Possible Risks of a too Early Adoption of Euro in Romania

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Abstract. *The aim of this article is to identify a possible risks generated by the Euro adoption for the Romanian economy, starting from the costs identified by the Optimal Currency Area theory. In this respect, we analyse the degree of convergence of Romanian economy related to the Euro Area. We use for this comparison of the Structural Convergence Index and the Index of Occupational Convergence, the Commercial Integration Degree using the trade intensity, and the Synchronization Degree of Business Cycles of Romania with the Euro Area through the analysis of correlation coefficients for business activity indicators i.e. GDP and Industrial Production Index. The background of the economic crisis was a test for the perspectives of Euro adoption by Romania; where, the negative external shock was transmitted through the trade channels with foreign partners. The monetary policy of the country proved to be inefficient in neutralizing the corresponding negative effects. The solution envisaged by the authorities was the use of an external adjustment mechanism rather than an internal one. However, in this case, the negative effects of the crisis will persist in the economy and will increase the adoption costs under the circumstances of a structural divergence between the Romanian economy and the Euro Area.*

Key-words: economic convergence, trade integration, business cycle synchronization.

JEL Classification: E32, F15, F44.

1. Introduction

According to the Optimal Currency Area (OCA) theory, which represents the theoretical framework used in this study, if the business cycle in the candidate country is not synchronized with those of the countries forming a monetary union, the loss of monetary policy autonomy may generate significant economic costs. In our research we therefore aim at to identifying the risk factors associated with the adoption of Euro in Romania.

The Optimal Currency Area theory was firstly developed by Mundell (1961). Since then, the theory has known multiple adjustments, as several economists identified and introduced subsequent or additional criteria. As a result, starting from the costs corresponding to the OCA theory, we identified a series of factors that represent potential risks for the Romanian economy if the Euro is adopted. In this article, we focus on the convergence intensity of Romanian economy towards the Euro Area, the trade integration intensity, respectively the synchronization of business cycles in Romania with the ones in the Euro Area.

The Maastricht criteria are not necessary and sufficient conditions when aiming at the Euro adoption; the Treaty itself does not make reference to the real convergence issue, capable of ensuring a high level of similarity, cohesion and compatibility of the candidate countries as compared to the Euro Area. This might also be explained by the fact that during the 1990's, the EU was mainly composed of compatible developed economies, with similar economic structures. Later on, West European decision,

making bodies realised the significance of real convergence in terms of achieving a successful insertion of Central and Eastern European economies. Consequently, both the European Commission and the Central European Bank intensified their warnings concerning the early Euro adoption by a candidate country insufficiently convergent, from a real perspective, with the West European economic structure of the Euro Area.

Even though not generally agreed upon, the real convergence criteria are (Iancu, 2008): the economic openness degree (– the share of the exports and imports in GDP), the share of EU Member States bilateral trade in total trade value, - the structure of the economy (the share of different sectors in total economic output) and the most comprising of all of them; – the GDP per capita, either in nominal terms, or expressed in terms of the standard purchase power parity.

From these ideas, we may conclude that the assessment of business cycle convergence of new member states depends on the analogy of economic structures, on trade degree and on out-put diversification intensity. A stronger correlation of business cycles with the currency area involves lower costs under the circumstance of losing monetary independence.

If prices and wages are not flexible, the financial and labour markets are not enough integrated in order to assure full factors mobility. On the other hand, if the fiscal transfer system is not present, then the only shock absorption mechanism is represented by the shocks' similarity on the supply and on the demand side, but also by the degree of business cycle synchronisation with the Euro area. Countries confronted with asymmetric shocks tend to have more synchronised business cycles and accordingly, similar economic policies. Even though, monetary integration costs are not determined only by asymmetric shocks, but also by the manner in which countries deal with such shocks.

Based on these most significant papers in the OCA field, we isolated few shortcomings of theoretical approach, given the fact that some criteria are contradictory, but also the fact that many papers cast a shadow of doubt on the hypothesis of giving up on the autonomous monetary policy. In case of an open economy, a fixed rate would seem best, but if correlated to a low labour market mobility compared to trading partners, certain adjustment difficulties would appear and a flexible exchange rate becomes necessary. Another contradiction concerns the output diversification criteria and business cycle synchronisation: an economy different in structure could deal better with a shock and is thus a better candidate to adopting the single currency. Even though, such a differentiated economic structure, is significantly different from that of trading partners and would thus generate a decrease in the synchronisation of business cycles and an increase in the cost of giving up the national currency.

2. Literature Review

In some opinion (Isarescu, 2007), the Euro adoption should occur even under less severe nominal and real convergence restrictions. One of potential counterargument to this view can be found in the Optimal Currency Area theory: the member states of a currency area may have common benefits deriving from a single currency only when their economic structures are similar and there is no risk of asymmetric shocks negatively affecting only a part of these countries. This is the reason for which Central and Eastern European countries can-not abandon their own monetary policy strategy as long as the risks of such symmetric shocks, generated by the difference in economic structure, is rather high. The endogenous approach shows that a monetary union may be achieved even if not all the requirements stated by the OCA theory of Mundell are fulfilled, as long as some of them may be reached after unification.

Frankel and Rose (1998) demonstrated that an rise in trading integration may lead to a stronger correlation of business cycles, which in turn reduces the need of monetary independence. The authors also conducted a research on two other criteria of the OCA theory by analysing the business cycles and the trade intensity in developed countries. They conclude that the adoption of the single currency may support fulfilling the requirements „ex-post" even if they were not fulfilled „ex-ante". In 2008, Rose published a new paper on the effects of the Euro adoption on trade, as a conclusion of 26 previous studies investigating this issue, and pointed out that there is no consensus regarding the EMU effects and the trade creation effect was estimated between 8% and 23% under the hypothesis that a "no effect scenario" is rejected. The paper also analyses the trade effects on the business cycle synchronization and concludes that results are heterogeneous, rejecting the idea that a change in trading volumes produced zero effects.

In the specialized literature such as Clark (2001), Trăistaru & Siedschlang (2005), Garcia & Ruiz (2005), Tatomir & Alex (2002) aiming to measure the structural similarity of an economy with the Euro Area proposes an indicator called the Index of Structural Convergence (ISC). This indicator was developed in order to measure the degree of specialization of a country in comparison to another country or group of countries. Wacziarg (2004) pointed out that once the integration degree increases, divergence amongst economies occurs. The more developed the countries, the more specialised and the more present the structural divergence process will be.

In the specialized literature and empirical research, two views have been outlined on the relationship between trade integration and asymmetric shocks. Thus, the European Commission (1990) believes that strong trade integration reduces the incidence of asymmetric shocks and ensures synchronized economic cycles. Frankel and Rose (1998) agreed with this idea and showed that the adoption of a common currency leads to increased trade and a better correlation to economic cycles. Dinu and al. (2014) did a complex evaluation of the interdependences between trade, financial integration, structural specialization and bilateral business cycles synchronization for seven CEE economies, and the results confirmed the theories regarding the effects of monetary integration. Some authors, such as Krugman (1993), consider that a greater trade integration leads to a high degree of specialization and a risk of asymmetric shocks.

Gouveia and Coerria (2013) emphasized the fact that the European integration deepening has been associated to an increase in trading inside the EMU, even though during 2008 - 2011 this increase has been lower than previously. This has also been confirmed by other studies (Berger and Nitsch, 2008 and Silva and Tenreyro, 2010) which concluded that the creation of the European single market had a greater effect on trade than on the single currency itself.

Analysis of synchronization of business can be conducted both ex-ante and ex-post (Frenkel & Rose, 1998). Ex-ante analysis allows the evaluation of cyclical gaps between a country and the Euro Area and the dependence of domestic business cycle on the one recorded by major trading partners. The ex-post analysis assesses business cycles' sensitivity to the single currency adoption through trade and financial impacts.

In order to determine the evolution of business cycles convergence, two approaches can be used: one that examines the dispersion of the domestic production gap, and the second based on the study of the correlation between fluctuations in the economy. The first one only shows the intensity fluctuations, without showing their nature as well, and therefore the growing trend of cyclical convergence due to the reduced dispersion gap could be contradicted by the existence of temporary periods of cyclical divergence. One way to obtain additional information on the correlation of the Euro Area economy in Romania is the analysis of the correlation coefficients for the

indicators of economic activity – the GDP and industrial production. The series were seasonally adjusted, in real terms, according to quarterly changes, which ensures their stationary character.

We performed the analysis of the economic cycle from the definition proposed by Lucas (1977), according to which the cycle is identified with the deviation indicator of that renders its economic activity from the long-term trend or its trend. The isolation of the economic cycle is a delicate issue, since it is an unnoticed economic variable, and the aggregate production trend properties and its connection with the cyclical component is still a controversial topic in the technical literature. In practice, the uncertainty surrounding the economic cycle estimation is reduced by using alternative methods in order to estimate the two components of the economic indicator (trend and cycle), based on different statistical or economic grounds.

Most studies use non-parametric filters like the Hodrick-Prescott filter (HP 1997), band pass filters Baxter King (BK 1999) and Christiano-Fitzgerald (CF, 2003). Another method developed in recent years refers to models with unobservable variables Harvey (1985, 1989), Koopman (1995) estimated using the Kalman filter. Other authors, Dinu and al. (2012), used four filters (HP filter, BP filter, Beveridge-Nelson decomposition, Quadratic trend filter) in order to extract the cyclical component of the GDP.

Mc Morrow and Werner R. (2001) showed that the HP filter leads to results close to those of other statistical methods and gives an acceptable estimation of the GDP trend, at least in the US economy and European Union countries. This method is often used by both researchers and economists from government institutions. There are relatively few studies that verify the sensitivity of the results at the different methods used for filtration. Artis and Zhang (1997) and Calderon et al. (2002) concluded that the selection of a particular filter is crucial for their results, but Canova (1998) believed that estimates of the economic cycle can be extremely sensitive to the choice of filtering method.

3. Methodology and Data

In this paper we analyze the convergence degree of the Romanian economy compared to the Euro Area using the Index of Structural Convergence (ISC) and the Occupational Convergence Index, the trade integration degree based on the trade intensity and the synchronization degree of the business cycle in Romania to the Euro Area by means of analysis of the correlation coefficients for the economic activity indicators – GDP and the industrial production index.

The ISC is used for computing the gross value added (GVA) as the unit of analysis in activity levels, as it captures the importance of overall economic activity in a country. This index takes into account 13 main sectors. The value added tax for each sector is calculated as a percentage of the value added in achieved in the economy. The index is calculated as the sum of absolute differences between the share of each sector in the economy and the corresponding share of the same sectors in the Euro Area (on average).

$$ISC_{i,EA} = \sum_{k=1}^{K} \left| S_{k,i} - S_{k,EA} \right| \qquad (1)$$

where: $ISC_{i,EA}$- the index of structural convergence to the Euro Area; $S_{K.i}$ – the share of GVA in total GVA of sector k country j; $S_{k,EA}$- the weight of GVA of k sector in total GVA in the Euro Area; k- number of sectors considered.The ISC construction shows that if the country's value trends to zero, the country becomes similar to the Euro Area in terms of production structure.

The intensity of trade integration between the Romanian economy and the Euro Area may be calculated as a measure of trade intensity (ICj,EA) used by Eickmeier & Breitung (2006).

$$IC_{R,\,EA} = \frac{E_{R,EA} + M_{R,EA}}{GDP_R x GDP_{EA}} \qquad (2)$$

where: $IC_{R,\,EA}$ - trade intensity index; $E_{R,\,EA}$ - Romanian exports in the Euro Area; $M_{R,\,EA}$ - Romania's import from the Eurozone; GDP_R- Romanian GDP; GDP_{EA}- Euro Area GDP.

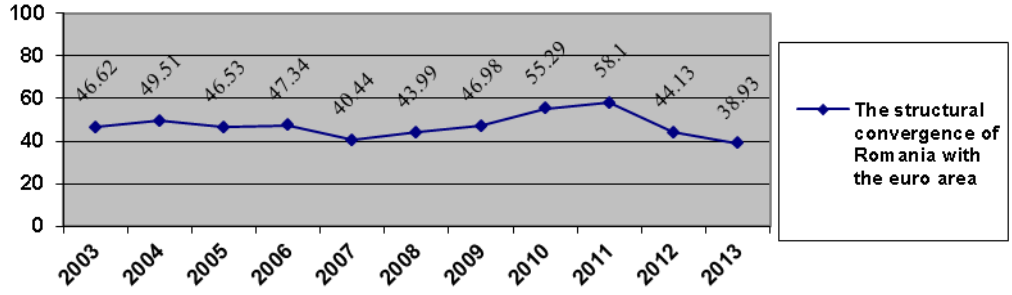
In this work, we used two techniques of extraction cycle: Hodrick-Prescott and Band-Pass: Baxter-King. As a measure of economic activity, we used the GDP as main indicator, encompassing all spheres of economic activity and industrial production. It has the advantage of being available on a monthly basis and has a strong cyclical component. Moreover, since a large part of industrial production is subject to trade (tradable goods), an increase in correlations due to increasing the degree of economic integration can quickly reflect the level of this variable.

4. Results and Interpretation

4.1. Structural Convergence of the Romanian Economy to the Euro Area

We may state that the adoption of Euro with minimum costs depends by the convergence process of the economic structure by sectors of activity to the member states of the monetary union. This may be explained by the fact that different economic structures mean different reactions to common shocks, and the application of a common monetary policy may not be simultaneously adequate to that economy and the rest of the world. Wacziarg (2004) pointed out the fact that once the integration degree increases, divergence amongst economies occurs. The more developed the countries, the more specialised and the more present the structural divergence process will be.

The gross value added by sector in Romania show that the main share belongs to industry, followed by real estate and transport. This reinforces the character of a poorly structured economy, largely based on external sources of capital accumulation. This slows down the development of those areas where the use of domestic capital can be seen in agriculture, health, and education.



Graph 1: The structural convergence degree of Romania with the Euro area (13 main sectors)

Source: Eurostat, own computing

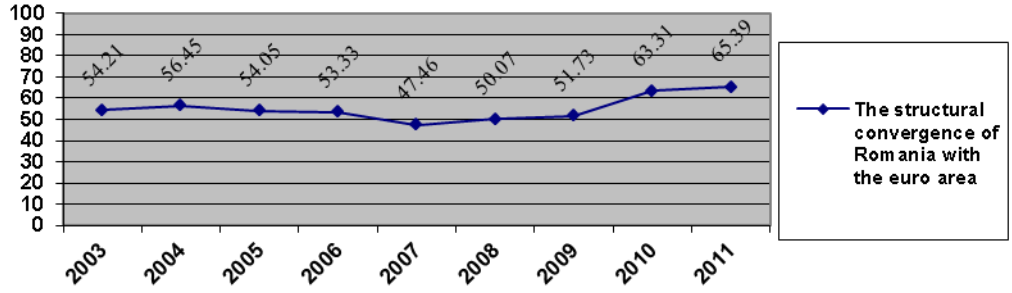
Graph no. 1 below illustrates the evolution of the degree of similarity between the production structure of the Romanian economy and the Euro Area, measure according to Krugman.

As it can be noticed from the graph, the growth of Romanian economy has resulted in reduced structural divergence from the Euro Area. Romania's economy was one of the most structurally divergent in 2010, due to the large share of agriculture (5.32 percent compared to 1.69 percent in the Euro Area), industry (8.3 percent more than the Euro Area), construction (9.63 percent in Romania to 5.77 percent in the Euro Area) and low share of services, public administration, defense, education, health care and social work activities (10.77 percent in Romania compared to 19.51 in EU Area). An explanation for this structural difference is the low level of financial market development to ensure a different distribution of resources and the associated large share of agriculture as a reminiscent of the communist era.

To deepen the analysis of the convergence of the economic structure, we considered appropriate to detail the structural differences between the manufacturing sectors in Romania and the Euro Area. This is because, as showed by Dinu (2014), the bigger bilateral structural disparity are, the more different the economic structures are, and those economies will respond more differently to certain external shocks, and the business cycles synchronization between them will decrease.

We can see a huge difference between the weights of Manufacture of food products; beverages and tobacco products in the total value added in Romania (21.47) related to the Euro Area (15.72).

Using the same indicator as above, we can determine the degree of similarity between the structure of the Romanian economy and the Euro Area (taking into account 31 main sectors), whose evolution is represented in Graph 2 below. We can see that Romania's structural convergence indicator compared to the Euro Area is higher than the one calculated without detailing the components of the manufacturing sector, which shows that Romania still has many levels to cover to the full convergence with the Euro Area.



Graph 2: The structural convergence intensity of Romania with the Euro area (31 main sectors)

Source: Eurostat, own computing

Within the manufacturing sector, the most divergent subsectors in Romania in comparison to the Euro Area are: the manufacture of food products; beverages and tobacco products and manufacture of textiles, wearing apparel, leather and related products, where the weight of the gross added value is three times higher in Romania compared to the Euro zone, but also in manufacture of machinery and equipment sector, where the weight of the gross added value is two times lower than the one in the Eurozone.

In terms of the future integration of Romania in the EMU, what is important is not the magnitude of the gap between the share of each sector in total gross value added towards monetary union economy, but in particular how these differences have evolved over time. The data presented in Graph 1 and in Graph 2 shows that there

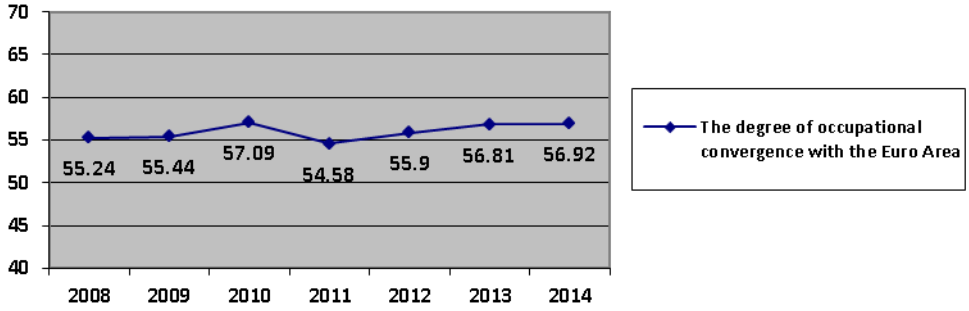
was a structural difference compared to the Euro Area economy, which makes uncertain the compatibility of the Romanian economy with the monetary union in the long term, even if there are some temporary factors which may cause synchronous developments in the two economies.

The inter-industrial structure in different countries depends mostly on the individual apects of certain economic sectors, but also on the individual aspects of each economy. An essential aspect for the inter-industrial structure is whether for some industries there are differences in productivity, external effects, and scale economies or, in case of large economies, there are non-tariff barriers or a high labour mobility. Empirical studies on inter-industrial convergence emphasize the dominant position of specialization and concentration processes, which contribute mainly to structural divergence amongst industries. Otherwise, structural convergence can be expected in the medium technology industries, while for high technology industries, capital consuming and for services area, the divergence phenomenon is to be expected.

Structural changes in the economy are accompanied by changes in the employment of labour.

When related to the structure of employment in the Euro Area, we discover that: (i) the highest contribution of employment in Romania in agriculture related to the Euro Area (25.4 percent contrast 3.05 percent); (ii) the growing, but still limited share of employment in services related to the Euro Area; (iii) a decline of employment in the Romanian industry, the same as in the Euro Area; (iv) little mobility of labour from agriculture or industry to the service sector.

In order to highlight the degree of convergence compared to the Euro Area employment structure, we used the same convergence index, adjusted for the share of sectorial employment (Graph 3). As far as employment in Romania is concerned, the structure is very different from the Euro Area. Regarding the structural similarity, the level of 56.9 percent is very distant from zero, and a convergence index closer to zero means that the country is more comparable to the Euro Area by the occupational structure of the employment. The convergence to the Euro Area index reflects the specific occupational distribution of employment by activity in Romania.



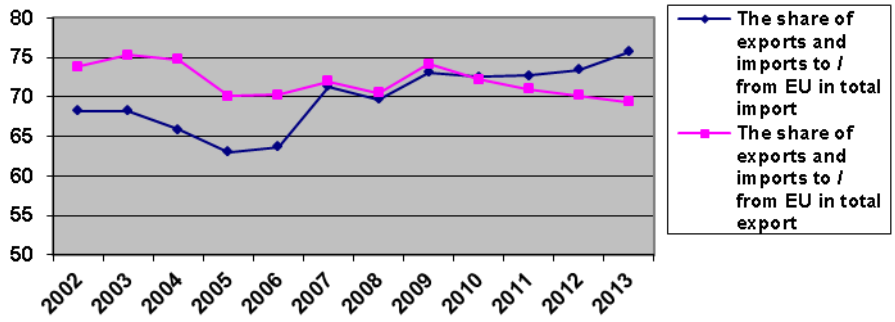
Graph 3: The degree of occupational convergence of Romania to the Euro Area
Source: Eurostat, own computing

The specialized literature treated that the existence of structural differences with the Euro Area economy leads to greater vulnerability to asymmetric shocks versus the Monetary Area, and a different reaction to the EU's common shocks (such as unanticipated changes in the rates of interest). However, the existence of such differences does not imply only negative aspects, as the large share of sectors: manufacturing and agriculture was the one to ensure economic growth in Romania.

The results of the structural convergence analysis indicate that the Euro adoption should be approached with caution. The Romanian economy needs to become more structurally suitable with the Euro Area in order to abandon the autonomy of the monetary policy, without encountering major cost in in terms of macroeconomic stabilization.

4.2. Trade Integration with the Euro Area Economy

Trade integration is a key factor affecting the degree of convergence, because the stronger the trade relations among states are, the greater the convergence is. Trade integration contributes to an increase in the alignment of business cycles. 70 percent of our country's foreign trade is conducted with EU countries.



Graph 4: The share of exports and imports to / from EU as a total
Source: Eurostat, own computing

As shown in Graph 4, Romania has a trade balance deficit with the Euro Area. From the theoretical point of view joining the Euro Area should lead to increased exports to the region. However, since the competitiveness of Romanian products could not be improved by a depreciated exchange rate, a more productive export industry would be required.In 2013, Romania's main trading partners from the Euro zone, as shown in Table 1, represented 70.2 percent of exports and 75.7 percent of Romania's imports. Compared to 2010, a reduction in exports to the Euro Area, in particular due to lower exports to Germany, Italy, and France, may be depicted.

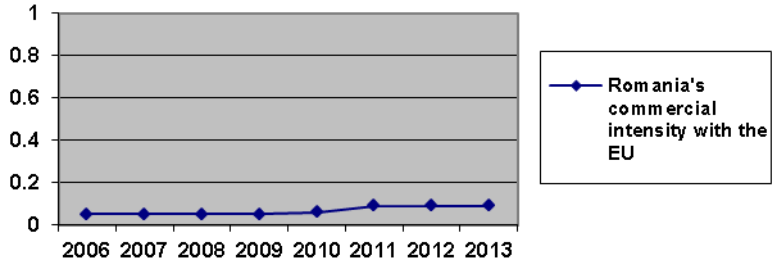
Table 1: The main trading partners of the Euro Area

2010		2011		2012		2013	
% export	% Import	% export	% import	% export	% import	% export	% import
G- 18,3 I– 13,9 F– 8,4 S– 3,1 0-2,8 A-2,2	G– 16,8 I– 11,6 F– 6 A– 4,1 O– 3,5	G- 18,6 I– 12,8 F– 7 O-2,8 S– 2,4 A-2,2	G-17,1 I-11,3 F-5,8 A-4 O-3,2	G- 18,6 I– 12 F– 7,5 O-3,1 S– 2,4	G-17,4 I-10,9 F-5,7 A-4,1 O-3,5	G- 18,5 I– 11,5 F– 6,7 O-3,1 S– 2,4	G-18,5 I-11 F-5,8 A-4 O-3,7
Total							
72.2	72.5	71	72.7	69.4	73.4	70.2	75.7

Source: INSSE, own computing
I-Italy, G-Germany, F-France, O-Holland, A-Austria, S-Spain

Since over 40 percent of Romania's foreign trade is conducted with Euro Area countries (Germany, France, Italy and Holland), any macroeconomic development in these countries will decisively influence the industrial and export activity in Romania. Any shock that will affect the economies of the Euro Area will be transferred in the Romanian economy through the trade channel.

Unless the domestic output and exports are reoriented, there is a possibility that Romania's exports to the Euro Area will drop after joining the EMU. The experience shows that countries in the Euro Area would hardly go from the position of net importer to net exporter after having joined the EMU. Even after 11 years, the countries which joined the Euro Area with a trade balance indicating a deficit in relation to the states in this area could not change this situation. On the contrary, in recent years, things have got worse for them, as shown in the study made by SAR (2012).



Graph 5: Romanian trade integration with Euro Area
Source: Eurostat, own computing

Low trade integration can be seen as an advantage when economies shrink. This positive effect was observed in Romania, as the international crisis spread late in the Romanian economy. However, low trade integration is generally considered a major impediment in ensuring sustainable economic growth rates in the medium and long term.

4.3. The Degree of Romania's Business Cycle Syncronization with the Euro Area

For a country prepared to join an optimum currency area and to accomplish real convergence within this area, the synchronization of business cycles in these economies is essential because, there is no possibility to call upon the monetary and exchange rate policy. It is considered that the higher the sequencing, the lower the cost associated with loss of monetary independence.

Correlation of business cycles is important in terms of joining the Euro Area as common policies can generate asymmetric shocks when economic development levels are different. The countries from the Euro Area that assume a higher flexibility of the economy, would adjust quicker for asymmetric shocks. In this respect, it is necessary to undertake structural reforms so that the economy would benefit from high inflows of foreign capital and have a flexible labour market.

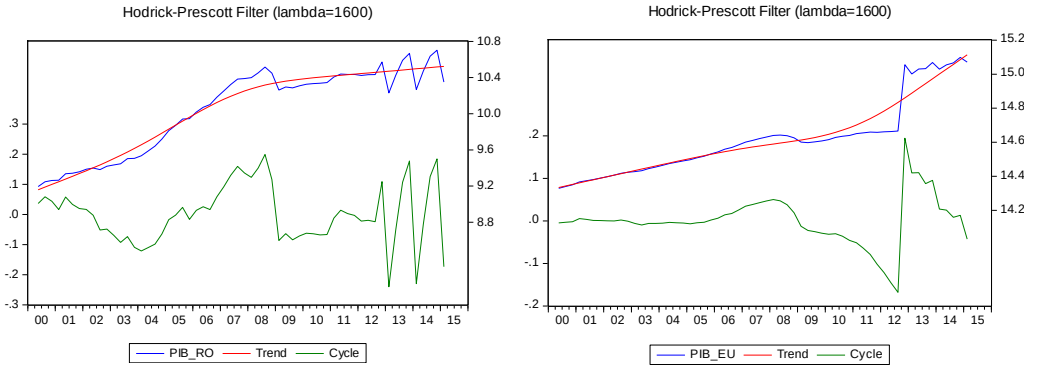
Although Romania has made some progress, the economy has a reduced capacity to adapt, as proven by the slippages that the single taxation level has generated on the increase of the domestic demand. To ensure the flexibility of an economy, aggregate supply side measures should be encouraged that can positively

affect the growth potential of the economy, namely: restructuring, stimulate investment, labour market flexibility, entrepreneurial activity, assimilation of technology.

Promoting such policies is also required by meeting the criteria of nominal convergence, which will reduce the measures of both the monetary policy and the budget. It will also allow the stimulation of both the disinflation process and the one of revenue growth.

As regards the correlation between the evolution of the business cycle and the economic factors in Romania and the Euro zone, we analyse the correlations between the components of the GDP in Romania (gross capital formation, consumption, imports, exports) and the euro area, based on the correlation indicators calculated for three periods: 2000-2007, 2008-2012, and 2013-2015 Q1 to capture how correlation of business cycles in Romania and the euro area worked, as a result of the impact of the financial crisis in 2008 and after that, as they were analysed by Bojesteanu and Manu (2011).

The data set used is the one provided by Eurostat and it includes seasonally adjusted series expressed in constant prices on a quarterly basis for GDP and monthly for IPI. Considerable periods vary depending on the availability of data for each country and the GDP analysis ends in 2015 Q1, respectively 2015 M4 for IPI. Before applying the filtering techniques in order to identify the economic cycle, the series has been transformed in logarithm values. In order to evaluate the intensity of synchronization of business cycles, the Pearson correlation coefficient was used as a benchmark indicator, one of the most used measures of linear dependence between two series.



Graph 6: Applying the Hodrick-Prescott filter (HP) and GDP_EU GDP_RO variables (logarithmic in advance)

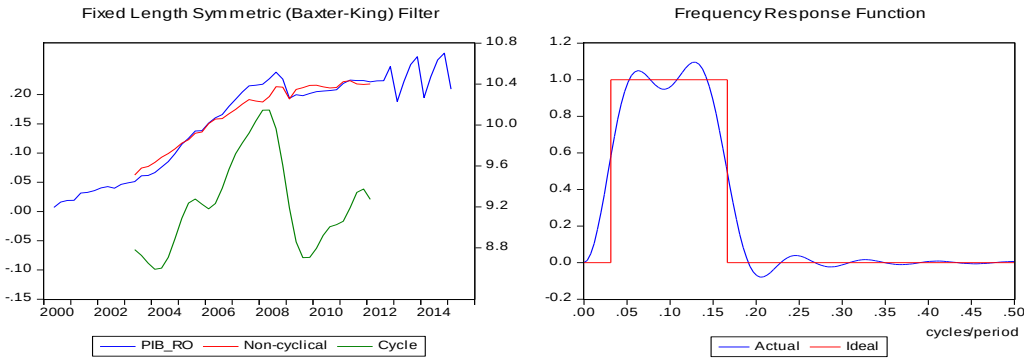
Source: Eurostat, own estimations

As shown in Table 2, the business cycle correlation between Romania and the Euro Area is high for both filtering methods applied. Thus, Romania has a better situation in terms of business cycle correlation with the Euro Area when using GDP, than the situation using IPI.

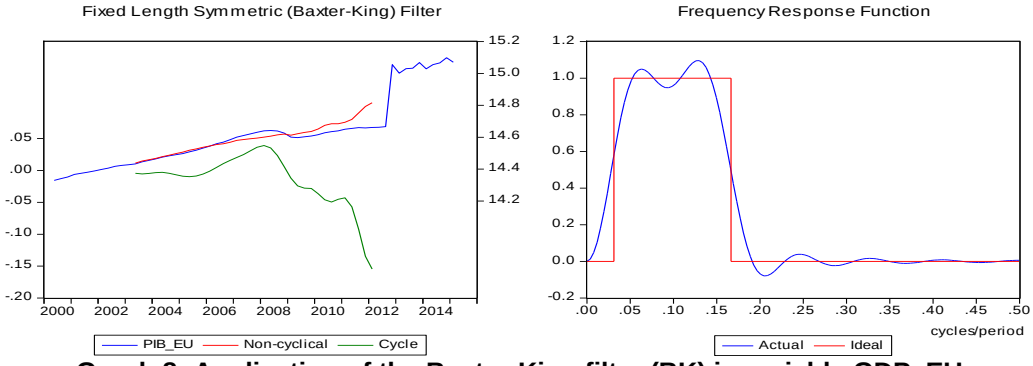
The dependence of business cycles in Romania on the Euro Area is tested using the least squares method, where the dependent variable, GDP_RO, is logarithmized and processed using the Hodrick-Prescott filter, and GDP_EU is the independent variable. After processing the data in the E-views, we obtained the following regression equation:

$$HP\_LGDP\_RO = 21.6248440118 - 0.640024371023 * HP\_LGDP\_EU + [ar(1)=0.985890001034] \quad (3)$$

This shows that there is a negative correlation between changes in GDP in Romania and the Euro Area. High value of R-squared (0.999638) indicates that this correlation is very strong. Between the two quantities, therefore, there is an indirect high intensity: if GDP_EU increases by 1%, GDP_RO decreases by 0.6 percent.



Graph 7: Application of Baxter-King filter (BK) in variable GDP_RO
Source: Eurostat, own estimations



Graph 8: Application of the Baxter-King filter (BK) in variable GDP_EU
Source: Eurostat, own estimations

In the case of BK filter, we obtained the following regression equation:

BK_LGDP_RO = 0.101409207371 + 0.55115409701 BK_LGDP_EU+ [AR(1)=0.942279528836] (4)*

This shows that there is a positive correlation between changes in GDP in Romania and the Euro Area. High value of R-squared (0.900608, but less than in HP filter) indicates that this correlation is very strong. Between the two quantities therefore there is a direct high intensity: if GDP_EU increases by 1%, GDP_RO increases by 0.55 percent.

Table 2: The business cycle correlation degree with the euro area in Romania

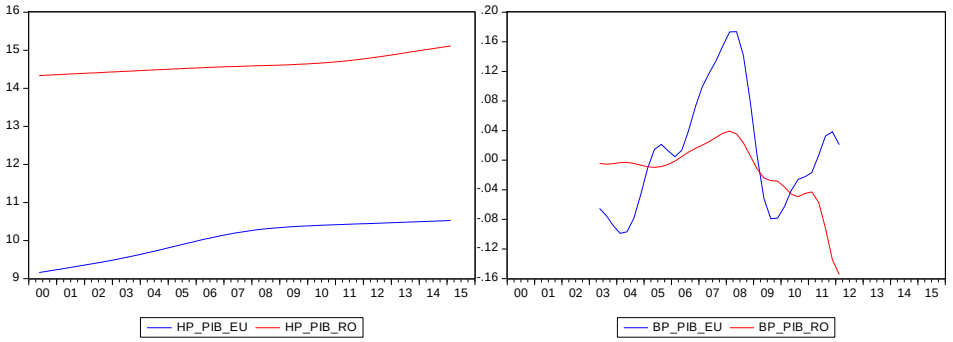
	HP_LGDP_RO	HP_LGDP_EU
HP_LGDP_RO	1.000000	**0.849365**
HP_LGDP_EU	**0.849365**	1.000000
	BK_LGDP_RO	BK_LGDP_EU

BK_LGDP_RO	1.000000	**0.354767**
BK_LGDP_EU	**0.354767**	1.000000

Source: own estimations

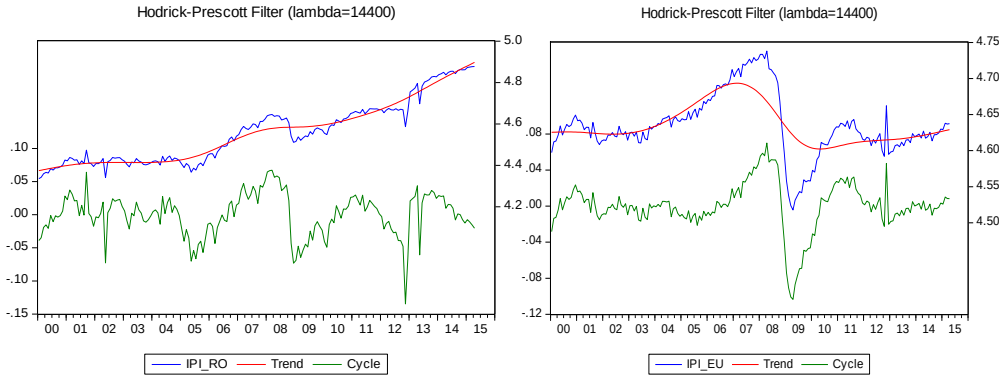
The correlations achieved between the business cycles in Romania and the Euro Area are represented in the table below. The data is obtained by applying the Hodrick-Prescott filter and then the Baxter-King filter.

The degree of correlation is 84 percent in the case of HP filter and 35 percent in the case of BK filter.



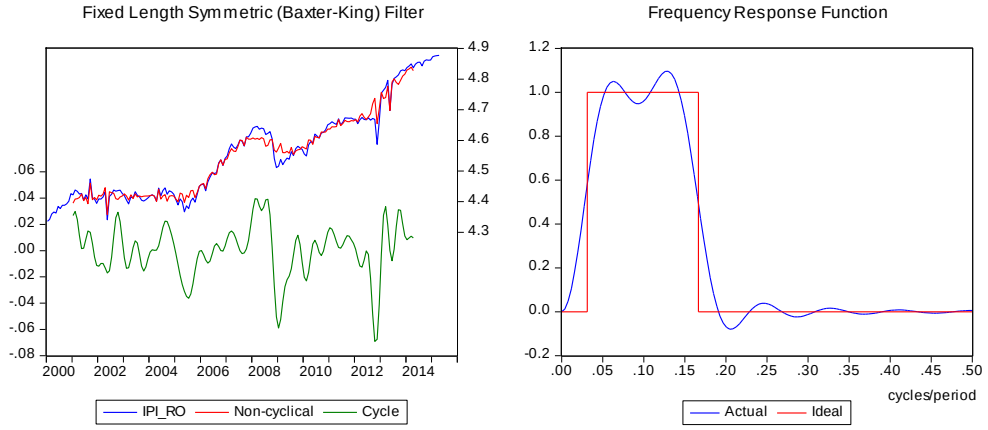
Graph 9: Economic cycles normalized (HP filter and filter BK)

Source: Eurostat, own estimations



Graph 10: Application of the Hodrick-Prescott filter (HP) to the variable LIPI_RO and LIPI_EU

Source: Eurostat, own estimations

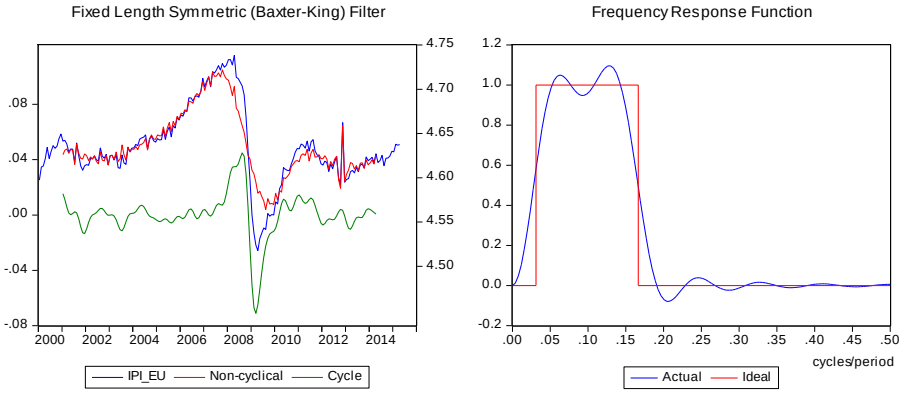


Graph 11: Application of the Baxter-King filter (BK) in variable LIPI_RO
Source: Eurostat, own estimations

The dependency of Romanian business cycles on the Euro Area is tested by the least squares method, where the dependent variable is the log IPI_RO and processed using the Hodrick-Prescott filter, and IPI_EU is the independent variable. After processing the data in the E-views, we obtained the following regression equation:

HP_LIPI_RO = 1.92024917398 - 0.510434576351 HP_LIPI_EU + [AR(1)=1.01052264565] (5)*

This shows that there is a negative correlation between changes in IPI in Romania and the Euro Area. High value of R-squared (0.999926) indicates that this correlation is very strong. Therefore, the two values are indirectly linked: if the IPI_EU increases by 1 %, IPI_RO decreases by 0.51 %.



Graph 12: Application of the Baxter-King filter (BK) in variable LIPI_EU
Source: Eurostat, own estimations

In the case of BK filter, we obtained the following regression equation:

BK_LIPI_RO = - 0.000209983255753 +0.516366766791 BK_LIPI_EU + [AR(1)=0.855348747381] (6)*

This shows that there is a positive correlation between changes in IPI in Romania and the Euro Area. The high R-squared (0.813751, but less than in HP filter) indicates that this correlation is high. Therefore, the two elements are directly related to

light intensity: an increase of one percentage IPI_EU, IPI_RO increases by 0.51 percent.

The correlations obtained between business cycles in Romania and the Euro Area are represented in the table below. The data is obtained by applying the Hodrick-Prescott filter and then the Baxter-King filtered.

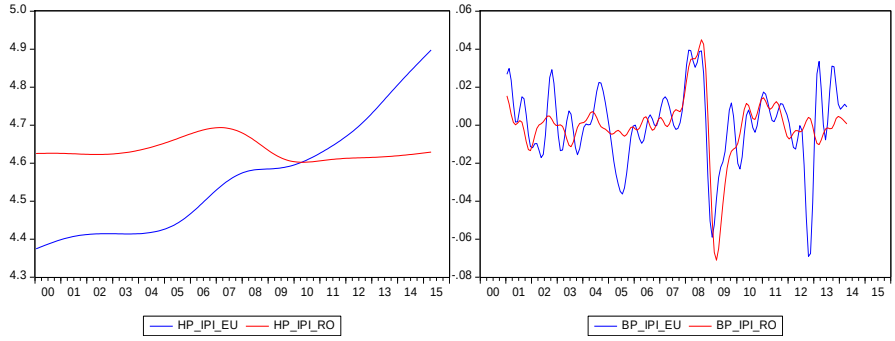
Table 3: The business cycle correlation with the euro area in Romania

	HP_LIPI_RO	HP_LIPI_EU
HP_LIPI_RO	1.000000	**-0.278966**
HP_LIPI_EU	**-0.278966**	1.000000
	BK_LIPI_RO	BK_LIPI_EU
BK_LIPI_RO	1.000000	**0.564954**
BK_LIPI_EU	**0.564954**	1.000000

Source: Eurostat, own estimations

The degree of correlation is 27 percent (mild negative correlation) in the case of HP filter with 56 percent (positive correlation of average intensity) in the case of BK filter.

The analysis realized highlights that the economy of Romania is highly associated to the Euro Area in the case the GDP evolution through the two filter method applied, as between the two, there is a very high positive correlation. While, when using the IPI, the connection is very weak. One of the filtering methods used indicates an inverse weak connection and the other a weak positive correlation. The explanatory factor here may be the external environment that could have been beneficial for some of the industry segments in Romania (road transport, industry related) generating thus a less visible contraction of industrial output in Romania compared to the Euro Area.



Graph 13: Economic cycles normalized (HP filter and filter BK) normalized (HP filter and filter BK)
Source: Eurostat, own estimations

Regarding the connection between the evolution of the business cycle and the economic factors in Romania and the Eurozone, we will continue to analyse the correlations between the components of the GDP in Romania (gross capital formation, consumption, imports, exports) with the euro area, established on correlation indicators calculated for three periods: 2000-2007, 2008-2012 and 2013-2015 Q1 to take into account how the correlation of business cycles in Romania and the euro area created as a result of the impact of financial crisis in 2008 and thereafter.

Table 4: Romanian correlation indexes to the Euro Zone

	GDP	Gross capital formation	Consumption	Export	Import
2000-2007	0.9849	0.9010	0.9645	0.9692	0.9725
2008-2012	0.6605	0.6747	0.5688	0.9576	0.8997
2013-2015 Q1	0.7170	0.6861	0.9269	0.8898	0.9370

Source: Eurostat, own estimations

The correlation coefficients with the euro area decreased in the period 2008 - 2012, both for GDP and in terms of the three components considered, but the lowest correlations were recorded for the GDP, gross capital formation and consumption. The lack of correlation with the euro area in terms of consumption in the second sub-period analysed may be due to different dynamics of credit and income. It can be said that the manifestation of the economic crisis in Romania was driven by excessive consumption, encouraged by the introduction of the single tax of 16%.

Economic growth in the period 2000-2007 was unbalanced, the domestic demand (consumption and investment) being the essential engine. In the future, to avoid the accumulation of imbalances, it is necessary to register a more balanced growth in the GDP components - internal vs. external demand (net exports).

The potential for higher economic growth of Romania compared to the developed countries, amplified by joining the European Union, also determined the increase of inflows of foreign direct investment in the first period analysed. Increased risk aversion amid international crisis led to a sudden halt of private capital inflows in Romania in 2009, which led to a gap of foreign financing.

The weak correlation in terms of gross capital formation in Romania with the Euro zone is determined by the fact that, in physical volume, the gross capital formation in Romania has not returned to the 2007 value, the value gets even more different from it. Although it looked like a return to higher values, growth stalled in 2012 together with cuts of funds for public investment, done to balance the budget. This affected the ability to absorb European funds, and the negative effect was amplified by the consequences upon the development of infrastructure and public services.

In the third period analysed, private capital flows became slightly positive again, but were located at much lower levels than in the pre-crisis period.

Evolution through the export correlation can be explained by the fact that in the first year of economic crisis, exports shrank amid declining external demand, but due to the drastic reduction in domestic demand (due to weaker consumption and investment in the context of external fiscal adjustment), imports contracted even further (so that net exports made a positive contribution to the GDP growth).

Over 75% of exports are now to EU-27 countries, which exposed us to the deterioration of economic performance of the region. In the coming years, we will have to increase exports to non-EU markets as well, by restoring commercial relations with other emerging markets (BRIC - Brazilia, Russia, India, China, Arab countries, African countries) by promoting foreign investment from countries outside the EU in Romania in exchange for access of our export to their domestic markets.

Making exports positive again, while maintaining the pace of import growth below that of exports, positively contributed to the growth. In the third period analysed, the economic development was positively influenced by net exports; hence the lower correlation with the euro area in terms of exports. On the positive export results, the national currency depreciation also contributed to a situation which determined the substantial reduction of the current account deficit.

The experience of the economic crisis has been a test towards the adoption of the Euro by Romania. Negative external shocks have been transmitted to our country by means of trade interdependencies with foreign economies and the monetary policy has not been effective in neutralizing the impact. The solution adopted was that of an external adjustment mechanism and not of internal devaluation, which is likely to prolong adverse effects and increased costs of Euro adoption. We consider that it is necessary to have a correction from a growth model based on the consumption model to a model based on investment, exports and attracting European funds.

As other authors also concluded, Dumitru (2010), Romania still needs more time to obtain more progress on the real convergence process and to become more correlated with the Euro zone business cycle. The negative impact of monetary integration might be significantly higher than the possible benefits for Romania (Zaman, 2001), because the economy is not sufficiently stable for resisting to asymmetric shocks, the structure of production is not enough adapted to Western structure, while the overall governmental policy seems to be still hesitant and biased towards ambiguous objectives.

5. Conclusions

The Euro adoption for Romania, without minimal achievements in terms of real convergence would be a risky path. We consider as necessary measures aiming the growth of GDP/capita, an increase in labour productivity, the increase in volume and of export's competitiveness.

The analysis on structural convergence aims pointing out the main risks facing Romania on its' Euro adoption path. One of the major risks is represented by a significant structural difference compared to the Euro Area economy, which makes uncertain the compatibility of the Romanian economy with the monetary union in the long term, even in the existence of circumstantial factors that may cause synchronous developments of the two economies. Structural changes in the economy have been accompanied by changes in the employment of labour, but the occupational convergence index shows that Romania has a divergence occupational structure compared to the Euro Area which has somewhat improved lately.

Structural reforms are necessary, aiming to have a similar economic structure to the Euro area. This would in time, generate a synchronization of business cycles, thus preventing major negative effects and asymmetric shocks.

In the case of identifying a high degree of business cycle synchronization of a candidate country with the euro zone, if there are structural differences between the two economies, the premises that they diverge in the future are created. Different economic structures imply different responses to common shocks and the probability of asymmetric shocks is higher.

Another risk factor is coming from the trade area: Romania has a trade balance deficit in relation to the Euro Area – it imports more than it exports. This means that from a theoretical point of view, joining the Euro Area should lead to increased exports to the region. The Euro Area countries experience, however, shows that it is very difficult to go from a position of net importer to net exporter with the adherence to the EMU. Low trade integration can be seen as an advantage when the economies of trading partners shrink. This positive effect was observed in Romania when the international crisis spread late in the Romanian economy. However, low trade integration is generally considered a major impediment to ensuring sustainable economic growth rates in the medium and long term.

The analysis complete on the correlation of business cycles in Romania with the Euro Area has confirm that the Romanian economy is firmly connected to the GDP evolution in the Euro Area through the HP filter method, and weak connected through

the BK method. While, when using the IPI, the correlation is weak. One of the methods used indicates a weak correlation inverse filtering and the other a weak positive correlation. The explanatory factor here may be the external environment that could have been beneficial for some of the industry segments in Romania (road transport, industry related) generating thus a less pronounced contraction of industrial output in Romania compared to the Euro Area.

The background of the economic crisis was a test for the perspectives of Euro adoption by Romania and yet another risk factor along this process. Negative external shocks have been transmitted to our country by means of trade interdependencies with foreign economies and the monetary policy has not been effective in neutralizing the impact. The solution adopted was that of an external adjustment mechanism and internal devaluation, which is likely to prolong adverse effects and increased costs of the Euro adoption.

Despite the fact that the accession to the EMU is not depends by real convergence criteria, the adoption of Euro and the lack of autonomy in terms of monetary policy would significantly influence the domestic growth potential. After giving up the national currency, the only markets available for adjustments would be the labour market, the goods' market and the fiscal area, but risking low employment rates and unstable prices given the lack of control of the interest rate and the foreign exchange rate.

The Euro adoption process should thus represent the final point in the effort to reach a high degree of real convergence, and not an initial condition for the debut of such a process.

References

Artis, M. and Zhang, W., (1999), "Further evidence on the international business cycle and the ERM: is there a European business cycle?", Oxford Economic Papers, 51:120-132.

Berger, H. and Nitsch, V., (2008), "Zooming out: The trade effect of the euro in historical perspective", Journal of International Money and Finance, 27(8):1244-1260.

Bojesteanu, E., Manu, S.A., (2011) "Empirical analysis of business cycle synchronization and shock similarity between Romania and the euro zone", MPRA Paper No. 31295, Available at http://mpra.ub.uni-muenchen.de/31295/ [Accessed in June 2015].

Calderón, C., Chong, A. and Stein, E., (2002), "Trade intensity and business cycle synchronization: Are developing countries any different?", Central Bank of Chile Working Paper, 195.

Canova, F., (1998), "Detrending and Business Cycle Facts", Journal of Monetary Economics, 41: 475-540.

Clark, T.E., van Wincoop, E., (2001), "Borders and business cycles", Journal of International Economics, 55(1)

Dinu, M., M., Socol,C.M., Socol, C., (2014), "Testing the Endogeneity of Trade and Financial Integration and Sectoral Specialization in an Enlarged Euro Area", Romanian Journal of Economic Forecasting, XVII (1)

Dinu, M., M., Socol,C.M., Socol, C., (2012), "Clusterization, persistence, dependency and volatilty of business cycles in a enlarged euro area", Romanian Journal of Economic Forecasting, Issue 2 /2012

Dumitru, I., Dumitru, I., (2010), "Business Cycle Correlation of the New Meber States with Eurozone", Romanian Journal of Economic Forecasting, Issue 4/2010.

Eickmeier, S., Breitung, J., (2006), "How Synchronized are new EU member states with the euro area? Evidence from a structural factor model", Journal of Comparative Economics, 34:538-563.
European Commission, (1990) One Market, One Money, European Economy, 44, October, Available at http://ec.europa.eu/economy_finance/publications/publication 7454_en.pdf. [Accessed in March 2013].
Frankel, J. and Rose, A., (1998), "The Endogeneity of the Optimum Currency Area Criteria", Economic Journal, 108 (449):9-25.
Garcia, H., Juan, A., Ruiz, M., (2005), "How Much do Trade and Financial Linkages Affect Business Cycle Synchronization for Small Open Economies?", Bank of Spain, Available at: http://www.cirje.e.u-tokyo.ac.jp/research/workshops/macro/documents/ macro0413.pdf. [Accessed in March 2013].
Gouveia, S. and Coerria, L., (2013), "Trade Integration and Business Cycle Synchronization in the Euro Area: The Case of Southern European Countries", Journal of Economic Integration, 28(1):85-107.
Iancu A., (2008), "Real Convergence", Working Paper no.1, Institute for Economic Research, Bucharest, 2008, Available at: http://www.studii-economice.ro/2009/seince090701.pdf. [Accessed in March 2016].
Isărescu M., (2007), "Romania: the Road towards the Euro", presentation as part of the Academic Colege of the Babeș Bolyai University Conference Cluj, 2007, Available at: http://www.ugir1903.ro/download/BNR_Drumul_catre_euro.pdf. [Accessed in March 2016].
Krugman, P., (1993), The lessons of Massachusetts for EMU, în Fontagne L., 1999. "Endogenous Symmetry of Shocks in a Monetary Union", Open Economies Review, 10:263-287.
Lucas, R., (1977), "Whererstanding business cycles", Carnegie-Rochester Conference Series on Public Policy, Elsevier, 5(1):7-29.
Mc Morrow, K and Werner, R., (2001), "Potential Output: Measurement Methods, "New" Economy Influences and Scenarios for 2001-2010 - A comparison of the EU-15 and the US", European Commission, Economic Papers, Available at: http://ec.europa.eu/economy_finance/publications/publication11048_en.pdf [Accessed in June 2015]
Mundell, R., (1961), "A Theory of Optimum Currency Areas", American economic Review, 51:657-665.
SAR, (2012), Romania 2012, Available at: http://sar.org.ro/wp-content/uploads/ 2012/12/Raport-Anual-SAR-Romania-2012.pdf. [Accessed in March 2013].
Popescu J., Meiță N.L., Popa B., (2016). "A Comparative Analysis of Bank Performance in Romania in the Period before the Global Financial Crisis and Post-Crisis", Finance - Challenges of the Future, XVI (18), 36-44.
Silva, J., Tenreyro, S., (2010), "Currencies Unions in Prospect and Retrospect", Annual Review of Economics, 2:51-74.
Tatomir, C., Alexe, I., (2012), "Laggards or performer? ECE vs. PIIGS countries", Theoretical and Applied Economics, 9(574):36-50
Trăistaru, J., Siedschlag, I., (2004), "Transmission Channels of Business Cycle Synchronization in an Enlarged EMU", ZEI working paper, No. B 18-2004, Available at: http://econstor.eu/bitstream/10419/39537/1/396488617.pdf [Accessed in March 2013].
Wacziarg, R., (2004). "Structural convergence". CDDRL Working Papers, No.8.
Zaman, C., 2001. "Evaluating The Seignorage Costs Of Emu Integration In Case Of Romania," Journal for Economic Forecasting, Institute for Economic Forecasting, vol. 2(3), pages 24-58,December.