 50%. The negative growth puts even higher pressure on the deficit, making it more difficult to respect the European Commission’s provisions.

Instead of increasing its productive expenditures (like education, health, etc.), Romania has increased the social protection expenditures dramatically. After a good path of the fiscal policy in Romania, the international subprime crisis provoked chaos.
Nominal convergence is the one taken into account for the final decision. But beside it, the other two groups play the same role as importance. Real and structural convergence may determine the level of the costs and benefits of entering a monetary union. Moreover, they are more difficult to be achieved by a former communist country.

The real convergence is represented in this research by two main parameters – the GDP, which captures the state of the economy, and the level of prices, which catches the impact of the EMU upon consumers and is also in contradiction with the inflation rate nominal criterion.

Most of the literature reviewed is based only on time analysis of the convergence process. Here the spatial dimensions were also considered as neighbours may influence a lot a country’s development.

The level of Romania’s GDP in absolute values is among the lowest in the EU (both as a total and per capita). It was compensated by the highest GDP growth rates until 2009. Being a big country, fort Romania was much harder to lower the gap between it and the Euro Area. The Romanian GDP at market prices reached only 1.5% of the Euro Area one. In purchasing power parities, the share is higher, demonstrating that the price gap is narrowing. Unfortunately, no time cointegration was found between the GDP in Romania and the Euro Area. They both had ascending trends, but the difference in the levels is significant. A long term relationship was found by the Granger causality. Romania’s main trading partner is the European Union, in which the Euro Area members have the highest contributions. Thus, as expected, the GDP level in Romania is determined by the GDP level in the Euro Area.

The maps resulted during the spatial analysis clearly show Romania’s position in the EU. The cruel reality is that Romania is among the poorest members. And the time needed to come closer to the Western, richer ones is too long. The average annual growth rate of a country is positively influenced in the EU by the average annual growth rates of the neighbours, indicating a spatial clustering of the EU members. In the same time, the β convergence hypothesis was also accepted – the growth rate for Romania is strongly influenced by the initial level of the GDP.

For consumers, at individual level, prices count the most. Their level of welfare is given by the quantity of goods and services they can provide with an amount of money. If the process of price convergence is fast, the result will manifest in inflationary pressures that would prevent from fulfilling the inflation rate criterion. As Romania comes from a period with very low prices during the communist regime, price convergence is definitely
happening. Authorities have to find ways to measure the speed of price convergence and to find an equilibrium between this process and the stability of prices. In the European Union, spatial price gaps are to be found not only between the old and new members, on the East – West direction, but also between Northern and Southern countries. As a continuation of this research special attention will be paid to the speed convergence for prices in Romania. This will help finding and taking the right decisions regarding inflation policies and politics.

The analysis of prices for different groups of products and services finds a problem. The non-durable goods, which are basically food, will generate inflationary pressures. The costs and monetary transformations related to the Euro introduction will be supported by the consumers, giving birth to the so called “inflationary illusion” phenomenon. Different types of households have different tastes. The average Romanian is a low – income individual. Consequently, he is more affected by changes in food products, utilities and transportation. He will feel with a greater intensity the costs related to the Euro manifested in an inflationary jump. Regulated prices (health, transportation, gas, electricity) represent around 34% of the basket in Romania, in comparison with around 25% in the EA. Their convergence is much more felt by the average Romanian.

But productivity plays also an important role in price convergence and inflationary pressures. In countries like Romania, with lower productivity levels and low value added sectors, the Balassa - Samuelson effect manifests more intensively.

When the Romanian Leu is replaced by the Euro, the monetary policy enters under the rule of law of the European Central Bank. Thus, a common monetary policy assesses shocks and problems in different parts of the Union. Is this common monetary policy suitable for Romania? History of the European Union demonstrates that the effects of this common monetary policy can be the opposite of what is needed. The types of shocks occurring and the vulnerability to asymmetric shocks are very important. If fluctuations throughout the area follow similar paths, no major problems will appear. Five variables were chosen as proxies to study the cyclical convergence of Romania, that cover both sides of the economy – demand and supply. The cyclical components of the five proxies for Romania and the Euro Area have more or less the same fluctuations. When applying the correlation methodology, Romania proved to be pro-cyclical correlated with the Euro Area, with correlation coefficients higher than 50%. Only for the final consumption the correlation is lower, due to the rapid credit growth in the previous years. Romania and the Euro Area are contemporaneously pro-cyclical: shocks in one part manifest in the same quarter in the other
and with similar effects. Nevertheless, the time interdependency is also outstanding. Business cycles convergence in Romania is on the right path and the ECB policies should have the expected results. At a more general level, business cycle convergence is pretty much influenced by the behaviour of the analyzed components, that may, for a short period of time, have counter-cyclical evolutions in respect to the Euro Area. For political decisions it has to be also taken into account the time needed for the reaction to take place and the intensity of the reaction (which has increased in time).

Macroeconomic stability and the synchronization of business cycles have to be carefully assessed. If not, the type of convergence and movement may change in time and convert into a counter-cyclical one. The type of cyclical relationship is not necessarily for good, that is why caution is needed.

But for the common monetary policy to be suitable, the business cycles synchrony has to be sustained by a similar economic structure and by foreign trade integration. The first one plays also a key role in the formation of citizens’ attitude towards European integration. Romania’s inheritance of low value added sectors make its economic structure to be far away from the EA average. The share of the agricultural sector in the total economy is high. Despite the low incomes and the lamentable situation, Romania should be clever enough to invest in agriculture and could become one of the main producers in the European Union.

The trend of moving towards higher incomes sectors, which are more capital intensive, has made Romania pass from an efficiency driven economy towards an innovation driven economy.

Based on the standard deviation approach, the structural asymmetry indicator took the value of 15.6 for Romania in 2006 and 13.27 in 2007, extremely high in comparison with other members. This very different economic structure exposes Romania to asymmetric shocks that would not be properly handled by the ECB’s actions. One of the main sources for these shocks is the labour market. Most of the Romanian economy is labour intensive and is already being affected by the relocation of production towards Eastern countries that are cheaper.

Foreign trade integration with the EU and the EA is high. The European members are Romania’s major partners. The good synchronization of business cycles is sustained by both vertical and horizontal interrelationships. But in the vertical processes, Romania is involved in the lower levels, where the value added is not high and the work is more labour intensive. Consequently, Romania is more exposed to asymmetric shocks.
The structure of Romania’s foreign trade has been constant over time. Investments and plans are needed to sustain the development of high value added sectors, based on innovation and high technologies.

Although Romania is contemporarily pro-cyclical with the Euro Area and thereby the common monetary policy should assess shocks in the same way, this feature is not sustained by the other two components of the structural convergence. Romania has a good foreign trade openness, but the disadvantage comes from the fact that most of these exchanges are based on low value added products and services. Only below 5% of the exports are high-tech commodities. In this way, it is a sure victim of the labour market fluctuations. Until the economic structure will get closer to the average of the Euro Area, introducing the Euro instead of the Leu would imply a too great effort.

The labour market and the fiscal policy remain the two major adjustment mechanisms. As the fiscal part was more dealt with for Romania and based on the fact that labour shocks are more likely to affect Romania, the characteristics of the internal labour market were carefully investigated.

One of the main characteristics of the Romanian labour force is the increased international mobility. While in the case of other new member states cultural and linguistic barriers limited very much labour force migration, this was not the case for Romania. The high mobility helped Romania decrease unemployment rates when needed. Furthermore, Romanian workers have become some of the largest minority groups in countries like Italy and Spain, that have the same Latin origins. It is interesting to mention that despite the high international mobility, the domestic one is quite limited. Driven by the high wages from abroad, Romanian citizens prefer to go directly there instead of moving first to another region in the country. And what is more worrying is that leaving more the country are the younger generations, namely exactly the ones that should sustain it in the future. This, combined with the descending trend of the population as a whole, has brought to a reduction in the active population and in the labour force. Employment and unemployment rates are far away from the EU and EA averages and from the Lisbon targets. And the research identified some special groups in this respect. Female unemployment grew rapidly after the 1990s, along with the one for the younger generations. But the later had, as a major cause, the liberalization of the educational system. While previously very few students had access to tertiary education, nowadays, everyone that whishes to do it has an opportunity ahead. In this way, many students disappeared from the labour force market. A new tendency that comes to
compensate for the loss in young work force is the desire of the old employees with tertiary education to remain active long after the official retirement age.

However, the rigidity of the Romanian labour force market is high and the general impression is that it will increase. Unemployment rate raised not only due to the Phillips curve effect, but also due to lack of flexibility in the labour force. The transition period came with a lot of restructuring. Employees from the old, big state-owned companies were not able to reconver. The main reason is to be found in the fact that life-long learning is almost inexistent in Romania. When laid off, individuals were not able to reconver professionally and either went to work in agriculture or went into unemployment, increasing the burden of the social security system. Another effect of this is a problem of most of the former communist countries – in the same time they face both high unemployment and labour shortages in different sectors. Some said also that the educational system was not able to adapt to changes in the labour market. Sectors that had a rapid development (like ICT) lacked professionals as universities were not able to prepare them as required.

Income convergence is happening, although not fast enough. But lately labour force and production costs have increased, causing a loss in competitiveness on the world market. Romania has a legal minimum wage established and the trade unions are striking for new augmentations. Wage setting becomes more and more rigid. Pressure is also given by the Balassa – Samuelson effect.

But in a flexible labour market, wage development is closely correlated to productivity (mostly) and inflationary evolutions. Unfortunately for Romania the analysis found no such thing. Wage changes were caused by inflation and by the convergence process to the European Union. Productivity had nothing to do, or too little to do with wage increases.

All in all, for the labour market to become a good adjustment mechanism, new regulations are needed. Yes, Romania benefits a lot from the work force migration, that allows for adjustments in times of problems. But wage flexibility, instead of increasing, it lowers. Much more so the social security system puts more and more pressure on the national budget and on the costs of labour in general. Already the convergence of labour costs, wages and incomes has diminished Romania’s competitiveness abroad.

For the moment, the labour market could not take the place of the monetary policy as an adjustment mechanism in a satisfying manner.
After analyzing all these aspects, the political life comes in front. All the official strategies and programmes have as a major idea the integration in the Euro Area. That is why the actions planned sight out the convergence process on different levels. The targets set by authorities were further used in the simulation part to see what would be the effects of putting them into practice.

The scenario approach was divided into very short term, short term and medium term effects. The long term effects were not considered due to several restrictions (the length of this paper, the shortage in data for Romania and so on).

The main conclusion is that replacing the RON with the EUR implies on short term economic slowdown and restrictiveness followed by economic recovery and growth on medium term if the present premises are preserved. Consequently for Romania will not be easy to enter the EMU.

The results obtained in the first part of Chapter VI were then verified through the cointegration and error correction approach. No matter the method used, the conclusion stated above holds true. For example, the reduction of the inflation rate has, as an immediate consequence, a drop in the level of the GDP on very short term. But, after a while, based on the income expectations and the price setting behaviour of the firms, the Romanian real output is expected to increase on medium term.

The stickiness of the labour market leads to important employment reductions as a consequence of monetary integration. Rigid wages and wage legislation, combined with the trade unions movements prevent the labour market to adapt through other channels than unemployment. Romanians are not willing to accept wage reductions against job creation.

The most affected by the whole process will be the labour market, through the rise in unemployment, and the investments. Wages will, more or less, continue their convergence trend.

The scenario analysis clearly shows that the best channel for reducing inflation is the fiscal one. When applying fiscal impulses, the effects were seen more rapidly and more intensively than in the case of monetary innovations. When budgetary expenditures are high, the national banks usually augment the monetary policy interest rate and vice-versa. And, as the present trend of the NBR is to reduce the interest rate in order to stimulate investments and economic growth, the best alternative is to restrict governmental expenditures (and decrease the budgetary deficit) by reducing their unproductive components.
One of the major effects of adopting the Euro for Romania will be an increased international competition. If domestic companies are not able to deal with this, they will disappear and Romania will face a terrible fact – the incapacity to produce and to be competitive. The degree of competitiveness determines the balance between the costs and the benefits of joining the EMU.

Competitiveness is a very complex issue. In the world, different international forums and entities have different ways of measuring it, based on different parameters. For the European countries, the main indicator of comparison is the Lisbon Agenda index, which for Romania has a low value. But what is worrying is that the Southern members, with which Romania resembles most, had the worst performances after the Euro adoption. Instead of converging to the others, they diverged.

The same evolution can be expected for Romania, too. In almost all the rankings, Romania is situated at the bottom, among the lasts. Labour productivity is very low and the international crisis has lowered it even more. Unemployment rate has augmented and the restructuring process is continuing. But the labour force is not able to cope with this. Instead of re-education and re-specialization, people prefer to remain unemployed, especially because the sum of money obtained now for unemployment has increased. Things have to be changed at educational level, to open individuals towards life-long learning. Only in this way Romania will be able to get a little bit closer to the Lisbon target.

When considering prices and labour costs, the degree of competitiveness has also decreased in time. Unfortunately, as presented in chapter VII, Romania performs badly in many fields. The whole position is accentuated even more by the lack of proper infrastructure and, more important, the lack of political trust due to scandals. Not even the small and medium sized enterprises are now encouraged any more. In their efforts to gather as much money to the budget as possible, the political actors have forgotten one of the main laws of the fiscal policy – when increasing taxes, revenues at the budget will increase, but only up to a point. Afterwards, the result will consist only in a retraction of the economic activity, with more losses than gains.

Instead of it, for a safer and sounder exit from the crisis, the government should increase its productive expenditures and not focus only on the social system. Romania’s high-tech sectors and the research and development sectors, that result in high value added,
need all the support from the part of authorities. Because these sectors in Romania are young and do not possess all the necessary resources to develop accordingly.

Another interesting idea is related to agriculture. It is being said that the next international crisis will be a food crisis. Consequently, Romania, which has important resources in this respect, should focus on making its agriculture more intensive, preserving in the same time its ecological characteristics. As pointed out in this research, agriculture still has an important share in the total economy. The fact that it brings low value added could be counterbalanced by producing only natural, ecological products, which are very much asked for outside the country and are more expensive. In this way, Romania would not only profitably use its natural resources and its production capacities, but would also become an important actor worldwide.

The economic slowdown on short term which has resulted from the prospective analysis can be compensated by an increased absorption of structural funds. The proportion of Romania’s benefits depends on the authorities’ capacities to inform the citizens about the available structural funds. In addition, it is very important to find the proper ways (through projects, either public or private) to use them. Structural funds coming from the European Union may counterbalance the losses if they are used where needed. Through them, Romania may develop its production capacities, its poor infrastructure and so on. And, the most important thing, it may insure in the near future a higher life standard to its citizens.

Romania has set as a target to join the EMU in 2015. Whether this will happen or not, depends on the balance between the costs and the benefits related to it. The macroeconomic policy has to guarantee the fulfillment of the convergence criteria in such a way as to minimize the costs. For example, as presented in chapter VI, a reduction in inflation towards the reference value implies a reduction in the GDP growth. Consequently, the welfare in Romania, instead of converging towards the European average would, for a moment, diverge. If authorities will be able to find the equilibrium and accomplish their targets, more benefits would result in an increased welfare on long term. Unfortunately, the present analysis has brought into light the fact that Romania is still far from the desired status of development. From the convergence criteria, nowadays only 1 is complied with. The situation is not better at all when dealing with real or structural convergence, too. The labour market is rigid enough as not to be the best substitute for the monetary policy. Its main
adjustment tool is the level of employment which proved very sensitive to monetary integration in the scenario analysis. Concurrently, the problem of competitiveness is very sensitive.

But in order to give a more objective answer to whether the present situation of Romania would permit its entrance in the Euro Area with great benefits, an interesting example comes into mind – the UK test. When faced with the option of replacing the British Pound with the Euro, the British authorities chose five questions to which they had to answer (Howarth, 2004):

1. Is there any sustainable convergence between the UK and the Euro Area?
2. Is there enough flexibility in the British economy to face the changes?
3. What would be the effect upon FDIs in UK?
4. What would be the impact upon the financial services sector?
5. Is the Euro adoption suitable for employment?

Replacing the UK with Romania, the discussion is as follows.

1. For the moment, there is not enough sustainable convergence between Romania and the Euro Area. The Romanian GDP is far from the EA average, while most of the nominal criteria are not carried through. Although the EU is the main foreign trade partner for Romania and the business cycles are pro-cyclical correlated, the structure of the Romanian economy is one of the most divergent from the EA average. Romania has a labour intensive economy, with poorly developed high-tech sectors. This characteristic makes it sensitive to labour market shocks, which are best dealt with using the monetary policy. What should be done? The state should increase its investments in research and development according to the Lisbon Agenda targets, should invest and promote investments in the high-tech sectors. And, why not, as previously mentioned, sustain ecological agriculture as the Romanian potential is very high in this field.

2. The degree of flexibility of the domestic economy is still low. It has been seen in the last 20 years how hard Romania has passed from a communist economy to a market economy. The lack of flexibility lies in the impossibility of the labour force to adapt to changes. The origin is in the individual’s education and
perceptions. Once riffed, the major part of the employees is not able to professionally reconvert and find other jobs. A second reason is the lack of synchrony between the educational system and the labour market along with the fact that most of the young specialized work force prefers to go abroad due to the higher salaries in comparison with the national ones. Romania lacks both the flexibility and the means and management to efficiently assess economic changes related to monetary integration.

3. After important amounts of FDIs that entered Romania in the early 2000s, the decision of the NBR to apply a more strict monetary policy, has reduced these flows. Its recent change of strategy (that is in accordance with the Maastricht criterion) to reduce the interest rate should reinforce investments flows. But monetary policy is not the only one applied in relation to the Euro adoption. Simulations in the research have emphasized that all in all, together with the labour force market, investments would be the most affected in a negative way. When dealing in the same time with the problems in the budgetary deficit, in the inflation rate level and in the interest rate level, FDIs have proved to be the most negatively affected. This field had more or less the same reaction on short term when analyzing the vanishing of the exchange rate.

Fortunately, on medium term, the FDIs flows recover with an interesting ascending path.

The problem is thus if Romania will be able to cope with the reduction of the investment flows for some periods of time until investors will react positively to the Euro introduction. A solution may be the use of all the structural funds Romania could access from the European Union.

4. The financial services have developed a lot once with the process of European integration. Actually, they started almost from zero. Due to increased confidence on the domestic market together with the important risk premia, many international banks have invested in Romania, opening working points here or buying domestic banks – the consequence was an increased inflow of know-how in the field. European integration had a good impact on the Romanian financial services, by increasing competition in the field. Along with the banking sector, other types of financial services have developed. The consulting activities have
flourished. The Romanian stock exchange becomes more and more integrated at international level. Moreover, the National Bank of Romania has started to be more lax in what regards financial regulations, making the market more flexible and the access on it easier.

With all this, the integration in the Euro Zone should positively influence the development of the Romanian financial services sector.

5. Normally, the Euro adoption should foster long term investments and lead to the creation of new and better jobs. This, because Romania would benefit from the entrance in a better ranked zone at international level; not to forget about the famous Lisbon Agenda. But here comes in front the problem of competitiveness. Investors are usually looking for low paid work force or for very well qualified work force. Labour costs in Romania have increased lately, making a lot of multinationals to move towards East. From this point of view, Romania’s competitiveness has dropped.

Meanwhile, it has been demonstrated during the present research that the Romanian labour market is still rigid enough. Workers and union trades do not accept wage diminutions. Consequently, what reacts first is the level of employment. On short term, for each of the impulses applied in relation to the monetary integration, employment in Romania decreases\textsuperscript{161} (in some cases quite a lot). In some cases, on medium and long term it recovers to the initial level, but in others, it finds its equilibrium under that value. The question to be answered to is, thus, if Romania is able to cope with all the costs that would appear on the labour market due to the Euro adoption. Considering all the aspects (not to forget about the running Excessive Deficit Procedure), there is a high risk not to be able to do it. So, for the moment, one should be reluctant in what regards the benefic effects of the Euro introduction in Romania on the labour market.

The Romanian monetary integration proves to be a very complex process. As highlighted, most of the sectors of the national economy are not ready yet to enter the Euro Area. There are problems with the convergence process and with the capacity of other policies to come into force once the monetary one disappears. Economic reactions are

\textsuperscript{161} The interest rate impulse was not even taken into consideration as its relationship to employment is too weak to matter.
divided between supply and demand. On one side, there are the expectations of both producers and consumers regarding their incomes and their life style. On the other side, people are reluctant to changes and this is to be seen not only in the rigidity of the labour market, but also in other fields.

Based on the results obtained through this research it is clear enough that for Romania is still too costly to renounce to the Romanian Leu. The benefits of an OCA will be seen only on medium and long term. And it is not sure that Romania has in the present the necessary resources to sustain the integration process until its positive effects will appear.

To comply both with their EU engagements and with the ones taken in front of their electors, authorities will have to search for the proper policy mix to diminish at minimum the costs and to augment at maximum the benefits. To join the Monetary Union according to the schedule, Romania and Romanians will have to pass through a period of restrictiveness, especially from the fiscal point of view.

All in all, Romania is not yet ready to change the Leu for the Euro.

This study has analyzed Romania’s entrance in the EMU mostly from an economic perspective. It would be interesting for specialists in other fields (especially in sociology) to approach the issue.

Studying the monetary integration process of a country in general is of great interest. For me, as a Romanian it becomes even more important to see this process for Romania in particular. But the whole issue, with all its aspects, is so complex, that a sole research as the present one is not enough to comprise it entirely. The next steps of research refer to a deeper and more focused analysis of all the problems related to the Euro adoption in Romania. Moreover, the models proposed in chapter VI cover only parts of different national sectors. The problem is in macro economy that the interdependencies between different variables are so strong that many of these are neglected in such small models. That is why future attention will be paid to obtaining a consistent system for Romania with no more than 10 - 15 equations that cover the whole economy, easy to apply in simulations and prospective analyses. The theoretical framework of this model is presented at the end of the research, in Appendix 5.

Another future project is to assess more deeply the problems of the labour market in correlation with the characteristics of different productive sectors.
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Appendix 1

Cointegration analysis for the GDP level – time convergence

The convergence level between two entities shows the level of similarity which is very important when talking about common policies. In this part of the paper, convergence is treated through the cointegration approach. Theory says that, if the values of a parameter for two entities are cointegrated, then there is convergence. The analysis is based on the Engle-Granger methodology regarding integrated variables. The main condition is to have at least one stationary combination for a group of non-stationary variables. As there are two variables, I could apply both the Engle-Granger methodology and the Johansen test.

Data used cover the range from the first quarter of 1999 to the first quarter of 2009 (1999:Q1 – 2009:Q1).

The first thing when doing such an analysis is to see the graphic representation of the variables. Both variables have an ascending trend (in the case of the Euro Area being almost linear – see graph 55). Towards the end of the period, greater fluctuations occurred in Romania. Anyway, the most important thing to see is the presence of a seasonal evolution\(^{162}\), in both cases the GDP values being the lowest in Q1 and the highest in Q4. Because of this, the second step was to seasonally adjust the data, using the Moving Average Method – multiplicative option. The adjusted values are presented in graph 56. The variables have remained only with their trends. To ensure an even greater achievement of the working hypothesis, the seasonally adjusted series were also logarithmated.

---

\(^{162}\) It is usual to find seasonality when dealing with quarterly or monthly data.
Figure 55. Quarterly evolution of the nominal GDP for the Euro Area and Romania (millions Euro)

Data source: Eurostat

Figure 56. Seasonally adjusted values of the nominal GDP for Romania and the Euro Area

Source: own calculations
To apply the proposed methodology, variables have to be integrated of the first order \(I(1)\). This can be verified through the unit root tests. Tables 17 and 18 show the summary of the group unit root tests in the level of the variables and in their 1\(^{st}\) differences.

### Table 17. Group unit root test in the level of the variables – summary option

<table>
<thead>
<tr>
<th>Method</th>
<th>Statistic</th>
<th>Prob.**</th>
<th>Cross-sections</th>
<th>Obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null: Unit root (assumes common unit root process)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levin, Lin &amp; Chu (t^*)</td>
<td>-1.90506</td>
<td>0.0284</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Breitung t-stat</td>
<td>5.73711</td>
<td>1.0000</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>Null: Unit root (assumes individual unit root process)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Im, Pesaran and Shin W-stat</td>
<td>0.67737</td>
<td>0.7509</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>ADF - Fisher Chi-square</td>
<td>3.58952</td>
<td>0.4644</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>PP - Fisher Chi-square</td>
<td>3.60891</td>
<td>0.4615</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Null: No unit root (assumes common unit root process)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hadri Z-stat</td>
<td>6.10852</td>
<td>0.0000</td>
<td>2</td>
<td>90</td>
</tr>
</tbody>
</table>

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

*Source: own calculations*

Among the 6 unit root tests, 3 assume the null regarding a common unit root process and the other 3 assume the null for individual unit root processes. Only one test, the Levin, Lin & Chu (LLC) rejects the hypothesis of a unit root in the level of the variables. The other five all accept it.

As expected, when running the tests in the first difference of the variables, stationarity characteristics were accepted, the two variables being first order integrated \(I(1)\).

---

163 LSAEA= logarithm of the seasonally adjusted GDP for the Euro Area
164 LSAROM= logarithm of the seasonally adjusted GDP for Romania
Table 18. Group unit root test in the 1st differences of the variables – summary option

<table>
<thead>
<tr>
<th>Method</th>
<th>Statistic</th>
<th>Prob.**</th>
<th>Cross-sections</th>
<th>Obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null: Unit root (assumes common unit root process)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levin, Lin &amp; Chu t*</td>
<td>-3.37786</td>
<td>0.0004</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>Breitung t-stat</td>
<td>-4.76794</td>
<td>0.0000</td>
<td>2</td>
<td>84</td>
</tr>
<tr>
<td>Null: Unit root (assumes individual unit root process)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Im, Pesaran and Shin W-stat</td>
<td>-4.55077</td>
<td>0.0000</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>ADF - Fisher Chi-square</td>
<td>26.9280</td>
<td>0.0000</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>PP - Fisher Chi-square</td>
<td>26.7662</td>
<td>0.0000</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>Null: No unit root (assumes common unit root process)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hadri Z-stat</td>
<td>0.36024</td>
<td>0.3593</td>
<td>2</td>
<td>88</td>
</tr>
</tbody>
</table>

Source: own calculations

Before going on with the analysis, there is another important issue – causality between variables. Is very important to know how much of the present level of a variable is explained by its own past and how much is explained by the other’s evolution. As expected, the GDP level in Romania is influenced by the level in the Euro Area, but the reverse is not true.

Tabel 19. Granger causality test for Romania and the Euro Area

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSAROM does not Granger Cause LSAEA</td>
<td>43</td>
<td>0.98518</td>
<td>0.38271</td>
</tr>
<tr>
<td>LSAEA does not Granger Cause LSAROM</td>
<td>7.57590</td>
<td>0.00170</td>
<td></td>
</tr>
</tbody>
</table>

Source: own calculations

Using both the Engle-Granger methodology and the Johansen test, no long term relationship was found between the GDP level in Romania and the one in the Euro Area. The former finds a long term relationship using the Least Squares, but when analyzing its validity, residuals turn out non-stationary in the level and I(1). In the same time, the latter finds no cointegration equations, meaning no convergence.
Table 20. Unit root test for residuals in the Engle-Granger equation

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-3.121518</td>
<td>0.1141</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-4.180911</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-3.515523</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-3.188259</td>
<td></td>
</tr>
</tbody>
</table>

Source: own calculations

Figure 57. Residuals of the Engle-Granger equation

Source: own calculations

In conclusion, there is a causality relationship found by the Granger test from the Euro Area unto Romania, but no long term relationship between the two GDPs based on the cointegration approach. From the point of view if the nominal GDP, Romania does not converge to the Common Currency Area.
Appendix 2
Comparative price level indices for Romania and the Euro Area
for ESA95 aggregates (EU27 = 100)

00 Gross Domestic Product
a01 Actual individual consumption
a0101 Food and non-alcoholic beverages
a010101 Food
a01010101 Bread and cereals
a01010102 Meat
a01010103 Fish
a01010104 Milk, cheese and eggs
a01010105 Oils and fats
a01010106 Fruits, vegetables, potatoes
a01010199 Other food
a010102 Non-alcoholic beverages
a0102 Alcoholic beverages, tobacco and
narcotics
a010201 Alcoholic beverages
a010202 Tobacco
a0103 Clothing and footwear
a010301 Clothing
a010302 Footwear
a0104 Housing, water, electricity, gas and
other fuels
a010405 Electricity, gas and other fuels
a0105 Household furnishings, equipment
and maintenance
a010501 Furniture and furnishings,
carpets and other floor coverings
a010503 Households appliances
a0106 Health
a0107 Transport
a010701 Personal transport equipment
a010703 Transport services
a0108 Communication
a0109 Recreation and culture

EA
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1999
102.6
32.1
102.8
32.4
105.4
51.2
106.4
49.2
107.5
41
112.5
39.1
100.8
66.6
104
62.6
105.5
58.8
104.5
56.6
102.7
66.2
97.5
82.4
94
41.8
94
50.8
92.9
34.3
102.1
40.1
101.9
39.8
103.9
45.8
111.2
23.5
110.3
6.6
98.9
47.5
100.4
38.9
99.5
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107.1
19.6
96.6
45.7
95.1
113.4
101.2
24.1
93.7
72.1
100.9

2000
101.2
36.5
101.2
36.6
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109.9
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100
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102.4
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98.7
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91.2
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90.3
56.9
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101.4
42
101.3
41.9
103
47.3
110.2
28.4
113.6
21.8
97.7
49.6
99.1
39.3
98.4
95.3
105.3
23.4
95.3
47.4
93.9
113.3
92.7
26.6
98.5
86.3
99.1

2001
101.3
36.8
101.2
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103.8
56.7
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55.2
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109.6
51.9
100.4
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101.8
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98.8
71.1
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53.4
91.1
33.3
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41.2
103.8
45.6
109.2
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111.9
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96.8
86.8
92.7
28.2
98.7
92.3
99.4

213

2002
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37.1
101.5
36.1
103.7
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111.1
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2004
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2008
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116.1
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98.7
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:
100.8
69.3
101.8
83.7
99
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103.1
78.4
:


Final consumption expenditure

Household final consumption

Individual consumption

Collective consumption expenditure

Government services

Total services

Individual services

Source: EUROSTAT
APPENDIX 3

Spatial Convergence Analysis

A3.1 Spatial convergence of the GDP

A3.1.1 Map description of Romania’s position among the EU countries

As Romania is the study object for this research, the following graphs show its place among the European states for the analyzed variables (the yellow spot).

Figure 58. Cartogram of nominal GDP in 2008 and the 2008 GDP growth rate

Source: own calculations using GeoDa 0.9.5i software
A3.1.2 Global and local spatial autocorrelation tests

As the Moran’s I test detected no spatial autocorrelation for the nominal GDP in 2008, the following of the analysis will refer only to the other four parameters that proved to be spatially autocorrelated: the GDP growth rate in 2008, the per capita GDP in 1999 and 2008 and the average annual growth rate from 1999 to 2008.

There are two tests applied for this: the Moran’s I and the LISA. As described in part II.2.8, they work with the null hypothesis of no spatial correlation for the variables, with the alternative of positive or negative spatial autocorrelation. The results were tested for stability using the randomization procedure. In all the four cases the same conclusion was reached: positive global spatial autocorrelation. In the randomization graphs, the results are presented in the form of the yellow bars representing the Moran’s I deviated to the right from the acceptance region in red. As an example, here is presented the randomization graph for the average annual growth rate of the GDP per capita.
Figure 60. Randomization for Moran’s I test (average annual growth rate of GDP per capita)

Source: own calculations using GeoDa 0.9.5-i software

The following graphs present the diagrams for the Moran’s I and the LISA tests with results explained in part IV.1.2. the yellow spots in the Moran’s diagram are the countries emphasized on the right-side maps.

Figure 61. Moran’s I diagram for GDP growth rate in 2008

Source: own calculations using GeoDa 0.9.5-i software
Figure 62. Moran’s I diagram for GDP per capita in 1999

Source: own calculations using GeoDa 0.9.5-i software

Figure 63. Moran’s I diagram for GDP per capita in 2008

Source: own calculations using GeoDa 0.9.5-i software

Figure 64. Moran’s I diagram for the average annual growth rate of GDP per capita in the period 1999 - 2008

Source: own calculations using GeoDa 0.9.5-i software
A3.1.3. Club convergence for the GDP per capita

In the club $\beta$ convergence, there are not only multiple equilibriums for growth, but also the initial conditions are very important. Beside the GDP per capita in 1999, the model also includes the latitude as it turned out to be the only significant from a geographical point of view.

For the first step was to run the OLS regression with results shown below.

Table 21. OLS estimation results for the GDP per capita 1999 – 2008

<table>
<thead>
<tr>
<th>REGRESSION</th>
<th>SUMMARY OF OUTPUT: ORDINARY LEAST SQUARES ESTIMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable: RPIBLOC99-0</td>
<td>Number of Observations: 27</td>
</tr>
<tr>
<td>Mean dependent var: 7.27989</td>
<td>Number of Variables: 3</td>
</tr>
<tr>
<td>S.D. dependent var: 4.48412</td>
<td>Degrees of Freedom: 24</td>
</tr>
<tr>
<td>R-squared: 0.653224</td>
<td>F-statistic: 22.6045</td>
</tr>
<tr>
<td>Adjusted R-squared: 0.624326</td>
<td>Prob(F-statistic): 3.02406e-006</td>
</tr>
<tr>
<td>Sum squared residual: 188.264</td>
<td>Log likelihood: -64.5284</td>
</tr>
<tr>
<td>Sigma-square: 7.84433</td>
<td>Akaike info criterion: 135.057</td>
</tr>
<tr>
<td>S.E. of regression: 2.80077</td>
<td>Schwarz criterion: 138.944</td>
</tr>
<tr>
<td>S.E of regression ML: 2.64059</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std.Error</th>
<th>t-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>4.577293</td>
<td>3.393074</td>
<td>1.349011</td>
<td>0.1899249</td>
</tr>
<tr>
<td>PIBLOC99</td>
<td>-0.0003339733</td>
<td>4.99572e-005</td>
<td>-6.685187</td>
<td>0.0000006</td>
</tr>
<tr>
<td>Y</td>
<td>0.1610346</td>
<td>0.07067818</td>
<td>2.278421</td>
<td>0.0318927</td>
</tr>
</tbody>
</table>

REGRESSION DIAGNOSTICS

MULTICOLLINEARITY CONDITION NUMBER: 14.84423

TEST ON NORMALITY OF ERRORS

<table>
<thead>
<tr>
<th>TEST</th>
<th>DF</th>
<th>VALUE</th>
<th>PROB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jarque-Bera</td>
<td>2</td>
<td>11.69747</td>
<td>0.0028836</td>
</tr>
</tbody>
</table>

DIAGNOSTICS FOR HETEROSKEDASTICITY

RANDOM COEFFICIENTS

<table>
<thead>
<tr>
<th>TEST</th>
<th>DF</th>
<th>VALUE</th>
<th>PROB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breusch-Pagan test</td>
<td>2</td>
<td>22.01283</td>
<td>0.0000166</td>
</tr>
<tr>
<td>Koenker-Bassett test</td>
<td>2</td>
<td>10.64505</td>
<td>0.0048804</td>
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</tbody>
</table>

SPECIFICATION ROBUST TEST

<table>
<thead>
<tr>
<th>TEST</th>
<th>DF</th>
<th>VALUE</th>
<th>PROB</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>5</td>
<td>21.29608</td>
<td>0.0007121</td>
</tr>
</tbody>
</table>

DIAGNOSTICS FOR SPATIAL DEPENDENCE

FOR WEIGHT MATRIX: euweights.GAL (row-standardized weights)

<table>
<thead>
<tr>
<th>TEST</th>
<th>MI/DF</th>
<th>VALUE</th>
<th>PROB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagrange Multiplier (lag)</td>
<td>1</td>
<td>4.0340498</td>
<td>0.0445908</td>
</tr>
<tr>
<td>Robust LM (lag)</td>
<td>1</td>
<td>5.5666001</td>
<td>0.0183063</td>
</tr>
<tr>
<td>Lagrange Multiplier (error)</td>
<td>1</td>
<td>0.0922969</td>
<td>0.7612771</td>
</tr>
<tr>
<td>Robust LM (error)</td>
<td>1</td>
<td>1.6248471</td>
<td>0.2024173</td>
</tr>
<tr>
<td>Lagrange Multiplier (SARMA)</td>
<td>2</td>
<td>5.6588970</td>
<td>0.0590454</td>
</tr>
</tbody>
</table>

Source: own calculations using the GeoDa 0.9.5-i software.
In spatial analyses, the $R^2$ and the F-statistic are pseudo parameters for the model. The ones that count are the log likelihood, the AIC and the SC. As can be seen, the coefficients of the two variables are both significant, while $\alpha$ is not.

All the diagnostic tests show problems with the model specification. Errors are not normally distributed and the model is heteroskedastic. That is why the Lagrange Multiplier is next analyzed to see which of the alternative models suits best the relationship. The LM-lag is significant ($\text{prob} = 0.044 < 0.05$) while the LM-error is not ($\text{prob} = 0.76 >> 0.05$). In this case, the alternative chosen is the spatial autoregressive model.

### Tabel 22. Results of the maximum likelihood estimation for a spatial lag model

#### REGRESSION SUMMARY OF OUTPUT: SPATIAL LAG MODEL - MAXIMUM LIKELIHOOD ESTIMATION

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPIBLOC99-90</td>
<td>27</td>
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</table>

<table>
<thead>
<tr>
<th>Mean dependent var</th>
<th>Number of Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.27989</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S.D. dependent var</th>
<th>Degrees of Freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.48412</td>
<td>23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lag coeff. (Rho)</th>
<th>Log likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.436983</td>
<td>-61.5003</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R-squared</th>
<th>Akaike info criterion</th>
<th>Schwarz criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.722014</td>
<td>131.001</td>
<td>136.184</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sigma-square</th>
<th>S.E of regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.58955</td>
<td>2.36422</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std.Error</th>
<th>z-value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>W_RPIBLOC99</td>
<td>0.4369826</td>
<td>0.1154186</td>
<td>3.786067</td>
<td>0.0001531</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>3.216334</td>
<td>2.868946</td>
<td>1.121086</td>
<td>0.2622515</td>
</tr>
<tr>
<td>PIBLOC99</td>
<td>-0.0002046939</td>
<td>4.986709e-005</td>
<td>-4.10479</td>
<td>0.0000405</td>
</tr>
<tr>
<td>Y</td>
<td>0.09109924</td>
<td>0.06345701</td>
<td>1.435606</td>
<td>0.1511147</td>
</tr>
</tbody>
</table>

#### REGRESSION DIAGNOSTICS

**DIAGNOSTICS FOR HETEROSKEDASTICITY**

**RANDOM COEFFICIENTS**

<table>
<thead>
<tr>
<th>TEST</th>
<th>DF</th>
<th>VALUE</th>
<th>PROB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breusch-Pagan test</td>
<td>2</td>
<td>1.115512</td>
<td>0.5724923</td>
</tr>
</tbody>
</table>

**DIAGNOSTICS FOR SPATIAL DEPENDENCE**

<table>
<thead>
<tr>
<th>SPATIAL LAG DEPENDENCE FOR WEIGHT MATRIX: euweights.GAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST</td>
</tr>
<tr>
<td>Likelihood Ratio Test</td>
</tr>
</tbody>
</table>

*Source: own calculations using the GeoDa 0.9.5-i software*

When comparing the measures of fit, an improvement is seen in the spatial lag model. The log likelihood has increased, while the AIC and the SC values have diminished. The constant remains not significant, but the latitude loses its significance over time. The average
annual growth rate depends more on its initial 1999 value and on the values of the neighbours.

The Breusch-Pagan test for heteroskedasticity in the error term strongly accepts the null hypothesis (prob = 0.57 >> 0.05). It suggests no heteroskedasticity problems left in the model. The Likelihood Ratio Test is an alternative to the asymptotic significance test on the spatial autoregressive coefficient. It compares the classic OLS regression with the alternative spatial lag model. In this case it confirms the strong significance of the latter. The LM-lag = 4.03 < LR = 6.05, validating the asymptotic properties of the ML estimates.

The last phase of testing the model’s validity is to compute the Moran’s I statistic for the residuals of the regression. The statistic’s value -0.116 is tested afterwards using the randomization procedure. Both the p-value = 0.321 and the yellow bar situated on the left side of the histogram show that including the spatially lagged variable has eliminated spatial autocorrelation.

Figure 65. The Moran’s I diagram and the randomization for Moran’s I test for the residuals of the spatial lag model

Source: own calculations using GeoDa 0.9.5-i software

165 The yellow spot is the value for Romania.
A 3.2. Spatial convergence of prices

Spatial price convergence analysis finds positive spatial autocorrelation for prices. With a p value of 0.001, the Moran’s I statistic rejects the null of no spatial autocorrelation. Moreover, the statistic’s value is 0.5276, much higher than \( E[I] = -0.0385 \). The results are the same when constructing the LISA diagrams.

**Figure 66. Moran’s I test and randomization for comparative prices in 2008**

![Figure 66: Moran’s I test and randomization for comparative prices in 2008](image)

*Source: own calculations using GeoDa 0.9.5-i software*

For the purpose of this research, comparative price levels were studied against longitude and latitude to see if can be found an adequate regression model to represent the spatial dependences outlined through the maps. The unconditional \( \beta \) – convergence model was first estimated using OLS:

\[
\text{PRETCOMP08} = \alpha + \beta_1 X + \beta_2 Y + \epsilon, \quad \epsilon \sim N(0, \sigma^2) \\
\]

where: PRETCOMP08 – comparative price levels in 2008

- \( X \) – longitude
- \( Y \) – latitude
- \( \epsilon \) – the unit vector

---

166 The yellow spot is Romania.
Table 23. OLS estimation results for comparative price levels in 2008

**REGRESSION**

**SUMMARY OF OUTPUT: ORDINARY LEAST SQUARES ESTIMATION**

Dependent Variable: PRETCOMP08  Number of Observations: 27
R-squared: 0.322084  F-statistic: 5.7013
Adjusted R-squared: 0.265591  Prob(F-statistic): 0.00942133
Sum squared residual: 8902.51  Log likelihood: -116.588
Sigma-square: 370.938  Akaike info criterion: 239.175
S.E. of regression: 19.2597  Schwarz criterion: 243.063
Sigma-square ML: 329.723  S.E of regression ML: 18.1583

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std.Error</th>
<th>t-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>52.55678</td>
<td>23.33616</td>
<td>2.252161</td>
<td>0.0337329</td>
</tr>
<tr>
<td>X</td>
<td>-0.8985964</td>
<td>0.3145832</td>
<td>-2.856466</td>
<td>0.0087048</td>
</tr>
<tr>
<td>Y</td>
<td>1.065717</td>
<td>0.4782345</td>
<td>2.228439</td>
<td>0.0354775</td>
</tr>
</tbody>
</table>

**REGRESSION DIAGNOSTICS**

MULTICOLLINEARITY CONDITION NUMBER 14.50848
TEST ON NORMALITY OF ERRORS
Jarque-Bera 2 2.005595 0.3668518

DIAGNOSTICS FOR HETROSKEDASTICITY
RANDOM COEFFICIENTS
Breusch-Pagan test 2 2.633772 0.2679685
Koenker-Bassett test 2 5.532913 0.0628844

SPECIFICATION ROBUST TEST
White 5 5.986687 0.3075165

DIAGNOSTICS FOR SPATIAL DEPENDENCE
FOR WEIGHT MATRIX: euweights.GAL (row-standardized weights)
Moran's I (error) 0.304072 2.4337387 0.0149438
Lagrange Multiplier (lag) 1 0.1968202 0.6572998
Robust LM (lag) 1 0.1509844 0.6975964
Lagrange Multiplier (error) 1 3.1609592 0.0754189
Robust LM (error) 1 3.1151234 0.0775686
Lagrange Multiplier (SARMA) 2 3.3119436 0.1909065

Source: own calculations using the GeoDa 0.9.5-i software

The results show that the coefficients $\alpha$ and $\beta$ are all significant and they confirm the $\beta$ – convergence hypothesis. The $\beta_1$ coefficient is negative (-0.8986) which means that when going from West towards East the level of prices decreases. In the same time, the $\beta_2$ parameter is positive, proving the increase in price levels from South towards North. The model is:

$$\text{PRETCOMP08} = 52.56e^{-0.8986X} + 1.066Y + \varepsilon$$
The Moran’s I test emphasizes once again the presence of spatial dependence (prob = 0.0149 < 0.05).

The other parameters used to measure a model’s validity all show that the OLS estimation is consistent in this case and analysis stops here. Based on this equation, when making time – space convergence analyses can be computed the convergence speed.
APPENDIX 4

Fulfilling the Inflation Rate Criterion
on Short Term

To see the very short term and the short term effects of fulfilling the inflation rate criterion, several models were estimated having as a starting point the new classical version of the Phillips curve\textsuperscript{167} (on short-run, based on Lucas aggregate supply function, 1972, 1973) and the Okun’s law (1962). The aggregate supply function (Lucas, 1973) and the Phillips curve compare the actual values with the “natural”, expected ones. To obtain the expected values, the present research uses the Hodrick – Prescott filter. It allows for computing the gap (inflationary gap, output gap, etc.) by defining it as the deviation from the HP trend. Following the HP methodology, data was first seasonally adjusted and then logarithmated (where needed).

When considering variable $Y_t$, the gap was computed as: $Y_{\text{GAP}} = Y - \text{HPTREND}_Y$.

A4.1. Inflation rate versus GDP

When analyzing the relationship between the GDP and the inflation rate in Romania, the following very short term equation was obtained\textsuperscript{168}:

$$
\text{GDPGAP} = 0.69 \times \text{GDPGAP(-1)} + 0.0022 \times \text{HICPGAP(-1)} + 0.0035 \times (\text{HICPGAP - HICPGAP(-1)}) + \varepsilon 
$$

(4.51) \hspace{2cm} (1.97) \hspace{2cm} (1.97)

The equation shows a positive relationship between the GDP gap level and the inflation rate gap in Romania. On short term, a 1 percentage point decrease in inflation would lead to a 0.22 percentage points drop in the GDP level. In the same time, the variation of the inflation rate from one quarter to the other would produce a variation of 0.35 in the GDP level. Therefore, bringing inflation rate close to the target and its natural value would lead the GDP towards its natural, equilibrium value.

\textsuperscript{167} Also called the expectations – augmented Phillips curve.

\textsuperscript{168} The t-statistics are written in parenthesis below each coefficient.
In order to accept the results several econometric procedures were run. Hereinafter are presented the results for testing the stationarity and the serial correlation of the residual values.

The first one was demonstrated both through graphic procedures (constructing the residuals’ graph – figure 67) and through applying the unit roots tests in the residual values. With a probability of 0.000, the ADF test admitted that the residuals have no unit root, i.e. they are stationary.

Figure 67. Residuals of the relationship between the GDP and the inflation rate in Romania

![GDP GAP Residuals](image)

Source: own calculations.

Both the Q-statistics correlogram and the Q-statistics for squared residuals show no serial correlations for the residual values up to high lags of more than 20. As an example here is presented a part of the first correlogram (up to a lag of 10).
Table 24. Q-statistics correlogram for the GDPGAP residuals

<table>
<thead>
<tr>
<th>Autocorrelation</th>
<th>Partial Correlation</th>
<th>AC</th>
<th>PAC</th>
<th>Q-Stat</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td></td>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>1.E-05</td>
</tr>
<tr>
<td>.</td>
<td>*.</td>
<td>2</td>
<td>0.161</td>
<td>0.161</td>
<td>1.2494</td>
</tr>
<tr>
<td>*.</td>
<td>.</td>
<td>*</td>
<td>3</td>
<td>-0.064</td>
<td>-0.066</td>
</tr>
<tr>
<td>*.</td>
<td>*.</td>
<td></td>
<td>4</td>
<td>0.157</td>
<td>0.136</td>
</tr>
<tr>
<td>*.</td>
<td>.</td>
<td>*</td>
<td>5</td>
<td>-0.105</td>
<td>-0.093</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>6</td>
<td>0.063</td>
<td>0.021</td>
<td>3.4832</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>7</td>
<td>0.032</td>
<td>0.080</td>
<td>3.5380</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>8</td>
<td>0.036</td>
<td>-0.013</td>
<td>3.6094</td>
</tr>
<tr>
<td>*.</td>
<td>.</td>
<td>*</td>
<td>9</td>
<td>-0.077</td>
<td>-0.063</td>
</tr>
<tr>
<td>*.</td>
<td>.</td>
<td>*</td>
<td>10</td>
<td>-0.075</td>
<td>-0.096</td>
</tr>
</tbody>
</table>

Source: own calculations.

But the coefficients, even though significant, are extremely low, so one could say that on very short term, from one quarter to another, the influence of the inflation rate upon the GDP is almost negligible. Consequently, a constant decrease in inflation rate in order to fulfill the price stability criterion would not lead to a major economic slowdown. Its variation from one quarter to another would not be felt too strong by the population. On very short term, fulfilling the inflation rate criterion would not be followed by a too strong loss of welfare.

To see the quarter/quarter relationship between the GDP gap and the inflation rate gap in Romania, the same model was constructed as a VAR\(^{169}\). Using the impulse response function\(^{170}\) I analyzed the intensity and the length of inflation rate influence upon the GDP. For the impulse response results to be valid, the VAR has to be stationary (stable). Table 25 and figure 68 show the results for the AR roots of the characteristic AR polynomial. As both roots have moduli less than 1 and lie inside the unit circle, the results of the VAR analysis are valid.

\(^{169}\) Variables were all previously tested for the integration order and came out all to be I(0). In addition the maximum lag selected by the Lag Length Criteria is 1, confirming the working hypotheses.

\(^{170}\) The impulses were defined as a Cholesky – dof adjusted one standard deviation.
Table 25. AR roots table for the GDP gap – inflation rate gap VAR estimation with 1 lag

<table>
<thead>
<tr>
<th>Root</th>
<th>Modulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.630204 - 0.073643i</td>
<td>0.634492</td>
</tr>
<tr>
<td>0.630204 + 0.073643i</td>
<td>0.634492</td>
</tr>
</tbody>
</table>

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: own calculations.

Figure 68. AR roots graph for the GDP gap – inflation rate gap VAR estimation with 1 lag

Source: own calculations.

When applying an impulse of 1 standard deviation in the inflationary gap, as expected, the most intense reaction of the GDP is in the first quarter and shows the positive relation found in the above equation. Thus, a one – time shock in inflation manifests immediately in the level of the GDP. If the shock is negative, e.g. a reduction of the inflation rate with 1 percentage point, in the next quarter the GDP level will immediately adjust towards its natural value by diminishing the GDP gap. The intensity of the innovation’s effect upon the GDP looses power from the third quarter, but remains positive. Starting with the fourth quarter, the response constantly decreases and the effect of that specific innovation vanishes towards the 15th quarter of analysis. The following figure presents the progressive path and the evolution of this relation for responses on different periods of time. The first graph of the figure clearly shows the value of the coefficient from the basic equation – 0.0022 for the inflation rate gap lagged 1.
In conclusion, the reduction of the inflation rate towards the targets established for the price stability criterion will have as effect a minor decrease of the GDP, causing a light diminution in welfare from one quarter to another. But on very short term, this negative evolution would not be felt too strong by the population.

**Figure 69. Impulse response analysis – response of the GDP gap to a one – time innovation of a standard deviation in the level of the inflation rate gap using the Cholesky method for several periods of time (lag 1)**

As inflation targets are established yearly, the analysis was also made on short term (year/year). This time, was taken into account only the relationship between the GDP gap and the inflation rate gap, without the influences of inflation variations from one quarter to another. The VAR with 4 lags is also stable, as the inverse polynomial AR roots are inside the unit circle. Consequently, the impulse response function was once again used. This time, variations in the GDP gap as a response to an innovation of one standard deviation in the inflation rate gap need more time to disappear (around 30 quarters in respect to the first model which needed only half of it). In the first year from the innovation, there are both positive and negative fluctuations. The shock in inflation causes first a reaction of the same sense in the GDP in the first quarter. This is followed by a sudden change and a powerful
inverse reaction in the second quarter. Although the intensity of the GDP response decreases, it still remains opposite to the sign of the innovation for almost more than 2 years.

**Figure 70. Impulse response analysis – response of the GDP gap to a one–time innovation of a standard deviation in the level of the inflation rate gap using the Cholesky method (lag 4)**

Source: own calculations.

**A4.2. Inflation rate versus wages**

The relationship between inflation rate and wages is one of the most sensitive in an economy. The pass-through effect has, in general, one of the highest intensities. Following the same path as for the GDP, the relationship between wages and inflation was analyzed both based on the Phillips curve and on the VAR representation. Wages are represented in the model by the average monthly net wage. The reason for this choice is that the net wage represents the final sum of money that goes to the employee. Thus, are analyzed the direct implications of inflation reductions on the citizen’s welfare, without having to consider the level of taxation in Romania.

\[
NWGAP = 0.25 \times NWGAP(-1) - 0.005 \times HICPGAP(-1) + 0.01 \times (HICPGAP - HICPGAP(-1)) + \varepsilon
\]

As expected based on the economic theory, the very short term influence of inflation on wages is higher than the one upon the GDP. The reaction of wages is more than double and contrary to the evolution of inflation rate. A reduction of the inflation rate gap with 1
percentage point in one quarter would increase the wage gap by 0.5 percentage points in the next quarter. From one quarter to the next, reducing inflation rate in order to fulfill the convergence criterion would augment the net income of the individuals, causing a rise in personal welfare. The impact of inflation rate variations is even higher. Net wage gap follows the same path as the first order difference in inflation (computed quarter on quarter).

Table 26. Q-statistics correlogram of the wage residuals (for 10 lags)

<table>
<thead>
<tr>
<th>Autocorrelation</th>
<th>Partial Correlation</th>
<th>AC</th>
<th>PAC</th>
<th>Q-Stat</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>1</td>
<td>-0.067</td>
<td>-0.067</td>
<td>0.1452</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>2</td>
<td>-0.061</td>
<td>-0.066</td>
<td>0.2695</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>3</td>
<td>-0.135</td>
<td>-0.145</td>
<td>0.9015</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>4</td>
<td>0.156</td>
<td>0.134</td>
<td>1.7727</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>5</td>
<td>-0.225</td>
<td>-0.235</td>
<td>3.6712</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>6</td>
<td>-0.090</td>
<td>-0.122</td>
<td>3.9868</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>7</td>
<td>0.079</td>
<td>0.082</td>
<td>4.2396</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>8</td>
<td>-0.017</td>
<td>-0.125</td>
<td>4.2514</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>9</td>
<td>-0.006</td>
<td>0.036</td>
<td>4.2528</td>
</tr>
<tr>
<td>.[*] .</td>
<td>.[*] .</td>
<td>10</td>
<td>0.011</td>
<td>0.004</td>
<td>4.2584</td>
</tr>
</tbody>
</table>

Source: own calculations.

Tables 26 and 27 show some of the results that certify the statistical consistency of the equation. Residual values not only are not correlated, but they are also stationary. For a higher certainty, the value obtained using the ADF test was also compared with the Engle – Granger cointegration critical values given by McKinnon. This means that based on the equation’s residuals, Engle and Granger also found cointegration. That is why further on, the VAR methodology was applied. As the pass-through effect is bilateral – both from inflation to wages and from wages to inflation, below are presented the impulse response functions of the two variables. Using the Cholesky one standard deviation decomposition method for defining impulses, the results of the model were once again validated.
Table 27. Stationarity test for the residuals in the wage equation

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-4.656477</td>
<td>0.0009</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.689194</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.971853</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.625121</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESID03(-1)</td>
<td>-0.974608</td>
<td>0.209301</td>
<td>-4.656477</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.000519</td>
<td>0.004100</td>
<td>0.126700</td>
<td>0.9002</td>
</tr>
</tbody>
</table>

R-squared 0.454730, Mean dependent var -0.002098
Adjusted R-squared 0.433758, S.D. dependent var 0.028556
S.E. of regression 0.021488, Akaike info criterion -4.773901
Sum squared resid 0.012005, Schwarz criterion -4.678744
Log likelihood 68.83462, F-statistic 21.68278
Durbin-Watson stat 1.846619, Prob(F-statistic) 0.000083

Source: own calculations.

Figure 71. Impulse response function for wages vs. inflation rate

A one standard deviation innovation in the inflation rate gap is followed by a contrary evolution of the net wage gap. Consequently, diminishing the inflationary gap will mirror in an augmentation of the wage gap. If the National Bank of Romania lowers the inflation rate according to its target and for the fulfillment of the criterion, the net wage will deviate even more from its natural level. But this is not desirable, as the second graph shows the impact of wages on inflation. Wage changes are directly seen in inflationary changes. Giving more money to the employees increases demand which, consequently, increases inflation. An
innovation of one standard deviation in the wage level provokes a reaction with half this intensity in the inflation rate level.

Moreover, the variance decomposition procedure shows that the share of an impulse in the inflation rate in the whole variance of the net wages goes just a little above 10%. Anyway, on short term and very short term, this influence in not to be neglected. In the same time, more than 50% of the inflation rate’s reaction is due to a shock in wages.

The problem becomes not only lowering inflation rate in order to fulfill the criterion, but also finding an equilibrium between wages and inflation and other levers that may attenuate the high influence of wages upon inflation.

Figure 72. Variance decomposition for inflation rate and wages – lag 1

Figure 73. Variance decomposition for inflation rate and wages – more than 2 lags

Source: own calculations.
Even though from the econometric point of view the results are consistent, they are somehow strange in respect to economic theory, as wages react both contrary to inflationary changes (HICPGAP(-1)) and in the same sense with them (HICPGAP-HICPGAP(-1)). On a flexible labour market, inflation and wages go hand in hand. A rise in one of them triggers the other one in the same sense. The peculiarities of these results for the Romanian market are explained on a larger scale in the specific part of the chapter.
APPENDIX 5

Scenarios

The first and second heads of this appendix present parts of the aggregated model of the Romanian economy proposed for future research (in the third head). Based on the economic and econometric theory, to insure the significance of the results and the consistency of the models, they were specified as simultaneous equations (in the first part) and as VECMs (in the second part). For this was followed the standard methodological procedure described in Chapter II.2. The scenarios were applied in the form of impulse responses, but in direct correlation with the variance decomposition that emphasizes the degree in which one variable depends on another.

A5.1. Output and the Maastricht criteria

In the opening of chapter VI was analyzed the very short term relationship between the inflation rate and the GDP in Romania. This trade off was further studied using the econometric approach of VECMs and simultaneous equations. Thus, the evolution of the GDP for Romania (output growth and output gap) is presented hereinafter in close relationship with the main Maastricht criteria (the inflation rate, the interest rate and the exchange rate). The equations and the variables represent a little part of the large model proposed for future research. This part encompasses some aspects of monetary policy decisions.

The system of equations used is the following:

\[
Y = (1-a_{10})Y_{-1} + a_{10}Y_{+1} + a_{11}(r - \pi_{+1}) + a_{12}\Delta X_{+1} + a_{13}\Delta Y_{+1} + 0.1\Delta e_{-1} + shk_1;
\]

\[
\pi = (1-b_{10})\pi_{-1} + b_{10}\pi_{+1} + b_{11}\Delta X_{+1} + b_{12}\Delta X + b_{13}(Y-\bar{Y}) + shk_2;
\]

\[
r = c_{10}r_{-1} + c_{11}\pi + c_{12}(Y-\bar{Y}) + shk_3;
\]

\[
\pi = d_{10}\Delta e + d_{11}\Delta X + d_{12}\pi^{EA} + shk_4;
\]

\[
\Delta e = e_{10}\Delta e_{-1} + 0.5\Delta X_{-1} + (-0.5)r + shk_5;
\]
\[\Delta X = f_{10} \Delta X_{-1} + \text{shk}_6;\]

\[\Delta X = \left(1/g_{10}\right)(\Delta Y^* - \Delta Y) + \text{shk}_7;\]

\[\Delta Y = Y - Y_{-1};\]

\[\bar{Y} = h_{10} \bar{Y}_{-1} + \text{shk}_8.\]

According to the methodology presented in chapter II, the absolute figures were seasonally adjusted and logarithmated. Moreover, the consistency of the system was strongly analyzed. Special attention was paid to the cointegration aspect, using the MacKinnon critical values.

As can be observed, shocks were put directly into each equation. From the methods available for calibration, in this case was chosen the estimation one. Coefficients of the equations were calibrated through econometric estimations.

The system deals with problems of monetary policy, international markets and so on. The pass-through effects from inflation and exchange rate towards other macroeconomic variables are completed by the tradeoffs between inflation and the GDP, interest rate and exchange rate and output. The following is the particular form of the equations as derived from the data analyzed.

\[Y = (1-0.1)Y_{-1} + 0.1Y_{+1} - 0.2(r - \pi_{+1}) - 0.4804\Delta X_{+1} - 0.0904\Delta Y^*_{+1} + 0.1\Delta e_{-1} + \text{shk}_1;\]

\[\pi = (1-0.2)\pi_{-1} + 0.2\pi_{+1} + 0.4288\Delta X_{+1} - 0.4608\Delta X + 0.2(Y - \bar{Y}) + \text{shk}_2;\]

\[r = 0.8r_{-1} + 1.2\pi + 1.5(Y - \bar{Y}) + \text{shk}_3;\]

\[\pi = 1\Delta e + 0.5329\Delta X + 1\pi^{\text{EA}} + \text{shk}_4;\]

\[\Delta e = 0.5242\Delta e_{-1} + 0.5\Delta X_{-1} + (-0.5)r + \text{shk}_5;\]

\[\Delta X = 0.357\Delta X_{-1} + \text{shk}_6;\]

\[\Delta X = (1/1.0425)(\Delta Y^* - \Delta Y) + \text{shk}_7;\]
Δ\(Y = Y - Y_{-1}\);

\(\bar{Y} = 1*\bar{Y}_{-1} + \text{shk}_8\).

The steady state of the system was considered to be given by the levels presented in the Maastricht criteria for the chosen variables. Consequently, Romania was held to be out of its steady state and shocks were applied in order to see how the national economy will evolve in time towards the specified equilibrium. Firstly, a simple shock of 1 percentage point was applied in the exchange rate, the interest rate and the inflation rate. After that, was measured the now-a-days difference between the state of the national economy and the target of the Maastricht criteria and the result was used as an innovation in the system.

**Figure 74. Exchange rate temporary shock of 1 pp**

*Source: own calculations.*
Figure 75. Inflation rate temporary shock of 1 pp

Source: own calculations.
Figure 76. Interest rate shock of 1 pp

Source: own calculations.
Figure 77. Combined shock interest rate and inflation rate (-7.67 pp, -4.21 pp respectively)

![Graphs of Inflation, Interest rate, Exchange rate change, and Output growth](image)

Source: own calculations.

When analyzing the four figures, one can see that the strongest impact upon inflation has the exchange rate and the combined impulse between inflation and interest rates. Actually, for all the variables the strongest reactions are for the first and the last type of innovation applied.

The foreign trade sector is not represented above. It was eliminated from the graphical results because the variation of the terms of trade to the four impulses proved to be extremely low (figures of a $10^{15}$ degree). This is a major drawback of the model, showing an inconsistent modelling of the external sector. The foreign trade channel will be paid special attention in future research due to this improper specification in the partial analysis.
A5.2. The labour market and the FDIs

For assessing the evolution of the labour market in relation to the Euro introduction were chosen two important variables – the total employment (E) and the monthly net wage (W). Together with them in the VEC model appear the inflation rate in Romania (\(\pi\)), the RON/EUR exchange rate (e), the real output (Y), the real governmental expenditures (G), the real investments (I) and the real money market interest rate for 12 – months maturity in Romania (as a proxy for the interest rate criterion) (r).

The Johansen cointegration test found 2 cointegration equations between the variables, which are consistent and statistically significant. As shown in the figure below, all the unit roots of the VEC model are lower than or equal to 1, being within the unit circle.

Figure 78. AR roots graph for the labour market VEC model

![Graph showing AR roots for the labour market VEC model](source: own calculations)

A decrease of the **public expenditure** by 1.5% yearly implies, in the case of the present data, a reduction by 0.375% quarterly. To such an innovation, the analyzed variables react differently. Thus, the total employment would first drop by more than 0.016% in the next quarter after the impulse and then increase again, but to a lower value than before the reduction of the public expenditure. In three years time, it would stabilize at a level lower by 0.005% than the initial value. If, at the beginning, this innovation is not very important in the variation of the total employment, its effect increases in time. Thus, after a year, the shock would be responsible for almost 35% of the variation in the level of employment in Romania.

Negative evolutions can also be found in the case of investments and of inflation rate. The shock would cause a reduction in investments in general, with the lowest level of -
0.16% in the first quarter. This is very important as the flow of FDIs depends very much on the fiscal policy adopted by the national government\textsuperscript{171}. The intensity and rapidity with which the fiscal impulse manifests in economy is best seen in the reaction of the inflation rate. Here appears the deepest drop – the inflation rate reduces in the quarters after the shock by 0.2 percentage points.

The rest of the variables considered all react positively to the negative innovation in the government’s expenditure. The variation of the average monthly net wage is quite negligible – with a peak of around 0.01% after more than a year from the innovation.

Except for an augmentation in the unemployment rate and in the interest rate, the reduction of the budgetary deficit according to the European Commission’s provisions would be benefic for the entire Romanian economy. It would help reducing inflation towards the targets established for monetary integration. It would also provide for a positive growth rate of the real GDP and an improvement in Romania’s position on international markets and of the trust in the Romanian economy (on medium term, the Romanian Leu appreciates against the Euro).

\textsuperscript{171} Almost 30% according to the variance decomposition analysis.
The macroeconomic theory states that for inflation to be reduced, the **interest rate** has to go up. But here the NBR has to be careful to assess both the price stability criterion and the interest rate one (which for Romania implies reducing the long term interest rates towards the levels in the EU). That is why for the interest rate was applied an innovation of 1%/year, namely 0.25% quarterly. As expected, the response of the inflation rate to the monetary impulse is weaker than to the fiscal one described above. An increase in the level of interest rate has the expected effect – it restricts FDIs flows and national investments. Consequently, both employment and the real GDP fall. Fortunately, the effects are not that powerful in any field than when reducing the budgetary deficit. It is thus explainable why the National Bank of Romania has preferred to reduce the interest rate lately to stimulate other important parameters and find other ways to reduce the inflation rate.
Figure 80. Response of the variables to a user specified innovation of 0.25 percentage points in the interest rate

Source: own calculations.

The results of this part of the study clearly show that the monetary impulses need longer periods to be felt in the economy in comparison with the fiscal ones. This statement is also sustained by the variance decomposition that emphasizes a low importance of interest rate innovations in affecting the variables in the model. For example, variations in the level of the total employment are given only in a proportion lower than 0.15% by variations in the interest rate.

The last individual impulses applied regard the inflation rate. As established in Chapter VI, there are two possible ways to comply with this criterion. The first one implies a gradual approach, while in the second the deflation is constant until the entrance in the ERM II. The first approach may be based on NBR’s inflation targets (for example 3.5% in 2010 and 3% in 2011 +/- 1 percentage point). Such a reduction in inflation would not be felt very much at the beginning, but increasing the rigidity of the targets towards the Euro adoption
would imply important costs. Hereinafter are presented the results in the case of constant decrease in inflation rate towards the limits established by the Maastricht Treaty.

The nearest target for Romania is to enter the ERM II in 2012. This implies the reduction of the inflation rate accordingly. Up to the moment, the inflation rate in Romania was quite high in respect to the other members. To reach this goal, authorities should find the ways to reduce inflation by 2% each year. The necessary impulse applied was of -0.5% per quarter. In case the deadline for entrance in the ERM II is postponed, the necessary innovation reduces and so do the short and medium term effects.

As expected, such an action would have on medium term a benefic impact upon the Romanian economy. After a slowing down in the next quarters after the reduction (see in figure 81 the decrease of employment, of the real GDP and of the monthly average net wage), the economy enters an ascending path on medium term. For the present analysis, the strongest reaction is the augmentation of the investments by around 0.2%.

**Figure 81. Response of the variables to a user specified innovation of -0.5 percentage points in the inflation rate**

![Graphs showing the response of various economic indicators to a reduction in inflation rate](Image)

*Source: own calculations.*
But in the real life, variables work together, they influence each other and so, there has to be taken into consideration a common shock. This shock brings together the ones studied individually above to see what could possibly happen when dealing with more aspects of the European integration process.

The reaction of the total employment is the most severe in the first quarters after the impulse. This shock causes a reduction by 0.023% in the next quarter and then a sensitive recovery. While both the net wage and the real output react positively to the shock, investments have an important fluctuation. The contraction by 0.14% is followed by an augmentation of the FDIs by 0.16% towards the end of the analyzed period, when it stabilizes around this value.

Figure 82. Response of the variables to a user specified innovation of combined impulses for the inflation rate (-0.5 pp), interest rate (-0.25 pp) and the budgetary expenditure (-0.375)

Source: own calculations.
The last impulse is related to the disappearance of the RON/EUR exchange rate. Considering the present real exchange rate, this impulse is based on the hypothesis of an exchange rate equal to 4 Ron/Eur at the moment of the Euro adoption. The scenario implies, thus, this sudden reduction to 0. The responses obtained are the most intense. The variation in employment is more than -0.7% and the transition from a point of maximum to a point of minimum would be violent in the first three – four years after the Euro adoption. The average monthly net wage will also fluctuate at the beginning, but not that strong as the employment. After approximately two years from the monetary integration, wages would set on an ascending path, having as a basis the integration process with the convergence aspects. The most affected seem to be the foreign direct investments which will probably drop by almost 15%. And finally but not the least, the government will have to pay attention to remaining under the limit of 3% of the GDP for the budgetary deficit. Public expenditures are due to rise in a significant manner (an average of 4%), while the response of the GDP predicts its reduction by almost 1.5%, followed by a slight recovery.

Figure 83. Response of the variables to a user specified innovation that cancels the exchange rate (impulse of -4 in the exchange rate)

Source: own calculations.
A5.3. The aggregated model of the Romanian economy (future research)

I. AGGREGATE DEMAND

1. Private consumption: \[ \Delta \ln \left( \frac{C}{Pop} \right) = a_{10} + a_{11} \Delta \ln \left( \frac{Y}{Pop} \right) + a_{12} (r - \pi) + a_{13} \Delta \ln \left( \frac{c_{-1}}{Pop_{-1}} \right) + a_{14} \ln \left( \frac{c_{-4}}{D_{-4} - IM_{-4}} \right) + \varepsilon \]

2. Labour supply: \[ \ln \left( \frac{LF}{Pop} \right) = b_{10} + b_{11} \ln \left( \frac{LF_{-1}}{Pop_{-1}} \right) + \varepsilon \]

3. Real output: \[ Y = C + I + G + (Exp - IM) \]

4. Net exports (terms of trade): \[ \Delta X = c_{10} \Delta X_{-1} + \varepsilon \]

5. Net exports vs. output: \[ \Delta X = \frac{1}{d_{10}} (\Delta Y^* - \Delta Y) + \varepsilon \]

6. Real demand: \[ D = e_{10} Y + \varepsilon \]

II. AGGREGATE SUPPLY

7. Real output: \[ Y = f_{10} Y_{t+1} + f_{11} (r - \pi_{t+1}) + f_{12} \Delta X_{t+1} + f_{13} \Delta Y^*_{t+1} + \varepsilon \]

8. Private investment: \[ \ln(I) = g_{10} + g_{11} \ln(D) + g_{12} (r - \pi) + \varepsilon \]

9. Labour demand: \[ \ln(E) = h_{10} + h_{11} \ln(D) + h_{12} \ln \left( \frac{W}{\pi} \right) + \varepsilon \]

10. Imports: \[ \ln(IM) = i_{10} + i_{11} \ln(D) + i_{12} \ln \left( \frac{W}{\pi} \right) + \varepsilon \]

11. Potential output: \[ \ln(\bar{Y}) = j_{10} + j_{11} T + j_{12} \ln(LF) + j_{13} \ln(I) + \varepsilon \]

III. GOVERNMENT

12. Government expenditure: \[ \Delta \ln(G) = k_{10} \Delta \ln(G_{-1}) + (1 - k_{10}) \Delta \ln(D - IM) + k_{11} \ln \left( \frac{D - IM}{\bar{Y}} \right) + \varepsilon \]

IV. PRICES, WAGES, INTEREST RATES, EXCHANGE RATE

13. Inflation rate vs. output: \[ \pi = l_{10} \pi_{t+1} + l_{11} \Delta X_{t+1} + l_{12} \Delta X + l_{13} (Y - \bar{Y}) + \varepsilon \]

14. Inflation rate in Romania vs. inflation rate in the Euro Area: \[ \pi = m_{10} \Delta e + m_{11} \Delta X + m_{12} \pi^{EA} + \varepsilon, \quad m_{10} = 1, m_{12} = 1 \]
15. Wages:
\[ \Delta \ln(W) = n_{10} + n_{11}\Delta \ln(W_{t-1}) + (1 - n_{11})\Delta \pi + (1 - n_{11}) n_{12}\Delta \ln(Y) + n_{13}\Delta \left(\frac{LF-E}{LF}\right) + n_{14}\left(\frac{LF_4-E_4}{LF_4}\right) + \varepsilon \]

16. Restricted interest rate:
\[ r = o_{10}r_{t-1} + (1 - o_{10})(o_{11}\pi + o_{12}Y + o_{13}\Delta e) + \varepsilon \]

17. Unrestricted interest rate:
\[ r = p_{10}r_{t-1} + p_{11}\pi + p_{12}Y + p_{13}\Delta e + \varepsilon \]

18. Exchange rate:
\[ \Delta e = q_{10}\Delta e_{t-1} + \varepsilon \]

Variables
C – real private consumption
D – real final demand
E – total employment (labour demand)
e – exchange rate RON/EUR
Exp – real exports
G – real government demand = real final consumption expenditure of general government
I – real investment = real gross capital formation
IM – real imports
LF – labour force (labour supply)
\(\pi\) – inflation rate in Romania
\(\pi_{EA}\) – inflation rate in the Euro Area
Pop – population of Romania
r – money market interest rate for 12 – months maturity in Romania
T – time
W – net wage
X – real net exports (terms of trade)
Y – real output
\(\bar{Y}\) – potential real output
\(Y^*\) – real output for the Euro Area

To insure the consistency of the models presented in this chapter and the significance of their equations was followed the methodology presented in Greene (2008). In this kind of models, to ensure all the characteristics required, variables have to be cointegrated. That is
why, after generating the equations, their residual values were not tested for stationarity using the regular Dickey – Fuller values, but the MacKinnon cointegration critical values, that take into account the number of variables and the number of observations. As an observation must be added that in many papers that use econometric modelling, this aspect is neglected. Most of the researchers simply use the ADF test and declare their equations and models valid, forgetting about the cointegration aspect. But the residual values resulted using this methodology are not simple values as in the regular equations, but are values that are strictly influenced by the correlations and the interconnections in the original variables.