9. INTEGRATION AND TRADE SPECIALIZATION IN CENTRAL AND EASTERN EUROPEAN COUNTRIES: TOWARDS A NEW CORE-PERIPHERY STRUCTURAL DIFFERENTIATION?

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Abstract

This paper investigates the dynamics of trade patterns in Central and Eastern Europe (CEE), in order to assess whether the EU integration process generates convergence between the older EU member states (EU15) and the CEE's economies (EU12). The analysis specifically focuses on specialization/diversification trends in connection with the intra-EU convergence, examining the comparative advantage convergence (Balassa indexes of RCA and RSCA) between EU12 and EU15. Despite a high degree of specialization in the EU12, no significant differences among the CEE economies, in terms of growth and convergence, might be observed. However, although the reverse relationship between the specialization and the level of development has been confirmed, in some CEE countries (Poland, Hungary, Romania and Bulgaria), the direct relation between the size of the economy and the degree of export diversification was invalidated.

Keywords: comparative advantages, trade specialization, export diversification, European integration, convergence

JEL Classification: F13, F14, F15, F43

1. Introduction

The accession of Central and Eastern European countries (CEECs) to the European Union is associated with a process of trade integration and economic restructuring able to generate, over time, the convergence of production and trade patterns and, consequently, the

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reduction of development gaps. Such a perspective is supported by neoclassical theories of trade and economic growth. In the context of free movement of goods and factors and decrease of market distortions (as result of the European Single Market mechanisms), the less developed economies benefit from the comparative advantage in production and trade specialization and register higher economic growth rates than developed economies (the beta-convergence process). The CEECs have widened the development gaps within the EU, both at national and regional level, leading to growing disparities.[4] The population living in lower GDP per capita regions (representing over 70% of the community average) has doubled, and over 10% of the EU population lives with less than 31% of the EU average income. Nevertheless, despite all these development gaps, previous enlargement waves and internal market dynamics confirm that the economies of the member states have gone through a constant process of deepening economic integration and convergence of trade patterns, with the increase in intra-industrial specialization, specific to the EU's advanced economies.

The paper provides some opinions about the relationship between concentration versus diversification patterns in production and trade specialization, from the perspective of economic growth potential and real intra-EU convergence. Also, through a dynamic analysis of the degree of export specialization in the New Member States (focusing on the CEECs), the paper intends to identify the main trade trends for the period 2000-2015. The authors were essentially interested in discovering whether the EU enlargement towards Central and Eastern Europe has reinforced the EU centre-periphery structures, considering that following the accession of CEECs, this risk of developing a multiple model centre-periphery in the European economy through a separate evolution of the CEECs (acceding in 2004 and 2007) in relation to the older EU member states (EU15) was highlighted. For example, according to Dupuch, Jennequin, and Mouhoud (2004), due to the high disparities between the EU15 and EU12 but also among the NMS, and due to the internal market-specific mechanisms, the 2004 CEECs were supposed to focus on capital-intensive activities with highly skilled workers and productivity (based on two-way trade in vertically differentiated products specialization), while the 2007 CEECs were supposed to focus on natural resources and labour-intensive industries, based on low skilled workers and low and medium technologies ('Mediterranean' vs. 'Spanish' pattern). Such a perspective was, to a certain extent, in accordance with the New Economic Geography's supporters (Krugman 1991), having as the main argument the agglomeration processes resulting from trade liberalization and free factors mobility as an effect of positive externalities, scale economies, and increasing returns.

In accordance with the relevant literature, the paper considers that even though there are many empirical studies on the dynamics of trade specialization, just a few of them focus on CEECs's specialization dynamics in relation to the impact of economic integration over a period allowing the observation of long-term trends (Vechiu and Makhlouf 2014). In addition, different studies comparatively analyse the EU Member States against the average of the EU15 or EU27/25 but not specific evolutions from specific regional perspective (CEECs vs old EU). Certainly, the new member states do not position well in terms of development compared to the EU12 average. We, therefore, consider that among the CEECs, important gaps in the levels of development, competitiveness, systems of institutions among others,

[4] *In 2015, GDP/capita in Romania was 57% of the EU28 average, while in Bulgaria it was 47%. In the EU15 cohesion countries, it represented 90% in Spain, 68% in Greece, and 77% in Portugal, Central European economies are better positioned, with 69% in Poland and 68% in Hungary (according to Europe in figures - Eurostat Yearbook 2015).*

require a separate deep analysis of trade-specialization models from the perspective of structural centre-periphery differentiations of the EU12 that are not dealt with by current empirical studies. For this purpose, in analysing the degree of concentration versus export diversification, we calculate the comparative export advantages in terms of the factor intensity and level of technology that emphasize the structural changes of trade-specialization models and convergence/divergence trends.

Specifically, by including a time frame covering the period before and after the economic and financial crisis (characterized by an intensification of economic integration after the accession of CEECs), our study intends to contribute to a better understanding of the interdependence between integration – specialization – growth patterns (focusing on Poland, Hungary, Romania and Bulgaria' situation), an issue, still open to debate in specialized literature. We chose these four countries as case studies to cover the typology of differentiations in specialization patterns identified in the literature (big vs small, different levels of development, different in terms of their peripheral nature). We also chose them to check whether the premises are shaped for a centre-periphery evolution inside the CEECs. Over a relevant period of time, our study tests the hypothesis launched before the latest accessions to the EU (Vechiu and Makhlouf 2014) concerning differing evolution of the trade-specialization model (according to the centre-periphery pattern). For the CEECs, the confirmation of such patterns would mean that participation in the EU's economic integration process would generate asymmetrical shocks, instability in the production and trade structures, and complicated restructuring processes with high social and economic costs. For the EU as a whole, the stress on development, according to the centre-periphery model, involves key risks ranging from difficulties in the well-functioning internal market and monetary union to those related to political union prospects.

2. Literature Review

The process of convergence has been confirmed by various empirical studies on the European economy, both at the national and the regional levels (Barro and Sala-i-Martin 1992; Dall'erba and Le Gallo 2008; Goecke and Hüther 2016). However, many studies that investigate the impact of the liberalization of trade flows and factors within the internal market on European economies have confirmed the existence of divergent rather than conergent trends (Petrakos, Rodriguez-Pose and Anagnostou 2005) as an effect of economic growth (this is illustrated by such theories, as the regional development theory, the cumulative causation model, the New Economic Geography and the endogenous growth model). According to these empirical studies, convergence is conditional and may be more likely to occur within country clusters between economies with similar levels of development and with competitive and potentially complementary production structures as a result of intra-industry specializations and positive effects in terms of trade creation, economies of scale, learning processes, or agglomeration economies.

Therefore, The European integration process has confirmed the first empirical research results regarding internal market achievement, according to which market period liberalization triggers the growth of intra-industry trade (Balassa 1965; Grubel and Lloyd 1975). For example, during 1985-1996, the intra-industry trade (IIT) average for the EU12 increased from 45.5% to 56.7% (Diaz Mora 2002), the most significant increases occurred in Spain, Greece, Portugal and Denmark (countries with the lowest IIT average thus confirming a clear convergence process). Recent studies also confirm the same convergence of trade patterns between the EU15 and EU12 (Caetano and Galego 2007; Cutrini 2010; Dautovic, Orszaghova and Schudel 2014). However, an analysis of the intra-

industry trade (IIT) typology shows that EU countries that are catching up tend to specialize in vertical IIT (VIIT) through a trade/manufacturing concentration process, while EU developed countries specialize mainly in horizontal IIT (HIIT) linked to diversified specialization and scale economies (Crespo and Fontoura 2004; Bojnec and Fertő 2015; Huber and Nguyen Thanh 2016).

Generally, the literature underlines that the smallest and least developed countries are more specialized (making use of comparative advantages in unskilled labor and medium/low technology intensity), whereas large and developed economies are less specialized, benefitting from comparative advantages in intensive industries, high technology, and human capital (Dupuch and Mazier 2002; Midelfart-Knarvik *et al*. 2002; Vechiu and Makhlouf 2014). According to center-periphery approaches, while the peripheral countries are more specialized the central ones are more diversified. Such a conclusion is important from the perspective of intra-EU economic convergence trends. The New Member States (NMS), especially the CEECs, link the features of economic peripherality with a high level of spatial peripherality (Pascariu and Tiganasu, 2017) and a relatively high level of export concentration in relation to the EU27, even with a long-term growth trend (De Simone 2006; Vechiu and Makhlouf 2014). Considering the inverse relationship between export concentration and economic growth proven by many empirical studies (Agosin 2009; Hesse 2008; Hamed Hadi and Hossein 2014), we should note that these countries have a low capacity to preserve a long-term economic growth trend or to reduce gaps compared to other more developed countries of the EU. Moreover, convergence processes are stimulated during periods of economic growth and take place essentially within clusters of countries/regions, as mentioned before (Pascariu and Frunză 2011; Chala 2015, Raileanu *et al*., 2019). In such a context, questions are raised concerning, on the one hand, the capacity of the NMS to benefit from the potential economic dynamics of the internal market (particularly in the context of a long economic crisis), and also from the potential intra-EU economic, social, and territorial convergence of the European policies on the other hand.

3. Methodology and Data

Both trade specialization and comparative advantages can be assessed in various ways, depending on the researcher's choice of reference. In this study, we apply the Herfindahl–Hirschmann Index (HHI) to calculate the absolute measures of specialization, the Krugman Specialization Index (KSI) to calculate the relative measures of specialization, and the Revealed Symmetric Comparative Advantage (RSCA) Index to calculate the comparative advantages by products. We also tackle the issue of the convergence and stability of the specialization pattern. The analysis of the specialization-process dynamics is based on the comparative advantage convergence of the Balassa index (RCA), and the analysis of comparative advantages is based on the structure mobility of the RSCA Index.

The analysis is conducted for three economic areas: EU27 (European Union without Croatia), EU15 (EU before the Eastern enlargement, the so-called 'old member states'), EU12 (the NMS acceded in 2004 and 2007). The four CEECs Poland, Hungary, Romania and Bulgaria are case studies.

The absolute measures of specialization at the EU27/EU15/EU12/national level were determined by using the HHI (Herfindahl 1950; Hirschman 1964; 1969) from the perspective of the export products' share. We applied the HHI to analyze a country's trade concentration in its export pattern (Cracau and Lima 2016) by using:

$$HHI_j = \sum_{i=1}^{n} s_{ij}^2 , \quad (1)$$

where: s_{ij} = share of exports of product *i* in total exports of country/economic area *j*,

n = total number of products, and

i ∈ {1,…, 99}.

The index oscillates in the interval [1/n, 1], and the concentration of exports on some products determines a value of the index tending to 1 (reflecting a high degree of specialization), while export dispersion on several products make the value of the index tend to 1/n, 1/99 (reflecting a low degree of specialization, namely, the diversification).[5]

The relative measures of specialization at the EU15/EU12/national level comparative to the EU27 and EU12 were determined by using the KSI (Krugman 1991), an index that measures how similar the distributions of economic activity are between two economic areas. In principle, this index represents a standard error of industry shares (Palan, 2010) and is calculated by using the following formula:

$$KSI_j = \sum_{i=1}^{n} \left| s_{ij} - S_i \right| , \quad (2)$$

where: s_{ij} = share of exports of product *i* in total exports of country/economic area *j*,

S_i = share of exports of product *i* in total exports of the reference economic area,

n = total number of products, and

i ∈ {1,…, 99}.

The index oscillates between 0 and approximately 2 (2(n-1)/n). A value close to zero shows us that a country/economic area has a specialization model similar to the reference economic area, while a high value shows different structures of the economic activity of a country compared to the reference group, and in that case, the country is considered to be specialized. The index enables us to perform the first assessment of convergence versus divergence trends of patterns of specialization among countries (Poland, Hungary, Romania, and Bulgaria) compared to the reference group (EU27 and EU12).

We assessed the export advantages/disadvantages of products by using the RSCA index (Dalum, Laursen, and Villumsen 1998), consisting of an adjustment made to the Balassa index (Balassa 1965). The RSCA index oscillates between -1 and 1 and is positive when the country has an export comparative advantage and negative when it is at a disadvantage. The index is calculated by using the following formula:

[5] *Indices quantifying only the degree of export specialization do not offer a synthetic image of the position that the respective country occupies in the European economy. For instance, for any level of export specialization, real comparative advantages of an economy can differ because its dependence on imports must also be taken into account. Therefore, in the specialized literature, there are also indices that take into consideration international trade flows, exports and imports.*

$$RSCA_{ij} = \frac{RCA_{ij} - 1}{RCA_{ji} + 1}, \tag{3}$$

$$RCA_{ij} = \frac{s_{ij}}{S_i}, \tag{4}$$

Where RCA_{ij} = value of the Balassa index corresponding to the product *i* in country/economic area *j*, s_{ij} = share of exports of product *i* in total exports of country/economic area *j*, S_i = share of exports of product *i* in total exports of the reference economic area, and i ϵ {1,…, 99}.

The analysis of the dynamics from the perspective of convergence of the Balassa (RCA) index gives us the information on the process of convergence of specialization patterns between the two economic areas. We use the analysis of the mobility of the comparative advantage structure to determine the modifications that have appeared in specialization patterns regarding the increase or decrease of comparative advantages depending on the degree of specialization of these sectors in the initial period.

According to the neoclassical growth theory, the growth rate of poor economies tends to increase faster than that of rich countries, with an inverse relationship between the growth rate and its initial level. Therefore, we calculate the convergence process on the basis of the Barro and Sala-i-Martin econometric model (1992) in which the entry variables are per capita income or product:

$$\frac{1}{T}\log\left(\frac{y_{i,t_0+T}}{y_{i,t_0}}\right) = a - \left(\frac{1-e^{-\beta T}}{T}\right)\log\left(y_{i,t_0}\right) + \varepsilon_{i,t_0t_0+T}, \tag{5}$$

where: y_{i,t_0} , y_{i,t_0+T} = value of per capita income or product across region/state *i*, (i=1,…., N) in time t_0 and t_{0+T}, T = interval time, β= speed of convergence, and ε_{i,t_0t_0+T} = error terms.

Starting from this model and considering other studies (Arbia and Piras 2005; Marelli 2007) that used various model entry variables (indexes such as: GDP, productivity, or employment) or where the coefficient of the independent variable $\left(\frac{1-e^{-\beta T}}{T}\right)$ is replaced with a coefficient 'B' (convergence speed is calculated from the formula β = –ln(1+T x B)/T), we replace the entry variables that are specific to economic convergence analyses with indices specific to trade analyses, the RCA Index (this index has only positive values, and therefore the growth rate could be calculated), and we use the coefficient 'B' for the independent variable. The suggested model then has this formula:

$$\frac{1}{T}\log\left(\frac{RCA_{i,j,t_0+T}}{RCA_{i,j,t_0}}\right) = a - B\cdot\log\left(RCA_{i,j,t_0}\right) + \varepsilon_{i,t_0t_0+T}, \tag{6}$$

where RCA_{i,j,t_0} , RCA_{i,j,t_0+T} = value of the Balassa Index in country/economic area *j*, across products *i* (i=1,…., 99), and in time t_0 and t_{0+T} with T = interval time, and ε_{i,t_0t_0+T} = error terms.

By adopting the interpretation of the econometric model suggested by Barro and Sala-i-Martin (1992) and considering that the model entry variables in our study are the Balassa index as shown above, we are able to find out whether there is a convergence of specialization processes, meaning high growth rates of export advantages for products with low comparative advantages relative to the reference economic area (EU27 or EU12) in the initial period.

We complete the analysis by testing the mobility of the comparative advantage structure based on Cantwell's (1989) methodology using the Galtonian regression model, a methodology also used in other studies (Dalum, Laursen, Villumsen 1998). A regression equation is developed, where the independent variable represents comparative advantages recorded at the beginning of the period, and the independent variable represents the advantages at the end of the period. The regression equation used in this study has the RSCA index as the entry variables, and it is:

$$RSCA_{i,j,t_0+T} = \alpha - \beta \cdot RSCA_{i,j,t_0} + \varepsilon_{i,j}, \quad (7)$$

where $RSCA_{i,j,t_0}$, $RSCA_{i,j,t_0+T}$ = value of RSCA Index in country/economic area *j*, across products *i* (i=1,…., 99), and in time t_0 and t_{0+T}, with T = interval time, and $\varepsilon_{i,j}$ = error terms.

The regression analysis of the built model provides information on the mobility of the specialization patterns, namely if β=1, the specialization patterns do not change, if β>1, they are divergent, or if β<0, they change profoundly. When 0<β<1, the specialization pattern, on average, remains the same, but changes occur in time, and increases of the RSCA are recorded when the initial values are low and decreases when the values are high; therefore, a convergence of specialization patterns results. If β>R (correlation coefficient), the degree of divergence grows, and if β<R, specialization patterns converge, and it is a σ-convergence (Dalum, Laursen, Villumsen 1998).

The Eurostat databases are the data source for the analysis. In order to be able to assess the degree of specialization and comparative advantages, we created a database for EU27 (EU without Croatia), EU15, EU12, Bulgaria, Hungary, Poland and Romania. Export trade flows for the period 2000-2015 (except for Poland, where the series of data begin in 2004) were organized by chapters of the Combined Nomenclature (CN)[6], so that the compatibility between the national and the European area could be achieved. Moreover, in order to provide relevant analysis of the degree of specialization, we interpreted the results both from the perspective of the technology intensity integrated into each product in the manufacturing industry and from the perspective of the factors' intensity. In order to provide such an analysis, we used the classification of industries based on technological intensity (according to the UNIDO classification in 2005) and on the intensity of the use of production factors, according to the classification proposed by Neven (1990).[7]

[6] *99 types of products (2-digit Chapters, presented in Appendix A, available in the online version of the paper).*

[7] *An alternative option may be the proposal made by Munkacsi (2009) in the study on "Export structure and export specialization in Central and Eastern European Countries".*

4. Assessing the Export Specialization Processes

Empirical studies (Krugman 1991, Caetano and Galego 2007, Hamed, Hadi and Hossein 2014) on the evolution of international trade identify two main specialization trends: diversification, with the prevalence of horizontal intra-industry trade for developed countries and concentration in the case of developing countries, the comparative advantage being capitalized through inter-industry trade and vertical intra-industry trade. The more open and economically integrated developing economies become, the more they tend to de-specialize in a manner similar to developed economies. (Dalum, Laursen and Villumsen 1998); in other words, the increase in the economic development and integration degree triggers the occurrence of a de-specialization process with a negative relationship between growth and export concentration (Agosin 2009). A series of studies underline the 'U'- shaped curve between export specialization and stages of economic growth (Imbs and Wacziarg 2003; Hesse 2008; Aditya and Acharyya 2013). In the first stage of an opening towards foreign trade and with a relatively low level of development, economies specialize by looking for a comparative advantage in a limited number of industries (inter-industries playing an important role). Later, economies become diversified due to the potential manifestation of the following effects: growth and diversification of internal demand (Imbs and Wacziarg 2003); discovery of new foreign markets (Vettas 2000); life cycle of products (Vernon model); convergence of production and consumption models and therefore the opportunity to make use of economies of scale; learning and information externalities; inter-industries' technological transfer and spillovers (Hausmann and Klinger 2007). In the third stage, with a high level of development, economies again tend to specialize by using comparative advantages in technology, innovation, and human capital.

In the case of European economies, most empiric studies reveal an increase in specialization before the establishment of the internal market and a diversification after its creation, potentially associating the increase in the degree of market integration with a structural convergence of economies and with production and trade diversification. Several studies identify a general trend towards the growing specialization for EU15/EU25 before the Eastern enlargement (Dupuch, Jennequin and Mouhoud 2004; Vechiu and Makhlouf 2014). These studies highlight several important differentiations by groups of countries or at the national level: EU15 have, on average, a lower level of specialization than the CEECs (Vechiu and Makhlouf 2014: analysis for 1996-2005); in general, the smaller, less developed or peripheral economies are generally more specialized than the large economies (Midelfart-Knarvik et al. 2002: for 1970-1997); the accession of countries to the EU led to export diversification for Spain and Portugal (Amiti 1999); the degree of specialization is more stable in EU15 than in the CEECs (Vechiu and Makhlouf 2014); Visegrad countries (Poland, Hungary, Czech Republic, Slovakia) became more and more specialized between 1995-2015 as an impact of trade liberalization (Gauger and Katarzyna 2017); and the CEECs, on the whole, become more specialized during the process of integration (De Simone 2006).

In general, the positive relationship between growth and diversification has been confirmed (Funke and Ruhwedel 2005; Hesse 2008; Hamed, Hadi and Hossein 2014), which means that Central and Eastern European economies might register a fall in the concentration degree of exports and a reinforcement in the terms of trade and economic growth with the convergence of specialization patterns in the long run. However, other studies stress the fact that developed economies benefit from comparative advantages by taking over knowledge-intensive industries and economies of scale while developing countries specialize on the

basis of the differences in factor endowments and technology (Caetano and Galego 2007; Cutrini 2010; Dautovic, Orszaghova and Schudel 2014) thus reducing the intra-EU convergence perspectives.

According to the above-mentioned studies, the main conclusions of the analysis carried out in our study could be that the degree of export concentration of the EU27 decreased during 2000-2015 due to an export diversification of the EU15. The level of export concentration in the EU12 was higher than in the EU27 (see Figure 1a), and only three categories of products (machinery and mechanical appliances, electrical machinery and equipment, vehicles) cumulate approximately 40% of total exports. During 2000-2015, the trend in CEE was towards export concentration with small trend fluctuations and reversal, as can be seen in Figure 1a and Figure 3a. Compared to the EU27, the degree of specialization in the EU15 is stable with low values (specialization pattern in the EU27 is similar to the EU15), and the degree of specialization is higher in the EU12 with a low decreasing trend and a relatively stable trend after 2011 (see Figure 1b). Therefore, the process of the European integration stimulated, overall, in the EU27, the increase of economic competitiveness of the member states generating an export diversification process due to economies of scale, agglomeration/ clusterization effects, trade intensification, the growth of foreign direct investments, and so on. Diversification occurs mostly in highly developed economies (EU15) found at an advanced stage of economic integration with a high level of vertical intra-trade specialization.

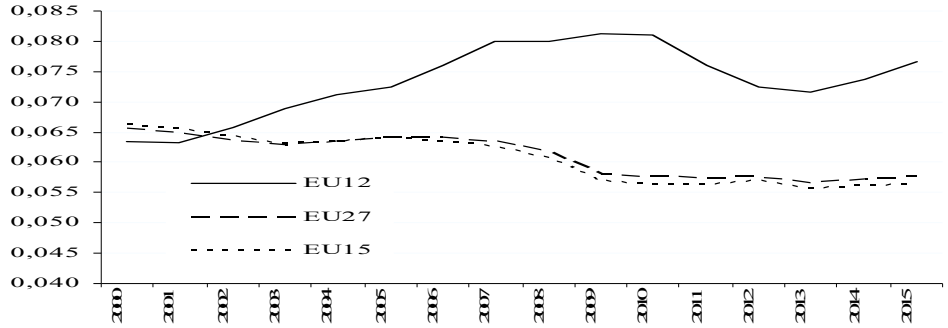
Considering the intensification of mutual trade flows due to integration, it is evident that the old Member States benefitted from integration's positive impact, enlarging their area of comparative advantages, and implicitly enhancing their sources of long-term economic growth as an effect of an increase in opportunities on the Internal Market. The new member states are still undergoing a stage of export concentration (with low short-term trend fluctuations and reversal) and becoming more specialized.

The intensification of competition, as a result of the integration process, in the conditions of reduced competitiveness of its own economies, led to the EU12 specialization according to their comparative advantage in a relatively small number of products, the lower vertical share of intra-industry specialization limiting the possibilities of export diversification (as is the case of the EU15). Correlating the average per capita GDP of the two categories of economies, we can say that the negative relationship of 'specialization to level of development' is confirmed. However, the positive relationship of economic growth to export diversification has not been confirmed. During the studied period, the CEECs recorded relatively high rates of economic growth, and the degree of trade specialization grew. With respect to the U-shaped curve (Imbs and Wacziarg, 2003), the CEECs could be in the first stage of development while the EU15 might be reaching the third stage. From here, a possible negative effect of a trade-specialization pattern of the CEECs towards convergence may result. Additionally, the current trends in the EU Cohesion Policy, as the main system of public intervention for reducing the intra-EU gaps (concentration of funds on limited thematic priorities, orientation towards smart specializations), will strengthen the growing trends of specialization, especially for smaller and peripheral economies with the risk of deepening core-periphery structural differentiation (Dragan, 2017).

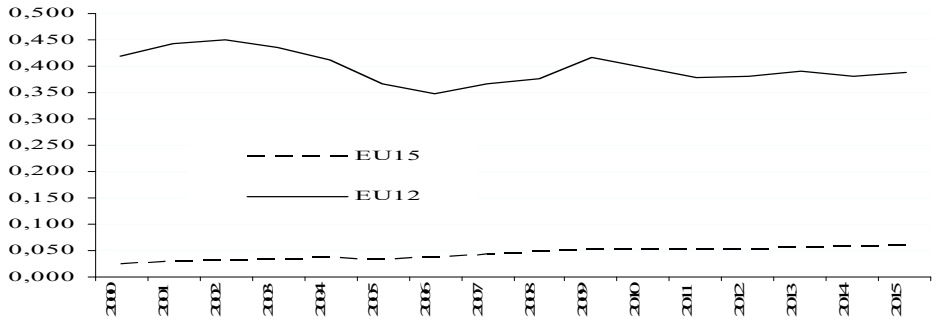
Figure 1

Herfindahl–Hirschmann Index (HHI) and Krugman Specialization Index (KSI) in EU27, EU15 and EU12, 2000-2015

a. HHI



b. KSI –compared to EU27



Source: Authors' processing based on Eurostat data.

It is also important to note that the trend in the evolution of the degree of export specialization at the NMS level is ascending (with a short period of trend inversion between 2010-2014, as the crisis impact) compared to the EU27 with a descended curve, reflecting a diversifying specialization process until 2009 and a stabilization of the degree of specialization after that (Figure 1a). Therefore, compared to other studies in the literature, our study underlines the effect of the 2008 crisis on trade specialization. We note that the export concentration trend generated by the intensification of competition due to the integration of the CEECs on the internal European market was reversed after the outbreak of the crisis.

The assessment of the structural dynamics of GDP shows that the resumption of growth during this period was based in many CEE countries on export growth above the European average (11.6 % in 2010, 6.5% in 2011), exports being the most dynamic element of GDP in all member states, with a few exceptions only in 2011 (for example, Austria, Greece, Poland, Finland, or Sweden). In a global economic crisis, it is obvious that the EU member states, especially the CEECs that were facing a large decrease in private consumption and

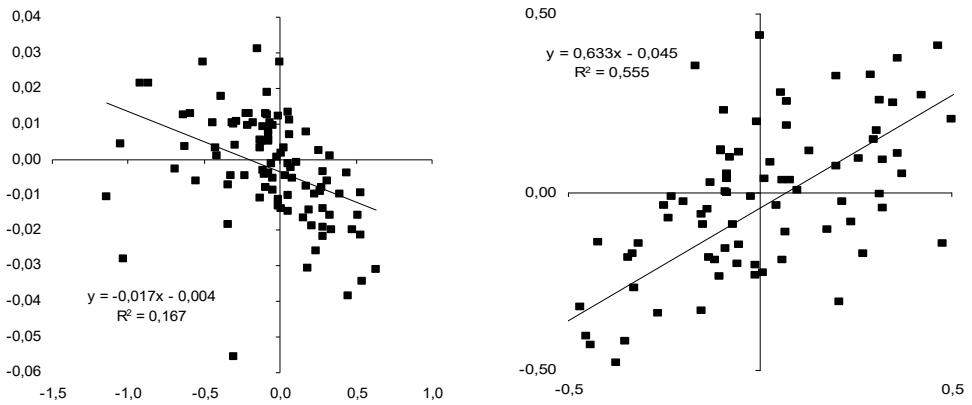
gross fixed capital formation (GFCF), oriented themselves towards a policy of export diversification to ensure their sources of economic growth. Later, after overcoming the difficult period of 2012-2013 (years marked by the coming back of negative average growth rates for the European economy) and re-launching the GFCF growth and private consumption, the accentuating trend of export specialization in the CEECs returned.

The econometric analysis confirms the previous conclusions. The two models (see Figures 2a and 2b) show the existence in the EU12 of a comparative-advantage convergence process compared to the EU27 ($\beta<0$ in the regression equation in Figure 2a). Convergence occurred through changes in the structure of these advantages ($0<\beta<1$ in the regression equation in Figure 2b), as sectoral growth was recorded where initially low advantages existed and decreased where initially there were high values. As a result, the EU12 economies underwent a significant process of economic restructuring under conditions generated by internal market competition, in search of stable poles of competitiveness.

Figure 2

Scatter plots of convergence process analysis for EU12 compared to EU27

a. The convergence of RCA **b. Structural stability of RCSA**



Source: Authors' processing based on Eurostat data. For details regarding the results of econometric analysis from SPSS, see Table 1.

At the national level, for the countries included in our analysis as case studies (Bulgaria, Hungary, Poland and Romania), the correlation between diversification and the level of development is less obvious (Figure 3). In Romania, Bulgaria and Poland, the degree of export concentration by chapters of the Combined Nomenclature (type of product) is lower than in the EU12 (see Figure 3a), although the levels of development are different (47% GDP/capita in Bulgaria, 56% in Romania, and 68% in Poland compared to the EU27 in 2015). In Hungary, the degree of specialization is close to Poland's in terms of the level of development (68% GDP/capita), and is quite high, much above the EU12. In terms of trends, there has been a concentration trend in the last three years of the period in Poland, Romania and Hungary, and a diversification trend in Bulgaria.

Table 1

Results of econometric models for convergence process analysis in EU12 compared to EU27

a. The convergence of RCA

Model	Variabies		Model summary		ANOVA	Coefficients	
			R	R^2	Sig. F. Test	Value	Sig. t. Test
1	Independent	LOG(EU12-Balassa EU27-2000)	0,409	0,167	0,000	-0,017	0,000
	Dependent	LOG(EU12-Balassa EU27-2015/2000)/15				-0,004	

b. Structure stability of RSCA

Model	Variabiles		Model summary		ANOVA	Coefficients	
			R	R^2	Sig. F. Test	Value	Sig. t. Test
1	Independent	EU12-DalumEU27-2000	0,745	0,555	0,000	0,633	0,000
	Dependent	EU12-DalumEU27-2015				-0,045	

Source: Authors' processing, in SPSS, based on Eurostat data.

It should be mentioned that Hungary is the only country in Central and Eastern Europe that has a share of exports of high and medium/high technology above the EU12, and even EU27 (68.4% for 2015, as compared to 54.6 % for the EU12 and 56.4% for the EU27, with a great increase displayed in high-tech categories in the last decade) and with a human capital intensity above the European average (68.4%).[8]

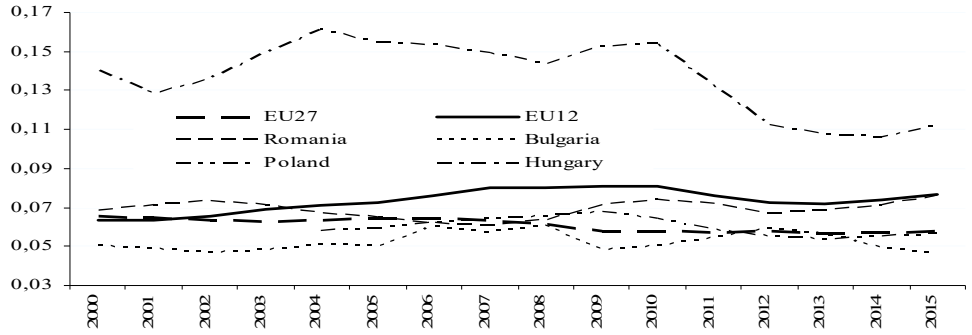
Considering the Krugman Index, we note in Figures 3b and 3c that Bulgaria records the highest values of the index, having a more balanced structure (low HHI) compared to the specialized patterns of the EU27 and EU12. Hungary, a highly specialized country (high HHI), has lower values of the Krugman Index, which means that the specialization patterns of Hungary compared to Bulgaria are closer to patterns of the EU12 and EU15. Poland is the closest to the specialization patterns of the EU27 and EU12, while Romania, only in 2010, gets closer to the EU12 but with higher differences compared to the EU27.

[8] *Authors' calculations for 92 of the 99 chapters in the Combined Nomenclature (Table 4).*

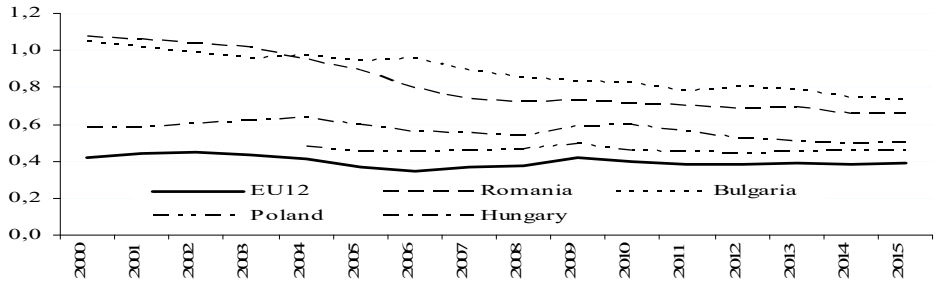
Figure 3

Herfindahl–Hirschmann Index (HHI) and Krugman Specialization Index (KSI) in Bulgaria, Hungary, Poland, Romania, 2000-2015

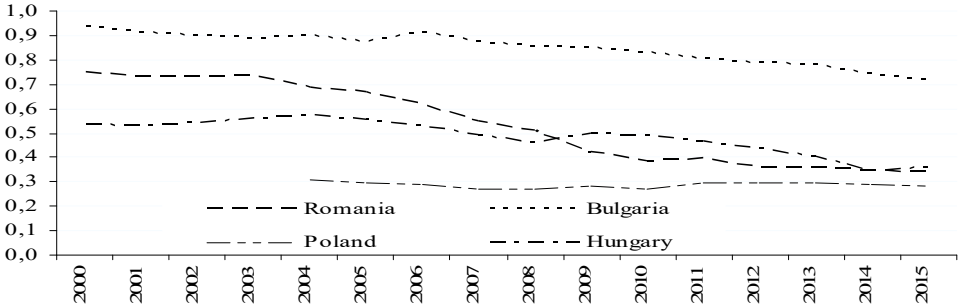
a. HHI



b. KSI compared to EU27



c. KSI compared to EU12



Source: Authors' processing based on Eurostat data.

We note that the dynamics of the specialization processes in CEE confirm, on average, the reverse relationship of 'specialization to level of development', but the evolutions at the national level do not reflect a high conditioning either between export specialization to level of development, export growth and diversification, or the peripheral nature and degree of export diversification, taking into account that all the four CEE countries recorded in the

studied period have average growth rates above the EU27 average. Also, the widely spread conclusions of the literature regarding the direct relationship between the size of the economy and the degree of export diversification have not been confirmed (as they result from the above references). For instance, Bulgaria has a lower level of gross value added (GVA) and lower population than Poland or Romania, but its degree of diversification is higher; Romania, with only 40% of Poland's GVA, has a comparable degree of diversification. Bulgaria, with the highest degree of peripherality among the studied countries (considering both economic and spatial peripherality: see Pascariu and Tiganasu 2017), has the highest degree of export diversification. Romania, closer to Bulgaria than Poland in terms of features of peripherality, has a level of export diversification closer to Poland, and Hungary, with the lowest level of peripherality, has the lowest level of export diversification. In addition, except for Poland with the specialization patterns similar to the EU27 characterized by stability, we observe high instability in export specialization concentration. Such a situation may be associated with a low level of integration, huge processes of production restructuring, and relatively low share of specializations based on economies of scale and inter-sectoral linkages.

The results of the regression analysis also support this point. Therefore, even if in the four countries there is a process of convergence of comparative advantages compared to both the EU27 and EU12 ($\beta<0$ in the regression equations in Table 2a or Table 3a), the speed of convergence differs from one country to another, and it is lower in the EU27 compared to the EU12 (except Hungary). Romania recorded the highest degree of convergence, followed by Poland, Bulgaria and Hungary.

Table 2

Results of econometric models for convergence process analysis in Bulgaria, Hungary, Poland, Romania compared to EU27

a. The convergence of RCA

Model	Variabiles		Model summary		ANOVA	Coefficients	
			R	R^2	Sig. F. Test	Value	Sig. t. Test
1	Independent	LOG(Bulgaria-BalassaEU27-2000)	0.552	0.305	0.000	-0.026	0.000
	Dependent	LOG(Bulgaria-BalassaEU27-2015/2000)/15				0.000	
2	Independent	LOG(Hungary-BalassaEU27-2000)	0.515	0.265	0.000	-0.024	0.000
	Dependent	LOG(Hungary-BalassaEU27-2015/2000)/15				-0.009	
3	Independent	LOG(Poland-BalassaEU27-2000)	0.586	0.343	0.000	-0.030	0.000
	Dependent	LOG(Poland-BalassaEU27-2015/2000)/11				0.000	
4	Independent	LOG(Romania-BalassaEU27-2000)	0.663	0.439	0.000	-0.041	0.000
	Dependent	LOG(Romania-BalassaEU27-2015/2000)/15				-0.010	

b. Structure stability of RSCA

Model	Variabiles		Model summary		ANOVA	Coefficients	
			R	R^2	Sig. F. Test	Value	Sig. t. Test
1	Independent	LOG(Bulgaria-BalassaEU27-2000)	0.552	0.305	0.000	-0.026	0.000

	Dependent	LOG(Bulgaria-BalassaEU27-2015/2000)/15				0.000	
2	Independent	LOG(Hungary-BalassaEU27-2000)	0.515	0.265	0.000	-0.024	0.000
	Dependent	LOG(Hungary-BalassaEU27-2015/2000)/15				-0.009	
3	Independent	LOG(Poland-BalassaEU27-2000)	0.586	0.343	0.000	-0.030	0.000
	Dependent	LOG(Poland-BalassaEU27-2015/2000)/11				0.000	
4	Independent	LOG(Romania-BalassaEU27-2000)	0.663	0.439	0.000	-0.041	0.000
	Dependent	LOG(Romania-BalassaEU27-2015/2000)/15				-0.010	

Source: Authors' processing, in SPSS, based on Eurostat data

Table 3

Results of econometric models for convergence process analysis in Bulgaria, Hungary, Poland, Romania compared to EU12

a. The convergence of RCA

Model	Variables		Model summary		ANOVA	Coefficients	
			R	R^2	Sig. F. Test	Value	Sig. t. Test
1	Independent	LOG(Bulgaria-BalassaEU12-2000)	0.636	0.404	0.000	-0.032	0.000
	Dependent	LOG(Bulgaria-BalassaEU12-2015/2000)/15				0.002	
2	Independent	LOG(Hungary-BalassaEU127-2000)	0.374	0.140	0.000	-0.018	0.000
	Dependent	LOG(Hungary-BalassaEU12-2015/2000)/15				-0.004	
3	Independent	LOG(Poland-BalassaEU12-2000)	0.690	0.476	0.000	-0.044	0.000
	Dependent	LOG(Poland-BalassaEU12-2015/2000)/11				0.002	
4	Independent	LOG(Romania-BalassaEU12-2000)	0.691	0.478	0.000	-0.046	0.000
	Dependent	LOG(Romania-BalassaEU12-2015/2000)/15				-0.007	

b. Structure stability of RSCA

Model	Variables		Model summary		ANOVA	Coefficients	
			R	R^2	Sig. F. Test	Value	Sig. t. Test
1	Independent	Bulgaria-RSCA EU12-2000	0.584	0.341	0.000	0.479	0.000
	Dependent	Bulgaria-RSCA EU12-2015				0.051	
2	Independent	Hungary-RSCA EU12-2000	0.723	0.522	0.000	0.694	0.000
	Dependent	Hungary-RSCA EU12-2015				-0.066	
3	Independent	Poland-RSCA EU12-2000	0.731	0.534	0.000	0.634	0.000
	Dependent	Poland-RSCA EU12-2015				0.024	
4	Independent	Romania-RSCA EU12-2000	0.468	0.219	0.000	0.401	0.000
	Dependent	Romania-RSCA EU12-2015				-0.086	

Source: Authors' processing, in SPSS, based on Eurostat data.

The convergence process occurred through changes in the structure of comparative advantages ($0<\beta<1$ in the regression equations in Tables 2b and 3b) and, on average, are

not significant, as growth was recorded in sectors with initially low advantages and decreases, where initially, values were high.

Therefore, the convergence of countries towards the patterns of the EU27 or EU12 is, in fact, a σ-convergence (β<R). The most stable specialization processes compared to the EU27 and EU12 occurred in Poland and Hungary, while the structure of comparative advantages in Bulgaria and Romania changed more compared to the other two countries.

5. Comparative Advantages and Disadvantages

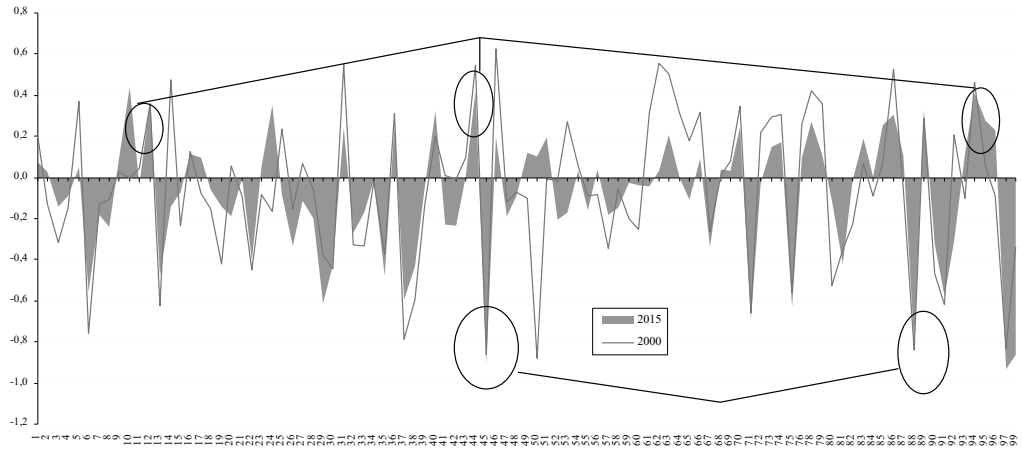
Although the positive relationship of 'export diversification to economic growth' in developing countries is confirmed by numerous empirical analyses and supported by a series of theories and models of growth and international trade (Al-Marhubi 2000; Aditya and Acharyya 2013; Hamed, Hadi and Hossein 2014), diversification does not provide, in itself, a guarantee regarding the potential of economic growth and convergence. The contribution of exports to economic growth depends on the trade specialization model, a horizontal intra-industry specialization based on the achievement of scale economies being primarily preferred (Frankel and Rose 1998; Agosin 2009). Also, diversification can generate a significant stimulation of growth, occupation, and productivity if specialization is in intensive capital assets, high/medium skilled labor, and high/medium technology (Petersson 2005; Hausmann and Klinger 2007) for which external demand is high (Alexander and Warwick 2007) and which addresses developing and diversification-based markets (emerging markets); the export diversification could increases inequalities and only the manufacturing specialization could support the convergence (Blancheton and Chhorn 2018); the export diversification is driven by the extensive margin (new products), and depends of the capacity of countries to produce sophisticated products, knowledge intensive.

In terms of the RSCA index, the countries that joined the European Union in 2004 and 2007 register the highest levels of comparative advantages (of over 0.4) in relation to the EU27 for the export of low-tech and natural resource-intensive products. High comparative advantages are also registered for the one high-tech product that uses human capital intensively (Appendix B, available online and Figure 4).

There are sectors in which the EU12 hold relatively constant advantages in the analyzed period, and they represent trade specialization areas and may constitute growth and competitiveness poles for Central and Eastern European countries. On the other hand, there are also products for which the degree of trade specialization in the EU12 is very low (values close to 0), and comparative disadvantages registered for both low- and high-tech products. Overall, of the 97 types of exported products in 2015, the EU12 registers comparative advantages for 55 of them and disadvantages for only 42 (Figure 4), which means that, from the perspective of the comparative advantages to disadvantages relationship, the EU12 export structure tends to become competitive and support intra-EU growth and convergence.

Figure 4

The RSCA indices, for EU12 compared to EU27, 2000 and 2015



Source: Authors' processing based on Eurostat data.

At the national level, the situation varies from one country to another. In 2015, Bulgaria displayed the highest comparative advantages (over 0.8) relative to the EU12 for the export of medium/low tech and capital-intensive products, and high comparative disadvantages, close to -1, in the export of high-tech products. Overall, 47 out of 97 categories of products exported in 2015 present comparative advantages and 50 comparative disadvantages (Figure 5 and Appendix B, available online).

Romania displays comparative advantages (over 0.5)) in the export of low-tech products and disadvantages (over -0.9) for the export of labor-intensive products. Overall, only 33 out of 97 types of exported products by Romania in 2015 presented comparative advantages, and 64 had comparative disadvantages. In dynamics, the products that register comparative advantages are constant throughout the analysed period, reflecting Romania's tendency to specialise in the export of those particular products (Figure 5 and Appendix B - available in the online version).

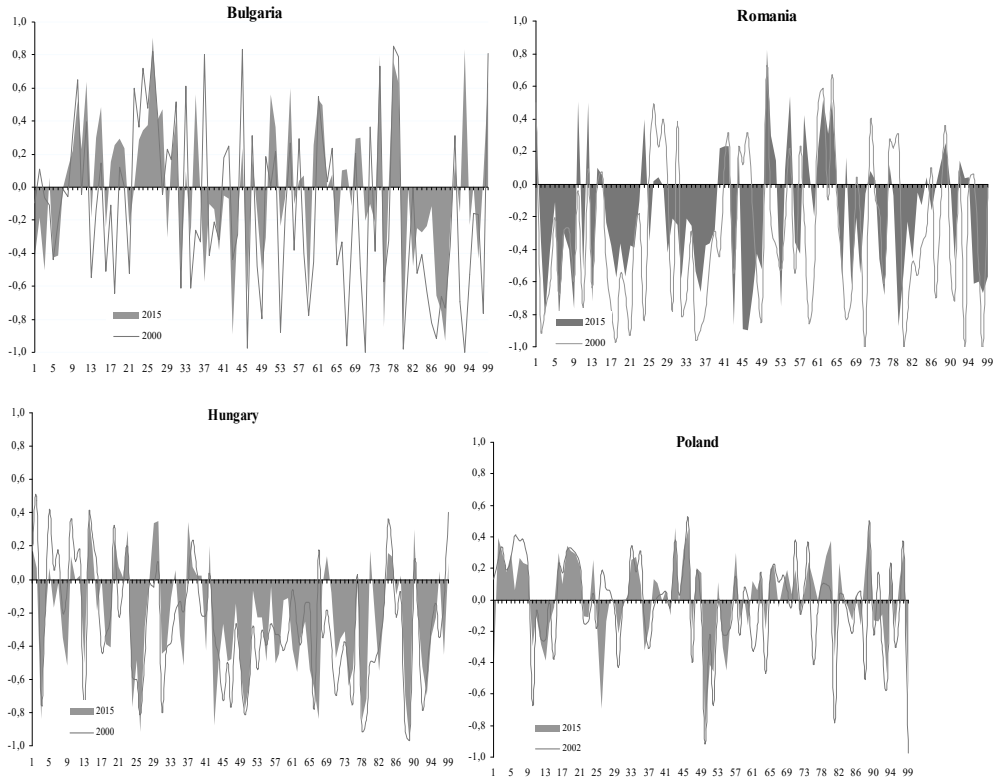
In CEECs, the analysis of Hungary and Poland shows significant differences in terms of achieving comparative advantages in exports. While in Hungary, 28 of 97 types of products exported in 2015 registered comparative advantages and 69 registered disadvantages, in Poland, 54 products registered advantages and only 43 disadvantages. Hungary displays the highest comparative advantages (0.4) as compared to the EU12 for the export of low-tech products, which intensively use natural resources and medium-low tech products. For trade in high-tech products and low-tech products that use labor intensively, Hungary presents the highest disadvantages (values close to -1). Poland registers advantages (between 0.4 and 0.5) for the low-tech products but also for the high-tech products. For trade in low-tech products that intensively use natural resources, Poland registers the highest comparative disadvantages (Figure 5).

Consequently, according to the RSCA index, we notice that Poland holds an advantage in terms of degree of diversification of products for which it displays competitive advantages as

compared to the EU12. Its vulnerability to external markets is, therefore, reduced and their export contribution to economic growth is more significant. Hungary is at the opposite pole, with an extremely high degree concentration of competitive exports.

Figure 5

The RSCA indices for Bulgaria, Romania, Hungary and Poland, compared to EU12, 2000 and 2015



Source: Authors' processing based on Eurostat data.

In terms of factor intensity and technology levels, Hungary holds the top position among the countries under analysis with a high and medium tech export share of 68.4% in 2015 (out of which 3.5% is in high tech), well above the EU12, which is only 2.2% as compared to the 6.4% of the EU27 (Table 4).

Also, in terms of factors intensity, Hungary has over 84.6% exports share of technical and human capital products, which is above the 78.5% of the EU27, followed by Poland (72.3%). Bulgaria is at the opposite end with a 67.1% share of exports for technical and human capital intensity products. Our analysis points out that Poland and Romania share similar export structures, being close in the high and high-medium tech exports (47.5% and 50.2%, respectively) as well as in technical and human capital intensity. However, Romania and Bulgaria are excessively focused on the export of labor-intensive products (as compared to the EU27), leading to the reduction of the potential for economic convergence.

Table 4

Trade structures of EU27, EU12, Bulgaria, Romania, Hungary and Poland, 2000-2015

Trade structures based on technology level

	High tech %		*Medium – High %*		*Medium low %*		*Low %*	
	2000	2015	2000	2015	2000	2015	2000	2015
EU 27	6.0	6.4	51.6	50.0	18.1	20.0	20.4	20.0
EU 12	1.4	2.2	45.3	52.4	23.2	21.2	24.2	18.9
Poland	1.2	1.9	44.1	45.6	25.6	22.1	21.5	23.3
Hungary	1.3	3.5	63.6	64.9	12.8	15.0	17.8	13.4
Romania	0.6	2.2	23.8	48.0	27.6	19.8	42.2	25.2
Bulgaria	0.6	1.2	18.4	29.3	38.6	35.1	34.1	28.8
Trade structures based on factors intensity								
	Resources %		*Labors %*		*Capital %*		*Human capital %*	
	2000	2015	2000	2015	2000	2015	2000	2015
EU 27	10.9	12.9	6.3	5.0	21.3	22.1	57.6	56.4
EU 12	10.1	12.2	11.3	4.8	25.9	23.1	46.8	54.6
Poland	12.4	15.8	6.0	4.8	28.9	24.8	45.3	47.5
Hungary	9.3	9.8	7.1	2.5	14.2	16.2	64.9	68.4
Romania	8.7	14.2	32.7	10.3	28.4	20.5	24.4	50.1
Bulgaria	12.2	17.9	20.6	9.6	39.9	36.5	19.0	30.6

Source: Authors' calculations for 92 from 99 chapters from CN.

6. Conclusions

The paper does not confirm the perspective of the New Economic Geography on the enlargement of the European Union to Central and Eastern Europe, according to which the integration process could offer different perspectives on the CEECs specialization, as compared to EU15. Furthemore, the possibility of a differentiated evolution of the production and trade specialization patterns of the CEECs compared to EU15 (with the risk of widening the centre-periphery gaps) represented a worrying assumption launched before the latest EU enlargements. This is significant because, from the point of view of the degree of trade specialization and comparative advantages, the CEECs are not well positioned in terms of development compared to the EU15. According to this paper, the development and convergence pattern is more 'Spanish' than 'Mediterranean', both for the analysed CEECs (Poland, Hungary, Romania and Bulgaria). Although there are differences between the trade specialization patterns in the CEECs, the potential for intra-EU growth and convergence is relatively high and similar for all these countries. However, the tendency of the four CEE economies is to increase their trade specialization, diminishing the potential for growth and convergence, while, on average, the EU27 registers a de-specialization trend, concentrating on high-tech and high-skilled industries with a high potential to sustain economic growth, productivity, and employment.

A high level of export specialization may affect the perspectives of economic growth, and implicitly, economic convergence in the EU. This is because export specialization is generally associated with higher risks related to instability of earnings, prices, investments, labor market or foreign exchange rates, lower attractiveness for foreign capital, and fluctuation of business cycles due to higher vulnerability to foreign shocks. For public policies

(EU and national level), once the hypothesis of 'diversification to growth to convergence' direct relationship has been accepted, it is important to establish the circumstances in which production diversification and intra-industry specialization can be achieved. A key role should be played by the optimization of the EU internal market, complementary to the increase of the EU Cohesion Policy efficiency (increasingly focused on the endogenous model). Finally, these internventions could better support a convergence process of CEECs production structures and the overall economic performance of the European Union.

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