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EU membership and exports competitiveness – benchmarking exports structures of Poland and Slovakia versus Bulgaria and Romania, and their convergence to the German pattern in the years 2000–2014

The competitiveness of a nation is associated with a set of characteristics that enable structural adjustments to global technological trends and improvement of living standards. The aim of this paper is to evaluate the competitiveness of Poland and Slovakia (in the EU since 2004) versus Bulgaria and Romania (in the EU since 2007) through the prism of their exports structure convergence to Germany, the strongest EU economy, in the years 2000–2014. The empirical analysis is based on Balassa's [1965] concept of Revealed Comparative Advantage (RCA) and conducted in a dynamic perspective. We use the UN trade statistics in the International Trade Classification (SITC), Rev. 3, with the exported goods grouped along their factor-intensities, following the methodology developed by Wysokińska [1997]. Within the analysed period, the catching-up economies have, to some extent, evolved towards knowledge-based economies, but not all of them with the same intensity and for the same commodity groups. Their competitive position in the exports of low-tech goods (i.e., resource- and labour-intensive) has not changed. The hypothesis that countries most lagging behind Germany at the beginning of the analysed period have undergone the largest adjustment (exports specialization convergence) appears true only in the case of Romania.

Keywords: exports competitiveness, exports specialisation convergence, catching-up economy

JEL classification: F14, F15, F23, F43

Członkostwo w UE a konkurencyjność eksportu – struktury eksportu Polski i Słowacji na tle Bułgarii i Rumunii oraz ich konwergencja do wzorca niemieckiego w latach 2000–2014

Konkurencyjność gospodarki narodowej wiąże się z zestawem cech umożliwiających strukturalne dostosowanie do światowych trendów technologicznych i w efekcie wzrost poziomu życia mieszkańców. Celem artykułu jest ocena konkurencyjności Polski i Słowacji (w UE od 2004 r.) oraz Bułgarii i Rumunii (w UE od 2007 r.) przez pryzmat konwergencji struktur ich eksportu do

wzorca Niemiec, najsilniejszej gospodarki UE, w latach 2000–2014. Analiza empiryczna opiera się na koncepcji ujawnionych przewag względnych (RCA) Balassy [1965] w ujęciu dynamicznym. Opieramy się na statystykach handlu baz UN według klasyfikacji SITC Rev. 3, zgodnie z metodą Wysokińskiej [1997] dokonując grupowania towarów eksportowych według intensywności wykorzystania czynników. W latach 2000–2014 struktury eksportu analizowanych gospodarek ewoluowały w kierunku specjalizacji opartej na wiedzy, ale przemiany obejmowały odmienne grupy towarowe i charakteryzowała je różna intensywność. Gospodarki utrzymały przewagi w eksporcie towarów niezaawansowanych technologicznie (surowco- i pracochłonnych). Hipoteza, zgodnie z którą kraje najbardziej opóźnione technologicznie w stosunku do Niemiec na początku analizowanego okresu dokonały największego przyspieszenia (konwergencja specjalizacji eksportu), jest prawdziwa tylko w wypadku Rumunii.

Słowa kluczowe: konkurencyjność eksportu, konwergencja struktury eksportu, gospodarki doganiające

Klasyfikacja JEL: F14, F15, F23, F43

Introduction

Competitiveness has become one of the most broadly discussed research areas at the intersection of modern international management and economics. Such popularity results from numerous voices and a wide variety of defining perspectives present in scholarly literature (for a literature review, see: [Czarny, Żmuda, 2017]). Recently, a consensus has been reached among the scholars to associate competitiveness with a set of self-enforcing characteristics of a country which enable structural adjustments to global technological trends and, as a consequence, lead to the ultimate developmental goal: improving the living standard of citizens [Reinert, 1995, pp. 23–24; Lonska, Boronenko, 2015]. Following this approach, GDP convergence towards leading world economies is the goal for catching-up economies. Its achievement, however, relies upon the ability to shift production and exports structure towards specialization based on knowledge and innovation [Peretto, 1990; Lollar, Beheshti, Whitlow, 2010]. Thus, in this paper, competitiveness is understood as a long-term ability to reach developmental goals and is evaluated through structural adjustments of exports.

Regional integration, enabling development of liberalized and integrated markets for goods, services, and production factors, establishes a new context for the competitiveness analysis – particularly for catching-up economies. Through integration within common markets and the free flow of capital, technologies, and human resources, catching-up economies gain access to basic and advanced production factors necessary for their development. Hyper-competitive international markets expose companies from catching-up economies to foreign rivals and confront them with sophisticated, demanding customers from around the world, thus mobilizing them to raise quality standards and innovate. Integration within the international division of labour and participation in global value chains facili-

tates access to both specialized suppliers and supporting industries. Integration within clusters is enabled, thus facilitating the establishment of business cooperation and access to modern technology. In the light of the mentioned arguments, it can be concluded that integration within the global economy gives a real chance to companies to overcome their natural internal limitations and become global players [Castello, Ozawa, 2014, p. 11–12].

Exports competitiveness, being a relative, qualitative category, relies on specification of benchmark indicators together with a set of characteristics of a "competitive economy" as a pattern. In this sense, for catching-up economies (in this paper exemplified by Poland, Slovakia, Bulgaria, and Romania[1]), competitiveness may be understood as the ability to close the structural gap to the strongest economy among the EU members: Germany. We analyse the evolution of the selected countries' exports specialization in the years 2000–2014, checking whether the convergence trend towards the German exports pattern can be observed, and which of these states has shown the best ability to shift its exports structure towards high-tech specialization.

The paper is divided into eight sections. After an introduction, the research method is briefly explained in the second part. In sections three to seven we analyse the evolution of exports structures for Poland and Slovakia versus Bulgaria, and Romania with the aim to assess their relative ability to close the structural gap to the German economy in the years 2000–2014. Additionally, we measure the changes in the exports structures in three sub-periods (2000–2004; 2004–2009; 2009–2014). The eighth section concludes the main findings.

1. Research method

There is a general consensus among scholars that international competitiveness is an interdisciplinary and multidimensional term[2] which should be analysed on three aggregation levels: micro (firm/product), mezzo (sector/cluster), and macro (whole economy). All these dimensions can be seen through a static prism (competitive position at a given moment) and in a dynamic perspective (ability to compete, understood as an ability to improve competitive position over a given

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[1] We benchmark two pairs of catching-up economies: Poland and Slovakia versus Bulgaria and Romania. The first pair joined the EU in 2004, whereas the second one (the latecomers) became EU members in 2007. We do not compare Poland with the other V4 states (the Czech Republic and Hungary) because we have already proved that Poland is relatively lagging behind them [Czarny, Żmuda, 2017]. We intend to look at Poland's ability to develop toward technologically advanced exports relating its achievements to the relatively less developed V4 member (Slovakia) and other countries joining the EU later, in 2007 (Bulgaria and Romania).

[2] For a discussion on the concept of national competitiveness and its meaning in the context of developmental constraints of a catching-up economy, see: [Czarny, Żmuda, 2017; Żmuda, 2017].

time period). Competitiveness should be assessed in relative terms, that is, an entity showing better results than its peers in achieving a certain goal can be assessed as more competitive. For both the static and the dynamic approaches to competitiveness a point of reference has to be chosen. This implies that when modelling competitiveness of a catching-up economy one needs to take under consideration unique characteristics of these countries. Research shows that catching-up economies are contextually different from the developed countries and generally tend to have weaker institutional and technological infrastructure[3] [Abramowitz, 1986]. The notion of competitiveness of a catching-up economy, departing from the trade perspective, is thus understood in this paper in the context of growth-theory [Reinert, 1995, pp. 23–24] as the ability to increase the national productivity level and close the technological gap in an attempt to reach the levels of the most developed countries. Following this line of argumentation, we define competitiveness as an ability of an economy to adjust exports structures to the changes in global technology and thus converging with the most developed partners.

The empirical analysis has been based on Balassa's [1965] Revealed Comparative Advantage (RCA)[4]. It allows us to determine whether and to what extent the export share of the commodity group j in the exports of country i differs from those of the commodity group j in total global exports.

To calculate RCA, we use Balassa's [1965] formula:

$$RCA = E_{ij}/E_{it} \, / \, (E_{nj}/E_{nt})$$

where:
E – exports,
i – country index,
n – set of countries,
j – commodity index,
t – set of commodities.

A RCA value greater than 1 signals a comparative advantage of country i in exports of commodity group j. We assume that specialization in exports of goods from commodity groups with high technological intensity indicates the competitiveness of the national economy [Bieńkowski et al., 2008, p. 21]. In dynamic terms, RCA can be used to show the evolution of exports towards specialization based on

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[3] A catching-up economy, in contrast to a developing economy, due to its basic institutional and infrastructural conditions for doing business, combined with a "set of special social capabilities", offers opportunities for above-average returns on invested capital. This encourages mobile factors of production to flow into these locations and supports closing of the technological gap.

[4] Understanding the limitations of the RCA (basing on simple exports figures) as a method for evaluating exports specialization, in the future research we plan to include: Lafay index of international specialization [Zaghini, 2003] and economic complexity index (ECI) [Bass, 2016], as well as evaluate the integration of country's enterprises within Global Value Chains (GVC). Thus, we will be able to benchmark the results of the conducted analyses and draw the conclusions.

knowledge and innovation, thus reflecting competitiveness as an ability to adjust to the latest global technological trends.

We observe the changes in global positioning of the selected catching-up economies within all the categories of exported goods (t in Equation 1) among all the countries in the world (n). These have been analysed using the UN trade statistics in the International Trade Classification (SITC), Rev. 3, classified according to the exports classification system proposed by Wysokińska [1997; Wysokińska, Witkowska, 1999, p. 307] with the exported goods grouped along factor intensities into: resource-intensive, labour-intensive, capital-intensive, technology-intensive easy to imitate, and technology-intensive difficult to imitate. We label resource-intensive and labour-intensive products as the least (or "less") technologically advanced. The other groups are being considered as technologically advanced, with the most advanced being the technology-intensive difficult to imitate products.

RCA in each of the analysed product groups has been measured in a dynamic perspective for the years 2000–2014 and benchmarked to the German pattern to prove the exports specialization convergence hypothesis. Our analysis starts in 2000 as the year of the offset of adjustments of Poland and Slovakia before joining the EU. In order to evaluate how the exports' competitiveness of both states has been impacted by their accession to the EU, we have included the year 2004. To analyse the effects of global trade collapse during the recent economic crisis [Czarny, Śledziewska, 2012, pp. 20–38], we use relevant data from 2009. The following analysis of changes in the years 2009–2014 shows the exports structures' recovery after the crisis.

Germany is considered as a benchmark due to the superior position of its economy in the EU. Furthermore, Germany has been the world's largest exporter for years (now competing with China for the lead position), which confirms strong global competitive position of its economy. We expect that its comparative advantages are concentrated on high-tech products.

2. Changes in comparative advantages of Poland, Slovakia, Bulgaria, Romania, and Germany in the export of resource-intensive goods

We consider resource-intensive goods to be the least technologically advanced, since their export remains the domain of developing countries, and the specialization of industrialized countries focuses on high-tech products [Czarny, Śledziewska, 2012, p. 144]. Knowledge-based specialization of industrialized countries indirectly confirms the large disadvantages suffered by Germany in the export of resource--intensive goods (RCA from 0.32 to 0.34 in the entire analysed period).
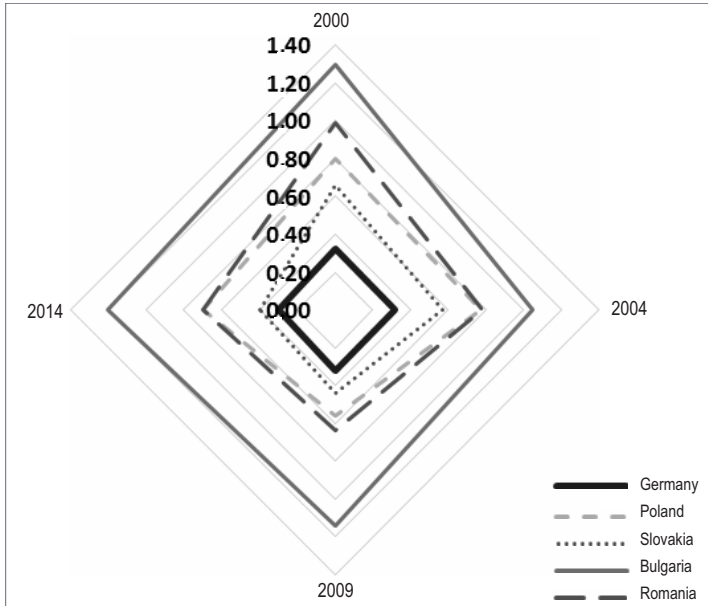
Figure 1. RCA of Poland, Slovakia, Bulgaria, Romania, and Germany in exports of resource-
-intensive goods

Source: Own elaboration based on UN COMTRADE data.

Among the analysed catching-up economies, only Bulgaria has a comparative advantage in the export of resource-intensive goods. This specialization persists throughout the study period, although it decreases after 2000 (respective RCA: in 2000: 1.3; 2004: 1.05; 2009: 1.14; 2014: 1.2). Among the other states, Slovakia had the lowest RCA (2000: 0.66) and its RCA in export of resource-intensive goods has been decreasing systematically (up to 0.42 in 2014). In Poland as well as in Romania, we observe a decreasing RCA levels in the category of resource-intensive goods until 2009, after which this trend was reversed.

3. Changes in comparative advantages of Poland, Slovakia, Bulgaria, Romania, and Germany in export of labour--intensive products

In 2000, all the analysed catching-up economies – as opposed to Germany – recorded comparative advantages in exports of labour-intensive goods, which we categorise as less technologically advanced. Romania had the highest RCA (2.35) and Slovakia the lowest (1.35). In 2004, the largest comparative advantage in exporting

labour-intensive goods was maintained by Romania (2.33). In 2000, Poland had a higher RCA of 1.83 as compared to Bulgaria (1.53). The situation got reversed in 2004, when Bulgarian dominance increased (RCA = 1.87) and Poland fell from its position (RCA = 1.64).

In 2009, all the catching-up economies reduced specialization in the export of labour-intensive goods. The biggest decrease was recorded by Romania. In 2014, Poland was the only economy to increase its advantage as compared to 2009, while the other countries decreased their specialization in this category. Slovakia lost its comparative advantage completely.
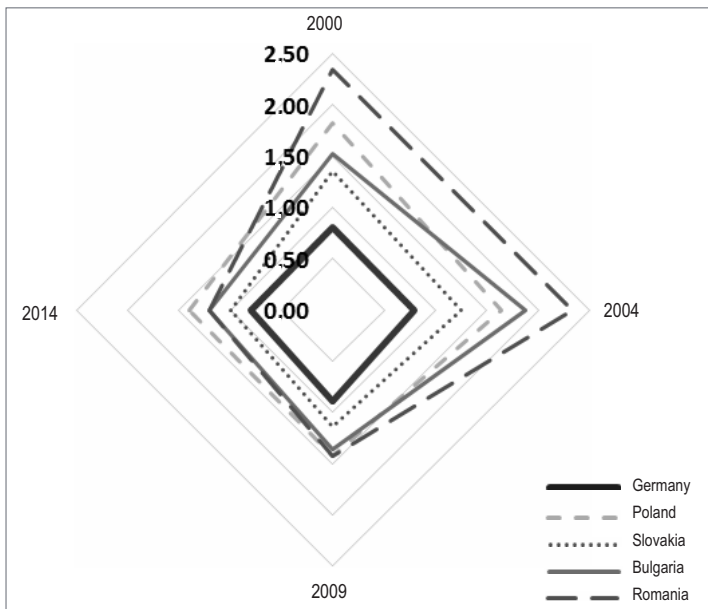

Figure 2. RCA of Poland, Slovakia, Bulgaria, Romania, and Germany in exports of labour--intensive goods

Source: Own elaboration based on UN COMTRADE data.

During the analysed period, Slovakia, Bulgaria, and Romania systematically lost their comparative advantages in the export of labour-intensive goods, which could herald the transition to a specialization based on knowledge and innovation (Bulgaria also lost comparative advantage in the exports of resource-intensive goods).

4. Changes in comparative advantages of Poland, Slovakia, Bulgaria, Romania, and Germany in the export of capital-intensive products

Capital-intensive products were the first group of technologically advanced goods that we analysed. As expected, in 2000, Germany had a different specialization structure than the analysed catching-up economies, recording in 2000 the highest RCA (1.43) in capital-intensive goods – as compared to the other years. However, German RCA was not the highest in the analysed sample. In 2000 and 2004 Slovakia recorded better results; in 2009, all catching-up economies had higher RCA; and in 2014 Romania and Slovakia performed better.

Poland and Bulgaria also recorded comparative advantage in capital-intensive exports throughout all the analysed years, while Romania got comparative advantage in 2009. However, Poland and Bulgaria did not make much progress towards specialization in capital-intensive exports measured by RCA indicators, as opposed to Romania – despite the fact that at the beginning of the analysed period they had an advantage over Romania (in 2000 Romania was the only country from the sample that had comparative disadvantage in capital-intensive exports).
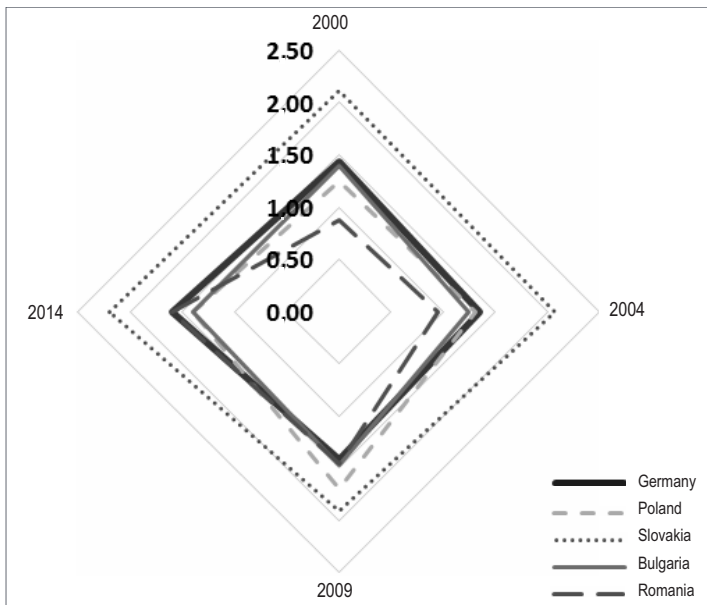

Figure 3. RCA of Poland, Slovakia, Bulgaria, Romania, and Germany in export of capital--intensive goods

Source: Own elaboration based on UN COMTRADE data.

5. Changes in comparative advantages of Poland, Slovakia, Bulgaria, Romania, and Germany in export of technology-intensive easy to imitate products

In 2000 and 2004, in exports of technology-intensive easy to imitate products, none of the economies recorded comparative advantages, although Germany was close to achieving an advantage (RCA in the range 0.82–0.94). Slovakia had been dominating since 2009 with RCA=1.35 in 2009 and 1.26 in 2014. In the years 2000–2014, Poland achieved progress with its RCA doubling from 0.39 in 2000 to 0.8 in 2014. The Bulgarian index increased from 0.31 in 2000 to 0.51 in 2014, while Romanian remained the lowest (around 0.4).
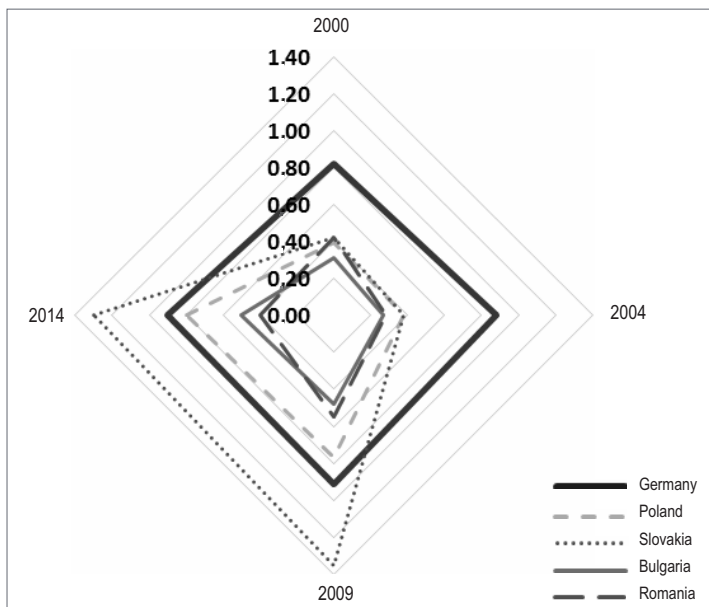

Figure 4. RCA of Poland, Slovakia, Bulgaria, Romania, and Germany in exports of technology-intensive easy to imitate products

Source: Own elaboration based on UN COMTRADE data.

6. Changes in comparative advantages of Poland, Slovakia, Bulgaria, Romania, and Germany in export of technology--intensive difficult to imitate products

The second category, after capital intensive goods, in which Germany had a strong comparative advantage are technology-intensive difficult to imitate goods (RCA = 1.22). Thus, German advantages were concentrated in the exports of two out of three commodity groups labelled as those at the high level of technological advancement. Germany's RCA had increased in the exports of technology-intensive difficult to imitate goods, considered as the most technologically advanced group of products (from RCA = 1.22 in 2000 to RCA = 1.32 in 2014).

Among the analysed catching-up economies, only Romania managed to achieve comparative advantage in high-tech difficult to imitate goods (with RCA in 2009 = 1.05 and in 2014 = 1.06). The situation in Poland was quite different. In 2004, it was one step away from gaining a comparative advantage in the export of these goods (RCA = 0.95), while in 2009 with RCA = 0.86 it drifted away from the perspective of a quick catch-up with the leading EU states.
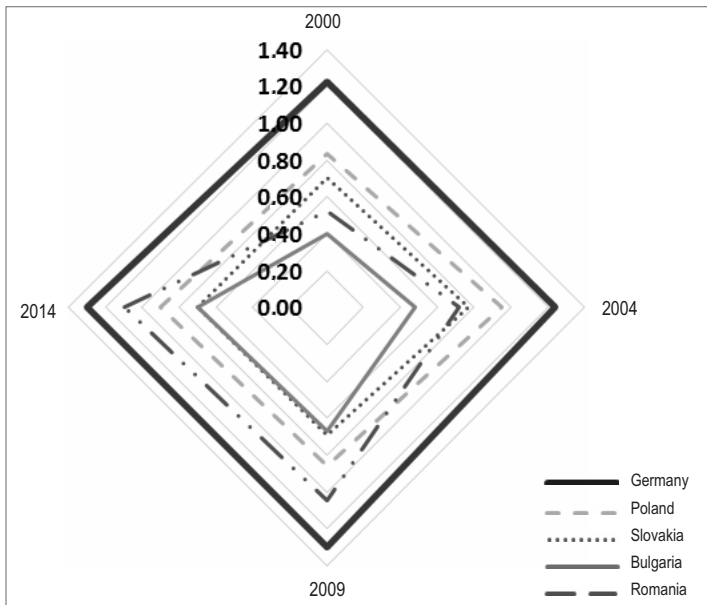

Figure 5. RCA of Poland, Slovakia, Bulgaria, Romania, and Germany in exports of technology-intensive difficult to imitate goods
Source: Own elaboration based on UN COMTRADE data.

Conclusions

This analysis shows that prior to the EU accession the analysed countries (Poland, Slovakia, Bulgaria, and Romania) could have been regarded as catching-up economies, considerably less developed than Germany. In 2000, all of them recorded comparative advantages in the exports of labour-intensive goods. However, among this group one can point out the leader and the state lagging behind. The first one was Slovakia, having the highest RCA in export of capital-intensive goods. The latter was Romania that had comparative advantage only in the exports of labour-intensive goods: relatively unprocessed and at a low level of technological advancement, usually considered a specialization domain of developing countries. Poland, with its comparative advantages in the exports of labour- and capital-intensive goods, can be categorized as a moderate group performer, together with Bulgaria, recording additionally RCA 1 in the exports of resource-intensive goods.

The 2004 EU accession of two countries from the sample did not have a significant influence on their performance. In 2004 they decreased their levels of specialization in the exports of relatively less technologically advanced goods in comparison to 2000 (with the exception of Bulgaria in export of labour-intensive goods), but without gaining advantages in the exports of more advanced products.

Despite the collapse in world trade in 2009, Poland, Slovakia, Bulgaria, and Romania not only maintained but even improved their position in the exports of technologically advanced goods. This may be evidence of, on the one hand, their progress in catching up with the strongest EU economy: Germany, and on the other, their ability to profit from a relatively good price-quality ratio, particularly valuable in difficult times.

In the last year of the analysed period, most of the comparative advantages that the catching-up economies recorded in 2009 were maintained, but the RCA had only increased in a few cases. This means that some of analysed economies discontinued the process of catching up with Germany.

Slovakia, despite not yet achieving competitive advantage in exports of technology-intensive difficult to imitate goods, already went through the process of adjustments within the European Monetary Union. This has not prevented its ability to maintain comparative advantages in exports of capital-intensive and technology-intensive easy to imitate products.

During the whole period, the catching-up economies have, to some extent, evolved towards knowledge-based economies, but not all of them with the same intensity and for the same commodity groups. Their competitive position in the exports of low-tech goods (i.e., resource- and labour-intensive) has not changed.

The hypothesis that countries most lagging behind Germany at the beginning of the analysed period have undergone a continuous and the largest adjustment (exports specialization convergence) appears true only in the case of Romania. In 2014, its exports position is better than that of Poland, which had a much better starting position.

The empirical study confirmed that choosing Germany as a point of reference for analysing the process of catching up of the EU-10 was the right decision. The analysis has confirmed that the German economy is based on solid foundations, constituted by the technologies that are difficult to imitate.

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References

Abramowitz M., 1986, *Catching up, forging ahead, and falling behind*, The Journal of Economic History, vol. 46, no. 2.

Balassa B., 1965, *Trade liberalisation and 'revealed' comparative advantage*, The Manchester School, vol. 33, no. 2.

Bass H., 2016, *Tunisia's progress in integration into global value chains: Achievements and obstacles*, Contribution to African Development Perspectives Yearbook (ADPY): Africa's Progress in Regional and Global Economic Integration, vol. 18.

Bieńkowski W., Weresa M., Czajkowski Z., Gomułka M., Brocka-Palacz B., Latoszek E., Misala J. (eds.), 2008, *Czynniki i miary międzynarodowej konkurencyjności gospodarek w kontekście globalizacji – wstępne wyniki badań* (no. 284), Szkoła Główna Handlowa.

Czarny E., Śledziewska K., 2012, *Międzynarodowa współpraca gospodarcza w warunkach kryzysu. Wnioski dla Polski*, PWE Polskie Wydawnictwo Ekonomiczne, Warszawa.

Czarny E., Żmuda M., 2017, *Competitiveness of a catching-up economy as ability to close technological gap: Evolution of the EU-10 exports specialization towards the German pattern*, CBS Working Paper 4.

Lollar J. G., Beheshti H.M., Whitlow B.J., 2010, *The role of integrative technology in competitiveness*, Competitiveness Review, vol. 20, no. 5.

Lonska J., Boronenko V., 2015, *Rethinking competitiveness and human development in global comparative researches*, Procedia Economics and Finance, vol. 23.

Peretto P., 1990, *Technology, learning opportunity and international competitiveness: Some empirical evidence with panel data*, Giornale Degli Economisti E Annali Di Economia.

Reinert E., 1995, *Competitiveness and its predecessors – a 500-year cross-national perspective*, Structural Change and Economic Dynamics, vol. 6.

Wysokińska Z., 1997, *Aspekty technologiczne konkurencyjności międzynarodowej Unii Europejskiej oraz Polski*, Studia Europejskie, vol. 2.

Wysokińska Z., Witkowska J., 1999, *Integracja europejska. Rozwój rynków*, Wydawnictwo Naukowe PWN, Warszawa–Łódź.

Zaghini A., 2003, *Trade advantages and specialisation dynamics in acceding countries*, European Central Bank Working Paper no. 249.

Żmuda M., 2017, *Taxonomy of international competitiveness*, Journal of Management and Business Administration. Central Europe, vol. 25, no. 3.

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ANNEX

Table A1. RCA in 2000

Country	Resource--intensive	Labour--intensive	Capital--intensive	Technology--intensive easy to imitate	Technology--intensive difficult to imitate
Germany	0.32	0.80	1.43	0.82	1.22
Bulgaria	1.30	1.53	1.39	0.31	0.40
Poland	0.80	1.83	1.25	0.39	0.83
Romania	0.99	2.35	0.88	0.42	0.52
Slovakia	0.66	1.35	2.11	0.42	0.70

Table A2. RCA in 2004

Country	Resource--intensive	Labour--intensive	Capital--intensive	Technology--intensive easy to imitate	Technology--intensive difficult to imitate
Germany	0.32	0.79	1.35	0.88	1.24
Bulgaria	1.05	1.87	1.25	0.27	0.48
Poland	0.77	1.64	1.31	0.38	0.95
Romania	0.78	2.33	0.95	0.28	0.77
Slovakia	0.57	1.24	2.07	0.48	0.77

Table A3. RCA in 2009

Country	Resource--intensive	Labour--intensive	Capital--intensive	Technology--intensive easy to imitate	Technology--intensive difficult to imitate
Germany	0.32	0.89	1.42	0.91	1.30
Bulgaria	1.14	1.36	1.47	0.48	0.67
Poland	0.56	1.42	1.70	0.77	0.86
Romania	0.64	1.42	1.46	0.55	1.05
Slovakia	0.44	1.14	1.91	1.35	0.69

Table A4. RCA in 2014

Country	Resource-intensive	Labour-intensive	Capital-intensive	Technology-intensive easy to imitate	Technology-intensive difficult to imitate
Germany	0.34	0.81	1.58	0.94	1.32
Bulgaria	1.20	1.18	1.38	0.51	0.70
Poland	0.70	1.45	1.42	0.80	0.92
Romania	0.71	1.24	1.61	0.41	1.06
Slovakia	0.42	0.96	2.24	1.26	0.71

Table A5. Exports classification system by technology intensities

Products grouped by technology-intensities	Product categories	SITC (Rev. 3)
Resource-intensive goods	Food, live animals Inedible resources (except textile fibres) Mineral fuels (except electric current) Animal and vegetable oils Fertilisers	0 2-26 3-35 4 56
Labour-intensive goods	Textile fibres Manufactured good classified by material (except rubber, steel and iron and non-metallic products) Miscellaneous manufactured articles (except scientific instruments and optical goods	26 6-62-67-68 8-87-88
Capital-intensive goods	Beverages and tobacco Electric current Dyeing, tanning and colouring materials Essential oils and perfume materials Rubber products Steel and iron Non-metallic goods Road vehicles	1 35 53 55 62 67 68 78
Technology-intensive goods easy to imitate	Organic and inorganic chemicals Pharmaceuticals Plastics in non-primary forms Chemical materials and products (except explosive materials) Office and automatic data-processing machines Telecommunications and sound-recording and reproducing apparatus	51,52 54 58 59-593 75 76
Technology-intensive goods difficult to imitate	Explosive materials Plastics in primary forms Machinery and transport equipment (except office and automatic data-processing machines, telecommunications and sound-recording and reproducing apparatus, road vehicles) Professional scientific and controlling instruments and apparatus Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks	593 57 7-75-76-78 87 88

Source: [Wysokińska, 1997, p. 18].