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Analysis of export diversification development of the European Union and BRICS countries

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Abstract

Export diversification theory came to the fore in the second half of the twentieth century, in opposition to the classical and neoclassical theories of foreign trade. It defends the positive impact of trade diversification on the economic performance of a country. The question of how much big economies diversify their exports in the case of product groups and export destinations is answered in this paper. Three different indices are used, describing various features of export diversification in two dimensions using the unweighted and the study's own weighted approach to values. It is shown by the analysis that the EU has achieved the greatest long-term export diversification for both product and territorial diversification. The BRICS countries have increased their export position in the world economy through the intensive and extensive margin, but from the perspective of the Herfindahl–Hirschman index of diversification, they have experienced very different developments of product and territorial diversification.

Keywords

BRICS, European Union, export diversification, extensive margin, intensive margin, international trade.

JEL Classification: F10, F12, F14

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1. Introduction

A new perspective on the role of export diversification is provided in this paper. The relative difference in the classic measurement and evaluation approach to export diversification is examined using three indicators. The aim of this paper is to answer two questions: how much do big economies diversify their exports in the case of product groups and export destinations and how do the indicators change after adding weights? The goal is to undertake an evaluation of export diversification in the European Union (EU) and BRICS[1] countries during the period 1995–2012. The main hypothesis states that the EU will reach a higher level of export diversification than the BRICS countries. It is shown that the performance of developing countries is relatively weaker than that of developed countries, which are represented by the European Union. Evidence is provided that developing countries have increased their position in the case of the intensive margin because they have intensified and deepened their export relationships with the world. In contrast, the European Union has lost its position as the world's export leader. It is suggested by the research on the extensive margin that there is a similar diversification of exports of products and exports to the final destinations. Most economies target their exports to higher production concentration rather than diversification with their method of economic evolution.

Export diversification is described by economic theory as a change in a country's export composition with regard to its existing product mix or export destinations (Ali et al., 1991). It is actually the process of a country's offer of a wide range of its products to a wide range of countries. Export diversification can be measured in two dimensions. The first of them is *product diversification*. According to economic theory, it is expected that the more the developed country, the more it will diversify its exports. Developed countries usually diversify their exports among many products of all product groups. The process of product diversification is particularly important for developing countries. These countries are usually highly dependent on the exporting of several products, especially commodities that are highly sensitive to the development of the demand of their main trade partners and to the world prices. Other economic risks consist of high volatility and instability in the foreign exchange rates, which have an impact on other parts of the economy (for example, economic growth, employment, investment, cash flow, etc.) or political instability. A poor economic and political situation caused by a bad or low level of foreign trade diversification, which exists in developing countries, particularly in the least developed countries, can lead to civil unrest or civil wars (Samen, 2010).

Territorial diversification expresses a focus on as many export destinations as possible. This type of diversification is very important, especially within the political–economic perspective. A high level of dependence of domestic exports on a narrow number of business partners risks future instability in the domestic market. This type of diversification has similar consequences to product diversification. Developed economies achieve greater territorial diversification of exports than developing countries. Developed economies benefit from long-term business relationships and economic and trade dominance of their colonial past. Although most former colonies have gained political independence, their dependence on exports and imports of goods persists. In recent decades, developing economies have been trying to penetrate new markets, and in some cases, they have pushed the developed countries from their traditional export markets due to their comparative advantages. From the perspective of the world economy and the economic point of view, vast diversification of exports may even be necessary. Therefore, the countries have to maintain and develop their economic relations to face the external shocks that can damage their domestic economy. Geographic diversification is also important from the perspective of

[1] The BRICS countries are five countries (Brazil, Russia, India, China and South Africa) that have achieved considerable economic development and a rise of their influence on the global economy is expected.

imported and exported goods. Due to the international diversion of labour, each economy specializes in the production of a few types of products. This makes the whole world economy highly dependent on each part of the global value chains that are represented by companies in every country. An unexpected mistake in one part of the globe value chain causes a chain reaction that can jeopardize every dependent country through the export or import channel.

To highlight the importance of export diversification, three research techniques are used in this paper. Territorial and product diversification are monitored from three distinct aspects: (a) deepening existing relationships, (b) creating new markets or product chains and (c) the real value of diversification. The first part, deepening existing relationships, is examined by the intensive margin. The second channel, creating new markets or product chains, is observed in relation to the extensive margin. The Hirschman–Herfindahl index (Hirschman, 1964), which measures the dispersion of trade value across an exporter's products or destinations, is used to evaluate the real value of export diversification. The patterns of export diversification of the European Union and BRICS countries are examined using three different types of indices and two types of measurement: the classical unweighted approach and the study's own approach of weighted values.

The paper is organized as follows: in the second part, the literature and the theoretical view on trade diversification are presented. In the third part, the territorial and product structures of the EU and BRICS exports are described. The methodology and data are included in the fourth part. The results of trade diversification using the weighted and unweighted indices are presented in the fifth part, which is followed by the conclusion.

2. Literature review

The issue of export diversification reached the forefront of economic interest after the Second World War. In the period before the First World War, the functioning of international trade was inspired by classical and neoclassical economic theory. Trade relations were thus based on the specialization, barrier-free trade and comparative advantages of the countries involved in international trade. Since the 1950s, in connection with the collapse of the colonial system, the question of whether developing countries should increase the variety of their export basket or not began to be tackled (Samen, 2010). The first pioneers of these ideas were Prebish (1950) and Singer (1950). In their work, it was pointed out that the excessive dependence of developing countries on exports of a few commodities to several countries, which may have a negative impact on the macroeconomic stability of the country. More influence on the economic policy of the country began to be exerted by new trade theories. For example, it was expected by Dornbusch et al. (1977) that the more a country diversifies its exports, the more the volume of its trade increases. The focus of recent works has been on export diversification and its consequences, as well as on the causes of high or low levels of diversification, using many modifications of indicators. Diversification of exports using the extensive and intensive margins was described by Amurgo-Pacheco and Pierola (2008). The product intensive margin can be described as the growth in exports of goods that are already being exported. The extensive margin means the growth in exports in new categories of goods. The geographical dimension is then defined in the same way. The geographical intensive margin represents the growth in exports to the traditional trading partners, but the extensive margin is defined as expansion into new markets.

Diversification across sectors is the tool for the long-run growth strategy of developing countries (Brenton et al., 2007; Delgado, 1995). The benefits from diversification in terms of the spillovers in the economy as a result of a more diversified production structure were researched by Hausmann and Klinger (2006). The studies by Bernard and Jensen (2004), Chaney (2008) and Melitz (2003) were focused on the microeconomic level of diversification. It was found that only the most productive firms tend to be exporters. It was shown by Hausmann and Rodrik (2003) that trade promotion policies are not always effective. In addition, it was found by Besedeš and Prusa (2008) that the expansion of the extensive margin has only a short-run impact on exports but almost no impact on the long-run export growth of a country. It was also detected in their paper that the intensive margin is the dominant force of trade growth. Strong ongoing discussions are related to the topic about which margin contributes more to export growth. It was found by Hummels and Klenow (2005) that the extensive margin accounts for 60% greater exports of large economies. However, the result of Evenett and Venables's (2002) examination of developing countries was only 30%. It was found by Felbermayr and Kohler (2006) and Helpman et al. (2008) that the role of the intensive and extensive margins depends on the time period of the economy. Other studies have been focused on identifying how the implementation of a common currency area affects the extensive margin of trade (Baldwin and Di Nino, 2006) or how preferential trade agreements affect the number of products traded among its members (Amurgo-Pacheco, 2006).

3. Structure of exports of the European Union and BRICS countries

In the analysis of export diversification, it is important to monitor the contribution of individual products or destinations to the total exports. Although 65 product groups and 224 countries and dependent territories are included in the subsequent analysis, it is important to consider the basis of foreign trade of each economy and especially to identify the most important trade commodities and partners. In this section, five major export product groups (at the SITC 2 classification level) and five major export destinations are introduced. The share of five major export partners or the share of five major export commodities in the total exports of the observed countries is illustrated in Table 1. The EU achieved a lower share of the five most important commodities in its export portfolio than the BRICS countries as well as in the case of the five most important destinations in 2012. As shown by Table 1, the European Union exported 45.6% of its total exports of goods to the five major export countries in 2012 and the five biggest export product groups accounted for 34.6%. Compared with the year 1995, the EU increased its diversification in the case of territorial diversification; nevertheless, it increased its specialization by 3.7 percentage points. Its major export partner was the USA, to which the EU exported 17.3% of its total exports. It is followed by China (8.5%), Switzerland (8%), Russia (7.3%)[2] and Turkey (4.5%). The major exports products of the EU in 2012 were road vehicles (10.6%), petroleum and petroleum products (7%), medical and pharmaceutical products (5.9%), electrical machinery (5.7%) and other industrial machinery (5.4%). The European Union did not change its major export commodities or its biggest trading partners much during the period 1995–2012.

Brazil showed much greater dependence than the EU, especially in territorial diversification, because it exported almost 60% of its total exports to the five major trading partners in 2012 (it was only 36.7% in 1995). Brazil significantly changed the composition of its main trading partners as well as the composition of its main trading products. While in 1995 the main trading partners of Brazil were the European Union, the USA and Japan, China took over the second place in 2012. In that year, a fifth of Brazil's total exports went to the European Union. Other major trading partners were China (17%), the USA (11%), Argentina (7.4%) and Japan (3.3%). Since 1995, Brazil has changed its product portfolio from agricultural products to industrial products. In 2012, it exported mostly metalliferous ores and metal scrap (15.2%), petroleum and petroleum products (10.9%), oil seeds and oleaginous fruits (7.3%), meat and meat preparations (6.5%) and sugar and honey (5.4%). Generally, the five product groups accounted for 45.3% of the total Brazilian exports in 2012.

Table 1 The EU and BRICS countries' export diversification by main five products and destinations in the years 1995 and 2012

	TP 1995	*TP 2012*	*PG 1995*	*PG 2012*
EU	46.4%	45.6%	30.9%	34.6%
BR	36.7%	58.8%	32.0%	45.3%
RU	70.8%	61.4%	71.7%	83.4%
IN	64.2%	51.6%	52.2%	45.8%
CH	78.9%	61.0%	46.6%	49.1%
SA	62.6%	50.8%	42.0%	51.7%

Source: UNCTAD (2014); own elaboration
Note: TP – trading partners, PG – product groups, EU – European Union, BR – Brazil, RU – Russia, IN – India, CH – China, SA – South Africa.

The Russian Federation is very specific in the case of product and territorial diversification. While the share of the five major export partners in the total exports decreased, the product specialization of export commodities rose significantly. As shown in the ranking of Table 1, the Russian exports were the most dependent on its five main trading partners (61.4%) as well as on its five main export commodities (83.4%) of the BRICS countries in 2012. In 2012, 45.1% of Russian exports went only to the European Union, followed by other partners with much lower shares. The second biggest export partner of Russia was China, but with only a 6.4% share, followed by Belarus (4%), Turkey (3%) and Japan (2.9%). Although the territorial orientation towards the EU countries decreased compared with 1995, Russia failed to replace the loss with a significant increase in exports to other economies and rather it unfolded evenly. In the case of commodities, the Russian dependence was already very high in 1995 and it increased significantly until 2012, from 71.1% to 83.4%. Russia exported as much as 58.3% of its total exports only in petroleum and petroleum products, gas (14.1%), iron and steel (4.8%), non-ferrous metals (3.6%) and coal, coke and briquettes (2.8%) in 2012 and the structure of the main trading products did not change at all.

Five major Indian partners shared 51.6% of its total export destinations and India exported 45.8% of its total exports in five major product groups in 2012.

[2] Although it was found by Fojtíková (2013) that there is untapped export potential to Russia in 12 member states of the European Union.

Since 1995, India has decreased the share of its major trading partners and commodities by 13 and respectively 7 percentage points. In 2012, India's major trading partners were the EU (16.7%), the USA (12.8%), the United Arabian Emirates (12.3%), China (5.1%) and Singapore (4.7%). Compared with 1995, the structure of the main trading partners has changed in favour of the United Arabian Emirates and China and to the detriment of the European Union and the USA. The main export products of India were petroleum and petroleum products (18.8%). Non-metallic mineral manufacturing (8.7%), miscellaneous manufactured articles (8.2%), textile, yarn and related products (5.3%) and articles of apparel and clothing accessories (4.8%) were the main export commodities of India in 1995. Since then, however, their share has decreased significantly, while the share of oil and oil products has increased considerably, because they accounted for only 1.5% of the total exports of India in 1995.

Chinese exports were also virtually dependent on a few trading partners or commodities. However, while the dependence on key trade partners has decreased significantly since 1995, the product dependence has grown slightly. In the first case, it amounts to 61% of Chinese total exports and in the case of commodities, it is 49.1% of the total exports. China exported mostly to the USA (17.2%), then to the European Union (16.3%), Hong Kong (15.8%), Japan (7.4%) and South Korea (4.3%) in 2012. The territorial structure did not change much over the period. In 1995, the exports of Chinese products were mainly focused on textile and footwear products. However, China changed its export structure in favour of light manufactured goods for twenty years. In 2012, the biggest share of Chinese exports consisted of electrical machinery (11.8%), telecommunication apparatus (11.2%), office machines (11.2%), articles of apparel and clothing accessories (7.8%) and miscellaneous manufactured articles (7.1%).

As shown by Table 1, most of the BRICS countries have reduced their dependence on major trading partners but increased the proportion of major export commodities. This also applies to South Africa. While it has decreased the share of its five main trading partners by 12 percentage points, it has increased the share of the five major export commodities by almost 9 percentage points since 1995. The top five biggest export partners of South Africa account for 50.8% and a similar situation exists in the case of the five major product groups. South Africa exported almost 38% of all its products to the European Union in 1995, but only a fifth of its total exports in 2012. South Africa has completely reversed the orientation of its exports to China. China's share increased from 2.5% in 1995 to 25.5% in 2012. This development is marked by the high demand from China for raw materials as well as the response to the massive Chinese investment in Africa. This is also reflected in the structure of exported goods. The five major trading commodities in 1995 were metalliferous ores, accounting for 15.7%, followed by non-ferrous metal (12.2%), road vehicles (8.8%), gold (7.5%) and iron and steel (7.5%). Since 1995, the product structure has not changed significantly. The exports of South Africa remain oriented towards raw materials and their products, especially goods of heavy industry. Other major partners are the USA (8.7%), Japan (6.2%) and India (4.2%). Appendix 1 contains the share of major export partners and commodity groups of each economy.

4. Data and Statistics

In the following section, three types of indices, broken down by product or territorial diversification, will be used to evaluate and compare export diversification. The data were retrieved from the UNCTAD[3] database and use the Standard Industrial Trade Classification Revision 3 detailed on the 2-digit level. Included in the analysis are 224 countries and dependent territories and 65 product groups. In the analysis of export diversification of the European Union and BRICS countries, two approaches are followed. The first approach is based on the calculation of three state indicators that are available in the current literature and studies. The new approach then involves the use of weights to refine the actual state of export diversification.

Original indexes are created as a weighted share of product groups or destinations in the total exports of the world. The original methodology to create double-weighted indices is enriched by this paper. The choice of the weights for product diversification is based objectively on the basis of the values of a given product group of the total export basket, as shown in formula 1. In territorial diversification, there is only replacement for each business partner, which creates the weight of the total exports (formula 2). This means that (a) the share of the exported product group in the country's total export portfolio creates the weight, then (b) this new index is used as a share of exported group *s* of country *i* in the total world exports to country *j*. It can also be applied to territorial diversification. This new approach creates a more detailed and real view of trade diversification.

The value of the weight for each product group *s* of country *i* in year *t* is given by the share of this product

[3] The United Nations Conference on Trade and Development.

group in the total exports of the country in a given year, counted as the sum of each commodity group of country *i* in year *t*. The same approach is used in the case of export partners. The value of the weight is calculated by dividing the value of exports from country *i* by partner country *d* in year *t* in the total export value of country *i* to all destinations *d* in the given year *t*:

$$w_s = \frac{s_{i(k)t}}{\sum s_{i(k)t}} \quad (1)$$

and

$$w_d = \frac{d_{i(k)t}}{\sum d_{i(k)t}}. \quad (2)$$

A variant of the measurement of export diversification through the extensive and intensive margins as the weighted share of the sectors in which the exporter exports its production in a given year to country *j* against the world's exports to country *j* was produced by Hummels and Klenow (2005). The same approach was also adapted to geographical markets. This approach is based on the ratio of the product group or destination to the world's exports. It investigates whether the country exports larger quantities of each variety of goods or a higher value of the total exports to the importing country (intensive margin) or whether the country exports a wider variety of goods or a greater number of export countries (extensive margin). This approach is then enriched by the above-mentioned weight proportion of the commodity or destination of the total trade of the country or the world. For the calculation of the selected indicators, it is important to calculate the value of the weights of individual export commodities and destinations in the world exports. The weight is calculated as the share of world exports *k* for commodity *s* with the total world *k* exports in the current year *t* or exports as a share of individual country *d* in the total world exports *k* in a given year *t*. The weighted indicators are shown in the following formulas.

The intensive margin refers to the growth in exports of goods that are already being exported. It measures the exports of observed country *i* to the importer relative to the total world's exports *k* to the importer (excluding the exporter's exports). Exports are counted only in those sectors in which the exporter exports to the importer in a given year. Formula 3 for the intensive margin indicator is:

$$\boldsymbol{IM_{ijt}} = \frac{\sum_{s \in \boldsymbol{Sijt}} \boldsymbol{X^s_{ijt}} . \boldsymbol{w_s}}{\sum_{s \in \boldsymbol{Sijt}} \boldsymbol{X^s_{kjt}} . \boldsymbol{w_s}}, \quad (3)$$

where IM_{ijt} means the intensive margin between country *i* and country *j* in year *t*. It is composed as a ratio of the exports of country *i* to country *j* and the exports of the world *k* to country *j* in the structure of production of exporting country *i*. S_{ijt} is the set of sectors *s* in which exporter *i* exports to *j* in year *t*. The same approach can be used for territorial diversification, as shown in formula 4:

$$\boldsymbol{IM_{ijt}} = \frac{\sum_{d \in (\boldsymbol{D})ijt} \boldsymbol{X^d_{ijt}} . \boldsymbol{w_d}}{\sum_{d \in \boldsymbol{D}ijt} \boldsymbol{X^d_{kjt}} . \boldsymbol{w_d}}. \quad (4)$$

In this case, the product structure of exports has to be exchanged for its territorial structure *d*. The territorial diversification is composed as a ratio of the exports of country *i* to country *j* and the exports of the world *k* to country *j* in the structure of destinations of exporting country *i*. D_{ijt} is the set of destinations *d* in which exporter *i* exports to *j* in year *t*. Both indicators take values from –1 to 1 depending on the increasing or decreasing of the intensive margin. The higher are the values of the intensive margin, the greater is the growth in exports of goods that are already being exported or the greater is the trade with destinations to which the country is already exporting (Colacelli, 2009).

The extensive margin measures the share of the products belonging to *i*'s portfolio in world trade. Formulas 5 and 6 show the possibility of counting the extensive margin index for products and destinations. The numerator of EM_{ijt} measures exports from the rest of the world *k* to importer *j* in those sectors *s* in which country *i* exports to *j* in year *t*. The denominator includes all the exports from the rest of the world to *j* in all sectors *s* in year *t*:

$$EM_{ijt} = \frac{\sum_{s \in Sijt} X^s_{kjt} . w_s}{\sum_{s \in S} X^s_{kjt} . w_s}. \quad (5)$$

The extensive margin of territorial diversification can be measured as the ratio of exports from the rest of the world *k* to importer *j* in those destinations *d* in which country *i* exports in year *t*. The denominator contains exports from the rest of the world *k* to country *j* from all destinations *d* in year *t*:

$$EM_{ijt} = \frac{\sum_{d \in Dijt} X^d_{kjt} . w_d}{\sum_{d \in D} X^d_{kjt} . w_d}. \quad (6)$$

The result of the extensive margin takes a value between 0 and 1. The higher is the value of this indicator, the higher is the number of exported product categories or destinations (Colacelli, 2009).

There are many alternative approaches to measure export diversification. The Herfindahl–Hirschman index (HHI) is used to estimate export diversification or concentration patterns. It measures the degree to which a country's exports are dispersed across different products or destinations. High concentration levels indicate excessive dependence of the economy on several types of exported products or important export destinations. The HHI can be defined as the square of the ratio of exported product group *i* and the total exports. Then, the ratio is summarized and the square root obtained, as shown by formula 7:

$$HHI = \sqrt{\sum_{\substack{i=1 \\ s=1}}^{N} \left[\frac{x_{ist} . w_s}{X_t}\right]^2}, \quad (7)$$

where x_{it} represents the exports of the country in product i in year t and X_t means the total exports of that country i in year t. A higher HHI shows a higher concentration of exports on a few commodities. The same approach can be used for territorial diversification, as shown by formula 8:

$$HHI = \sqrt{\sum_{\substack{i=1 \\ d=1}}^{N} \left[\frac{x_{idt} \cdot w_d}{X_t}\right]^2}. \quad (8)$$

In this case, the export concentration of the country among its export partners d is measured. N is the total number of export products or destinations in the country's portfolio. In both cases, the value of the index is between 0 and 1. An index value closer to 1 means extreme export concentration on a small amount of product categories or a few trading partners. A value closer to 0 represents a high level of export diversification (WTO, 2012).

5. Results

Interesting results are produced by the analysis using the above-mentioned indices to evaluate commodity and territorial export diversification of the European Union and BRICS countries in the period 1995–2012. The changes over time in commodity and territorial export diversification of the selected countries are examined in the paper. For the following Table 2 and Table 3, only the initial and final years of the period under study were chosen. Both tables have the same structure. In Table 2, the product diversification indices of the EU and BRICS countries in the year 1995 and 2012 are described, and in Table 3, the territorial diversification indices are presented. The values of the intensive margin (IM), extensive margin (XM) and Herfindahl–Hirschman index (HHI) in their natural form (with respect to how they are used in the recent literature) are described in both tables. The values of the diversification indices following the author's approach using the weights are designed by *w* in the side columns to compare the results.

It is shown by the intensive margin that the EU still keeps a much higher product intensive margin in international trade than the BRICS countries. However, in contrast to emerging countries, the values of the European Union continued to decline during the period. In other words, the positive indicator shows the increasing export flows of the EU, but the share in the world's exports is weakening. The average export growth rate of the EU was only 4.7% during the period. This is also confirmed by the weighted intensive margin indicator, but this indicator shows a more pronounced slowdown. The intensive margin of the BRICS countries, besides South Africa, grew by different rates during the period. While this indicator grew slowly for the majority of BRICS countries, in the case of China, the value of this indicator increased significantly. This confirms the current status of China in world trade, in which China has gained a privileged position as the world's largest exporter over the last two decades. For example, the average export growth rate of China was 14% per year. The weighted intensive margin mostly copies the results of its natural form. The Russian Federation is the only exception. The significant growth in the weighted intensive margin can be explained by the large share of energy sources in the Russian export basket, which experienced an unprecedented boom during the period; moreover, the growing global demand increased their prices. Russia is an export-dependent country on these commodities and therefore the growth in trade intensity in these commodities caused a large increase in this indicator. South Africa is the only country of the BRICS group for which the change in this indicator is negligible.

Table 2 Results of the export product diversification indices of the EU and BRICS countries in the years 1995 and 2012

	IM	IM*w*	EM	EM*w*	HHI	HHI*w*
EU1995	0.410	0.405	1.000	1.000	0.191	0.273
EU2012	0.312	0.240	1.000	1.000	0.197	0.267
BR1995	0.009	0.009	0.998	1.000	0.193	0.213
BR2012	0.013	0.016	0.998	1.000	0.245	0.378
RU1995	0.013	0.055	0.995	0.999	0.388	0.607
RU2012	0.028	0.192	0.985	1.000	0.604	0.920
IN1995	0.006	0.013	0.994	0.999	0.276	0.421
IN2012	0.016	0.021	1.000	1.000	0.258	0.495
CH1995	0.030	0.050	1.000	1.000	0.247	0.412
CH2012	0.115	0.142	1.000	1.000	0.249	0.303
SA1995	0.006	0.008	1.000	1.000	0.230	0.311
SA2012	0.004	0.007	1.000	1.000	0.268	0.355

Table 3 Results of the export territorial diversification indices of the EU and BRICS countries in the years 1995 and 2012

	IM	IM*w*	EM	EM*w*	HHI	HHI*w*
EU1995	0.142	0.468	1.000	1.000	0.258	0.596
EU2012	0.124	0.362	1.000	1.000	0.245	0.526
BR1995	0.009	0.011	0.997	1.000	0.373	0.672
BR2012	0.013	0.021	1.000	1.000	0.311	0.558
RU1995	0.013	0.011	0.989	0.960	0.482	0.900
RU2012	0.024	0.029	0.999	1.000	0.563	0.951
IN1995	0.006	0.007	0.999	1.000	0.362	0.682
IN2012	0.016	0.019	1.000	1.000	0.272	0.506
CH1995	0.029	0.075	0.999	1.000	0.385	0.527
CH2012	0.111	0.212	1.000	1.000	0.310	0.510
SA1995	0.005	0.005	1.000	1.000	0.409	0.849
SA2012	0.005	0.012	1.000	1.000	0.350	0.632

The extensive margin of product differentiation is very stable for all the economies. It measures the width of the variety of exported goods. The EU, China, India and South Africa export the whole range of goods in accordance with the SITC level 2 classification, while Russia and Brazil do not fill the whole range of product differentiation, meaning that their export portfolio does not include all the commodity groups. India increased its coverage of all the product groups during the reporting period. The extensive margin of Russia has declined in the long term, which means that Russia has narrowed its product portfolio and stopped exporting some commodities. Despite that, a full production portfolio is shown by the weighted values of the extensive margin. This could be caused by missing commodity groups in the Russian export portfolio, which, however, are not relevant to the economy of Russia.

The Herfindahl–Hirschman index describes product diversification. This index shows a very slight increase in export concentration on a certain type of commodities for the EU and China and a decline in the case of India. However, there is a significant increase for Brazil, South Africa and especially Russia, which has intensified its export concentration by 22 percentage points during the last two decades. The weighted Herfindahl–Hirschman index slightly differs from the previous results. It shows higher export concentration in all the economies but it copies the trend in the case of Brazil, Russia and South Africa. Higher values of the weighted index are given just by the weight of the commodity in the export basket of the economy. A significant concentration on a small number of Russian export commodities is confirmed by the functioning of the weighted index, which, moreover, increased significantly during the period under study. This is confirmed by the table in section 3, in which the share of the five most important export commodities of Russia increased by up to 83%. The Herfindahl–Hirschman index thus suggests strong dependence of the Russian economy on exports of a narrow portfolio, mainly raw materials, such as oil and gas. Brazil also decreased its export product diversification. In particular, Brazil fundamentally increased its exports in products of petroleum, metalliferous ores and oil seeds, as shown in Appendix 1. On the other hand, the major part of traditional production, for example manufacturing of natural materials from food to wood and cloth, have continued to decline. Similar trade can be seen in South Africa, which substantially increased its metalliferous production. The opposite trend between the unweighted and the weighted Herfindahl–Hirschman index was found in the case of the European Union, India and China. The slight index decline of the EU could be caused by the rise of new specialized production in a wide range of industries and the new orientation towards high-tech products. The export concentration growth of India could be induced by a significant increase in petrol and petroleum products in India's export portfolio, as described in the third part. However, there is a significant increase in the Chinese export product diversification. Although the share of the five major commodities in the Chinese export portfolio increased slightly, many other export groups (for example light industry and raw materials manufacturing) settled at a similar level and therefore the weighted Herfindahl–Hirschman index was significantly reduced in favour of greater diversification of Chinese exports.

The intensive margin of territorial diversification shows that the share of the EU exports decreased during the observed period. In other words, the EU exports have been slowly replaced in some destinations by exports from other countries. This decline in the EU intensive margin is mainly at the expense of Chinese expansion, which increased rapidly. This is particularly true for countries in Africa. Countries of Latin America replaced the EU in the Caribbean area. On the other hand, the intensive margin of other BRICS countries increased slightly during the whole period, with the exception of South Africa. The previous results are confirmed by the weighted intensive margin, but with higher differences among the resulting values. The EU decline in the weighted intensive margin is very significant as well as the Chinese growth in this indicator. China also rapidly increased its position in South-East Asia. The values of the other BRICS countries copy the previous results, but with slightly higher values. The highest increase in this weighted indicator was recorded in the case of South Africa, because the *natural* intensive margin remained the same. This growth was probably caused by the significant role of China in the South African export destination portfolio. In general, and with the exception of China, it can be said that each BRICS country has increased its dominance in its region. China´s influence has grown worldwide.

The European Union and South Africa have the highest values of the extensive margin because they included all the countries of the world in their trade portfolio during the whole period 1995–2012. None of the other BRICS countries had all the states and territories in their portfolio in 1995. They expanded their territorial diversification during this period. It can be said that all the economies under study export their products worldwide, with the small exception of Russia.

It is clearly shown by the Herfindahl–Hirschman index that the EU has maintained the best position in the territorial diversification of its exports because its values are the lowest; moreover, the value of the index declined over the period. Brazil, China, India and South Africa have also expanded their portfolio of export destinations during the last two decades. The only exception is Russia again. Russia concentrates its territorial

exports, which reduces the number of its export destinations. The weighted Herfindahl–Hirschman index exhibits much higher values than the classical index. The majority of the national economies are export-oriented towards a small number of markets for various reasons. These reasons may be the market size of the economy, its distance, the influence of business relationships from the past, the amount of trade barriers and many other issues. That is the reason for the very different values of exports for all the economies and hence for the high value of the index. However, the trend of the weighted Herfindahl–Hirschman index copies all the results of the unweighted index. Accordingly, all the economies have increased their territorial diversification except the Russian Federation. The significant change towards diversification can be seen in the case of Brazil, India and especially South Africa. Russia is again a special case. Not only does it have the highest territorial concentration of exports, but also such concentration increased during the reporting period.

6. Conclusion

The aim of this paper was to answer the question of how much the observed economies diversify their exports in the case of product groups and export destinations. In the paper, an attempt was made to use a new approach of weighted indices in comparison with the commonly used unweighted indices. Various features of product and territorial export diversification during the last two decades were described. The data used the Standard Industrial Trade Classification Revision 3 detailed on the 2-digit level and included 65 product groups and 224 countries and dependent territories. Evidence was shown that developing countries have increased their position in the case of the intensive margin because they have intensified and deepened their export relationships with the world. In contrast, the European Union has lost its position as the world's export leader. Most economies target their product portfolio to higher production concentration as a way of economic evolution.

Export diversification has positive effects on the economy, especially for developing economies, where it works as a protective function against adverse shocks in the global economy. Export diversification can be measured in two dimensions. In the analysis of the five major export products and five major export destinations, it was found that countries increase their territorial diversification, but specialize in goods production using their comparative advantages.

It was shown by the analysis using three types of indices that the European Union still maintains a much higher product intensive margin than the BRICS countries, but the values are continuing to decline. In other words, the positive indicator shows the increasing export flows of the EU, but the share in the world's exports is weakening. This was also confirmed by the weighted intensive margin indicator. While this intensive margin has grown slowly for the majority of BRICS countries, in the case of China, the value of this indicator has increased significantly. The Russian Federation also experienced a large increase in the weighted intensive margin, which can be explained by the rapidly growing global demand for raw materials, like crude oil and gas, in the period 1995–2012. The extensive margin of product diversification is stable for all the economies. The EU, China, India and South Africa export the whole range of goods in accordance with the SITC 3 2-digit-level classification, while Russia and Brazil do not include all the commodity groups. India increased its coverage of all the product groups during the reporting period. A very slight increase in the export concentration on a certain type of commodities for the EU and China and a decline in the case of India were shown by the Herfindahl–Hirschman index. However, a significant increase was found for Brazil, South Africa and especially Russia, which has intensified its export concentration by 22 percentage points during the last two decades. The results of the weighted Herfindahl–Hirschman index differ slightly from the previous results. The functioning of the weighted index confirms a significant concentration on a small number of Russian export commodities, which, moreover, increased significantly during the period under study. The opposite trend of the weighted Herfindahl–Hirschman index was found in the case of the European Union, India and China.

The intensive margin of territorial diversification shows that the share of the EU exports decreased during the observed period, mainly at the expense of Chinese expansion, which increased rapidly. On the other hand, the intensive margin of other BRICS countries increased slightly throughout the period, with exception of South Africa. The previous results for the weighted intensive margin were confirmed by the larger differences among the resulting values. The European Union and South Africa achieved the highest values of the extensive margin because they included all the countries of the world in their trade portfolio throughout the period 1995–2012. It can be said that all the economies under study exported their products worldwide, with the small exception of Russia in 2012. It is clearly shown by the HHI index that the EU retains the best position in the territorial diversification of its exports. Brazil, China, India and South Africa have also expanded their portfolio of export destinations during the last two decades. The only exception is Russia, which has a growing concentration of territorial diversification of its exports, which reduces the number of its export destinations. The trend of the weighted

Herfindahl–Hirschman index copies all the results of the unweighted index.

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Appendix 1 The EU and BRICS countries exported main five products and destinations as a percentage of the total exports in 2012

	Destination		*Product group SITC 2-digit level*	
EU	USA	17.3	Road vehicles	10.6
	China	8.5	Petroleum	7.0
	Switzerland	8.0	Pharmaceutical products	5.9
	Russia	7.3	Electrical machinery	5.7
	Turkey	4.5	Other machinery	5.4
Brazil	*Destination*		*Product group SITC 2-digit level*	
	EU	20.1	Metalliferious ores	15.2
	China	17.0	Petroleum	10.9
	USA	11.0	Oil seeds	7.3
	Argentina	7.4	Meat	6.5
	Japan	3.3	Sugar and Honey	5.4
Russia	*Destination*		*Product group SITC 2-digit level*	
	EU	45.1	Petroleum	58.3
	China	6.4	Gas	14.1
	Belarus	4.0	Iron and steel	4.8
	Turkey	3.0	Non-ferrous metals	3.6
	Japan	2.9	Coal and briquettes	2.8
India	*Destination*		*Product group SITC 2-digit level*	
	EU	16.7	Petroleum	18.8
	USA	12.8	Non-metalic manufactures	8.7
	UAE	12.3	Manufactured articles	8.2
	China	5.1	Textille yarn	5.3
	Singapour	4.7	Articles of apparel	4.8
China	*Destination*		*Product group SITC 2-digit level*	
	USA	17.2	Electrical machinery	11.8
	EU	16.3	Telecomunication	11.2
	Hong Kong	15.8	Office machiness	11.1
	Japan	7.4	Articles of apparel	7.8
	South Korea	4.3	Manufactured articles	7.1
South Africa	*Destination*		*Product group SITC 2-digit level*	
	EU	20.0	Metalliferous ores	15.7
	China	11.7	Non-ferrous metals	12.2
	USA	8.7	Road vehicals	8.8
	Japan	6.2	Gold, non-monetary	7.5
	India	4.2	Iron and steel	7.5

Source: UNCTAD (2014), own elaboration