COMPETITIVENESS OF A CATCHING-UP ECONOMY AS ABILITY TO CLOSE TECHNOLOGICAL GAP: EVOLUTION OF THE EU-10 EXPORTS SPECIALIZATION TOWARDS THE GERMAN PATTERN[1]

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Competitiveness of a nation is a broad and multidimensional term. Over the last years, a consensus has emerged, associating competitiveness with a set of self-enforcing characteristics of a country that enable structural adjustments to global technological trends, productivity increase and as consequence, a rise of living standard of its citizens. We conclude that the competitiveness on the macro level can be thus understood as the long-term ability to develop.

Applying this approach to the catching-up economies, high levels of competitiveness would mean fast GDP convergence towards leading world economies. This achievement, however, relies upon the ability to shift production and exports structure towards a specialization based on knowledge and innovation. To uncover existence of such structural adjustments, it is crucial to specify 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: the EU-10 states), competitiveness may be understood as the ability to close the structural gap to the strongest economy amongst the EU members: Germany.

We analyzed the evolution of EU-10's exports specialization in the years 2000-2014, examining whether the convergence trend towards the German exports pattern can be observed and which of the EU-10 states showed the best ability to shift their exports structure towards high-tech specialization. The results of the analysis have shown that the exports of the EU-10 have been on the evolutionary path since 2000, however the timing, pace and scale of adjustments differ greatly across the studied economies. The analysis outcomes have revealed that Romania belonging to the group of countries most lagging behind Germany at the beginning of the analyzed period, has undergone largest structural adjustments, supporting the exports specialization convergence hypothesis.

1. Introduction

Over the years, competitiveness has emerged as one of the most broadly discussed research areas at the edge of modern international management and economics. Such a popularity is a sum of numerous voices and wide variety of defining perspectives, present in the scholarly literature across disciplines (Klein, 1988; Porter, 1990; Dunn, 1994; Krugman, 1996; Waheeduzzaman & Ryans, 1996; Chaudhuri & Ray, 1997; Mitschke, 2000; Reiljan, Hinrikus, & Ivanov, 2000; Babu, 2002; Minford, 2006; Berger, 2008; Bracey, 2008; Cho & Moon, 2008; Önsel et al., 2008; Parrinello, 2010; Bhawsar & Chattopadhyay, 2015; Voinescu & Moisoiu, 2015). Complexity of the competitiveness phenomenon results in difficulties in its modelling and measuring – the fact that enhances the scientific research but confuses the public debate.

Recently, a consensus has been developed among the scholars to associate competitiveness with a set of self-enforcing characteristics of a country, which enable structural adjustment to global technological trends, and as a consequence, lead to the ultimate goal: a rise of living standard of its citizens (Reinert, 1995, pp. 23–24; Radło, 2008, p. 77; Lonska & Boronenko, 2015). Following this approach, GDP convergence towards leading world economies is the ultimate goal for catching-up economies. It's achievement, however, relies upon ability to shift production and exports structure towards specialization based on knowledge and innovation (Peretto, 1990; Magnier & Toujas-Bernate, 1994; Katsouli, 2006; Wang, Chien, & Kao, 2007; Lollar, Beheshti, & Whitlow, 2010). In this paper, competitiveness is understood as long-term ability to reach developmental goals, and is evaluated through structural adjustments of exports.

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 the EU-10[2] states), competitiveness may be understood as the ability to close the structural gap to the strongest economy among the EU members: Germany. We analyze the evolution of EU-10 exports specialization in the years 2000-2014, checking whether the convergence trend towards the German

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[2] The term EU-10 refers to the following 10 New EU Member States (NMS-10): Bulgaria, Czech Republic, Hungary, Latvia, Lithuania, Estonia, Poland, Romania, Slovakia, Slovenia. They constitute a heterogeneous group of catching-up economies, sharing post-communist heritage as well as facing comparable developmental challenges of structural and institutional nature.

exports pattern can be observed and which of the EU-10 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 second section opens with a discussion on the concept of national competitiveness and its meaning in the context of developmental constraints of a catching-up economy. In the third section, the research methodology is briefly explained. In the sections four to seven we analyse the exports structure evolution of EU-10 states and assess their relative ability to close the structural gap to the German economy in the years 2000-2014, measured in four sub-periods. The eighth section concludes the main findings, suggests research directions and elaborates on policy implications.

2. Controversies and a consensus around the term "international competitiveness"

There is a general consensus among scholars that international competitiveness is an inter-disciplinary category and as a multidimensional term, it should be analyzed on three aggregation levels: micro (firm/product), mezzo (sector/cluster) and macro (whole economy) (Martin, 2005; Daszkiewicz, 2008). All these dimensions can be seen through a static prism (competitive position at a given moment in time) and in a dynamic perspective (ability to compete, understood as an ability to improve competitive position in an analyzed time period).

Competitiveness should be assessed in relative terms, thus denoting how well a subject of analysis performs in relation to its peers within a defined area (Ezalea-Harrison, 2005, p. 84; Fagerberg, Srholec, & Knell, 2007, p. 1595; Berger, 2008). In this context, competitiveness can be understood as an ability to reach developmental goals, referred to as a kind of a "contest, which results in an achieved goal, consisting of some form of superior reward, be it financial or non-financial nature" (Flint, 2000, p. 123). An entity showing better results than its peers in achieving a goal in a given area can be assessed as a more competitive. However, it is important to note that at each of the aggregation levels (micro, mezzo and macro) the goals differ [3].

Origins of the competitiveness concept can be traced back to the micro-level where, in the theory of competitive advantage, the goal of the company is to achieve above-average returns in the international markets through the ability to offer products that competitors find too costly to

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[3] Elaboration on the modern approaches to defining international competitiveness on three aggregation levels and a resulting definitional taxonomy can be found in (Żmuda, 2017).

imitate (cost-leadership strategies) or impossible to duplicate (differentiation strategies) (Porter, 1985). The joined efforts of domestic companies stimulate the relative economic success of a whole country. This can be reflected in the share of domestic firms in the total consumption of the goods category (the market) – in the national and international perspective (Papadakis, 1994, 1996; Wysokińska, 2012, pp. 127–128).

Cumulated successes of single companies lead to the emergence of competitive industries. Here, sectoral/industrial competitiveness (mezzo level) is associated with the ability of whole industries to compete with their foreign counterparts (Castellacci, 2008), and can be reflected in growing shares of domestic industries in the world exports (Cohen & Zysman, 1988), as well as through increasing levels of their technological advancements and productivity (Castellacci, 2008).

Referring to the strategic management basics on how to achieve competitive advantage, two different strategies to stimulate the national competitiveness can be distinguished (Aiginger & Vogel, 2015). "Low-road competitiveness" (concept inspired by the cost-leadership business level strategy) focuses on the cost-based competition. Here countries offering low wages, low taxes and low energy prices (mainly the emerging economies) win the competitive battle. On the contrary "high-road competitiveness" (concept inspired by the differentiation business level strategy) is focusing on national efforts aimed at raising productivity through development of innovative capabilities to become a quality/innovation leader. Cumulative shifts in industrial productivity and long-term evolution of specialization patterns, reflected in the structural adjustments to the technological advancements in the global economy ("ability to adjust") (Żmuda, 2017), enable achieving the ultimate goal of a competitive economy (macro competitiveness): producing high and sustained living standards for its citizens (Porter, 1990; Porter & Rivkin, 2012). In this view competitiveness of a nation departs from the static, quantitative view criticized by Krugman (1991b, 1996) and as a qualitative category and a dynamic phenomenon, is understood as the ability to reach developmental goals in the era of globalisation (Dunn, 1994; Reinert, 1995; Martin, 2005; Cho & Moon, 2008; Jagiełło, 2008; Radło, 2008).

For both, the static and the dynamic approaches to competitiveness evaluation, a point of reference has to be chosen. Benchmarking should be, however, conducted carefully, with com-

petitiveness analyzed within groups of countries similar in terms of level of economic development (Cho & Moon, 2005). This implies that modelling of competitiveness of a catching-up economy 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 (Abramowitz, 1986).

These contextual characteristics of a catching-up economy affect the profitability of business conducted within its borders (relative to the developed economies). In contrast to the developing countries, the catching-up economies, due to the met basic institutional and infrastructural conditions for doing business, combined with a "set of special social capabilities", offer opportunities for above-average returns on invested capital. This encourages mobile factors of production to flow into these locations, supports closing of the technological gap, and stimulates the socio-economic convergence within regions.

The notion of competitiveness of a catching-up economy, departing from the trade perspective, is thus understood in this paper in the growth-theory context (Reinert, 1995, pp. 23–24; Radło, 2008, p. 77) 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. This fact finds its reflection in the evolution of exports patterns towards high-tech specialization and in closure of the gap towards the most developed countries. In this paper, we follow this line of argumentation, defining competitiveness as an ability of an economy to adjust exports structures to the changes in the global technology and thus converging with the most developed partners.

3. Research method

The analysis has been based on a commonly accepted measure of exports specialization – Revealed Comparative Advantage (RCA) by Balassa (1965) – frequently used as a means for evaluating exports competitiveness. It allowed 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 the formula suggested by Balassa (Balassa, 1965):

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

where:

E: exports

i: country index

n: set of countries

j: commodity index

t: set of commodities

When the RCA value exceeds 1, it is a sign of a comparative advantage of the country i in the commodity group j. We assume that the specialization in exports of goods from specific commodity groups (characterized by high technological intensity) is a determinant of the competitiveness of the national economy (Bieńkowski et al., 2008, p. 21). In dynamic terms, the RCA can be used to show the evolution of exports towards specialization based on knowledge and innovation, thus reflecting competitiveness as ability to adjust to the latest global technological trends.

Table 1. Exports classification system by factor intensities

Products grouped by factor-intensities	Product categories	SITC (Rev. 3)
Resource-intensive goods	Food, live animals	0
	Inedible resources (except textile fibres)	2-26
	Mineral fuels (except electric current)	3-35
	Animal and vegetable oils	4
	Fertilisers	56
Labour-intensive goods	Textile fibres	26
	Manufactured goods classified by material (except rubber, steel and iron and non-metallic products)	6-62-67-68
	Miscellaneous manufactured articles (except scientific instruments and optical goods)	8-87-88

Capital-intensive goods	Beverages and tobacco	1
	Electric current	35
	Dyeing, tanning and colouring materials	53
	Essential oils and perfume materials	55
	Rubber products	62
	Steel and iron	67
	Non-metallic goods	68
	Road vehicles	78
Technology-intensive goods easy to imitate	Organic and inorganic chemicals	51,52
	Pharmaceuticals	54
	Plastics in non-primary forms	58
	Chemical materials and products (except explosive materials)	59-593
	Office and automatic data-processing machines	75
	Telecommunications and sound-recording and reproducing apparatus	76
Technology-intensive goods difficult to imitate	Explosive materials	593
	Plastics in primary forms	57
	Machinery and transport equipment (except office and automatic data-processing machines, telecommunications and sound-recording and reproducing apparatus, road vehicles)	7-75-76-78
	Professional scientific and controlling instruments and apparatus	87
	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks	88

Source: (Wysokińska, Witkowska, 1999, p. 307)

In our analysis we observe the change of global positioning of the EU-10 countries within all the categories of exported goods with *n* from the equation above referring to all the countries in the world and *t* - all exported commodities. These have been analysed using the UN Trade statistics in the International Trade Classification (SITC), Rev. 3, classified according to the exports classification system by Wysokińska, Witkowska (1999, p. 307) presented in table 1.

Following this classification, the exported goods have been grouped along the factor-intensities into: resource-intensive, labour-intensive, capital-intensive, technology-intensive easy to imitate and technology-intensive difficult to imitate. We label the resource-intensive and labour-intensive products as the least technologically advanced (in our paper they are also referred to as "less technologically advanced"). The other groups are being considered as technologically advanced, with the most advanced products being these technology-intensive difficult to imitate products.

The 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. In order to evaluate how 8 out of 10 states from our sample (EU-10) responded to the EU accession, we have added the year 2004, comparing the data with those of 2000. 2004 in this context means the "year of accession", since the NMS 10 states Bulgaria and Rumania only joined the EU in 2007.

To be able to analyse the effects of global trade collapse during the recent economic and financial crisis (Czarny & Śledziewska, 2012, pp. 20–38), relevant data from 2009 served as the foundation for analysis of the next sub-period. The following analysis of changes in the years 2009-2014 show the exports structures' recovery after the crisis.

Germany is set as a benchmark due to its superior position in the EU economy as a result of its stability and high level of development. We therefore expect that its comparative advantages are concentrated on high-tech products. Furthermore, Germany has been the world's largest exporter for years (now rivalling for the leading position with China), what confirms strong competitive position of its economy even in global terms.

4. Starting point of the analysis: Year 2000

As expected, in the year 2000, which marks the beginning of the analysed period, Germany had a different specialization structure than the EU-10 group. At this moment (as in all the following analysed years) the highest German RCA was recorded in the area of capital-intensive goods (RCA = 1,43 – see Figure 1). The second category, in which Germany had strong comparative advantage, were technology-intensive difficult to imitate goods (RCA = 1,22). Thus, German advantages were concentrated in the exports of two out of three commodity groups at the highest level of technological advancement.

Except for Hungary, all EU-10 countries had comparative advantages in exports of labour-intensive goods (the highest: Romania with RCA = 2,35, the lowest: Slovakia with RCA = 1,35). Hence, as many as 90% of the NMS-10 showed comparative advantage in the exports of labour-intensive goods, which after Wysokińska, Witkowska (1999, p. 307) were categorised as less technologically advanced. In addition, the Baltic states and Bulgaria recorded comparative advantage in the exports of resource-intensive goods (Figure 1).
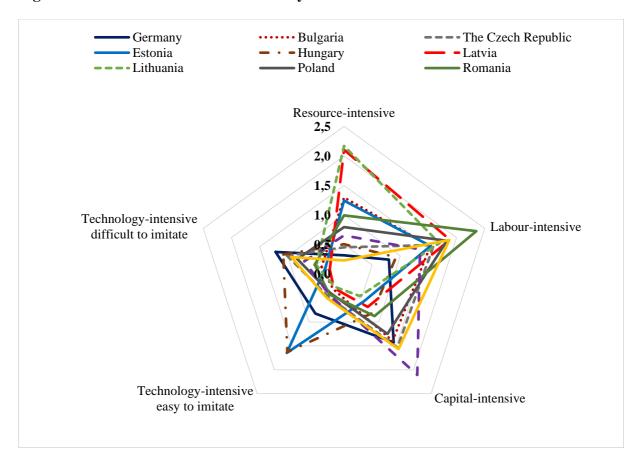
Figure 1. RCA of the EU-10 and Germany in 2000

Source: own analysis based on UN COMTRADE data, access: January 2017

As far as high-tech industries are concerned, Slovakia, Slovenia, the Czech Republic, Bulgaria, and Poland had comparative advantages in exporting capital-intensive goods, while Estonia and Hungary specialized in technology-intensive easy to imitate goods. Additionally, Hungary and the Czech Republic recorded comparative advantages in exporting technology-intensive difficult to imitate products (Czech Republic's advantage was however marginal with RCA = 1,01). Thus, RCA > 1 in the exports of capital-intensive goods has been displayed by 5 out of 10 NMS. Amongst them there were three states (Slovakia, Slovenia, and the Czech Republic), which had a greater advantage in this export category than Germany. Specialization in exports of technology-intensive easy to imitate goods has been represented by two countries (20% of EU-10). It is worth noting that while the comparative advantages in exporting technology-intensive easy to imitate goods were quite high (RCA = 1,65 for Estonia and RCA = 1,63 for Hungary), specialization in exports of goods difficult to imitate was significantly lower. At the same time Hungary was the only country in the EU-10 group, which did not specialize in exporting

either group of less technologically advanced (labour- and resource-intensive) or capital-intensive goods. Instead, Hungary had comparative advantage in both groups of technology-intensive goods (easy and difficult to imitate).

Before their accession to the EU, all the NMS-10 group members could therefore be considered as catching-up economies, considerably less developed than Germany. However, among this group one can point out the leaders and the states lagging behind. The first group was composed by Hungary, the Czech Republic and Estonia, whereas the latter by Lithuania, Latvia, and Romania, which had comparative advantages only in the exports of labour- and resource-intensive goods, thus these relatively unprocessed and at the low level of technological advancement - that are usually the specialization domain of developing countries.

5. The accession year: 2004

In 2004, eight states from our sample became members of the EU. Thus, they fulfilled the conditions of accession and made the necessary institutional adjustments. It could be expected that changes in their economies should result in modernization and convergence to the German specialization pattern. The EU-10 technological development should be reflected in the improvement of their RCA structure, when compared to the year 2000.

The analysis shows, that both the Czech Republic and Hungary had increased their comparative advantages in exports of technology-intensive difficult to imitate products (see Figure 2). Slovenia had also gained advantage in the exports of this goods category. Moreover, Hungary had increased its comparative advantage in the exports of technology-intensive easy to imitate goods.

In the exports of capital-intensive goods, five countries which recorded comparative advantages in 2000 retained it, however Poland was the only one able to increase their comparative advantage in this product category. The Czech Republic and Slovenia had clearly shifted to the higher level of exports specialization, as the Czech Republic has increased and Slovenia has gained advantage in exporting technology-intensive easy to imitate goods. Moreover, the development of Slovakia was also positive, as despite of a slight RCA decrease, it maintained the highest RCA in capital-intensive goods among all the members of the analysed group.
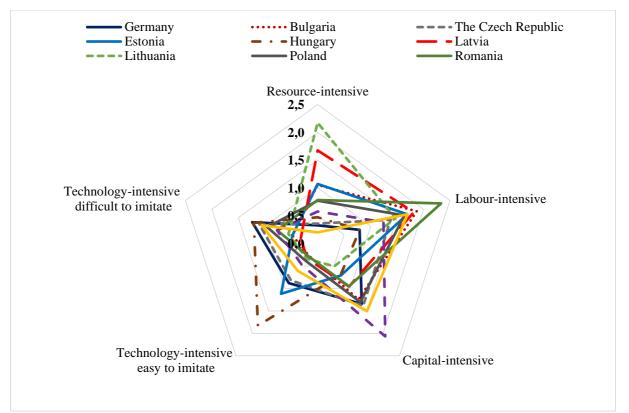
Figure 2. RCA of the EU-10 and Germany in 2004

Source: own analysis based on UN COMTRADE data, access: January 2017

The remaining NMS did not conquer foreign markets with the high-tech products. Further-more, the vast majority of them recorded decreased levels of comparative advantages in exports of less technologically advanced products, which in 2000 constituted the major strength of their export position. This indicates that the EU-accession of eight states and the accession adjust-ments of Bulgaria and Romania have not brought any technological impetus, despite the indis-putable modernization of their economies due to e.g. introduction of EU standards and the inflow of foreign capital. In 2004 most of the EU-10 countries reduced their comparative advantages in exports of goods at the lower level of technological advancement without gaining strength in the exports of more technologically advanced products.

6. Decline of the global trade: Year 2009

The year 2009 is the first in our analysis with the whole group of 10 states as Members of the European Union (until 2007 Bulgaria and Romania stayed outside). We are interested whether the EU accession significantly influenced their competitive position. Simultaneously, we are aware of the fact that it is difficult to evaluate progress in turbulent times when world trade had collapsed.

As shown in Figure 3, the economic crisis did not harm German exports, with its economy in 2009 able to maintain their comparative advantages in both key export categories (capital-intensive and technology-intensive difficult to imitate goods). In addition, its RCA had increased in the exports of technology-intensive difficult to imitate goods, which are being considered as the most technologically advanced (from RCA = 1,24 in 2004 to RCA = 1,3 in 2009).

EU-10 also managed to survive the crisis relatively unharmed. The Czech Republic and Hungarian RCAs have recorded decline in the category of technology-intensive difficult to imitate goods, but they still managed to maintain their comparative advantage. Slovenia's RCA index for exports of these goods has not changed either. In addition, Romania with a RCA of 1,05 emerged amongst the countries with a comparative advantage in exporting these most technologically advanced goods. In this context, the situation in Poland was troubled. In 2004 the country 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.
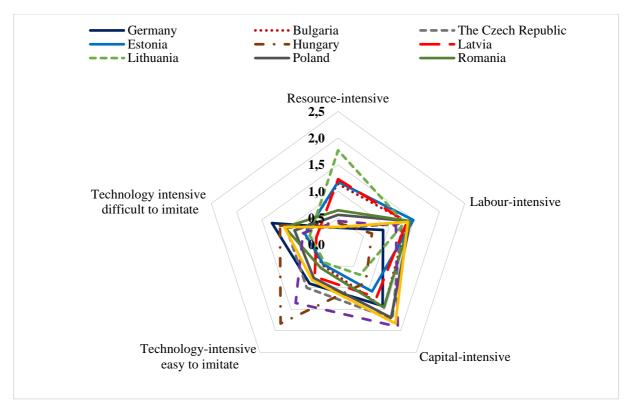
Figure 3. RCA of the EU-10 and Germany in 2009

Source: own analysis based on UN COMTRADE data, access: January 2017

In the category of technology-intensive easy to imitate goods, invariably as little as two EU-10 countries have recorded comparative advantages, but only Hungary had defended its position. While in 2004 RCA > 1 has been recorded by Estonia (RCA = 1,12), in 2009 Slovakia overtook Estonia's competitive position in this product category with the RCA equal to 1,35.

In the exports of capital-intensive goods, the situation of EU-10 looked better. The number of countries with comparative advantages has increased, as Estonia, Latvia, and Romania had been accompanied by Bulgaria, the Czech Republic, Poland, Slovakia, and Slovenia. Hence, in 2009 in the category of capital-intensive goods already 80% of EU-10 have shown comparative advantages. Especially Slovakia has improved its competitive position, as it not only maintained a strong specialization in the capital-intensive goods, but additionally gained comparative advantage in the category of technology-intensive easy to imitate goods.

The technological advancement of the EU-10 is also reflected in the analysis of their RCA in the category of labour-intensive goods. None of the countries from the group that had a comparative advantage in 2004 had lost it, however all of the analysed countries have shown a slight decrease in the RCA levels in this product category.

Despite the collapse in world trade, EU-10 not only maintained but improved their positions in exports of high-tech goods. This may be, on the one hand, evidence of progress in catching up with the strongest economies, and, on the other, the ability to profit from a relatively good price-quality ratio to maintain strong export position even in difficult times.

7. The final year of the investigation: 2014

In the last year of the analysed period, most of the comparative advantages that the EU-10 countries recorded in 2009 were maintained, but the RCA had only increased in a few cases. This means that the EU-10 discontinued in the process of catching up with Germany.

Hungary had confirmed its position as the undisputed innovation leader of the group. Firstly, its comparative advantage in exports of technology-intensive difficult to imitate products grew to reach the German level (RCA = 1,3). Secondly, for the first time, it has also obtained a comparative advantage in the exports of capital-intensive goods, combining advantages in the all three high-tech industries. The Czech Republic had a similar range of specialization (additionally with the RCA of 1,2 in exports of labour-intensive goods), however Hungary has shown higher RCA levels in the exports of the most technologically advanced goods – both easy and difficult to imitate.

In general, in the case of the Czech Republic and Slovakia a catching-up process is clearly visible. The Czech Republic is the most versatile exporter among the NMS-10, as it maintained comparative advantages in the exports of various goods: labour-intensive and capital-intensive, as well as both groups of the most technologically advanced products. 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 (EMU). This has not prevented Slovak ability to maintain comparative advantages in exports of capital-intensive and technology-intensive easy to imitate products.
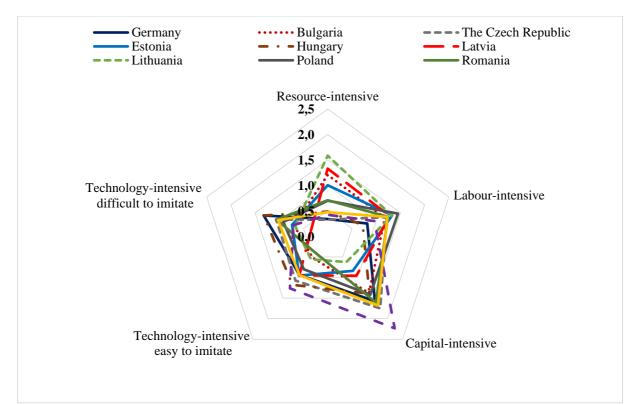
Figure 4. RCA of the EU-10 and Germany in 2014

Source: own analysis based on UN COMTRADE data, access data: January 2017

In the whole group, more countries (three in 2014 compared to two in 2009) had comparative advantages in exports of technology-intensive easy to imitate goods, and two further countries had recorded RCA levels equal or close to 1.

While benchmarking the comparative advantages recorded in 2000 and 2014, it becomes evident that countries belonging to the EU-10 group had increased their advantages in the exports of resource-, labour- and capital-intensive goods. Interestingly, even though more countries could sustain advantages in the easy to imitate category, the countries recording these advantages in 2000 had decreased them. Hungary intensified advantages in the technology-intensive difficult to imitate goods category, while other countries merely sustained their advantages. It may be concluded that the direction of development seems right, convergence is visible, and export specialization gets closer to the German pattern. However, the dynamics of the changes differ considerably among the analysed countries.

In 2014 the Czech Republic appears to be the "master of exports diversity", due to its comparative advantages in all categories except for resource-intensive goods. The Hungarian economy remains the innovation leader, maintaining comparative advantages in all three categories of the most technologically advanced products, with higher RCA levels than the ones reported for the Czech Republic. Poland looks rather pale, when benchmarked to its peers. It is even worse off than Romania, which was much weaker economically at the starting point of the analysed period. It is worth noting that the countries listed as the leaders of the EU-10 group have not yet entered the EMU. This means, that they might be confronted with difficult adjustment processes on their way to Euro. In this context, a relative competitive success of Slovakia and Slovenia becomes even more evident, as these countries have already adopted the common European currency, and continue to perform well.

8. Conclusions

The analysis has shown that prior to the EU-accession, the EU-10 countries could have been undoubtedly regarded as catching-up economies, considerably less developed than Germany. In 2000 as much as 90% of the EU-10 recorded comparative advantages in the exports of labour-intensive goods (the only exception was Hungary). However, among this group one can point out the leaders and the states lagging behind. The first group was composed by Hungary, the Czech Republic, and Estonia – the exporters of technologically advanced goods, and the latter by Lithuania, Latvia, and Romania that had comparative advantages only in the exports of labour- and resource-intensive goods, thus these relatively unprocessed and at the low level of technological advancement being usually the specialization domain of developing countries. Poland, Slovakia, and Slovenia with their comparative advantages in the exports of labour- and capital-intensive goods can be categorized as the moderate group performers, together with Bulgaria recording additionally RCA > 1 in the exports of resource-intensive goods.

The 2004 EU accession of eight countries from the sample didn't have a significant influence on their performance. In 2004 most of the EU-10 countries decreased levels of their specialization in the exports of relatively less technologically advanced goods in comparison to 2000, however without gaining advantages in the exports of more advanced products.

Despite the collapse in the world trade in 2009, the EU-10 not only maintained but even improved their position in the exports of technologically advanced goods. This may be, on the one hand, evidence of progress in catching up with the strongest economies and, on the other, the ability to profit from a relatively good price-quality ratio, particularly valuable in difficult times.

During the whole analysed period (2000-2014), the EU-10 countries have evolved towards knowledge-based economies, but not all of them with the same intensity and for the same commodity groups. The competitive position of these countries in the exports of low-tech goods (i.e. resource- and labour-intensive) has not changed. The number of countries recording advantages in these product categories remained unchanged as the advantage-holders were able to keep them.

The results of the analysis show that the exports structure of the EU-10 has been on the evolutionary path since 2000, however the timing, pace, and scale of adjustment differ greatly across the studied economies. The hypothesis that the 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 Poland having much better starting conditions. The evolution of the exports specialization of the V4 countries was on the evolutionary track until 2009 but afterwards the structure froze and no further changes could be observed.

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

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ANEX

Table A1. RCA in year 2000

2000	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
The Czech Republic	0,45	1,60	1,54	0,46	1,01
Estonia	1,24	1,54	0,57	1,65	0,33
Hungary	0,51	0,92	0,81	1,63	1,08
Latvia	2,10	1,88	0,68	0,29	0,25
Lithuania	2,17	1,70	0,46	0,27	0,49
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
Slovenia	0,23	1,87	1,57	0,50	0,94

Table A2. RCA in year 2004

2004	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
The Czech Republic	0,36	1,38	1,39	0,82	1,10
Estonia	1,07	1,70	0,71	1,12	0,48
Hungary	0,47	0,79	0,70	1,83	1,21
Latvia	1,67	1,82	0,96	0,33	0,32
Lithuania	2,17	1,47	0,51	0,34	0,55
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
Slovenia	0,20	1,70	1,51	0,61	1,06

Table A3. RCA in year 2009

2009	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
The Czech Repblic	0,32	1,25	1,73	1,00	1,02
Estonia	1,18	1,49	1,09	0,46	0,65
Hungary	0,40	0,67	0,88	1,83	1,15
Latvia	1,23	1,36	1,23	0,75	0,43
Lithuania	1,77	1,31	0,70	0,42	0,56
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
Slovenia	0,33	1,38	1,83	0,83	1,06

Table A4. RCA in year 2014

2014	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
The Czech Republic	0,33	1,21	1,75	1,08	1,06
Estonia	1,00	1,33	0,84	0,95	0,74
Hungary	0,49	0,72	1,39	1,18	1,32
Latvia	1,33	1,28	0,96	0,95	0,35
Lithuania	1,58	1,32	0,63	0,56	0,67
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
Slovenia	0,47	1,23	1,68	0,95	1,03