

STRUCTURAL CONVERGENCE OF BULGARIAN FOREIGN TRADE AND EXPORTS TO THE EURO AREA

The study focuses on the structural convergence of foreign trade, and in particular of Bulgarias' exports to the Euro area. By interpreting and systematising theoretical and empirical models, frequently applied methods for analysing the real and structural convergence of exports and imports are summarised. Leading trends, similarities and differences in the dynamics of exports, imports and foreign trade balance of Bulgaria, the Euro area and a group of CEE countries during the period 2002-2018 are highlighted. The values of dissimilarity index by J. Von Hagen and J. Traistaru method and divergence index by C. Van de Coeving method, by commodity groups and the Bulgarian exports as a whole in 2002-2018, are determined. In this regard, export commodity groups are derived, on which Bulgaria has reached a coincidence, convergence or divergence with the similar structural parameters of the Euro area exports (as a whole), entered as reference values. It is concluded that there is a trend of increasing structural convergence of Bulgaria's exports to the Euro area exports in recent years, with greater similarities in some commodity groups. In the study, traditional methods of analysis and synthesis, induction and deduction, methods of descriptive and comparative analysis, structural σ -convergence methods are used.
JEL: B40; F10; F14; O40; P50

Introduction

The consequences of the development and deepening of integration processes within the European Union (EU) are often linked to the achievement of overall coincidence or greater similarity (convergence) in the economic processes in the EU Member States. Convergence can be proved and analysed in terms of the parameters and dynamics of main macroeconomic indicators, to which gradually foreign trade flows for different time frames, geographical regions and a group of countries have been added. In this context, multiple dimensions of convergence can be examined, conditionally distinguishing the directions of economic and trade convergence.

Numerous recent studies have provided well-substantiated evidence that greater similarity between EU countries has been observed since the beginning of the 21st century. It is influenced by a complex and broad set of interrelated factors, including the ever-closer

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linking of economies and the expansion of trade among EU countries, the introduction of the common currency euro in 1999 and the creation of the Euro area (Franks, et al., 2018). The consideration and measurement of the effects of various factors give a tangible impetus to the implementation of theoretical and empirical research, which manifests itself in two main directions. First, there is outlined a gradual focus on convergence issues, especially in the area of foreign trade. It is assumed that greater similarity in exports and imports can have a positive impact on the synchronisation of GDP dynamics and business cycles among member states, as well as on the homogenisation of economic structures. This underlines the close link between economic convergence and trade convergence. Second, comparative analyses are being increased, which introduce different criteria – relevant indicators for groups of countries, the EU as a whole, or the Euro area, are applied in the role of benchmark variables.

The construction of multiple applied models is intended not only to outline similarities or differences, but also to verify some earlier views on the role of trade and the currency used in foreign trade transactions. In this connection, for example, right in 1998, C. Goodhart (1998) perceived that the planned introduction of a common European currency (the euro) would contribute to enhancing convergence, facilitating and stimulating mainly regional trade – among EU member states. J. Frankel and A. Rose (1998) also predict the forthcoming (and subsequently realised) effects on the expansion of trade among EMU member states and within the EU. Their conclusions are based on results obtained from a relatively large-scale and in-depth empirical study. They reveal that there is a strong and markedly positive effect of trade intensity on the income ratio for a group of 21 industrialised countries in the period 1959-1993. However, some of these preliminary hypotheses are rejected or partially revised in more recent analyses, according to which the impact of trade on different countries is not equally and can be a source of divergence.

In recent years, more sophisticated convergence models have been elaborated, focusing on revealing the importance and characteristics of not only real but also structural convergence. By applying a set of econometric methods and techniques, it becomes possible to go deeper into national specifics or regional similarities in the sectoral structure of economies, as well as in the structural characteristics of trade among EU countries. It is recognised that in the current conditions of the 21st century, the process of transition to a new and more similar sectoral structure of the created GDP is expanding, in which the services sector starts to dominate. However, the expansionary development of this sector is ongoing in parallel with an increase in production in the industrial sector, stimulating and leading to an increase in foreign trade flows, in which exports and imports of goods and services between the EU Member States and the Euro area are higher compared to other countries in the world. In doing so, it is important to identify the links, similarities or persistent differences in the commodity structure of exports and imports of EU countries. Thus, the concept of structural convergence as “convergence of industrial structures” is complemented by the concept of structural convergence in foreign trade. Scientific arguments for this are provided by Ben-David (1996) and Mauricio Bittencourt (2004), who confirm the validity of the Heckscher-Ohlin-Samuelson theorem on the countervailing role of trade. According to Ben-David (1996), the achievement of significant income convergence in a particular group of countries is mainly due to the liberalisation of trade among these countries. Mauricio Bittencourt (2004), for his part, refers to the factor of price equalisation of production factors and explains the role of free trade in certain goods in balancing factor prices in different countries. From

the point of view of their connections, economic and trade convergence are sometimes in parallel explored, with an emphasis on their structural characteristics. On this basis, it is possible to carry out conditionally separate or complex analyses of convergence in the area of GDP and of foreign trade, proving the applicability of certain similar methods and approaches.

In some of the studies on the topic of economic, trade and structural convergence, Bulgaria is included, giving it a main or peripheral place. The authors set and follow various dimensions of the convergence. For example, they have deduced some similarities in the dynamics of GDP of Bulgaria, the EU-15 countries and the EU as a whole (Pirimova, 2012, 2014), similarities in the expenditure structure of Bulgaria's GDP and the EU countries (Stattev, Raleva, 2006), which also highlights the contribution to the convergence of foreign trade. Studies of Balkanska (2015, 2017), Totev (2010, 2017), Bobeva (2019) and others are focused on theoretical and empirical perspectives of economic convergence or convergence in the field of industry. Other analyses are concentrated on determining the comparative advantages of manufacturing and exports of different countries, incl. Bulgaria, for the purpose of which differentiated methods and approaches are applied. Some of them also include structural convergence, as advantages are derived and systematised into detached product groups (Pirimova, Peshev, 2018; Pirimova, 2018; Peshev, Pirimova, 2020; Zhelev, 2009; Tullio, 2016). Specific sets of key factors for achieving greater similarity or differences are summarised, but the role of structural features of exports and imports of goods as a significant source of cohesion and economic growth of the EU Member States and the Euro area is confirmed.

In the context of real and structural convergence in the field of foreign trade, the main purpose and tasks of this study are outlined.

The main objective is to study the basic structural parameters of the convergence of foreign trade and exports of Bulgaria to the Euro area countries as a whole.

The study distinguishes theoretical and descriptive empirical parts, in which several specific problems are solved:

- Systematisation of scientific concepts, theoretical and empirical studies of foreign trade convergence, with emphasis on frequently applied methods and approaches for analysing the real and structural convergence of exports and imports;
- By selecting and applying certain methods of descriptive and index analysis to study the structural peculiarities of foreign trade, to identify commodity groups in Bulgaria's exports, on which Bulgaria has reached a coincidence, approximation or there are differences with the reference values of similar structural parameters of the Euro area exports.

In the study, traditional methods of analysis and synthesis, induction and deduction, methods of descriptive and partly comparative analysis, structural σ -convergence methods are applied. Primary statistical information, calculated from the author's derivative indicators and indices based on the Eurostat database, are used. In the second empirical part of the survey, commodity groups in the exports of Bulgaria and the Euro area, according to the Standard International Trade Classification (SITC), Rev. 4. are subdivided. Some comparisons of the

basic parameters of Bulgaria's foreign trade, the Euro area and the EU member states of CEE have been made. It covers the period 2002-2018, for which Eurostat data on an annual basis, on all foreign trade indicators are available.

1. Empirical Studies and Applied Methods

The developed convergence models contain capabilities to apply different methods and indicators to determine the degree of convergence achieved in foreign trade. Each of these methods has specific cognitive abilities, capacity to reveal specific aspects of the real achieved convergence.

In the context of the development and complication of convergent models, the relationship between economic and trade convergence, applied approaches, methods and indicators for foreign trade, a brief systematisation of theoretical and empirical research can be presented.

The role and the importance of the achieved degree of trade openness are highlighted and taken into account in the concept of conditional convergence. Accordingly, when verifying the availability of β -convergence, three indicators can be included in the models as additional variables – the foreign trade ratio (foreign trade as a percentage of GDP), the export ratio (exports as a percentage of GDP) and the import ratio – represented by imports as a percentage of GDP (Marinov, 2006; Pirimova, 2019a). A similar model is constructed and tested empirically, for example, by Rudenko and Zinkovskaya (2015). They've included in their model variables, such as the average value of the foreign trade ratio and the geometric average growth rates of exports of goods and services of the studied economies. In fact, many more variables are involved in this model, accordingly to its main aim in measuring the degree of internationalisation of national economies (see more Pirimova, 2019b). The results suggest that countries with higher FDI inflows and export growth also achieve higher GDP per capita growth rates. This is especially true for developing countries, which are ahead of the growth rates of the higher developed and wealthier countries. Similar conclusions have been reached by Dollar and Kraay (2004) when applying different methods. Despite some criticism of the approaches of these studies (Howard, et.al, 2002; Rodrik, 2000), they have been able, through various methods, to detect a convergence in the economies and foreign trade of a wide group of countries in the world. In addition, the methods for analysing the structural σ -convergence of economies are being improved, which provide certain possibilities for analysing the structural convergence of exports (for example, by applying the dissimilarity index of J. Von Hagen and J. Traistaru (2005) and the C. Van de Coeving divergence index (2003).

In a group of models focused on the two-way causal relationship between international trade and convergence, the Granger causality and cointegration approach is applied. For example, using this approach, Jianhong Zhang (2006) confirms the previously formulated hypothesis that the long-term and causal relationship between trade and cohesion depends on the stage of development of the concerned countries. For the EU, ASEAN and NAFTA countries, Jianhong Zhang comes to two main conclusions. For countries with low levels of development, cause and effect are two-sided, but trade causes differences and diversity leads to trade. For the higher developed countries, causality is also proven and is bilateral, but trade

causes cohesion and cohesion leads to trade. This confirms, in the long run, the manifestation of two earlier dominant conceptions on trade – of Krugman (1979) and Helpman (1981). According to their conclusions, the similarities in income (GDP) between two countries provoke an increase in trade if conditions of monopolistic competition exist and economies of scale are realised. The Granger-causality approach is applied to determine the direction of the causal relation between income and trade convergence also by Teresa Cyrus (2004). She argues that the income gap has a slowing effect on trade, but her conclusion about whether and to what extent trade contributes (to widening or narrowing income differences) is not emphatic. These results are influenced by the large-scale study (1965-2000), the data used at five-year intervals, the large number (56) of countries with different degrees of development (part of the OECD countries as well as countries in Africa, Asia and Latin America).

Applying other approaches and methods to similarly ambiguous conclusions about the role of trade in convergence, also reaches Iader Giraldo (2016). He draws up and investigates a model of endogenous economic growth in an open economy, with a home market effect (HME) and non-homothetical preferences. The model results show trade's contribution to the convergence of economic growth only when it takes place between similar countries. If there are too many differences between countries (they are asymmetric), the opposite is proven – trade leads to divergence, it can even become a source of poverty or induce a so-called „growth drop“. The assumption that convergence leads to increased welfare for all trade partners is not confirmed – it is valid for the largest country, but not for its smaller and less developed trading partner. The author emphasises these different effects and distinguishes them from the one-type effect of international trade for the welfare of all countries, which is the usual result of research in a static context, with the preferred CES (constant elasticity of substitution).

Identical methods and similar models of economic growth are constructed and applied in the research of Ben-David (1996) and Guillaume Gaulier (2006). However, their results do not match. According to Ben-David (1996), the probability of convergence is higher for groups of countries with large trading partners than for groups of arbitrarily selected countries. Focusing on assessing the sustainability of this result, Guillaume Gaulier (2006) argues that trade integration alone does not lead to convergence. He does not reject the link between trade and β -convergence, but does not find evidence that trade causes σ -convergence.

Regardless of their specific results, objectives and points of reference, applied methods, studied country groups and other features of the multitude of analyses on the connection between convergence and trade, they can all be considered as the starting point for more in-depth researches. They are being developed in the areas of structural convergence. In this respect, the development of perceptions and models focuses on the presence or absence of convergence in the structures of economies, and in particular in the export and import of goods and services. In this context, the degree of correspondence between the commodity/product structure of exports is considered and sought, which can be implied as a sign of convergence because it contributes to greater similarity in the dynamics of aggregate production (GDP). As Alina Alexoaei and Raluca Robu (2018, p. 2) note, “structural convergence can be achieved after completing the following three processes: the degree of

similarity of economic structures, synchronisation of business cycles and trade integration (foreign trade)”.

In the structural convergence models, various other methods are applied, as well as combinations of several econometric methods, in accordance with the goals and objectives of the analyses. Part of this group of models focuses on similarities in the economic structure or in separate sectors, and other part concentrate on the structural aspects of foreign trade convergence.

For example, to measure the similarities (and differences) in the commodity structure of exports and imports of a study group of four countries (Serbia, Romania, Bosnia and Croatia) in the period 2000-2009, Goran Nikolić (2011) applies cosines and the Finger-Kreinin (1979) method. In addition, Goran Nikolić also used the Bray-Curtis Index (1957) to measure similarity. These methods make it possible to outline the specialisation of production and exports, in which more complex products or products with less processing are predominant. On this basis, Goran Nikolić makes summaries for realising economic growth of different quality. According to him, the quality of growth is improved if more significant growth of exports is realised and at the same time the coefficients of similarity increase. Conversely, when growth in exports is accompanied by a reduction in the coefficients of similarity, growth is achieved by resource-intensive products and is of lower quality.

The Finger-Kreinin (1979) method is also used in a comparative analysis of the export similarity index between China and the EU by Pei-Zhi Wang and Xiao-Jing Liu (2015). The obtained index values for the period 2007-2013 show a high level of similarity in exports of China and the EU with exports to the markets of the developed countries, which causes intense competition for export products. In the developing countries, the index tends to decline in value, which is a sign of weakening their trade competitiveness and strengthens the complementarity of trade between the two countries.

Luca De Benedictis and Lucia Tajoli (2007) also apply Bray-Curtis's (1957) semimetric method, which examines the similarity of trade structures between four CEE countries and the EU15, with regard to the EU market. In order to compare export flows, they calculate in particular correlation indices and distance metrics. Through them, they express how the commodity composition of a country's exports has changed over time, as well as in regard to the commodity composition of EU exports. In summary, they emphasise that changes in the overall pattern of exports of countries in transition and greater economic integration in terms of trade flows and manufacturing trade do not always lead to greater similarities in exports.

Using several methods that require a broader set of indicators, a study by Güzin Erhat and Seda Ekmen (2009) differs. They calculate and analyse three similarity indices. The first is the Export Similarity Index (ESI), which they calculate according to the methodology of Finger-Kreinin (1979). Simultaneously they also calculate a product similarity index (PSI) and a price similarity index (PRSI). This study covers a large group of countries, including Bulgaria, using absolute data for exported products up to the 5-digit level, according to SITC Rev. 3. The focus is on Turkey's exports; therefore the “export similarity” between Turkey and other competing countries is measured, both for the industry as a whole and for each sector separately.

In the results of Güzin Erlat and Seda Ekmen make an impression those related to the similarities or differences in exports of Bulgaria and Turkey. According to the values of the ESI index, the greatest similarity between the two countries is found for the commodity group “other industries”. Similarities between Turkish and Bulgarian exports in the commodity groups of the „drinks and tobacco products“ are also being proven, as it has grown over the years. The PSI index values, however, show a similarity between Bulgaria and Turkey in terms of labour-intensive products, which has increased in recent years. According to the results for the third PRSI index, Turkey and Bulgaria have similarities in products for which Turkish exports have higher prices and therefore Bulgaria would be preferred as a foreign trade partner. In their summary, Güzin Erlat and Seda Ekmen rank Bulgaria among the countries that are Turkey’s main competitors in the export of products to the EU-15 (along with Poland, the Czech Republic, Slovakia and Slovenia).

The ESI export similarity index has also been applied in a number of other studies, such as those of Derado (2007), Benedictis and Tajoli (2007), Crespo et al. (2004), Caetano et al. (2002), Kreinin and Plummer (2007), Langhammer and Schweickert (2006) and others. This index makes it possible to assess the similarities or differences between countries in terms of the commodity composition of their exports, as well as the effects of regional integration. It is based on the share of each product in the total exports of each country and is calculated as the sum of the minimum value for each product. The PSI and the PRSI price index were developed by Antimiani and Henke (2007) on the basis of the G-L index proposed by Grubel and Lloyd (1971). Through the PRSI index can be compared the export prices of industrial products of one country with those of other countries. The inclusion in comparisons of price-related indicators, connected with differences in technology, and the product composition of exports is also a feature of the study by Andreas Joseph and Chiara Osbat (2016). For the period 1995-2013, the G-L Similarity Index of Grubel and Lloyd (1971) is applied by the World Bank, which publishes data for this indicator to determine the degree of similarity in the trading structures of two economies. The index is calculated at the three-digit level, according to SITC Rev. 3, and ranges from 0 to 1. A value close to 1 reveals a greater similarity of trade structure between two countries or two groups of countries (see the similarity in merchandise trade structures of exports, Worldbank, 1995-2013).

Several methods for examining export specialisation and its relation to the convergence have been applied by Ville Kaitila (2013). Through the Herfindahl-Hirschmann index is determined the degree of export specialisation of EU countries and the added value of the industry. The Finger and Kreinin (1979) similarity index is used to measure the degree of structural similarity. This study has a more specific and broader focus as it also includes the convergence of GDP growth rates, which are comparable to similarities in exports. The analysis includes EU 27 countries, 10 CEE countries and Euro area countries, from the 1980s to 2012. Some results from the empirical analysis of Ville Kaitila (2013) also apply to Bulgaria and relate to the following parts of this analysis. Thus, according to Ville Kaitila, exports to the EU-15 (then the Euro area) were more specialised before the introduction of the euro and less specialised thereafter. At a more disaggregated product level, EU-15 exports are more specialised after the introduction of the euro. Most CEE countries generally have low levels of specialisation. For Bulgaria (as well as Malta, Greece and Luxembourg), a conclusion is drawn about relatively higher specialisation at the product level. The export

structures are more similar in the period before the crisis of 2008-2009, but the similarity in the added value of the industry is diminishing after it.

In the development of theoretical models and empirical analyses, the application of a wide variety of methods and structural indicators for foreign trade, according to the purposes of the analyses and the specific degree of disaggregation of exported and imported products, stands out.

2. Descriptive and Empirical Analysis of Structural σ -Convergence of Bulgarian Exports

Methodological parameters

In the subsequent empirical analysis, the summaries, applied methodology and indicators in the interpreted set of scientific concepts and empirical models of real and structural convergence in foreign trade are taken into account.

The geographical scope of the empirical study is consistent with a pre-set focus on Bulgaria and the Euro area countries (as a whole), while the Euro area data are considered as referent values. In addition, separate comparisons with other Central and Eastern European (CEE) countries that are members of the EU are made. The CEE countries are subdivided into two groups – Euro area member states and non-euro area countries and include 11 EU countries – Bulgaria, Czech Republic, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia and Slovenia. These countries join the EU at the latest – in the last three enlargements of the EU in 2004, 2007 and 2013. Five of these countries have introduced the euro – Estonia, Latvia, Lithuania, Slovakia and Slovenia, while the other six countries (including Bulgaria) use their national currency. This further subdivision of the CEECs into two subgroups is intended to show whether there is an impact from the introduction of the euro on foreign trade flows and on its structural convergence with the Euro area countries.

The time span of the empirical analysis is within the period 2002-2018. It is determined by the availability of annual data for all necessary indicators and surveyed groups of EU countries included in the Eurostat statistics database. This period avoids the methodological problems associated with the revaluation according to the ESS, covers the whole period (without interruption) and divides it into two subperiods – before and after the last global crisis. In descriptive and σ -convergence analysis, only annual data for the selected indicators are used. In order to determine the magnitude of some of the indicators pertaining to individual groups of countries and to the reference group of Euro area countries, it was necessary to make own calculations based on primary Eurostat data.

The selection of appropriate indicators is based on the formulation and introduction of several specific goals and objectives for empirical analysis. They follow the already distinguished stages and the logic of constructing, extending the covered indicators and complicating the methodology applied in the empirical models and revealed in the first theoretical part of the study.

The intensity of foreign trade of Bulgaria, CEE countries and the Euro area is initially examined. It is revealed on the basis of the parameters (values) and the peculiarities in the dynamics of the export (and import) of goods and the foreign trade balance. The dynamic characteristics are derived by comparing the start and end years of the period, the rate of change (increase or decrease) of exports and imports of goods, on the basis of 2015. This allows us to identify realised expansion (or restriction) of foreign trade flows, such as a sign of a possible deepening of integration processes with a closer linking of the foreign trade of the CEECs, the EU and the Euro area during the study period. The greater similarity (or differentiation) in the rate of change of the foreign trade flows of Bulgaria, the CEECs and the Euro area can be considered as one of the initial prerequisites for achieving greater convergence or divergence, in the field of foreign trade and in the economies of these countries.

The assessment of achieved foreign trade convergence also requires a calculation of the relative share of exports in GDP, i.e. the export ratio, and the relative share of imports in GDP, i.e. the import ratio. The interpretation and comparison of the results obtained in the three groups of countries take into account the degree of openness and interconnectedness of the economies. At the same time, these indicators are also applied in the framework of the subsequent structural σ -convergence analysis, decomposing and presenting them in separate groups of goods.

In connection with the convergence of the structural parameters of foreign trade, we summarise, analyse and compare another set of indicators. These include the value of exports and imports by commodity groups, with an appointed degree of disaggregation; the relative shares of exports by commodity groups in the total value of exports of Bulgaria and the Euro area countries as a whole. The study applies export/import commodity structure according to the Standard Foreign Trade Classification (SITC), Rev. 4. This data is also used in many other studies, which facilitates comparisons of the obtained empirical results.

The conclusions of the descriptive analysis are supplemented and refined after performing an additional analysis in which σ -convergence methods are applied. To characterise structural convergence in the field of exports, we use a modified type of dissimilarity index by J. Von Hagen and J. Traistaru (2005) and the divergence index by C. Van de Coeving (2003). As a rule, they are used in structural convergence analyses of GDP, but after some adjustment, they can also be applied to structural convergence analyses in foreign trade.

First, we apply the basic formula of J. Von Hagen and J. Traistaru (2005), which is subject to partial modification. In their original form, they calculate a dissimilarity index (DISSIM) to represent the structural divergence or convergence of the economy of one country to the Euro area. To this purpose, J. Von Hagen and J. Traistaru compare the relative share of each economic sector in a country's gross value added with the share of the same sector in the Euro area GVA. This index is adapted to structural convergence in exports, whereby the equation retains its general form:

$$\text{DISSIM}_{nx} = - \sum | E_{nx} - E_{EZx} | \quad (1)$$

where, however, data are now being entered and used as follows:

E_{nx} is the relative share of a commodity group x in the exports of the respective EU country n , in the case of Bulgaria;

E_{EZx} is the relative share of the same commodity group x in Euro area exports (EZ – country reference group).

Second, we also calculate the divergence index (DIV) proposed by C. Van de Coeving (2003). In its original form, this index is determined by the formula:

$$DIV_{nx} = - \sum \frac{(E_{nx} - E_{EZx})^2}{E_{EZx}} \quad (2)$$

where, after adjusting to the structural convergence of exports, the values explained in formula (1) for E_{nx} and E_{EZx} are applied.

The Dissimilarity Index and the Divergence Index are calculated for Bulgaria, for each of the seven commodity groups classified in the SITC, Rev. 4, for each year of the research period 2002-2018. In addition, the aggregate values of the two indices for Bulgaria's exports as a whole, for each year were calculated and summarised. For ease of interpretation, the specific index values are presented in absolute value, summarised in tables and illustrated with graphs.

When interpreting the significance of the results obtained, it is borne in mind that when the Dissimilarity index (DISSIM) of J. Von Hagen and J. Traistaru accepts higher values, there is a higher degree of structural distinction, i.e. there is more limited similarity and convergence. Conversely, lower values of the DISSIM index, which tend to zero, are indicative of greater convergence (or identity at DISSIM=0) of exports of a particular commodity group from Bulgaria to exports of the same commodity group from the Euro area as a whole.

Concerning the second divergence index (DIV) of C. Van de Coeving, the conclusions are similar, also taking into account several cases of its values obtained. If $DIV_{nx}=0$, the relative share of the respective commodity group x in Bulgaria's exports changes similarly to that in the Euro area. The lower absolute value of the index is indicative of a higher structural convergence of the country's exports to that of the Euro area. If the value of the index is higher, there are more significant differences, there is divergence rather than convergence in the commodity structure of Bulgaria's exports to the reference group of Euro area countries.

Descriptive analysis for Bulgaria

In the context of convergence or divergence in foreign trade, the values and dynamic characteristics of Bulgarias' (and CEECs') exports, imports and foreign trade balance can be compared with the same indicators for the Euro area reference group of countries.

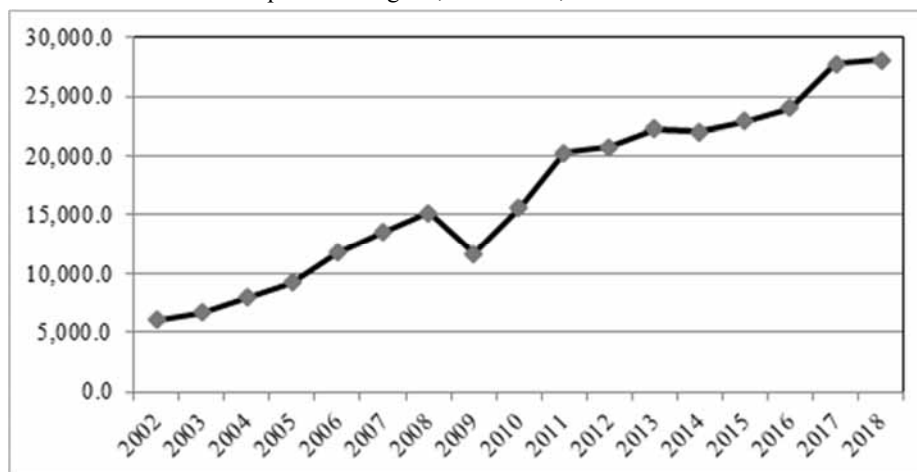
Bulgaria's foreign trade with countries from Europe and the world has increased significantly over the past years. This shows a comparison of exports and imports of goods in the first and in the last year of the period (2002-2018). Both exports and imports have fallen sharply during the crisis in the Bulgarian economy in 2009. Over the remaining years, though inconsistent and uneven, flows of exported and imported goods have increased. As a result,

more realised gains are accumulated and by 2018, the export of goods is more than 4.5 times higher than its value at the beginning of the period, amounting to EUR 28 095,7 mln. Imports were maintaining similar dynamics, rising to more than 3.8 times in the whole period and reached to EUR 32 104.7 mln. However, imports are growing faster and exceeding exports of goods, according to Eurostat data, the Bulgarian trade balance is negative throughout all years. This balance has a negative, retarding effect on GDP growth, including hence on the convergence in growth dynamics (see Pirimova and Peshev (2018); Pirimova (2019)). More significant differences in export and import values can be seen in the years immediately before and after 2007. This can be attributed to the accelerating impact of the intensive preparation, the initial signals for Bulgarian accession to the EU and subsequently the already realised membership of the country in the EU. Due to Bulgaria's deepening involvement in the integration process, a closer linking of Bulgarian foreign trade with other EU countries after 2007, we can expect a relatively greater similarity with the dynamics of export and import flows of other European countries through the second half – after the middle and towards the end of the period under review.

Comparison of Bulgaria's exports (Figure 1) with those of the Euro area reference group of countries (Figure 2) shows a relatively large similarity in the aggregate dynamics. But at the same time, there are differences in the pace of the gains and mainly in the trade balance.

Figure 1

Exports of Bulgaria, 2002-2018, EUR million



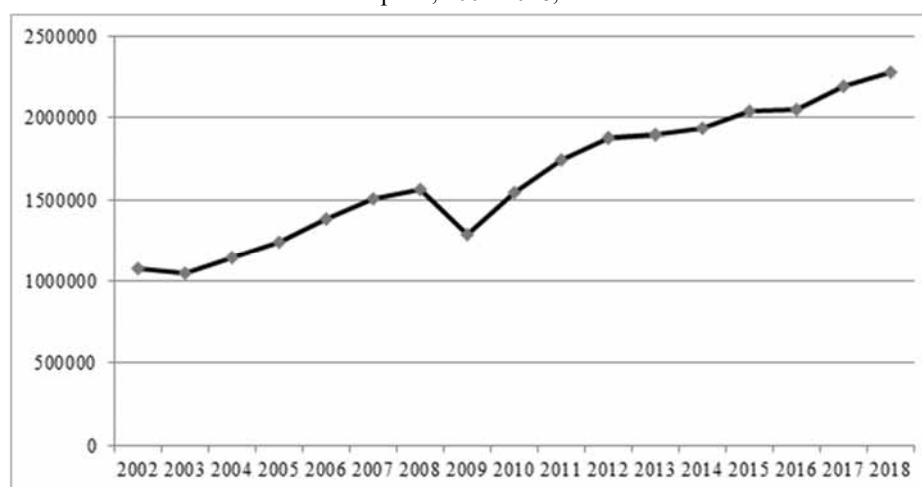
Source: Eurostat data; own calculations.

Over the same period, the foreign trade variables of the Euro area countries also have increased. In summary, the growth in exports and imports in the Euro area is more limited (compared to that of Bulgaria). However, this estimate is only valid for the percentage change in foreign trade flows, since they show a significant increase in absolute terms. Exports and imports of these countries have increased about 2 times, reaching respectively EUR 2 282

900.2 mln (for the exports) and EUR 2 087 824.7 mln (for imports) by 2018. After 2012 and until the end of the period, the trade balance of these countries is positive. Although in previous years it is characterised by fluctuations and even a negative sign within a certain number (six) of years. This arranged the exports of goods among the main (external) sources of growth in the Euro area in recent years. Both flows of exported and imported goods fall through the crisis in the higher developed countries of the Euro area in 2009 (which coincides with the crisis in Bulgaria). Exports overcome the crisis faster and recover, showing steady growths until the end of the period, while the dynamics of imports remain divergent.

Figure 2

Euro-area exports, 2002-2018, EUR million



Source: Eurostat data; own calculations.

Comparison of the indicators of exports and imports of the Euro area countries with those of Bulgaria in the second subperiod (2010-2018) demonstrate specificity and differences, and some lagging of Bulgaria from the trends of convergence. Exports and imports of goods in Bulgaria are growing at a higher pace than those in the Euro area, but they can be explained from a formal point of view, with differentiated scales of their absolute parameters being significantly smaller for Bulgaria. Imports of goods are increasing at a higher pace than exports. Accordingly, the foreign trade balance remains negative, even the gap is growing over the last two years of the period under review. The relative share of Bulgarian exports in the total exports of the Euro area countries amounts to only about 1%, while, for example, Poland's exports are almost 10% of that of the Euro area for 2018. Certain positive importance and impact can be attached to the predominance and concentration of a major part of Bulgarian foreign trade flows with the EU and the Euro area countries. For example, in 2018, 68.6% of Bulgarian exports and 64.6% of Bulgarian imports are related to trade with EU countries, which, in addition to the growing and high degree of trade openness of the

Bulgarian economy, is sometimes regarded as a sufficient sign of convergence (Kaneva, 2018, p. 82).

Some conclusions about Bulgaria can also be made on the basis of comparisons of the characteristics and dynamics of foreign trade of Bulgaria and the countries of CEE.

Growth in foreign trade flows is also characteristic of the other 10 CEE countries that are members of the EU. With regard to the balance of trade, they establish specificity. In four of these countries, the balance was positive at the end of the period, with its previous negative sign being overcome at different times – exports began to permanently exceed imports of goods in the Czech Republic since 2005, in Hungary – since 2009, and most recently later in Slovakia and Slovenia – since 2012. For the most part of the period and for 2018, Poland's trade balance is also positive (excluding three years – 2015-2017). Thus, a total of six CEE countries – Bulgaria, Estonia, Croatia, Latvia, Lithuania and Romania – remain with a negative trade balance for all years of the period, including the last one. The contribution of the introduction of the euro to achieving a preponderance of exports over imports in the CEECs is not clear and unambiguous. As in three of the latter separate group of countries (namely Bulgaria, Croatia and Romania), the national currency is still used, while in the other three (Estonia, Latvia and Lithuania), the euro is introduced. It can be argued that in these six countries, the effects of others, and especially of specific internal (national) factors, prevail. It is likely that the commodity structure of their foreign trade flows is not sufficiently optimised – which differs and diverges from the commodity structure of exports and imports of the Euro area countries as a whole. If the differences in this structure are prevalent, it is a sign of moving away from the achievement of real convergence. This could also be attributed to the still unsatisfactory degree of involvement of the six countries in the real integration of their economies with the Euro area and the EU.

According to data, the trade openness of all CEE countries, as measured by the export prism, has increased in 2002-2018. It exceeds the increase in exports to the Euro area countries. While exports from the 11 CEE countries have increased nearly 4 times, Euro area exports are 2 times higher. As a result, from 8.4% in 2002, CEE exports amounted to 18.5% of the Euro area countries' exports in 2018. Slovakia and Romania have contributed most to this, reaching the highest relative shares (over 10% and 8.6% respectively) in the CEE exports in 2018. The contribution of Bulgaria's exports is smaller – only about 3.6%, but it can be attributed mainly to the different dimensions of the economies of these three countries. The simultaneous effects of internal and external factors have a greater impact on the export flows of the CEECs. In particular, these are the market transformations and their effects, along with the accession to the EU and the deepening involvement in integration processes. Although part of the Eastern European countries (five of them) belong to the Euro area, apparently, their more intensive export flows did not have a sufficiently stimulating and decisive influence on export trends in the Euro area.

Some similarities, but also differences, can be deduced in terms of the commodity and geographical structure (within CEE countries) of the exports of the two compared groups of countries. They have a starting importance for a stronger or slighter structural convergence in foreign trade.

When calculating the relative shares in the exports of the seven commodity groups (according to SITC, Rev. 4), an identical leading position is established for two of them simultaneously in the exports of the CEECs and the Euro area. Exports of „machinery and transport equipment“ and „other manufactured goods“ account for the largest relative share of exports of goods in the CEECs and in the Euro area countries. However, their shares are higher for the Euro area (38% and 25% respectively) and smaller for the CEE countries (22.4% and 21.8%, respectively). The data clearly shows the large difference of almost 13 percentage points in the group of “machinery and transport equipment”, while for “other manufactured goods” it is more limited and amounts to only about 1,4 percentage points. Such commodity characteristics of exports are indicative to a certain extent of the specifics of the sectoral structure of economies, of the superiority and competitiveness of the types of production carried out in the Euro area and the CEECs. On the other hand, the least represented in exports of the Euro area are “commodities and transactions not classified elsewhere in the SITC” (1.2%), followed by „raw materials“ (3%) and “mineral fuels, lubricants and related materials” (5.9%). This creates some opportunities for more exports of these three product groups from the CEE countries – which have been used to some extent, as the results of their comparison show. Because in the exports of the CEE countries, these three commodity groups occupy a relative share of 6.8%, 20.6% and 13%, respectively. It should also be noted that during the period, all commodity groups in CEE exports registered a significant increase – the largest being more than 6 times for “food, drinks and tobacco”; more than 5 times for “chemicals and related products, n.e.s.”; almost 5 times for „machinery and transport equipment“, between 4 times and 3 times for other product groups. Geographically, by relative share, Poland’s exports ranked first in the CEE countries in the first six commodity groups, Czech Republic ranked first in “commodities and transactions not classified elsewhere in the SITC”. The Czech Republic ranked second on three of the product groups, Hungary on two, and Romania on the other two. The most expressed is Poland’s leading position in the “food, drinks and tobacco” group (7.7% of CEE exports as a whole), also in the „raw materials“ – where its relative share is smaller (4.3%), but with a considerable preponderance over other CEE countries.

Bulgarian exports account for about 0.7% of the Euro area countries exports in 2018. This is mainly due to the smaller scale of the Bulgarian economy, rather than to a limited volume or unfavourable dynamics. The arrangement of the separate commodity groups in Bulgarian exports is about the same as in the CEE region and in the Euro area, but of course with different relative shares. The most represented in the Bulgarian exports in 2018 are the group of „other manufactured goods“ with a share of 36.6% and the group of “machinery and transport equipment”, whose share amounts to 22.7%. On third place with a share of 11.7% are “food, drinks and tobacco”, the other commodity groups have smaller shares (from 10% and less than 10%). With the lowest relative share of 2.8% in Bulgarian exports is the group of “commodities and transactions not classified elsewhere in the SITC” and in the penultimate position with a share of 7.6% are “raw materials”. The comparison between Bulgaria and the CEE region shows that in three of the commodity groups, higher relative shares in Bulgarian exports in the last 2018 compared to the CEE as a whole are achieved – these are the groups of “other manufactured goods”, “machinery and transport equipment”, “chemicals and related products, n.e.s.”. In one large part of the types of goods, these three

groups are dominated by those with higher added value, which can be considered as a positive trend, with a greater contribution to the growth of Bulgarian exports.

Therefore, it is found from the descriptive analysis that over the period, more similar tendencies have developed in the dynamics of the studied indicators for Bulgaria and the Euro area, while maintaining some national and regional specifics. For Bulgaria (and for the CEE countries as a whole), the export variables demonstrate signs of gradual convergence, with some minor differences in the dynamics by individual years. There are more differences in the foreign trade balance due to the lower similarity in imports. In Bulgaria, imports of goods are increasing at a faster pace than exports in most years of the period. Among the main reasons for this are the increasing imports of both consumer goods and raw materials, components of products with a higher degree of processing. They are influenced by the dominant in the period consistent increase of incomes and purchasing power of Bulgarian households for Bulgarian and foreign goods, the increase of production and the need for more domestic and imported raw materials, the increase of income and profits of the companies in the conditions of more sustainable economic growth.

Structural σ -convergence of Bulgaria's exports to the Euro area

An additional empirical analysis of the structural convergence/divergence of Bulgaria's exports to the exports of the Euro area was performed on the basis of the adapted variants of equations (1) and (2). Eurostat data and additionally calculated relative indicators for Bulgaria and the Euro area exports, for seven commodity groups, based on the SITC, rev. 4. were used. The commodity groups are: 1) food, drinks and tobacco; 2) raw materials; 3) mineral fuels, lubricants and related materials; 4) chemicals and related products, n.e.s.; 5) other manufactured goods; 6) machinery and transport equipment; 7) commodities and transactions not classified elsewhere in the SITC.

The values of the dissimilarity index (DISSIM) and the divergence index (DIV) for the Bulgarian exports of the seven commodity groups compared to those for the Euro area, for each year in the period 2002-2018 were calculated. The values of the indices are presented in absolute values. They are summarised in Table 1 and Table 2 and illustrated with graphs in Figure 3 and Figure 4. The values of the indices allow to achieve certain conclusions about the real convergence or the presence of divergence.

In cases where the values of the indices are smaller and closer to zero, this is a sign of lower divergence and, therefore, higher structural convergence to the Euro area. If the indices are of greater or different value for Bulgaria and the Euro area, the differences prevail, i.e. there is a divergence in the exports of the respective commodity groups from Bulgaria compared to the Euro area. This interpretation makes it possible to highlight more clearly the commodity groups in respect of which a larger, respectively smaller, similarity has been achieved or a specificity and difference with the Euro area benchmarks are still available.

In addition to the annual indices for each of the seven product groups, summary indices for Bulgaria's exports for each year have been calculated. On the basis of the aggregated DISSIM and DIV indices, the general tendency in the structural convergence of the Bulgarian exports as a whole to the exports of the Euro area is derived.

Table 1
Dissimilarity index (DISSIM BG) by commodity groups for Bulgaria's exports to the Euro area, 2002-2018 (by absolute value)

Year/ Index	DISSIM BGF	DISSIM BGR	DISSIM BGMI	DISSIM BGCH	DISSIM BGO	DISSIM BGMA	DISSIM BGCO
2002	0.02681	0.03642	0.0302	0.07356	0.22219	0.29893	0.05702
2003	0.00695	0.03522	0.02522	0.07694	0.26311	0.28866	0.03524
2004	0.01429	0.03503	0.0461	0.08867	0.26115	0.2933	0.02674
2005	0.01298	0.0408	0.05877	0.08051	0.23239	0.2606	0.00285
2006	0.0004	0.04574	0.08232	0.09251	0.23289	0.25948	0.00768
2007	0.00157	0.03978	0.09625	0.08359	0.20195	0.24718	0.00473
2008	0.02184	0.04017	0.09828	0.07896	0.15354	0.22784	0.00604
2009	0.0425	0.05084	0.07618	0.10264	0.14425	0.20168	0.00864
2010	0.0441	0.06214	0.07523	0.0959	0.1239	0.2009	0.00766
2011	0.0308	0.07455	0.06682	0.09227	0.12316	0.19489	0.00722
2012	0.03653	0.06311	0.08466	0.08971	0.1113	0.19544	0.00928
2013	0.04688	0.06284	0.07121	0.09201	0.10172	0.18206	0.00751
2014	0.03816	0.05301	0.05655	0.08261	0.11085	0.17342	0.0015
2015	0.03653	0.04857	0.05018	0.07831	0.11098	0.17628	0.00853
2016	0.03986	0.04972	0.04163	0.07633	0.1008	0.17486	0.01938
2017	0.02511	0.0434	0.0424	0.07666	0.11396	0.17385	0.02584
2018	0.02994	0.04595	0.02659	0.0813	0.11357	0.15115	0.01661

Designations used:

DISSIM BG – Index DISSIM for Bulgaria

DISSIM BGF – Index DISSIM for commodity group "Food, drinks and tobacco"

DISSIM BGR – Index DISSIM for commodity group "Raw Materials"

DISSIM BGMI – Index DISSIM for commodity group "Mineral fuels, lubricants and related materials"

DISSIM BGCH – Index DISSIM for commodity group "Chemicals and Related Products, n.e.s."

DISSIM BGO – Index DISSIM for commodity group "Other manufactured goods"

DISSIM BGMA – Index DISSIM for commodity group "Machinery and transport equipment"

DISSIM BGCO – Index DISSIM for commodity group "Commodities and transactions not classified elsewhere in the SITC"

Source: Own calculations.

In the results and conclusions from the structural σ -convergence analysis, some similarities with the conclusions from the previous descriptive analysis stand out, but there are also differences between them.

The previous descriptive analysis highlighted the leading role in Bulgaria's exports in 2018 of three commodity groups. The largest relative share in exports have „other manufactured goods“, followed by „machinery and transport equipment“ and third are „food, drinks and tobacco“ (see Table 3). Commodity groups can also be ranked based on the results of the structural σ -convergence analysis. According to the values of both the DISSIM and DIV indices, Bulgaria has the greatest similarity with the exports of the Euro area in two product groups – „commodities and transactions not classified elsewhere in the SITC“ and „food, drinks and tobacco“. In the third place are two different commodity groups – according to the DISSIM index, these are “raw materials”, while according to the DIV index, they are “chemicals and related products, n.e.s.”. These several commodity groups show the highest relative resemblance to the similar groups for the Euro area, since in absolute terms, the indices are the smallest, tending to zero.

Table 2
Divergence index (DIV BG) by commodity groups for Bulgaria's exports to the Euro area, 2002-2018 (by absolute value)

Year/ Index	DIV BGF	DIV BGR	DIV BGMI	DIV BGCH	DIV BGO	DIV BGMA	DIV BGCO
2002	0.0090663	0.0513518	0.03053365	0.03594204	0.18176876	0.21105634	0.168024827
2003	0.0005992	0.0479864	0.01933866	0.03896889	0.2585311	0.19886538	0.056861612
2004	0.0026603	0.0450312	0.06280171	0.05106429	0.25381214	0.20639369	0.033506448
2005	0.0022081	0.0600736	0.07234841	0.04095445	0.20285896	0.16703731	0.00050108
2006	2.157E-06	0.0705139	0.12668877	0.05439586	0.19977073	0.16952406	0.003740165
2007	3.263E-05	0.0525033	0.18016458	0.04377726	0.1503384	0.15407765	0.001535546
2008	0.006015	0.0536446	0.146016	0.03933553	0.08953827	0.13564428	0.001921095
2009	0.0199014	0.0913324	0.10941539	0.0588776	0.08058581	0.10992601	0.00374747
2010	0.0229152	0.1201051	0.09454649	0.05251419	0.05997972	0.10966419	0.002541169
2011	0.0112425	0.1639924	0.0631083	0.04958794	0.05909454	0.10457342	0.002823857
2012	0.0155041	0.1215031	0.08802893	0.04666793	0.05023394	0.10587868	0.004592981
2013	0.0243678	0.1247667	0.06402606	0.04881698	0.04187526	0.09181674	0.00344323
2014	0.0162014	0.0923451	0.04517449	0.03919598	0.04907433	0.08196919	0.000136695
2015	0.0148502	0.0812623	0.04677749	0.03455294	0.04917969	0.08122814	0.004385829
2016	0.0172961	0.0874453	0.03849527	0.03295028	0.04036806	0.07872302	0.021183553
2017	0.0069855	0.0629953	0.03416496	0.03335844	0.05148213	0.07871402	0.045670698
2018	0.010294	0.0711149	0.01205093	0.03623932	0.05109188	0.0604608	0.023681725

Designations used:

DIV BG – Index DIV for Bulgaria

DIV BGF – Index DIV for commodity group "Food, drinks and tobacco"

DIV BGR – Index DIV for commodity group "Raw Materials"

DIV BGMI – Index DIV for commodity group "Mineral fuels, lubricants and related materials"

DIV BGCH – Index DIV for commodity group "Chemicals and Related Products, n.e.s."

DIV BGO – Index DIV for commodity group "Other manufactured goods"

DIV BGMA – Index DIV for commodity group "Machinery and transport equipment"

DIV BGCO – Index DIV for commodity group "Commodities and transactions not classified elsewhere in the SITC"

Source: Own calculations.

Table 3
Classification of commodity groups in Bulgaria's exports, for 2018

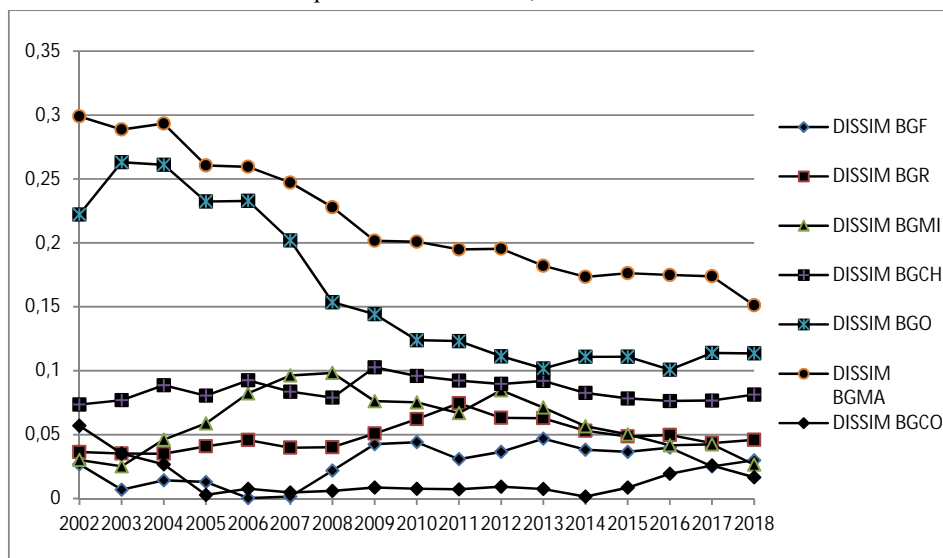
Position	By relative share of the commodity group in the export of Bulgaria (descriptive analysis)	By biggest similarity to the Euro area according to the DISSIM index	By biggest similarity to the Euro area according to the DIV index
1	other manufactured goods	commodities and transactions not classified elsewhere in the SITC	commodities and transactions not classified elsewhere in the SITC
2	machinery and transport equipment	food, drinks and tobacco	food, drinks and tobacco
3	food, drinks and tobacco	raw materials	chemicals and related products, n.e.s.

Source: Eurostat; own calculations.

The graphically depicted results (in Figure 3 and Figure 4) for the DISSIM and DIV indices make it possible to identify clearly the similarities/differences and their peculiarities over the period.

In Figure 3, the DISSIM index lines for the three commodity groups with the biggest similarity to the Euro area, are the lowest, closest to the abscissa – as the DISSIM values tend to zero. Structural convergence is most pronounced for the group of “commodities and transactions not classified elsewhere in the SITC”. Their line develops as almost parallel and very close to the abscissa (almost coinciding with it) during the predominant part of the period. Relatively slight deviations from it were observed at the beginning and end of the study period. The lines of the DISSIM index for the other two commodity groups, which rank second and third in importance for the structural convergence of Bulgaria’s exports to the Euro area, are situated higher. But they also have a more smooth deployment, with relatively minor deviations. All three of these leading commodity groups do not present a pronounced impact of the 2009 crisis – it did not cause a sharp pull up or down of the curves in 2009, i.e. the main reasons for the relatively limited deviations in some years are other. Some widening of the gap with the Euro area has been observed since 2009 in the „food, drinks and tobacco“ product group and since 2011 in „raw materials“.

Figure 3
Dissimilarity index (DISSIM BG), by absolute value, by commodity groups for Bulgaria’s exports to the Euro area, 2002-2018



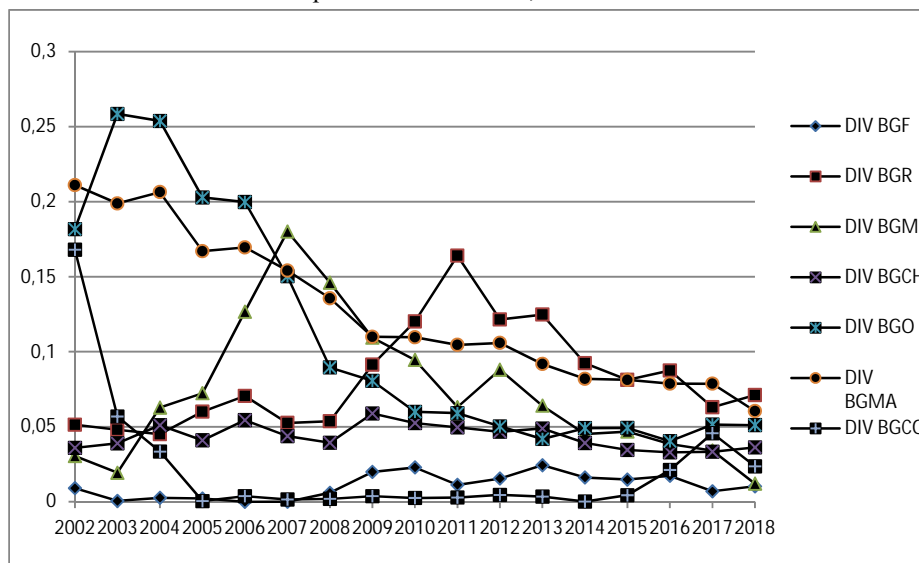
Source: Own calculations.

Regarding the commodity groups, for which the difference with the Euro area is greatest, is established specificity by years and subperiods. At the beginning of the period, there was a

marked difference, a weakest convergence in the product groups of “machinery and transport equipment” and “other manufactured goods”. The lines of their DISSIM indices are in the first years well above the DISSIM lines of the other product groups. At the same time, however, it is noticeable that their change over the years is characterised by a positive and consistent trend – narrowing the gap, gradually lowering it and bringing the lines closer to those of the other product groups. However, these two commodity groups continue to be at the top of the gap and divergence in 2018 (when they remain highest, above the lines of the other commodity groups).

According to the results for the Divergence Index DIV (see Figure 4), the largest divergence with the Euro area was found for “other manufactured goods” at the beginning of the period. Their line is then highest situated and even rises. However, since 2003-2004 it has started to go down sharply, the gap with the Euro area has been narrowed. After 2010, the index for this product group is changing more gradually, the line becomes lower, the index remains relatively low until the end of the period. Second in terms of divergence at the beginning of the period is “the machinery and transport equipment”. This second product group is characterised by a slower and more gradual descent of the index line until the end of the period.

Figure 3
Divergence index (DIV BG), by absolute value, by commodity groups for Bulgaria’s exports to the Euro area, 2002-2018



Source: Own calculations.

According to the DIV Index, for two of the product groups more negative trends are identified. Both groups of „raw materials“ and „mineral fuels, lubricants and related materials“ are initially distinguished by minor differences with the Euro area – their lines are

near the abscissa. Subsequently, however, they deepened – in 2009 and 2011-2012, their index lines rose sharply and rapidly. However, after these crucial years, their trend has reversed and the lines are declining, with achieving a relatively greater similarity to the Euro area for the group of „mineral fuels, lubricants and related materials“ at the end of the period.

Initially, the divergence indices of „other manufactured goods“ deteriorated sharply. Until 2006-2007, they remain the biggest difference with the Euro area. However, the trend of reducing the gap started from 2003-2004. It proved to be lasting, continuing until the end of the period.

According to the DIV results, two commodity groups indicates the most pronounced and consistent trend of reducing the difference with the referent values for the Euro area – these are „machinery and transport equipment“ and „other manufactured goods“.

Different trends develop according to the divergence index for the other commodity groups. For example, the group of “commodities and transactions not classified elsewhere in the SITC” starts the period with a very large difference, which is reduced later and approaches the Euro area referent values quickly. However, this continues until 2015, after which the gap widens again. With smooth deviations are highlighted “food, drink, tobacco”, which is also characteristic of the third category of „chemicals and related products, n.e.s.“.

Several conclusions can be made based on the values and graphs of the DISSIM and DIV indices. The lines of change during the period of the two indices reveal a clearly pronounced identical and downward trend. They contain signs of a gradual declining of the differences and a noticeable approximation to the Euro area referent values. This is a general characteristic of the indices of all commodity groups. Therefore, there are more structural differences in exports in the first years of the study period, which are reduced over time and at the end of the period. Thus, a tendency for greater convergence is achieved and emphasised. In the last few years and for 2018, closer values of Bulgaria’s export to the Euro area have been reached according to the DIV index, while regarding the DISSIM index, there are relatively higher deviations.

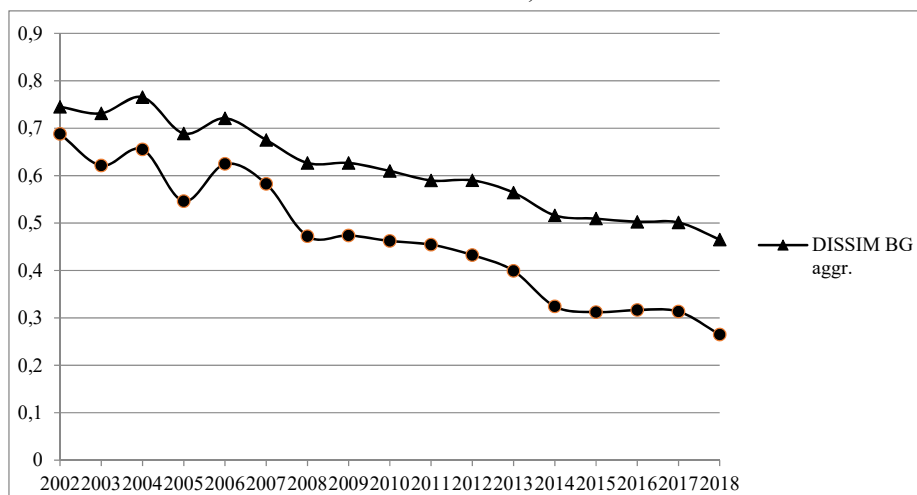
Along with the annual values of the dissimilarity index and the divergence index for the different commodity groups, aggregated indices of structural convergence of exports have been calculated (see Table 4). Based on the aggregated DISSIM index and the aggregated DIV index, resumptive conclusions about the trends in the dynamics of the general convergence in the structure of Bulgaria’s exports to the Euro area can be made (see Figure 5). They can be considered as indicative of the achievement of a certain structural convergence or the presence of divergence in Bulgaria’s exports. As shown in the table and figure, the values and therefore the conclusions of both methods and both indices are similar.

Table 4
Aggregated DISSIM and DIV Index for Bulgaria's Exports to the Euro Area, 2002-2018

Year	Aggregated DISSIM BG	Aggregated DIV BG
2002	0.74513	0.68774369
2003	0.73134	0.621151247
2004	0.76528	0.655269804
2005	0.6889	0.545981953
2006	0.72102	0.624635641
2007	0.67505	0.582429337
2008	0.62667	0.472114705
2009	0.62673	0.47378603
2010	0.60983	0.462266049
2011	0.58971	0.45442293
2012	0.59003	0.432409714
2013	0.56423	0.399112785
2014	0.5161	0.324097195
2015	0.50938	0.312236624
2016	0.50258	0.316461566
2017	0.50122	0.313371066
2018	0.46511	0.264933619

Source: Own calculations.

Figure 5
Aggregate structural convergence of Bulgaria's exports to the Euro area according to the DISSIM and DIV index, 2002-2018



Source: Own calculations.

As can be seen from Figure 5, the structure of Bulgaria's exports for 2002-2018 is not similar to that of the Euro area. The lines of both indices are located far above the abscissa. However,

there is a persistent process of reducing the differences (the two lines are descending downward), which is uneven. Until 2006, for both the dissimilarity index and the divergence index alternate years of deepening and reducing the discrepancies, with the average values of the two indices varying around 0.7 and about 0.6, respectively. From 2006 to 2015, the deviations from the average level for the Euro area marked a significant decline, as in 2014, DISSIM reached 0.51 and DIV – 0.32. Over the next three years, discrepancies with the structure of exports to the Euro area remained almost unchanged, which is more pronounced for DIV. In 2018, a new strengthening of the convergence process was registered, which is judged by the decrease in the indices of dissimilarity and divergence to 0.46 and 0.26, respectively.

The results for the yearly and the aggregated indices and the conclusions drawn from them can be used to concentrate measures in the field of stimulating the export of certain commodity groups from Bulgaria and increasing the contribution of exports to the structural convergence of Bulgaria to the Euro area.

Conclusion

As a result of the performed theoretical, methodological, descriptive and structural σ -convergence analysis, the structural characteristics of convergence in foreign trade and mainly in Bulgaria's exports to the Euro area were derived.

The systematisation of the theoretical and empirical models showed that there are opportunities for the application of a wide set of indicators for foreign trade, as well as similar approaches and methods for the analysis of economic and trade structural σ -convergence.

From the results of the descriptive analysis, it was concluded that the parameters of Bulgaria's exports contain signs of gradual and greater convergence with the exports of the Euro area. The trends in it were confirmed and specified by their structural features on the basis of the performed analysis of the structural σ -convergence in exports. For these purposes, adapted variants of the approaches and methods for the analysis of the structural σ -convergence of GDP, developed and used by J. Von Hagen and J. Traistaru (2005) and by C. Van de Coeving (2003), were applied.

From the analysis of the dissimilarity index (DISSIM) and the divergence index (DIV) for the period 2002-2018, it can be concluded that Bulgaria and the Euro area have a growing degree of export similarity and a relatively achieved convergent structure of exports. The convergence trend is more pronounced with respect to some of the product groups. The more important aspects, reasons, and prerequisites for these results are summarised and reduced as follows:

- 1) Bulgaria achieved its EU membership in 2007, and in 2009 was hit by the global economic crisis, simultaneously with the Euro area countries. In the post-crisis period, the countries have gradually recovered their economic growth, the import-export flows are intensifying again, Bulgaria has deepened and expanded its participation in the integration processes and trade with the EU and the Euro area countries. This leads to lower values of the dissimilarity and divergence indices, which indicate a greater

convergence in the export structure of Bulgaria and the Euro area by the end of the period. On this basis, competitive pressure has intensified, hence the need to raise the competitiveness of production, quality, technical and price characteristics of the goods involved in Bulgarian exports to the EU and the Euro area is increasing.

- 2) Bulgaria's export structure is not yet sufficiently optimised, hindering an increase in return on export and its transformation into a stable and lasting source of economic growth. This conclusion is based on greater similarity in lower processing and value-added products, which are more labour-intensive, while convergence in capital and technology-intensive products is lagging behind. This is illustrated by the several commodity groups that have the maximum resemblance to the Euro area, simultaneously according to the DISSIM index and the DIV index. In particular, they are the commodity groups „food, drink and tobacco“, „raw materials“, „chemicals and related products“, „commodities and transactions not classified elsewhere in the SITC“. Inducements for bigger production and export of higher value-added products – machinery and equipment, transport equipment, new technologies can lead to more significant effects on convergence, the total value of exports and economic growth.

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