THE CONVERGENCE TO EUROPEAN UNION: INVESTIGATIONS FOR CENTRAL AND EASTERN EUROPE COUNTRIES

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Biographical note

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Abstract

The prospects of the Central and Eastern European countries to become members of the European Monetary Area depend very much on introducing structural reforms in order to have economic policies correlated with a high degree of convergence with the rest of the European Union countries. The transition process of the Central and Eastern European countries offers the opportunity to carry out a quantitative analysis of convergence, as well as to identify the paths of economic development leading to a certain degree of convergence.

This article explores the convergence of the Central and Eastern European countries based on the macroeconomic indices.
Keywords: real convergence, Central and Eastern European countries, trade integration, business cycle synchronization, structural convergence
JEL Classification: R11, E60

1. Introduction

Integrating the Central and Eastern European (CEE) countries into the European Union (EU) and later in the Eurozone (EZ) is a long-term process that is conditioned by the fulfillment of many legal, political and economic criteria. Meeting these criteria should create a reasonable level of legal, political, and economic convergence with the EU standards. Apart from the first two criteria, the economic criteria are only partially formalized and refer mainly to the nominal economic variables stipulated in the Maastricht Treaty: price stability, public finance sustainability, exchange rate stability and long-term interest rate parity. The analysis of changes in these variables aims to assess the nominal convergence of a country which is necessary for its participation in the Economic and Monetary Union. Besides the formal economic criteria, the economic literature in this field identifies other criteria that ensure the convergence of the economic and cohesion structures in the Member States and the candidate countries to the EU.

Convergence is a process that describes the progress of a country to eliminate the disparities in revenue. The main research objective in this paper is to assess the progress of CEE countries towards fulfilling the real convergence criteria by using different economic variables as well as convergence indices. Given the multidimensional nature of real convergence, we will analyze the real convergence process of CEE economies by using the following indicators: the real GDP growth rate, unemployment rate, budget balance, government debt, and foreign direct investment.

The paper focuses on the Central and Eastern European states (CEE) that joined the supranational structure of the EU in 2004 (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia), and in 2007 (Romania and Bulgaria) and identifies the degree of convergence of CEE 10 countries with the EZ (EU) as well as the reconciliation of the business cycles with the euro area. Of these 10 countries, only five have so far adopted the common currency by meeting the euro area membership criteria (Slovenia, Slovakia, Estonia, Latvia and Lithuania). The period studied is between 2000 and 2015. The article is organized in four sections as follows: the synthesis of the specialized literature in Section 2,

the proposed research methodology in Section 3, the presentation of the results in section 4, and the last part presents the findings of the study (section 5).

2. Literature review

The "catching-up" process takes a long time and continues after accession, which was demonstrated by the experience of the countries that have joined the EU so far; also, the CEE states that have joined the EU with a much lower real income level will have a very long way to go in the process of convergence with the euro area.

The last two waves of the EU accession (2004 and 2007) have brought into the European construction new states that were considered as peripheral compared to the euro area member states in terms of economic convergence. Consequently, this has led to major disparities in levels of economic development within the Union.

The fulfillment of the four nominal convergence criteria is mandatory and involves assessing the state of preparation of an economy to participate in the third stage of the Economic and Monetary Union. However, reaching a certain level of real and structural convergence is not mentioned as a precondition for accession. Economic convergence is not negligible, so its absence leads to higher costs of adopting the single currency.

The study of economic convergence has received special attention in the literature, especially in the process of integration in the European Union (EU). Research has focused on real convergence, defined by Van De Coevering (2003) as a two-sided process: on the one hand, it is about the inclination to equalize incomes and levels of development, and on the other hand, it is about the tendency to achieve a similar level of business cycles, namely the cyclical convergence. The analysis of this type of convergence has become necessary in the context of the single European currency and the common monetary policy defined by the European Central Bank.

According to Krugman’s hypothesis, an increase in the degree of openness will lead to a lower correlation of business cycles; consequently, increasing the level of economic integration will generate economic divergence, because each EMU country will specialize in the production of goods and services for which it has a comparative advantage. The members of a monetary area will therefore have a very little diversified economic structure, prone to be affected by supply shocks. As a result, their business cycles will become weakly correlated.

The enlargement of the EMU towards the CEE countries has been extensively addressed in the specialized literature. Cameron (2003) made an early appraisal of the countries of Central and Eastern Europe (CEE) before their accession to the EU, questioning

whether they are really ready for the EMU, in addition to the Maastricht criteria, underlining the role of the regional and cohesion policy. The study run by Figuet and Nenovsky (2006) investigated the extent to which Romania and Bulgaria can adopt the EU's common economic (and especially monetary) policy and to what extent the convergence towards the EU stimulates the economic development of these countries. They analyze the degree of nominal, real and financial convergence and the synchronization of the economic cycle with that of the European Union, by using the unconditional approach of convergence β. The analysis of the group of four economies (Bulgaria, the Czech Republic, Romania and Hungary) showed, at that time, that Bulgaria would move forward faster than Romania towards the integration into the dynamics of the European economy, by showing greater convergence.

Darvas and Szapary (2008) analyzed the evolution of the industrial production structure in Hungary, Poland and Slovenia, observing a high degree of correlation with the euro area. The more an economy has a sectoral structure more similar to that of the EZ, the more likely it is to have more symmetrical shocks on the supply side, and the costs of replacing the national currency will be reduced.

On the other hand, it is also important to analyze the cyclical convergence necessary in the context of the single European currency and the common monetary policy, since the synchronization of the business cycles is a prerequisite for the adoption of the single currency. If the countries that form a monetary union have unsynchronized business cycles, they will face inappropriate, pro-cyclical monetary policies. As a result, it is preferable for an economy with a business cycle that is not synchronized with that of the states in a monetary union to postpone the adoption of the single currency.

Bojesteanu and Bobeica (2008) analyzed the synchronization of the business cycles between the new EU Member States and the euro area and showed that there is a growing level of structural convergence for all the countries analyzed, except for Estonia, Lithuania, Slovakia and Romania.

3. Research methodology

This section describes the methodology and techniques applied for empirical analysis. This paper presents a quantitative analysis to determine the degree of structural convergence of the states within the research related to the euro area and the degree of similarity between the business cycles in the CEE countries and the euro area. The analysis includes 10 EU states belonging to the CEE area (Romania, Bulgaria, Slovakia, Slovenia, Estonia, Lithuania, Latvia, Hungary, Czech Republic and Poland). The data used refers to the 2000-2015 period

and the source for statistical analysis and for calculation of indices, as well as for identifying the degree of convergence between Central and Eastern European states is Eurostat.

To evaluate the degree of structural convergence of an economy, we use the Krugman Specialization Index, calculated according to the following formula:

$$\sum_{i=1}^{n} abs(VA_{i,X} - VA_{i,UE}) \quad (1)$$

where:

X, UE - the two economies whose economic structures are compared;

VA_i - the share of the value added of the sector of activity i in the total VA;

i = 10 sectors of activity.

Proposed by Krugman, this index provides information on the structural divergence between the country and the EU. More precisely, it highlights the structural distance between the two countries' sectoral structures. The index takes the value 0 (perfect similarity) and value 1 (maximum divergence). The analysis based on this index was based on the NACE 10 structure (where the number of activity sectors is 10).

The Landesmann index compares the share of the main 10 activity sectors of Central and Eastern European countries, according to the same classification used by the Krugman Index, in the total value added of the applicant and the reference country (EU-28). The index takes values between 0 and 1, so the closer it is to 0, the more the structural convergence between the economies analyzed is higher. It is calculated according to the following formula:

$$\sum_{i=1}^{n}\left(VA_{i,X} - VA_{i,UE}\right)^2 * \frac{VA_{i,X}}{100} \quad (2)$$

where:

X, UE - the two economies whose economic structures are compared;

VA_i - the share of the value added of the sector of activity i in the total VA;

i = 10 sectors of activity.

In order to extend the analysis of the structural convergence process, the process of commercial integration of the CEE states with the euro area and the structure of the foreign trade was also carried out. In this respect, an analysis was carried out regarding the share of exports and imports of the CEE states to and from the EU, the structure of exports and the structure of imports based on 6 categories of goods, as well as the convergence of the structure of exports to the euro area using the Krugman index of export specialization, calculated according to the following formula:

$$\sum_{i=1}^{n} abs(Exp_{i,X} - Exp_{i,UE}) \quad (3)$$

where:

X, UE - the two economies whose economic structures are compared;

Exp_i - expansion of exports of the sector of activity i in total exports;

i = (food, beverages and cigarettes, raw materials, mineral fuels, chemicals, other industrial products, transport machinery and equipment).

For a greater symmetry of monetary union shocks, it is necessary to transform the trade according to the structure of the developed economies and to increase trade, especially the intra-industry trade.

In addition, it is important to classify trade between two economies, depending on the inter-industry or intra-industry nature. Thus, to determine the nature of trade exchanges between the CEE economies and the EU-28 economies, the intra-industry with euro area trade index was used, calculated for each category of goods according to the formula:

$$\text{Intra-industry trade index sector i } (IGL_i) = 1 - \frac{abs(Exp_i / toEZ - \text{Im } p_i / fromEZ)}{Exp_i / toEZ + \text{Im } p_i / fromEZ} \quad (4)$$

where:

i = 9 categories of goods (SITC classification) after which the share of each category of goods was determined in the total trade with EU-28

Intra-industry trade index with euro area (total)

$$= \sum_{i=1}^{9} ICI_i \cdot \frac{Exp_i / toEZ + \text{Im } p_i / fromEZ}{(Total.Exports + \text{Im } ports.total) withEZ} \quad (5)$$

The analysis of business cycle convergence of the CEE economies with the euro area refers to identifying the business cycles (based on the Hodrick Prescott filter) and the business cycle correlation (Pearson). The Pearson correlation coefficient of the national business cycles was calculated for both the entire period (2000-2016) and the two sub-periods (2000: Q1-2007: Q4 and 2008: Q1-2016: Q3).

The variable used to determine the similarity of business cycles is the business cycle compliance index with the euro area calculated according to the following formula:

$$C_{XY} = \frac{1}{T}\{\sum_{t=1}^{T} S_{Xt}S_{Yt} + \sum_{t=1}^{T}(1 - S_{Xt})(1 - S_{Yt})\} \quad (6)$$

where:

- X - EU member country;
- Y - euro area
- $S_t = 1$, when the economy is expanding;
- $S_t = 0$ when the economy is in recession;
- T - number of observations

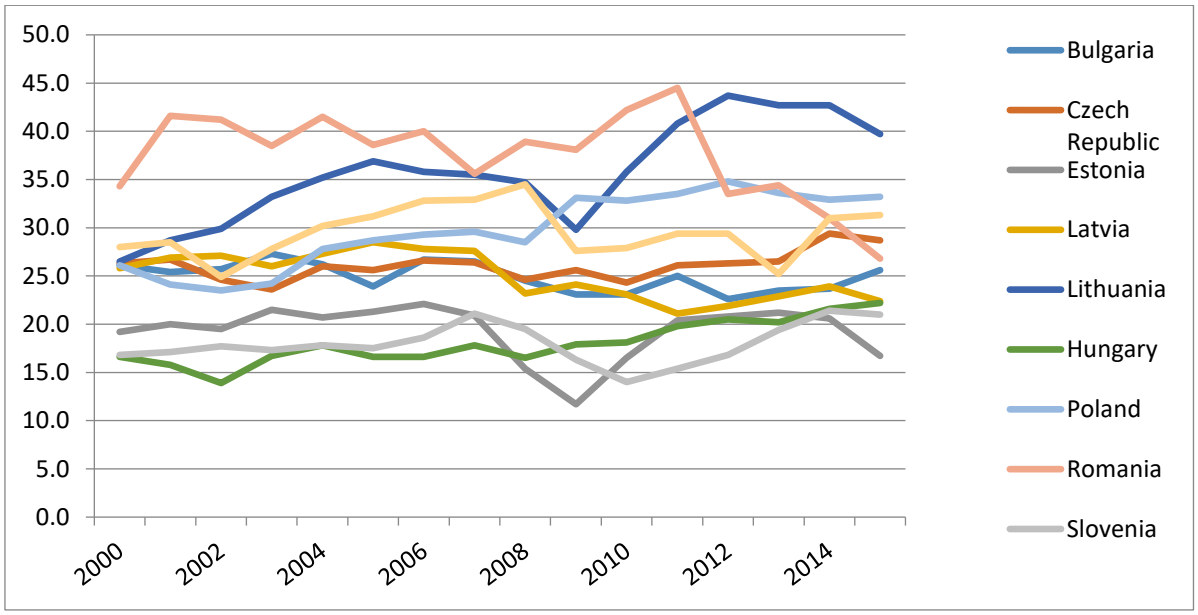
The C_{XY} index can take the value 1, and the X and Y countries (euro area) are always in the same phase of the business cycle, or $C_{XY} = 0$, then X and Y countries (euro area) are always in different phases of the business cycle.

4. Identifying the convergence degree of the CEE countries with EU / EZ-data analysis

Within this section, the degree of structural convergence of Romania and other CEE countries with the EZ was studied to capture the specificity and dynamics of the transformation process of developing economies in the EU. These economies have been characterized by a decrease in the contribution of agriculture to the GDP formation, a reduction in the share of industrial activity and an increase in the contribution of services to the formation of domestic gross value added. The results show that during the analyzed period the CEE economies have undergone a significant structural change process in order to make it compatible with the existing one at European level.

In order to capture the structural features of the Central and Eastern European economies, a comparative analysis of these countries, including the three Baltic States using the Krugman specialization index, was made. The degree of structural convergence of the 10 countries with the EU was analyzed on the basis of the NACE 10 classification, which implies the division of the economy into 10 sectors of activity with data available on Eurostat for the period 2000-2015. (Figure 1)

Figure 1. Evolution of the Krugman index in the CEE countries during 2000-2015



Source: Author's calculations based on Eurostat, 2018

The results show that Romania has the most different structure of the economy compared to the EU, mainly because of the share of agriculture, industry and services. In Romania, the contribution of agriculture to the formation of gross value added decreased in 2015 compared to 2000 by about 40%, but it is still higher than the CEE states, in 2015 having almost double the value of Poland. Romania has the largest share of agriculture in gross value added (8.6% on average compared to the average of only 1.8% in the EU in the period 2000-2015, 2.4% in Slovenia, 2.5% in the Czech Republic). The industry sector remained relatively constant in the structure of the Romanian economy throughout the analyzed period. Thus, the Krugman index for Romania in 2015 was 26.8% compared to 22.4% in Latvia, 21% in Slovenia and 16.7% in Estonia, the lowest level among the CEE economies in 2015. The most significant sectoral difference between Romania and the EU appeared in the public education and health services averaged around 7 percentage points between 2000 and 2015.

In 2010, the degree of divergence of the economic structure with the euro area for Romania was 42.2%, according to the Krugman index, which was higher than the value registered during 2005-2008.

If, at the beginning of the period analyzed, the agricultural sector gaps represented about 35% of the index, it halved in 2015, accounting for only 17% of the aggregate difference from the euro area.

An important cause of the structural differences in the CEE economies vis-à-vis the EU lies in the poor contribution of the services to the value added in these countries, as well as the poor contribution of the financial services.

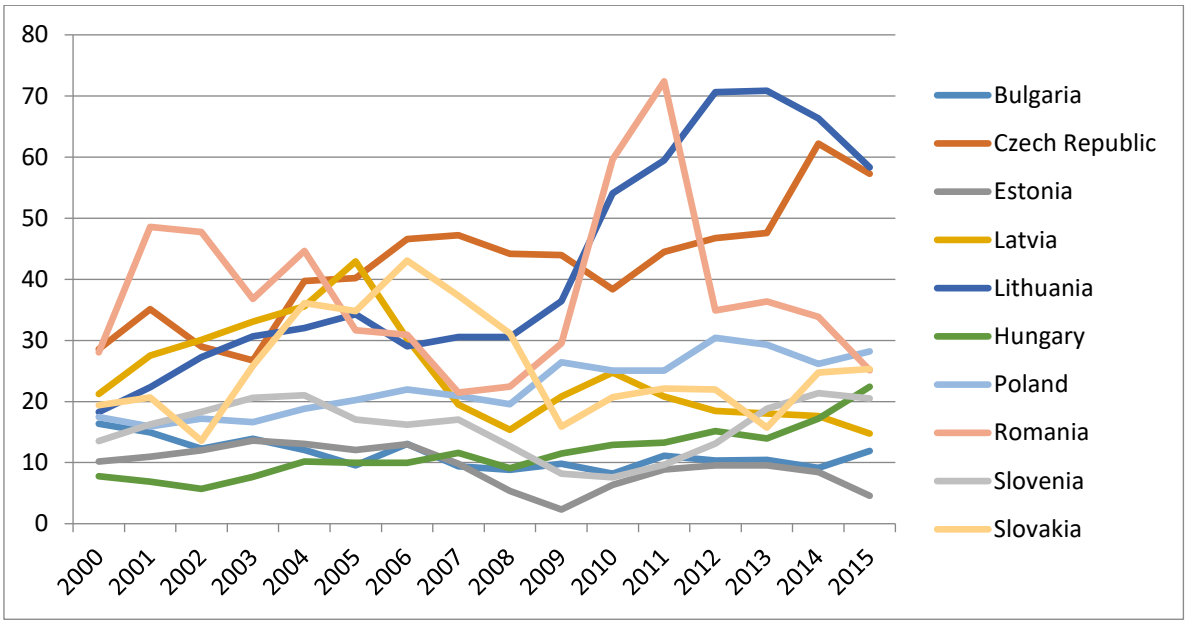
Concerning the convergence of the other CEE states, the Krugman specialization index results indicate that Estonia has the lowest levels, with a minimum value of 11.7% in 2009, showing structural differences from most of the other CEE economies.

The most developed economy of the CEE, Slovenia, is characterized by a reduction in the value of the Krugman index with a minimum value of 14% in 2010. The structural disparities are caused by the higher proportion of industry (27.3% of the value added versus 19.3% in the EU in 2015) and by the lower contribution of real estate activities (6.9% compared to 11.2% in 2015).

Looking from another perspective, the magnitude of the gap between the share of each sector in the total gross value added compared to the EU economy is not so important, but rather the dynamics of the share of these sectors, the evolution of these differences over time. Thus, improvements can be observed, for example in the agriculture sector, where the share of total gross value added fell from 12% in 2000 to 4.7% in 2015 for Romania. Bulgaria also recorded a downward trend from 12.6% in 2000 to 4.8% in 2015. However, both economies have the highest shares of agriculture in the total gross value added between the CEE states in 2015.

The results are not different even if we follow the Landesmann index; it results from its analysis that Romania's economic structure is quite divergent from that of the European Union, so that the expansion period did not lead to a decrease in the structural divergence; on the contrary, in 2004 it reached the value of 44.6%, while entering the recession accentuated the divergence reaching a value of 72% in 2011. The Landesmann index was then narrowed down and reached 25% in 2015. (Figure 2)

Figure 2. Evolution of the Landesmann index in the CEE countries during 2000-2015



Source: Author's calculations based on Eurostat, 2018

In order to complete the analysis of the degree of structural convergence of the CEE economies with the EZ, the structure of foreign trade and of trade integration with the euro area were assessed.

The high level of trade integration of a country favors the adoption of the single currency because it influences the costs and benefits associated with the process. It also influences the way shocks are correlated, as well as the degree of synchronization of the economic cycles.

The main trading partner of Romania and of most of the CEE countries is the Eurozone, so that the trade of these countries is influenced by the macroeconomic evolution of economies of the Economic and Monetary Union. (Figure 3)

The Romanian economy is less commercially open compared to the 10 analyzed countries, so that in the period 1999-2015 the share of Romania's exports to the EU was relatively stable with values ranging from 69.6% to 76.2%. Furthermore, joining the European Union has not increased the proportion of exports over the 2003-2004 levels. If the EU membership did not have a positive influence on Romania's export share, imports were influenced by this moment, and this was due to the elimination of customs duties and the benefits of the single market. Thus, the share of imports from the EU increased by about 8 percentage points in 2007 compared to the previous year, but after 2007 there were no significant increases.

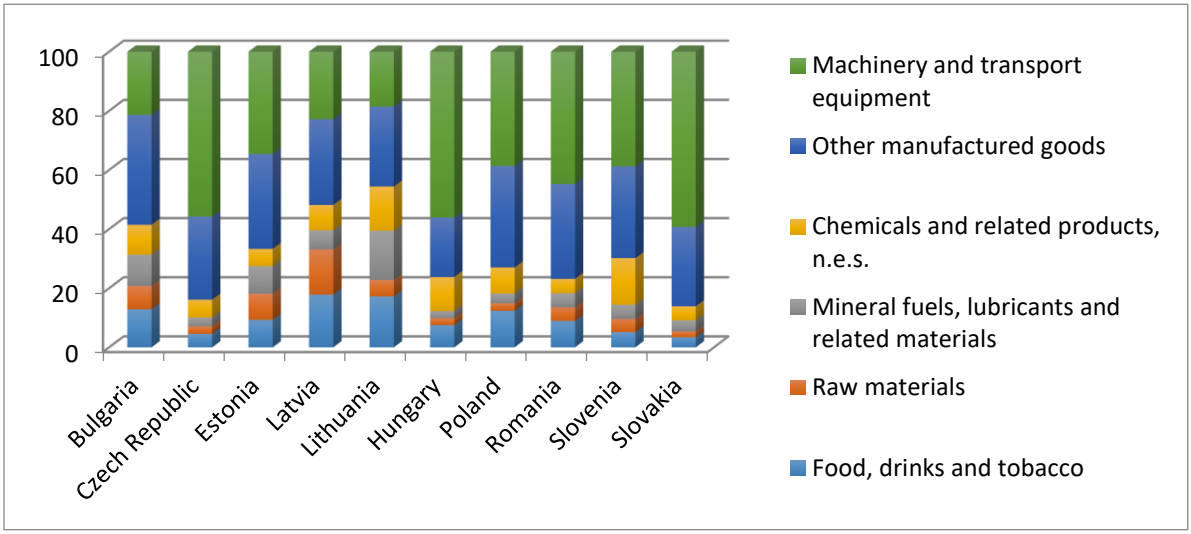
Figure 3. Share of the CEE trade relations with the EU-28 (2015)

Source: Author's calculations based on Eurostat, 2018

As for the other CEE economies, as in the case of Romania, imports have increased after their accession to the EU. Thus, in 2004 compared to 2003, imports in the Czech Republic increased by 8.9 percentage points, in Estonia by 8.8 percentage points. On the other hand, the share of Lithuania's exports was the only one that increased after the accession to the EU in 2004 by 4.5 percentage points as compared to the previous year, with other countries registering insignificant increases, even export cuts. However, the dependence on the European imports was temporary, with Slovenia declining by 16.6 percentage points in 2015 as compared to 2004. Estonia and Latvia imported 77% of the goods from the EU in 2011, while Lithuania recorded the lowest level of dependence on the EU, 56.8%. In terms of exports, on average over 85% of the Czech and Slovakian outlet market is the European market.

Based on the analysis of the export structure, it can be noticed that in the case of Romania, the machinery and transport equipment sector has the largest contribution to the total exports in 2015 (44.49%), up by 25 percentage points compared to 2000, and the lowest contribution was registered by the raw materials sector, (4.61%), which was halved compared to 2000. (Figure 4)

Figure 4. Analysis of the structure of exports based on six product categories (2015)



Source: Author's calculations based on Eurostat, 2018

The machinery and transport equipment sector accounts for the largest share of total exports in the 10 economies analyzed, the highest share being in Slovakia (59.28% in 2015) and the smallest in Lithuania (18.52% in 2015). On the other hand, the smallest share in total exports in the 10 economies is held by the raw materials sector with a value of 1.99% in 2015 (Slovakia).

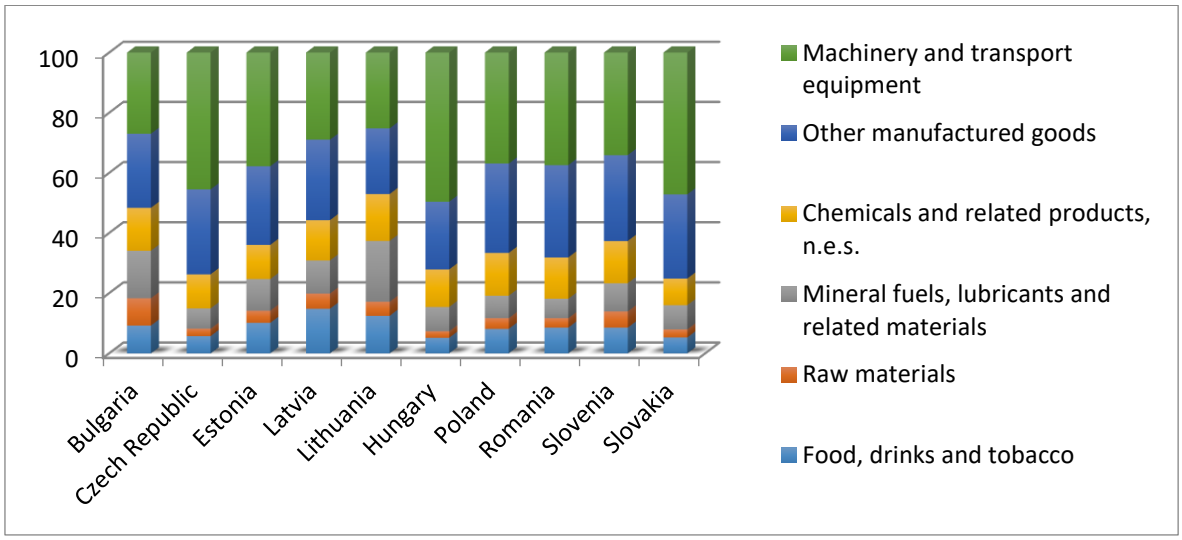
The structural developments of Hungary, the Czech Republic and Slovakia were similar to those of Romania, in the sense that the machinery and transport equipment sector has evolved from a lower contribution to the euro area to a higher one, both of which generating a structural divergence. From the perspective of diversifying exports, Lithuania has the most balanced contribution of the six groups of goods, while in Hungary, the Czech Republic and Slovakia there is a tendency to concentrate exports on one or two categories of goods.

The structural convergence of foreign trade not only involves increasing the consistency of the shares of the categories of goods, but also increasing the trade with a high value added, category which also includes the machinery and transport equipment. The foreign direct investments in this sector have increased the share of exports to the EU in all the CEE economies. The CEE region has become an attractive destination for investment for the automotive manufacturers worldwide. According to the Coface study in 2015, 3.6 million vehicles were produced in Eastern Europe, equivalent to 21% of the total EU production. In the CEE countries covered by the Coface analysis, there are 33 automotive factories, most of which have been created through foreign direct investments (FDI) inflows. The analysis

points to the fact that, despite the high dynamics of car sales generated by local customers, the factories in the CEE remain highly dependent on the external demand. The CEE region has been able to attract FDI, with investors being motivated by the attractive labor force costs, the geographic proximity to Western Europe, and the educated workforce.

The analysis of the structure of Romania's imports shows that the machinery and transport equipment sector accounts for the highest share of 37.3% in 2015 in the total imports of the 6 categories of goods (an increase of 8 percentage points compared to 2000) and the lowest contribution was that of raw materials, with values ranging from 2% to 9%. (Figure 5)

Figure 5. Analysis of the structure of imports based on six product categories (2015)



Source: Author's calculations based on Eurostat, 2018

The imports of automobiles held the highest share in other CEE countries as well with values between 25.18% in Lithuania and 49.47% in Hungary in 2015. The lowest share of imports of raw materials in total was held by Hungary, with 2.18% in 2015.

Savings imports are less divergent compared to exports, so countries such as Hungary, Slovakia and the Czech Republic import machinery and transport equipment in a proportion of 45% -50%, while Lithuania, Bulgaria and Latvia rely less on imports of this category of goods (25% -30%).

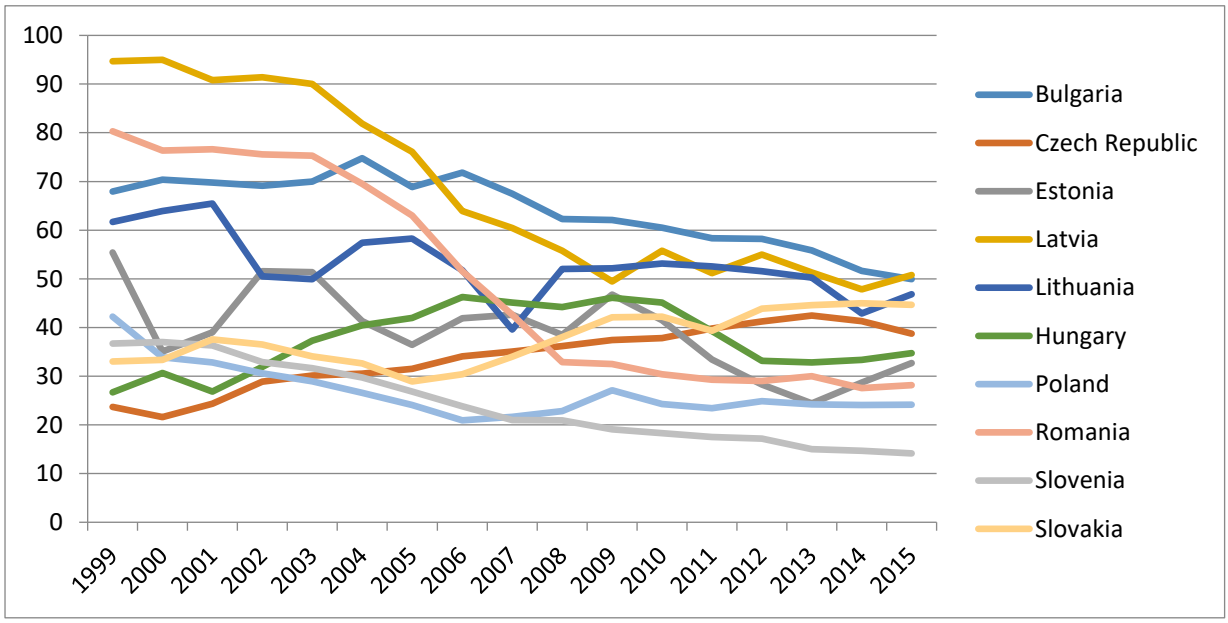
Considering the high commercial integration between most central and eastern European economies and the euro area, we can say that the dependence of these states on the monetary union's macroeconomic developments will increase. In this case, some CEE

economies may be re-launched based on the increased exports to the economies where there has been an increase in domestic demand.

According to the nomenclature of six categories of goods, there is a convergence of the export structure of Romania and the euro area. All exported goods groups reduced the gap with the euro area over the period considered, with the exception of chemicals. The share of exports of other industrial goods declined from 60% in 1999 to around 32% in 2015, a value of 7 percentage points above that of the euro area. Also, the share of exports of machinery and transport equipment registered an increase in 2015 compared to 1999 by about 28 percentage points, reaching 45% of Romania's total exports. The two categories of goods contributed to the reduction of the Krugman specialization index of export from 80% in 1999 to 28% in 2015.

The Krugman index of exports in Slovenia decreased in 2015 compared to 1999, reaching the lowest level of the 10 economies analyzed, namely 14%. The share of exports of other industrial products decreased in 2015 compared to 1999 by 16 percentage points. (Figure 6)

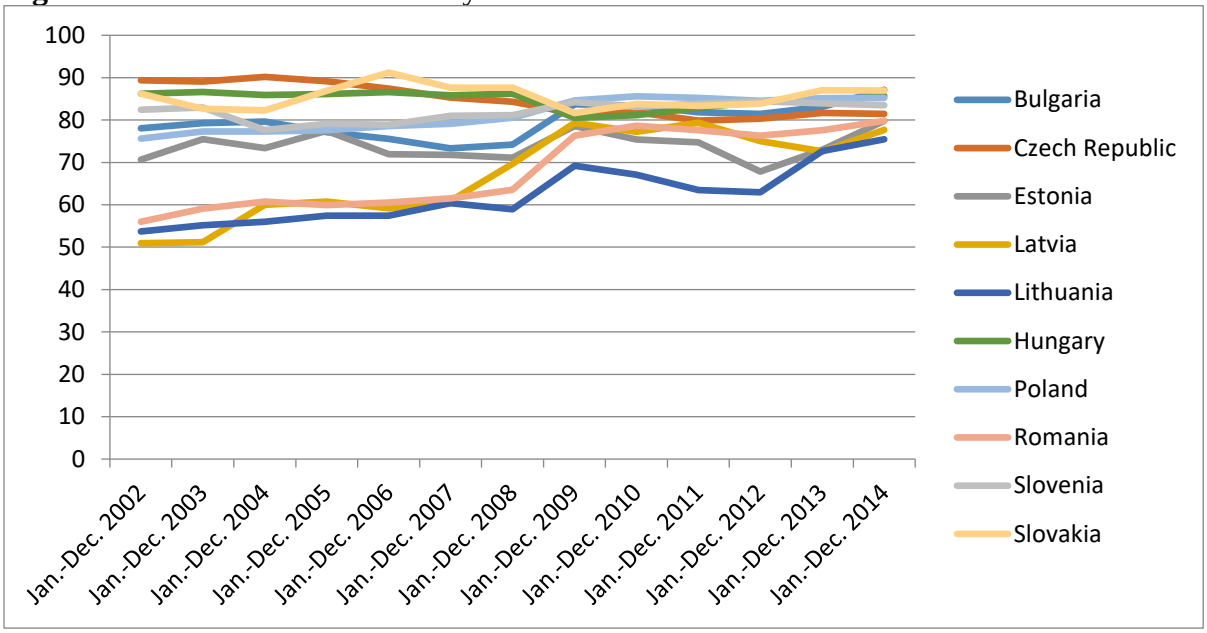
Figure 6. Evolution of the Krugman specialization index of exports in the CEE countries during 1999-2015



Source: Author's calculations based on Eurostat, 2018

From the structural analysis of exports and imports, it can be noticed that, in general, there is a high similarity between certain important categories of exported and imported goods, which suggests the existence of an intra-industry trade. (Figure 7)

Figure 7. Evolution of intra-industry trade share with EU-28



Source: Author's calculations based on Eurostat, 2018

The trend of structural convergence of foreign trade does not automatically lead to the reduction of risks of asymmetric shocks in the context of the accession of the CEE economies to the euro area. Thus, it is important to classify trade between economies, depending on the inter-industry character (A exports to B goods x, and B exports to A goods y), respectively intra-industry ones (A exports to B goods of industry x, and B exported to A the same category of goods). In order to determine the nature of the trade between the CEE and the EU-28 economies, the intra-industry trade index with the euro area (Grubel-Lloyd Index) was used. In the first phase, this index was calculated for each category of goods, after which an aggregate index was calculated according to the share of each category of goods in the total trade with the EU-28 (proxy for the euro area due to lack of information).

The closer the value of the index is to 1, the higher the proportion of intra-industry trade with the EU, which results in a higher likelihood of symmetric shocks on the commercial side. Instead, if the value of the index is close to 0, then the economy records a significant share of inter-industry trade, which leads to asymmetric trade developments. According to the aggregate indicators calculated for each of the 10 CEE economies, it

appears that between 2002 and 2014 the CEE economies were characterized by high levels of intra-industry trade, so countries such as the Czech Republic, Hungary, Slovakia and Slovenia had significant shares, over 80% at the beginning of the analysis period. Only Latvia, Lithuania and Romania had shares of less than 60% of intra-industry trade (50.9%, 53.7% and respectively 55.9% - Romania). However, the three economies subsequently recorded significant increases in intra-industry trade by the end of the period under review. These countries recorded increases in intra-industry trade not only compared to the initial year of the analysis but also compared to the year the economic and financial crisis began. In this way, the degree of symmetry of the shocks on the commercial side has increased, which increases the cyclical correlation with the EU-28.

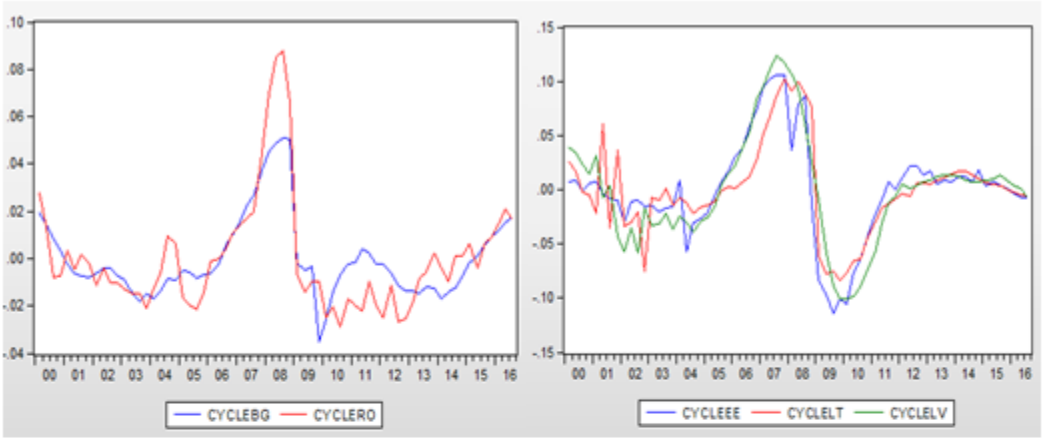
The previous analysis of the commercial integration of the 10 CEE states is completed by the business cycle convergence analysis as an important criterion in determining the costs and the benefits of joining a monetary union.

In the business cycle convergence analysis of the Central and Eastern European countries with euro area, the business cycle extraction method based on the Hodrick-Prescott (HP) filter was used to determine the business cycles of the 10 CEE countries that have adhered in 2004 and respectively 2007: Romania, Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Slovenia and Slovakia, using the GDP data series at the market prices; the period analyzed was 2000:Q1 – 2016:Q3; in the case of Poland there were only 59 observations available and the data series covered the period 2002:Q1 – 2016:Q3. Prior to applying the filters to extract the cyclical component, seasonality was eliminated using TRAMO / SEATS in the Eviews 7 program. (Figure 8)

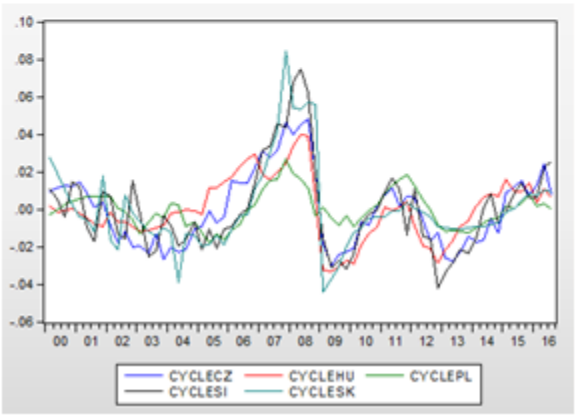
To use the HP filter, a value of 1600 was set for the lambda coefficient in order to penalize the acceleration of the trend component in relation to the cyclical component of the GDP.

The data series of the business cycles present a series of inflection points generated by factors such as the preparation and the effective accession to the EU in 2004, respectively in 2007, the liberalization of their capital accounts and the 2007-2008 economic and financial crisis.

Figure 8. Business cycles of the CEE economies



Bulgaria and Romania **Estonia, Lithuania and Latvia**



The Czech Republic, Hungary, Poland, Slovenia and Slovakia

Source: Author's calculations based on Eurostat, 2018

The Central and Eastern European countries have had a different path in terms of economic convergence with the EU and a different degree of exposure to external shocks. According to the business cycle, Romania recorded a positive production gap for two quarters of 2004, as opposed to the Czech Republic, which had negative gaps from 2002 – first quarter to the end of 2005. Poland has had two quarters of positive gaps starting with 2004, while Hungary has experienced recessionary gaps since 2001, the first quarter to 2005, the first quarter; then it began to produce over its potential until the beginning of 2009. As far as the Baltic countries are concerned, they had been experiencing negative gaps from 2001 to 2005, after which they recorded positive production gaps until the crisis began.

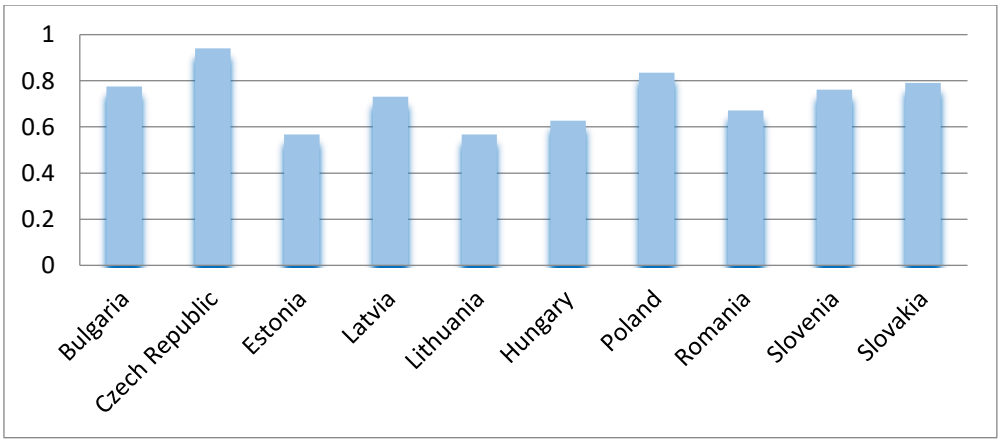
After the accession to the EU, the Central and Eastern European countries benefited from significant capital flows that led to an overheating of the economy over the same period. However, the emergence of the crisis in these countries generated significant capital outflows

and, consequently, their exposure to the external shocks generated by the crisis was higher. The effects of the crisis have been felt since 2009, but in Poland and Romania, the shock was offset by a quarter. Thus, all 10 economies recorded high levels of inflationary gaps in early 2008. Later on, the CEE countries were exposed to external shocks and, starting with 2009, they began to produce below their potential.

Based on the analysis of the business cycle correlation between the CEE countries and the Eurozone, the Czech economy was by far the most correlated with that of the euro area with a value of about 90%, superior to that registered by Slovenia and Slovakia (86% respectively 80%), while Romania showed the lowest level of correlation among the 10 countries analyzed (64%). Under these circumstances, Romania would have the most to lose following the renunciation of its own monetary policy, especially since it does not have alternative mechanisms to adjust a possible asymmetric shock.

The assessment of the synchronization degree of the business cycle can also be achieved by estimating the business cycle concordance. According to the results obtained, the business cycles of the Central and Eastern European states have a high concordance with the euro area. The economy with the most consistent business cycle with the euro area was the Czech Republic, the value of the index being 94%, which corresponds to the cyclical correlation analysis. Romania recorded one of the lowest values of the index (67%); Estonia and Lithuania are the only ones registering a lower concordance (57%). However, according to the literature, the values registered by the concordance index are high enough to say that there is a high consistency between the business cycles of the 10 economies with the euro area. (Figure 9)

Figure 9. Concordance of the business cycles in the CEE countries with the euro area



Source: Author's calculations based on Eurostat, 2018

5. Conclusions

Joining the euro area requires the fulfillment of the nominal convergence criteria. However, they are not sufficient for joining a common monetary area, and progress is needed in the real convergence process. The lack of such progress will increase the costs of the country because the economy would be unable to eliminate the shocks that affect it. Taking into account that the economic structure is divergent from that of other economies, the shocks will have an asymmetric character. Thus, the convergence with the euro area will reduce, which will induce an asymmetric impact of the common monetary policy. As a consequence, the respective economy will want to leave the Economic and Monetary Union because it would feel disadvantaged by the decisions of the European Central Bank.

Setting a date of adherence to the member status of the euro area depends on the countries concerned and on an important element, their ability to meet the membership criteria. The fulfillment of the criteria can be assessed from the point of view of the economic alignment and the structural similarities that exist between the respective economies and the economy of the European Union as a whole. In addition to all these aspects, it is particularly important to assess the ability of these economies to absorb shocks of any kind.

The objective of the paper, focusing on the measurable aspects of the CEE countries convergence process, is addressed through several indexes reflecting the degree of structural convergence of the economies analyzed and the analysis of the business cycle convergence with the euro area.

The Central and Eastern European countries should not hurry to join the euro area, even if they meet the nominal criteria, but rather wait for a real convergence and choose the right time to enter the Eurozone.

After analyzing the structural gaps of the group of Central and Eastern European countries regarding the euro area and the process of economic integration, we can see that the reduction in the divergence between the economic structures of the 10 economies vis-à-vis the euro area increases the likelihood of more symmetrical shocks, and the costs of renouncing the national currency would be reduced.

Given the fact that the economic structure of the euro area is relatively stable, the change in economic growth of the CEE countries will increase the structural divergence towards the euro area.

The CEE economies have a high degree of commercial integration with the EU, and in this case, the macroeconomic developments of the the EU countries will influence the

exports of the 10 Central and Eastern European countries. However, in addition to increasing the trade integration of the Central and Eastern European countries, it is also important to transform the structure of exports that contributes to increasing competitiveness on the European market. Also, the increase in the share of the intra-industry trade is not negligible, so most CEE economies are characterized by higher levels of intra-industry trade in relation to the euro area.

After analyzing the data, Romania has the most different structure of the economy in relation to the euro area economy, and this comes as a consequence of a high share of the agriculture industry compared to the euro area, as well as a high difference in the services sector.

The analysis of business cycle convergence shows that the business cycles of the CEE countries are heterogeneous; thus the Czech Republic, Slovenia and Slovakia are more synchronized with the monetary union, while Romania and Lithuania have registered the lowest values of the business cycles concordance index of the 10 economies analyzed, which leads to increased costs for renouncing their own monetary policy and adopting the single currency.

The last part of the research, which is based on the synchronization of business cycles, shows that adopting the euro currency too early and as a result of a fiscal consolidation policy in order to control inflation - could induce a risk of a slowdown in the trend of economic growth and economic recovery of these countries.

Consequently, a real sustainable convergence is an important condition for EU economies that are next to adopt the single currency. A real healthy convergence, based on economic fundamentals, leads to the resilience of economies against shocks, and experience has shown that the countries that have adopted the euro currency and have not made progress in this direction, have been severely affected by the global crisis.

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