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## TRADE SPECIALISATION AND DIVERSIFICATION: THE CASE OF THE EUROPEAN UNION AND BRICS *

***The main goal of this paper is to confirm the hypothesis that the larger the amount of a product with a revealed comparative advantage is, the higher export diversification will be in the cases of the European Union and Brazil, Russia, India, China and South Africa (BRICS). Another goal is to identify whether product diversification and territorial diversification of the surveyed countries have increased. The results of the analysis show that the distinctions in the development of the revealed comparative advantages in invidual BRICS countries in the period 2001–2013 as well as the dominant position of the EU in this area was confirmed. While the EU achieved the highest product diversification, the BRICS countries, excluding South Africa increased their export product concentration in the recorded period. From the territorial point of view, only the EU and Brazil increased their diversification.***

***Keywords:*** *trade specialisation; comparative advantage; trade diversification; Herfindahl-Hirschman index; the EU; BRICS.*
***JEL classification: C19; F14; F40.***

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## СПЕЦІАЛІЗАЦІЯ ТА ДИВЕРСИФІКАЦІЯ ТОРГІВЛІ: ЗА ДАНИМИ ЄВРОСОЮЗУ ТА КРАЇН БРІКС

***У статті перевірено гіпотезу (на прикладі Євросоюзу, а також Бразилії, Росії, Індії, Китаю та Південної Африки (БРІКС)) про те, що чим більше є в країні продуктів з чіткою конкурентною перевагою – тим більшою є диверсифікація експорту з цієї країни. Інша мета статті – виявити, чи не збільшується продуктова та територіальна диверсифікація досліджуваних країн. Результати аналізу даних вказують на відмінності в розвитку явних порівняльних переваг у країнах БРІКС у період 2001–2013 рр., а також на домінуючий стан ЄС у даній сфері. У той час як ЄС досягає в досліджуваному періоді рекордного рівня експорту продуктової диверсифікації, країни БРІКС, за виключенням Південної Африки, збільшують продуктову спеціалізацію. З територіальної точки зору лише країни ЄС та Бразилія посилили диверсифікацію.***

***Ключові слова:*** *спеціалізація торгівлі; порівняльна перевага; диверсифікація торгівлі; індекс Херфіндаля-Хіршмана; ЄС; БРІКС.*
***Форм. 3. Рис. 4. Табл. 5. Літ. 25.***

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## СПЕЦИАЛИЗАЦИЯ И ДИВЕРСИФИКАЦИЯ ТОРГОВЛИ: ПО ДАННЫМ ЕВРОПЕЙСКОГО СОЮЗА И СТРАН БРИКС

***В статье проверяется гипотеза (на примере Европейского Союза и Бразилии, России, Индии, Китая и Южной Африки (БРИКС)), что чем большее количество продуктов с четким сравнительным преимуществом имеется в наличии у той или иной страны, тем большей диверсификации экспорта она достигает. Вторая цель заключается в выявлении, увеличилась ли продуктовая диверсификация и территориальная диверсификация исследуемых стран. Результаты анализа указывают на различия в развитии явных сравнительных преимуществ в странах БРИКС в период 2001–2013 гг., а также на доминирующее положение ЕС в данной сфере. В то время как ЕС достиг в отчетном периоде по экс-***

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* This paper was supported within Operational Programme Education for Competitiveness – Project No.CZ.1.07/2.3.00/20.0296 and under the SGS project (SP2015/106) of Faculty of Economics, VSB-Technical University of Ostrava.

***порту рекордного уровня диверсификации продукции, страны БРИКС, за исключением Южной Африки, увеличили продуктовую специализацию. С территориальной точки зрения только страны ЕС и Бразилия увеличили свою диверсификацию.***
***Ключевые слова:*** *специализация торговли; сравнительное преимущество; диверсификация торговли; индекс Херфиндаля-Хиршмана; ЕС; БРИКС.*

**1. Introduction.** International trade generally fulfils many positive functions, although the need for trade as well as the structure of exports and imports is different in individual countries. Trade openness, also called trade integration of a country, is influenced by number of factors, such as economic growth, geographical size of a country, level of protectionism etc. Different results on trade openness among countries can also be obtained by using various methods of calculation (Fojtikova, 2014). On the one hand, international trade can bring gains by allowing countries use their comparative advantage, reap benefits from scale economies and ensure competition, greater variety and, potentially, more stable markets and prices (Krugman and Obstfeld, 1991). On the other hand, the export-led growth strategy of some countries lead to their higher dependence and vulnerability. On the whole, growing interdependence within the global economy allows a country benefit more quickly from growth in other parts of the world, but it can also cause challenges, as crises can be quickly transmitted across borders (WTO, 2014). Data on trade development in the world in the time of the financial and economic crisis in 2009 confirms this trend.

Economic globalisation and trade liberalisation have contributed to competition among countries throughout the world regions. Although developing countries have more dynamic trade growth than the developed ones during the last two decades and have gradually increased their share in the world exports and imports, developed countries, such as the United States of America (USA) and the European Union (EU) participate in the world trade all the time. The growth of the share of developing countries in the world trade was influenced especially by China. According to the data published by Eurostat (2014), the share of China in the world trade in goods and commercial services was 12.6% (the share of the USA was 13.4%, the EU – 16.4%), but the share of China in the world trade in goods was 13.7%, while the share of the USA was only 12.9% at the same time. Export competition of a country is given especially by its export profile and the way in which it achieves exports growth.

However, the position of a country in the world trade is to be explored in a dynamic form rather than statically. From this point of view, dynamic gains of international trade can be achieved in intensive rather than extensive margin. For most countries, particularly middle and high income countries, the majority of export growth takes place through intensive margin, i.e. by selling more of the same products to the same markets (Brenton and Newfarmer, 2009). This deepening of trade relations is supported by increasing specialisation (Farole et al., 2010). The main goal of this paper is to confirm the hypothesis that the larger the amount of products with revealed comparative advantages is, the higher export diversification will be in the case of the European Union and Brazil, Russia, India, China and South Africa (BRICS countries). Another goal is to identify whether product diversification and territorial diversification of the countries surveyed have increased.

The structure of this paper is as follows. Section 2 outlines the literature review on trade specialisation and diversification. Section 3 contains the methodology of the

analysis based on theoretical background and statistical methods, as well as datasets used in calculations of revealed comparative advantages and product/market diversification of the countries in question. Section 4 presents the empirical results of the analysis in detail. Section 5 contains the main conclusions of this analysis.

**2. Literature review.** The system of international trade uses the concept of specialisation. Economic theory defines specialisation as a method of production where a business or area focuses on production of a limited scope of products or services in order to gain greater degrees of productive eficiency within the entire system of businesses or areas (Krugman and Obstfeld, 1991). The basis for trade specialisation lies in the classical theories of international trade (the theory of absolute advantage, the theory of comparative advantage, the Heckscher-Ohlin trade theory etc.). Especially the concept of comparative advantage associated with the name of David Ricardo has become the object of successive research. A country has a comparative advantage if its real labor cost is lower than in other countries for the same commodity. Ricardo demonstrated that, given similar demand conditions between countries, each country would export that commodity in which it had a comparative advantage (Harris, 1989). Although the Ricardian model is based on many unrealistic assumptions (for example, it assumes only two countries producing two goods using just one factor of production; there is no capital or land or other resources needed for production etc.), the concept of comparative advantage is the base for liberal trade policy and many empirical studies were published on this topic (Deardoff, 1980; Eaton and Kortum, 2002; Levchenko and Zhankg, 2011; Costinot et al., 2012).

The modified version of the concept of comparative advantage presents the revealed comparative advantage (RCA) proposed by the neoclassical author Balassa (1965). The Ballasa index basically measures the normalised export share, with respect to exports of the same industry in a group of reference countries. The concept was widely used to capture the sectorial specialisation of countries, although it lacks greater theoretical foundation. There is also a modified version of RCA, such as the revealed symmetric comparative advantage as propened by other authors (Dalum et al., 1998; Widodo, 2009). Leromain and Orefice (2013) drew on the new measure proposed by Costinot et al. (2002) and created on the new dataset of RCA with a higher level of sector disaggregation and a bigger set of partner countries in order to obtain better statistical properties than the Balassa index. While some studies focused on how to develop the measurement of RCA, other empirical studies use RCA to estimate the comparative advantage of different countries. For example, Serin and Civan (2008) analyse Turkey's revealed comparative advantage towards the EU over the period 1995–2005. They found that Turkey had a high comparative advantage at the fruit juice and olive markets in the EU. Ma (2013) investigates the revealed comparative advantage of the ASEAN countries and China. The main results of this analysis show that China has more established trading patterns than the ASEAN countries and also that comparative advantage has a positive influence on the achievement of net export.

Some studies confirmed that comparative advantages or revealed comparative advantages change with time. Balassa and Noland (1989) found that during 1967–1983 Japan's pattern of specialisation changed dramatically with Japan shifting from specialisation in unskilled labour intensive goods to human capital intensive

products while its comparative disadvantage increased in natural resources intensive products. The United States maintained its specialisation in physical capital and human capital intensive goods while increasing its comparative advantage in natural resource intensive products. Both countries increased their comparative advantage in high-technology products. Harris (1989) observes the pattern of global specialisation and defines the main factors that impact the world trade in the previous decades, such as global enterprises, activist government industrial policies, technological innovation, competition between low-wage and high-wage countries. The WTO (2013) determines several factors that will change the comparative advantage and shape the world trade in the future. These are demografic transition, including ageing, migration, educational convergence and women's growing participation in labour force, also – investment in physical capital, such as roads and ports, information and telecommunication infrastructure, technology diffusion, energy and other natural resources, transportation costs and institutions.

Many authors are interested in trade specialisation and diversification, especially in relation to economic growth. Kaulich (2012) developed a debate on specialisation and diversification that he perceived as alternative strategies for economic development. He claims that the selection of a given theory should be dependent on the objects of a development policy in a country. This means that a country focuses on improving its production or export capacity within a certain narrow range of products for which it has a comparative advantage, or that a country aims to diversify its production structure to be less vulnerable to economic shocks. Imbs and Wacziarg (2003) bring empirical evidence that both theories take place but at different economic stages. They found that low-income countries typically specialize in a narrow range of products. At higher levels of GDP per capita, the diversification slows down and eventually veers towards the re-specialisation of a country. In this context, studies also explore if trade diversification is achieved by extensive or intensive margins. Other studies, for example, Carrere et al. (2010) deal with the link between productivity and trade. These so-called "new-new" trade models have highlighted complex relationships between trade diversification and productivity using microlevel data (firm level) as well as data at the aggregate level.

Trade liberalisation has brought bigger opportunities for many countries participating in the world trade. The data confirm that rising living standards in developing countries since 2000 have gone hand-in-hand with rising shares in world trade for these countries (WTO, 2013). However, export structure of many developing countries is concentrated especially on natural resources and low-skill manufacturing. Kaulich (2012) claims that diversification is the driving force for economic development for low-income countries. Developed countries also try to find new markets for their products and invest in new technologies development in order to be more competitive at the world market.

**3. Methodology of calculation.** The trade theory since Adam Smith says that international exchange ratio influences the position of a country at the international market. Each country focuses on goods production with a comparative advantage that is caused by different productivity (Lipkova et al., 2011). On the other hand, today's globalised economy connects all countries together and makes them interdependent. Any negative economic shock can penetrate the trade flows and thus threaten eco-

nomy's functioning. Each economy produces a portfolio of goods. The bigger portfolio of goods a country has, the lower the threat and consequences of a negative shock impact will be. This does not mean that every country should produce all types of products. This hypothesis only warns against excessively high product concentration. The thought about higher product diversification does not have to go against the production of comparative advantage products. As Figure 1 shows, the higher the amount of products with a revealed comparative advantage exported (RCAp) is, the lower the export specialisation will be, i.e. the higher the export diversification (HHI) is.

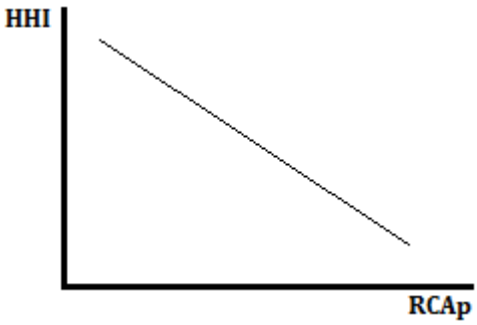


*Figure 1.* **The relation between the amount of products with a RCA and product export concentration,** *own elaboration*

The second hypothesis is trying to ascertain whether there is a correlation between product and territorial diversification. Due to countries' differences in factor endowments, some countries are forced to import particular commodities. This means that countries that have enough of one factor of production export the surpluses of their production. Thus, every country satisfies its needs through foreign trade. A situation may arise when the growth of various products also increases the amount of business partners. However, if a country specialises in the export of a narrow variety of products and reduces its export diversification, it may still expand the number of its trading partners. The goal of the analysis is to determine in which direction the trade of the selected countries is developing.

The following section brings the methodology of the Revealed Comparative Advantage (RCA) and the Hirschman-Herfindahl index (HHI) for calculating the specialisation and diversification of export. Two types of the HHI for calculating product diversification and territorial diversification of exports are used. The source of the dataset is UNCTAD. The paper uses the data of Standard Industrial Trade Classification (SITC), revision 3 detailed on the 3-digit level which contains 255 product groups and 224 countries and dependent territories. The period under study was chosen as 2001–2013. The analysis contains two approaches. The fist one is export specialisation measured by comparative advantage in production of goods for each economy (the EU is counted as one economy). The approach of the RCA has theoretical background in the neoclassical hypothesis of the Hecksher-Ohlin model based on the amount of labour or capital productive endowment. Each country gains its comparative advantage due to productivity and the amount of product endowment. As the Hecksher-Ohlin theory says, the country where the capital is

comparatively abundantly available and is thus relatively cheaper should focus on the production of capital-intensive products and vice versa. In 1965, Bela Balassa contributed to economic theory by observing comparative advantage without needs of knowledge of relative prices of factor endowment. The RCA shows the direction of export flows of goods in which a country specialises. It uses a trade pattern to identify the sectors in which an economy has a comparative advantage, by comparing the country of interest's trade profile with the world average (UNESCAP, 2008). The original Balassa index (1965) was then proposed in the following form:

$$RCA_{ij} = \frac{\frac{x_{ij}}{X_j}}{\frac{x_{aj}}{X_a}}, \quad (1)$$

where $x_{ij}$ represents the exports of product $j$ from country $i$; $X_i$ its the total exports of country $i$; $x_{aj}$ is the total world exports of product $j$ and finally $X_a$ represents the total world exports. Consequently, the numerator means the share of exports of product $j$ in the total exports of the country $i$, while the denominator represents the share of product $j$ in the total world's exports. The index shows a specialisation of goods production that is exported if its market share is higher than the world's average. The result can only be a positive value less or higher than the unity. If the RCA index is higher than the unity, the country reaches a revealed comparative advantage in commodity $j$. If the index is in the interval (0,1), then the country reaches a revealed comparative disadvantage.

The Herfindahl-Hirschman Index (HHI) is used to estimate export diversification or the concentration pattern. It measures the degree of dispersion of the country's exports across different products ($s$) or destinations ($d$). High concentration levels indicate excessive dependence of the economy on several types of exported products or important export destinations. The Hirschman index for product diversification can be defined as a square of the ratio of exported product group $i$ and the total export. Then the ratio is summarised and extracted as shown in formula:

$$HHI_s = \sqrt{\sum_{\substack{i=1 \\ s=1}}^{N} \left(\frac{x_{ist}}{x_t}\right)^2}, \quad (2)$$

where $x_{it}$ represents the exports of the country in product $i$ in year $t$; $X_t$ means the total exports of that country in year $t$. The higher the value of the Hirschman index is, the higher the concentration of exports on a few commodities. The same approach can be used for territorial diversification as in formula:

$$HHI_d = \sqrt{\sum_{\substack{i=1 \\ d=1}}^{N} \left(\frac{x_{idt}}{x_t}\right)^2}, \quad (3)$$

where $x_{it}$ represents the exports of the country in product $i$ in year $t$; $X_t$ means the total exports of that country in year $t$. The higher the Hirschman index is, the higher the concentration of exports on a few trade partners will be. $N$ is the total number of export products or destinations in the country's portfolio. In both cases the value of

the Herfindahl-Hirschman index is between 0 and 1. The index value that is closer to 1 means extreme export concentration of a small amount of product categories or few trading partners. The value closer to 0 represents high export diversification.

**4. Empirical results.** The empirical results of the paper are divided into two parts. There are the results of the Revealed Comparative Advantage index of the economies under study as well as the results of their product and territorial diversification based on the Hirschman-Herfindahl index in the first sub-chapter. This part explains the development of comparative advantages and export diversification during 2001–2013. The second part finds the correlation between the amount of RCA products and product-export diversification of each country as well as the relation between product-export and territorial diversification. The results are graphically presented in Annex 1–3.

Table 1 shows the number of product groups with a revealed comparative advantage of the European Union (EU) and the BRICS countries in the period 2001–2013. The results of the RCA index clearly show the dominance of the EU at international markets. The EU had not only the highest amount of RCA products during the entire period but it also increased the number of goods with a comparative advantage. The European Union keeps its RCA the most in the categories of chemicals, manufactured goods and machinery and transport equipment. It is usually goods with high value added.

*Table 1.* **The number of product groups with a revealed comparative advantage in the period 2001–2013**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 80 | 75 | 78 | 73 | 80 | 75 | 81 | 69 | 72 | 70 | 61 | 63 | 60 |
| CH | 96 | 91 | 88 | 86 | 91 | 89 | 92 | 98 | 91 | 98 | 104 | 105 | 103 |
| IN | 79 | 84 | 89 | 88 | 85 | 89 | 86 | 86 | 77 | 80 | 81 | 80 | 85 |
| RU | 46 | 43 | 42 | 40 | 37 | 34 | 34 | 31 | 38 | 33 | 35 | 39 | 40 |
| SA | 72 | 70 | 68 | 63 | 61 | 62 | 57 | 56 | 69 | 65 | 61 | 68 | 70 |
| EU | 144 | 140 | 145 | 147 | 149 | 154 | 150 | 157 | 150 | 153 | 158 | 161 | 156 |

Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.
Source: UNCTAD, 2015; own calculations.

The results of the RCA for BRICS are very different. While Asian economies increased the number of product groups with a comparative advantage at international markets, other BRICS economies reached the opposite. For example, Brazil lost 20 product groups during the last 6 years, especially in higher value added products. Brazil retained comparative advantages in the categories of food and live animals, crude materials except fuels and a few groups of manufactured goods. Russia and South Africa kept a similar trend in a number of RCA products. These countries achieved the best comparative advantages in the categories of crude materials and mineral fuels. During the period of the world's economic growth (2001–2008) both economies lost their comparative advantages at international markets. It was caused especially by rapid growth of commodity prices. After the break of the commodity prices bubble, both economies began to take their RCA products back. Meanwhile, both economies reached a very low amount of RCA groups. Asian economies, China and India, achieved a high and continuous growth of a number of RCA product

groups during the period. However, there is a big difference between India and China. While India kept its RCA in the same groups of goods (food and live animals, crude materials except fuels and miscellaneous manufactured articles), China changed its comparative advantage from food and live animals and miscellaneous manufactured articles into high value added production such as manufactured goods and machinery, transport equipment. As Vahalik (2013) assumes, the neoclassical theory of comparative advantages is confirmed in real economy because if a country has a comparative advantage in the export of certain raw materials, it usually achieves comparative advantage in exports of products made from this material as well.

The Hirschman-Herfindahl Index (HHI) measures the export concentration of a country (or export diversification). The lower its the value of the HHI, the higher the export diversification is. As Table 2 shows, the highest product diversification was reached by the EU in the period 2001–2013 and it is relatively steady. On the other hand, all BRICS countries, excluding South Africa, increased their export concentration. This means their export is more specialised in a certain amount of exported product groups. The highest product concentration can be seen in the case of Russia. In 2001, the value of the HHI reached 0.358, but in 2013 it already reached 0.426. This rapid decline of export-product diversification is caused by the increasing share of petrol and petroleum products and gas in Russian's export portfolio. In 2001, these 3 commodities shared about 57% of export, but in 2013 it was already 68%. Other economies had similar development of the product HHI, only South Africa reached the same value at the beginning and at the end of the period. For example, Brazil reached a similar trend as Russia in iron ore or oil seeds, India increased its share of petroleum oils from 5% to 20% in 2013.

*Table 2.* **The results of product the Hirschman-Herfindahl Index, 2001–2013**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 0.149 | 0.146 | 0.143 | 0.141 | 0.145 | 0.149 | 0.148 | 0.165 | 0.175 | 0.209 | 0.225 | 0.203 | 0.207 |
| CH | 0.138 | 0.145 | 0.158 | 0.164 | 0.166 | 0.165 | 0.160 | 0.154 | 0.164 | 0.162 | 0.155 | 0.158 | 0.159 |
| IN | 0.180 | 0.189 | 0.189 | 0.177 | 0.189 | 0.195 | 0.206 | 0.214 | 0.206 | 0.220 | 0.240 | 0.226 | 0.238 |
| RU | 0.358 | 0.363 | 0.377 | 0.389 | 0.419 | 0.418 | 0.414 | 0.430 | 0.417 | 0.439 | 0.450 | 0.431 | 0.426 |
| SA | 0.192 | 0.179 | 0.189 | 0.191 | 0.196 | 0.210 | 0.213 | 0.213 | 0.198 | 0.203 | 0.213 | 0.198 | 0.192 |
| EU | 0.123 | 0.125 | 0.125 | 0.124 | 0.123 | 0.122 | 0.120 | 0.118 | 0.119 | 0.119 | 0.120 | 0.122 | 0.121 |

Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.
Source: UNCTAD, 2015; own calculations.

The territorial HHI has the opposite trend. Most economies try diversifying their export among more trade partners during the period under study. The EU reached the highest change in the HHI when it diversified its export from 32% to 25%. Developing countries began to acquire a higher share of the EU's export portfolio, especially China, Russia and India. BRICS countries evolved differently. China diversified its export the most. Brazil, for example, increased its diversification, but also totally changed its main trade partners. Whereas in 2001 Brazil exported 25% of its production to the USA, in 2013 it had almost 20% to China. India kept a similar trend in favour of the United Arab Emirates. On the other hand, Russia and South Africa reached the opposite trend and decreased their territorial-export diversifica-

tion. Russia increased its territorial concentration, especially in favour of the EU. The growth of the territorial HHI of South Africa is very significant. It is caused by rapid growth of Chinese export share. Whereas most countries have their share of South African exports decreases, China increased its share from 3% in 2001 to 30% in 2013.

*Table 3.* **The results of the territorial Hirschman-Herfindahl Index, 2001–2013**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 0.293 | 0.294 | 0.278 | 0.263 | 0.249 | 0.240 | 0.230 | 0.223 | 0.221 | 0.234 | 0.248 | 0.246 | 0.260 |
| CH | 0.329 | 0.329 | 0.319 | 0.313 | 0.307 | 0.297 | 0.277 | 0.258 | 0.265 | 0.261 | 0.256 | 0.264 | 0.269 |
| IN | 0.248 | 0.254 | 0.241 | 0.234 | 0.233 | 0.225 | 0.216 | 0.206 | 0.227 | 0.216 | 0.220 | 0.219 | 0.207 |
| RU | 0.198 | 0.197 | 0.196 | 0.200 | 0.208 | 0.218 | 0.220 | 0.220 | 0.217 | 0.225 | 0.220 | 0.232 | 0.223 |
| SA | 0.245 | 0.238 | 0.239 | 0.234 | 0.229 | 0.236 | 0.232 | 0.228 | 0.227 | 0.236 | 0.270 | 0.294 | 0.332 |
| EU | 0.319 | 0.321 | 0.309 | 0.296 | 0.290 | 0.284 | 0.269 | 0.256 | 0.253 | 0.252 | 0.250 | 0.249 | 0.248 |

Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.
Source: UNCTAD, 2015; own calculations.

The question is whether the number of product groups with a comparative advantage is affected by export concentration, as shown in Figure 1. The correlation coefficient was used to answer this question. In Table 4 the correlations coefficient between the amount of RCA products and product-export diversification (first row) and its significance (second row) for each country can be seen. The result is considered as significant at the 5% significance level. Comparative advantage is a relative advantage in goods production as compared to other trading partners due to higher productivity. The more products with a comparative advantage a country has, the more favourable position it has at international markets. The more RCA products a country has, the greater diversification of its exports and thus it is less vulnerable to external shocks. The results are very different. The relation between RCA products and the HHI is significant only for Brazil, Russia and South Africa. In this case, the correlation coefficient is negative, confirming the hypothesis (Figure 1). However, these economies decrease the amount of RCA products and increase their export concentration. This means they are losing their comparative advantages in exported products and their export continues to concentrate on a lower amount of products.

*Table 4.* **Correlation between the amount of RCA products and product-export diversification,** *own calculations*

| BR | CH | EU | IN | RU | SA |
|---|---|---|---|---|---|
| -0.8286 | -0.0104 | 0.1961 | 0.0876 | -0.8937 | -0.8141 |
| 0.0000 | 0.9664 | 0.4209 | 0.7214 | 0.0000 | 0.0000 |

Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.

The results of other economies are not significant. However, it is interesting to look at them. India increased its product HHI compared to 2001, but also increased the number of RCA product. In this case, the slope of the curve in Figure 1 would be positive. Theoretically, China shows similar behaviour. Its correlation coefficient is slightly negative; nevertheless, comparing 2001 to 2013, China increased its export concentration and the amount of RCA products. The EU shows a positive correlation. The value of the product HHI did not show significant changes but increased its amount of RCA product groups.

Table 5 shows the results of correlation between product and territorial export diversification. There are only 3 economies with significant results here. India has a negative correlation coefficient because it increased its territorial diversification but decreased its product diversification. On the other hand, the EU and Russia have a positive correlation. However, while Russia reduced both types of export diversification, the European Union increased both of them. Brazil, China and South Africa reached negative but insignificant results of the correlation coefficient. Nevertheless, China and Brazil increased their territorial diversification but decreased product diversification. South Africa rapidly decreased its territorial diversification in favour of China, while product diversification did not show excessive volatility.

*Table 5.* **Correlation between product and territorial export diversification,** *own calculations*

| BR | CH | IN | RU | SA | EU |
|---|---|---|---|---|---|
| -0.3251 | -0.3851 | -0.7705 | 0.8900 | -0.1253 | 0.8180 |
| 0.2784 | 0.1938 | 0.0021 | 0.0000 | 0.6834 | 0.0006 |

Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.

**5. Conclusions.** The main goal of this paper was to confirm the hypothesis that the higher the amount of a product with a revealed comparative advantage is, the higher the export diversification will be in the case of the European Union and Brazil, Russia, India, China and South Africa (BRICS). This hypothesis was confirmed only for the European Union. The other considered countries, i.e. all BRICS on the contrary, have increased their export concentration. Their curve of export diversification has the same slope, but most of BRICS move in the opposite direction from the EU. For China and India a positive slope of export diversification curve applies. These results are in compliance with some conclusions of the classical trade theory, i.e. countries export those commodities which require, for their production, a relatively intensive use of those productive factors found locally in relative abundance (Krugman and Obstfeld, 1991). All BRICS countries are of large size and have enough mineral resources; it means they are not so much pressed on diversification as for example the European Union that is dependent on the import of energy and mineral resources.

Another goal of the paper was to identify whether product diversification and territorial diversification of the countries surveyed have increased. The development in the area of product diversification was different than in the area of territorial diversification. The European Union achieved the highest product diversification and was relatively steady in the period 2001–2013. South Africa also recorded a steady value of product diversification, but other countries increased their export product concentration. This means their export remained limited to only narrow groups of products. In the area of territorial diversification, the European Union as well as China and Brazil recorded a higher diversification of its trade partners in 2013 than 2001. Conversely, Russia and South Africa decreased their territorial diversification. India kept a similar trend in the recorded period. This development shows the direction of economic policy and the priorities of governments in these countries.

The hypothesis that the more products with a revealed comparative advantage a country has, the greater is diversification of its export was statistically significant only

for 3 coutries, i.e. Brazil, Russia and South Africa. However, these economies recorded a decline of products with a revealed comparative advantage and their export concentration and voluntarity strengthened.

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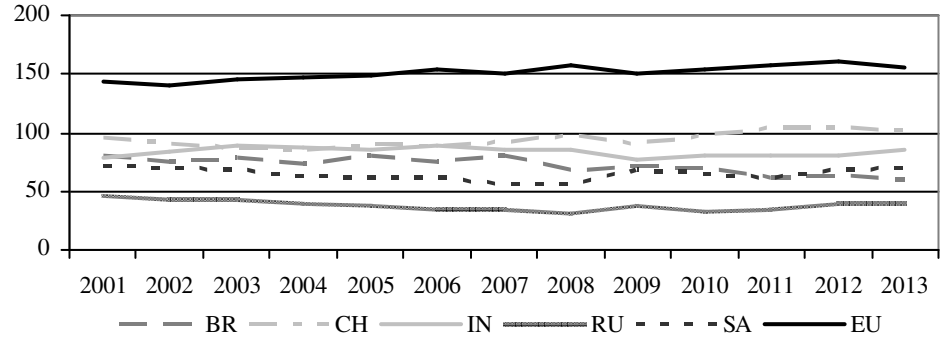
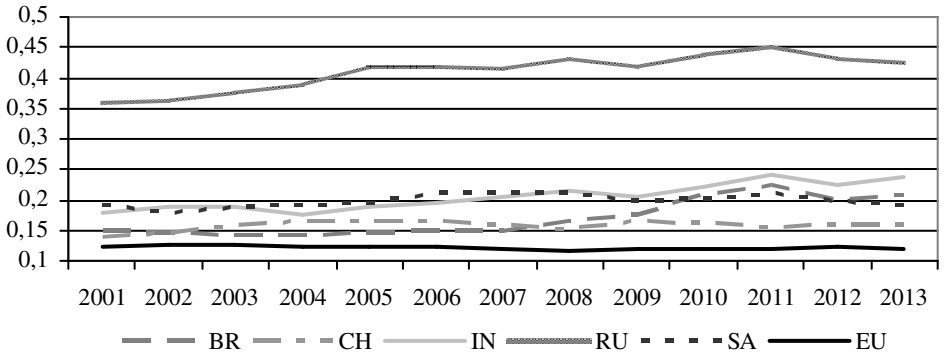
**Annexes:**

*Annex 1.* **The number of the product groups with a revealed comparative advantage, 2001–2013**



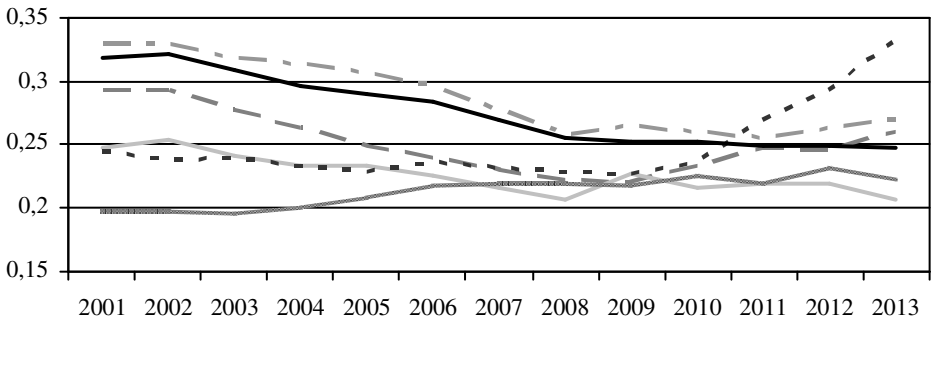

Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.
Source: UNCTAD, 2015; own calculations.

*Annex 2.* **The results of the product Hirschman-Herfindahl Index, 2001–2013**




Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.
Source: UNCTAD, 2015; own calculations.

*Annex 3.* **The results of the territorial Hirschman-Herfindahl Index, 2001–2013**




Note: BR-Brazil; CH-China; IN-India; RU-Russia; SA-South Africa; EU-European Union.
Source: UNCTAD, 2015; own calculations.

Стаття надійшла до редакції 13.02.2015.